Towards an Optimal Theory of Reflexivization

von

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Contents

Introduction

1. General Outline

Reflexivity has been the subject of many studies, in particular since Chomsky's (1981) Binding Theory has been put forward. The main goal of this thesis is to develop a theory of binding which satisfies the following two concerns: It aims to provide an adequate account of the empirical facts and addresses moreover important conceptual considerations.

From an empirical point of view, we generally have to keep in mind two things when we deal with binding phenomena. On the one hand, there are some generalizations that seem to hold universally, but on the other hand, we also encounter a lot of crosslinguistic variation in this field. Hence, an adequate theory should be able to account for both aspects. However, one crucial observation is that – although there are general tendencies – it is often impossible to capture them with a precise formulation without producing at the same time numerous counterexamples. It is, for instance, a well-known fact that anaphors only suface if the binding relation is relatively local, and the less local the binding relation gets, the more probable it is that only pronouns are licit. However, it is by no means an easy task to determine an exact boundary. The following examples serve as an illustration: Although the locality conditions are the same in (1-a) and (1-b), English only allows pronouns in this configuration, whereas in Icelandic an anaphoric realization of the bound element is also possible. In (2), by contrast, English allows both pronominal and anaphoric binding, but German excludes pronouns in this context. (3) serves as an example where English requires an anaphoric form, whereas Frisian rules out this possibility and requires a pronoun.[1] This shows that although the general tendency is clear, we have to express it in a way that is flexible enough to capture this variation.

(1) *English vs Icelandic:*

a. John$_1$ ordered Peter to shave **him$_1$/*himself$_1$** every day.

b. Jón$_1$ skipaði Pétri$_2$ PRO$_2$ að raka **sig$_1$/hann$_1$** á hverjum
John ordered Peter to shave$_{inf}$ SE-anaphor/him on every
degi.
day

(2) *English vs German:*

a. Max$_1$ glanced behind **himself$_1$/him$_1$**.

b. Max$_1$ blickte hinter **sich$_1$/*ihn$_1$**.
Max glanced behind SE-anaphor/him

(3) *English vs Frisian:*

a. Max behaves **himself/*him**.

b. Max hâld **him/*himsels**.
Max behaves him/himself

Similarly, although we find a near-complementary distribution of anaphors and pronouns, it has often been observed that there are also examples where both elements

[1]Strictly speaking, (3) does not involve binding (cf. also chapter 2), but ideally we have a uniform theory that accounts for all occurences of anaphors and pronouns alike. (Note moreover that in local binding configurations, Frisian also uses the anaphor.)

can occur and optionality arises (cf., for instance, the English sentence in (4-a) (repeated from (2-a)) and its Dutch counterpart in (4-b), and also the Icelandic example in (1-b)). Again, we are faced with a clear tendency which is nevertheless not without exceptions.

(4) *English vs Dutch:*

a. Max_1 glanced behind $\textbf{himself}_1\textbf{/him}_1$.

b. Max_1 keek achter $\textbf{zich}_1\textbf{/hem}_1$.
Max glanced behind SE-anaphor/him

A reasonable explanation seems to be that the occurence of anaphors, pronouns, and also R-expressions is restricted by constraints that may be violated. The idea that principles are not strict rules but should be reinterpreted as soft (i.e. violable) constraints has become the fundamental principle of a theory which has been developing since the 1990s – Optimality Theory. Hence, the analysis I propose is developed within an optimality-theoretic framework.

As far as the underlying conceptual considerations are concerned, the integration of reconstruction phenomena shows that it is reasonable to adopt a derivational theory, because the contrast that arises in examples like (5) depends on the underlying binding relation that is established in the course of the derivation.

(5) *Reconstruction effects:*

a. *[Which picture of $\text{John}_1]_2$ does he_1 like t_2?

b. [Which claim that John_1 $\text{made}]_2$ did he_1 later deny t_2?

The ultimate goal of this thesis is therefore to develop a derivational approach to binding based on violable constraints.

Apart from the reconstruction data which motivate a derivational analysis empirically, derivational models are furthermore supported in view of conceptual reflections as outlined, for instance, by Epstein *et al.* (1998). They argue that "the derivational approach to structure-building, unlike a representational definition of possible structures, entails a partially-ordered sequence of Merge/Move operations" (Epstein *et al.* (1998:177)). As a result, asymmetric concepts like c-command fall out naturally in such an approach, because

> [w]e can say that C-command is simply a "reading off" of the partial order inherent to a derivational system of hierarchical structure-building; that is, the asymmetry of intercategorial relations is *equivalent* to the asymmetry of structure building. An asymmetric relation such as "X C-commands Z" is simply a restatement of the derivational property, "X was introduced into a phrase-marker after Z was introduced." Viewed this way, the derivational nature of the syntactic component is indeed an optimal system. (Epstein *et al.* (1998:177f.))

A further advantage of derivational theories is that they reduce complexity to a large extent; since the structure is not computed as a whole but step by step, information processing is much less complex. This move can be optimized if the domain accessible for computation is minimized, that is, if it is assumed that it is neither possible to look ahead to the structure that is yet to come nor to look back on the structure that has already been built earlier in the derivation. Such a local derivational approach maximally reduces complexity and is thus optimal from a conceptual point of view; however, at the same time it raises the question of how *a priori* non-local phenomena like binding can be captured within this framework. To address and answer this question will be the theoretical aim of this thesis.

2. Overview

I will proceed as follows. Chapter 1 starts with a general introduction to binding theory and presents various former accounts. In the beginning, the two central theories by Chomsky (1981) and Reinhart & Reuland (1993) are introduced and critically evaluated. In view of the derivational perspective I will adopt later on, I then turn to three former derivational approaches to binding – Hornstein (2001), Kayne (2002), and Zwart (2002) – which are similar in that they all assume a movement-based account of binding. Since a central assumption in this thesis is that the constraints that regulate binding are violable, I conclude the first chapter with a brief summary of various former competition-based approaches to binding which include Fanselow (1991), Burzio (1989, 1991, 1996, 1998), Wilson (2001), Menuzzi (1999), and Newson (1997).

As argued in chapter 1, the standard Binding Theory based on Chomsky (1981) cannot account for phenomena like long distance anaphors, the difference between different types of anaphors, data where anaphors and pronouns are not in complementary distribution, or languages like Vietnamese in which R-expressions may be bound. The aim of chapter 2 is therefore to develop a theory of binding which captures these phenomena and accounts for the broad range of crosslinguistic variation. Based on a close analysis of English, German, Dutch, Italian, and Icelandic, I show that these apparent exceptions can easily be integrated into a uniform theory of binding if it is assumed that the principles that regulate binding are violable. Thus I propose an optimality-theoretic analysis that makes it possible to account for the occurrence of simple anaphors, complex anaphors, pronouns, and R-expressions in a uniform and straightforward way. A central assumption is that the crucial constraints are ordered in two universal constraint subhierarchies and that their different interaction is responsible for the variation we find. One of these hierarchies takes into account that binding is sensitive to domains of different size, the other one prohibits elements of different anaphoric degree. While the second hierarchy is ordered in such a way that it generally prefers less anaphoric elements, the first one penalizes binding of non-maximally anaphoric elements in the respective domain. Since the underlying idea is that those constraints that refer to smaller domains are universally higher ranked than those that refer to bigger domains, binding of non-maximally anaphoric elements (e.g. pronouns) becomes worse the smaller the relevant domain is. Technically, the analysis works as follows: On the basis of these two constraint hierarchies, the competition selects the optimal bindee/element in a given context.

Since it is assumed that there are basically only two groups of constraints that are relevant for binding and that these constraints are ordered in two universal hierarchies, the system is both flexible and restrictive. It is flexible insofar as the potential extension of each hierarchy makes it possible to get as fine-grained a net of constraints as necessary; on the other hand, it is quite restrictive since crosslinguistic variation is restricted to the interaction of the two underlying hierarchies, whose constraints are universally ordered in a fixed and invariable way.

However, one set of data remains unexplained, namely reconstruction effects (cf. (5)). Chapter 3 is therefore dedicated to this particular phenomenon and investigates syntactic reconstruction. The chapter starts with an overview of various former proposals which are based on the central assumption that the argument-adjunct distinction plays a crucial role in determininig whether a reconstruction sentence is grammatical or not. The argument-adjunct approach has first been put forward by Lebeaux (1988) and Freidin (1986). After introducing their basic concepts (as outlined in Lebeaux (1988, 1991, 2000) and Freidin (1986, 1994), respectively), I discuss Chomsky's (1993, 1995), Fox's (1999, 2000), Epstein *et al.*'s (1998), and Chomsky's (2001a) elaborations, before I address the question of how arguments and adjuncts can be distinguished in general. Against this background, I provide counterevidence against the argument-adjunct approach and finally develop an alternative analysis: It is an optimality-theoretic account of the relation between pronouns and R-expressions which offers a new way of analyzing apparent Principle C effects in reconstruction contexts. The basic assumption is that the relevant binding principles are violable constraints that are checked in local optimization procedures after the completion of each phrase. It is argued that these reconstruction effects can be dealt with in syntax in the course of the derivation. As a result, ungrammatical structures are ruled out immediately during the derivation, and reconstruction in the traditional sense is a superfluous mechanism.

However, the analyses developed in chapter 2 and chapter 3 are not yet compatible. The binding theory outlined in chapter 2 relies on global optimization, whereas the approach developed in chapter 3 is a derivational analysis which involves serial local optimization. The aim of the two remaining chapters is therefore to reconcile these two approaches.

In chapter 4, I bring the binding theory developed in chapter 2 into line with a derivational theory. The goals of this chapter can thus be formulated as follows. On the one hand, I address the question of whether it is possible to integrate binding into a local derivational syntactic approach and explore the theoretical consequences of such an enterprise. On the other hand, I focus again on crosslinguistic variation and try to make sure that the analysis is not weaker from an empirical point of view than the one put forward in chapter 2. The new theory is based on the following assumptions: (i) Binding corresponds to feature checking between binder and bindee (=: x). (ii) The concrete realization of x is determined in the course of the derivation in an optimality-theoretic competition. In the beginning, x is equipped with a realization matrix which contains its possible realizations (anaphoric or pronominal specifications). (iii) After the completion of each phrase, optimization takes place and might restrict x's realization matrix depending on the respective language and the domain that has been reached. As a result, anaphoric specifications might be deleted. (iv) When checking takes place, the optimal realization matrix of x is mapped to PF, where the concrete realization of x is finally determined in a post-syntactic process.

In chapter 5, I come back to the issue of reconstruction and reanalyse the data discussed in chapter 3 according to the theory developed in chapter 4. The main difference between this analysis and the one proposed in chapter 3 concerns the status of the bound element and thus the candidate set. In chapter 3, it is assumed that the form of the bound element is determined from the beginning and cannot be changed; hence, what might change in the course of the derivation is not the form of the bound element but the index of the antecedent, and thus it is the interpretation of the sentence that is optimized. In chapter 5, by contrast, it is the form of the bound element which is optimized, hence, the competing candidates do not differ with respect to interpretation but with respect to the realization of the bindee. Strictly speaking, it is not yet the concrete form as such that is subject to optimization, but the realization matrix that has been introduced in chapter 4. As a result, the optimal realization form is not assigned in narrow syntax but at PF. This detail is crucial for the account of reconstruction effects proposed in chapter 5, according to which sentences like (5-b) (*Which claim that John*$_1$ *made did he*$_1$ *later deny?*) are the result of optimal linearization at PF. The underlying idea is the following: In the syntactic component, the realization matrix which finally selects a pronominal realization for the bound element is optimal. However, at PF, it turns out that the pronoun would linearly precede its antecedent (an R-expression), and on the assumption that it is preferable if R-expressions linearly precede coindexed pronouns, the realization forms are exchanged, informally speaking. Technically, this process does not really correspond to an exchange of the lexical items; instead, an operation is involved which simply shifts one feature from the linearly preceding item to the other one (*Feature Shift*), and as a result, after Vocabulary Insertion has taken place, the bindee is realized as R-expression and the antecedent as pronoun.

Finally, following chapter 5, a short conclusion is drawn.

Chapter 1

Binding Theories

1. Introduction

Imagine someone tells you "John fell out of the window!" Depending on the situation, this person could as well have said "He fell out of the window!" and you would have interpreted it in exactly the same way as the first sentence, namely that John fell out of the window – maybe, because you have desperately tried to find John for hours and outside under the window is the only place where you have not looked for him, or since John is such a walking disaster that something like this could only happen to him.

This example shows two things: First, an expression like *John* and the pronoun *he* can have the same reference. Moreover, it illustrates that these two NPs can occur in the same syntactic position.

(1) a. John fell out of the window.
    b. He fell out of the window.

However, this observation only holds in one direction, as the contrasts in (2) indicate.[1] Although the pronoun *he* can always replace the full NP *John* (cf. (2-a)

[1] In the following, coindexing indicates that two NPs refer to the same entity. Note moreover

vs (2-b)), the distribution of a full NP seems to be more restricted; in (2-c), for example, the NP *John* cannot replace the embedded subject pronoun.

(2) a. John_1 is convinced that he_1 opened the window carefully.
b. He_1 is convinced that he_1 opened the window carefully.
c. *He_1 is convinced that John_1 opened the window carefully.

Moreover, if we want to express that John hurt himself when falling out of the window, we have to express it in exactly this way. Neither can the anaphor *himself* be replaced with the full NP *John* (cf. (3-b)) nor with the pronoun *him* (cf. (3-c)).

(3) a. John_1 hurt himself_1 when falling out of the window.
b. *John_1 hurt John_1 when falling out of the window.
c. *John_1 hurt him_1 when falling out of the window.

However, the occurrence of the anaphor is also restricted. For example, in sentences like the following it is excluded.

(4) a. *His_1 colleagues laughed at himself_1.
b. *Himself/*heself fell out of the window.
c. *John_1 is convinced that someone pushed himself_1 out of the window.

The conclusion that can be drawn is that, depending on their syntactic distribution, three different kinds of NPs can be distinguished: referential NPs or R-expressions (like *John, the man with the red nose, Chomsky's latest article, ...*), pronouns (like *he, him, her, ...*), and anaphors, which comprise reflexives (like *himself, themselves, ...*) and reciprocals (like *each other*).[2] The question that remains open is how the

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that I adapt the NP terminology (instead of DPs) from Chomsky (1981) for the sake of convenience (cf. also the subsequent sections).

[2]However, the analysis of reciprocals will be neglected; thus, the notion anaphor will basically refer to reflexives. Note moreover that although reciprocals and reflexives seem to have a very

distribution of these elements looks like and how it can be accounted for. The module of grammar that investigates these issues is called Binding Theory.

The remaining chapter is organized as follows. First, two very influential approaches to binding are introduced and critically evaluated – in section 2., Chomsky's (1981) Binding Theory is presented, and in section 3., Reinhart & Reuland's (1991, 1993) theory of reflexivization is discussed. In section 4., three more recent approaches to binding are introduced which are developed within a derivational framework – Hornstein (2001), Kayne (2002), and Zwart (2002). Finally, section 6. concludes the chapter with a brief discussion of some former competition-based approches to binding, which include Fanselow's (1991) blocking theory, Burzio's (1989,

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similar distribution (cf. (i) *vs* (3-a), (4-a), (4-b), (4-c)), it is not really identical (cf., for example, (ii) and (iii)).

(i) a. [John and Peter]$_1$ hurt each other$_1$.
b. *Their$_1$ colleagues laughed at each other$_1$.
c. *Each other fell out of the window.
d. *[John and Peter]$_1$ are convinced that someone pushed each other$_1$ out of the window.

(ii) a. It would please [the boys]$_1$ very much for each other$_1$ to win.
b. ??It would please John$_1$ very much for himself$_1$ to win.

(cf. Lebeaux (1983:723))

(iii) *Long distance binding across an infinitival clause in Russian:*

a. My poprosili ix [PRO nalit' drug drug-u čajku].
we$_{nom}$ asked them$_{acc}$ to-pour each other$_{dat}$ tea$_{acc}$
'We$_1$ asked them$_2$ [PRO$_2$ to pour each other$_{*1/2}$ tea].'

b. On ne razrešaet mne [PRO proizvodit' opyty nad soboj].
he$_{nom}$ not permit me$_{dat}$ to-perform experiments$_{acc}$ on self$_{inst}$
'He$_1$ does not allow me$_2$ [PRO$_2$ to perform experiments on himself$_1$/myself$_2$].'

(cf. Rappaport (1986:104))

1991, 1996, 1998) Referential Economy account, Wilson's (2001) optimality-theoretic interpretation of the latter, Menuzzi's (1999) cumulative approach, and Newson's (1997) theory of pronoun chains, which is also couched within Optimality Theory and heavily relies on Reinhart & Reuland's theory of reflexivity.

2. Chomskyan Binding Theory

Before turning to Chomsky's original approach from 1981 in section 2.2., let us first take a more informal look at the distributional differences between anaphors, pronouns, and R-expressions. The reason for this proceeding is that it might be easier to get a grasp of the basic ideas underlying Chomskyan Binding Theory (henceforth also referred to as standard Binding Theory) if the whole bunch of definitions entailed in the original work is ignored for the time being.

2.1. An Informal Approach

The sentences in (3-a) and (4), repeated here in example (5), allow us to draw first conclusions about the behaviour of anaphors. Obviously, (5-a) is the only sentence that provides a configuration in which anaphors are grammatical. Thus the question arises as to what the decisive difference between (5-a) and the remaining sentences is.

(5) a. John_1 hurt himself_1 when falling out of the window.
b. *His_1 colleagues laughed at himself_1.
c. *Himself/*heself fell out of the window.
d. *John_1 is convinced that someone pushed himself_1 out of the window.

At first sight, the most striking characteristic of (5-a) is that it contains an antecedent for the anaphor *himself*, namely *John*. On this antecedent the anaphor depends for its interpretation, thus it must agree with it with regard to person, number, and gender. If we assume that the presence of this antecedent is obligatory, we can account for the ungrammaticality of sentence (5-c), which does not contain an antecedent for the anaphor.

However, as (5-b) and (5-d) show, this restriction alone does not suffice to account for the distribution of anaphors. As far as (5-b) is concerned, it differs from (5-a) with respect to the syntactic configuration that holds between the antecedent and the anaphor. According to the definition in (6), *John* c-commands the anaphor in (5-a) (cf. (7-a)), whereas in (5-b), the antecedent *his* does not c-command *himself*, as (7-b) illustrates.[3]

(6) *C-command (following Reinhart (1976)):*
X c-commands Y iff the first branching node dominating X dominates Y, X does not dominate Y, and X≠Y.

(7) a. [$_{\mathbf{TP}}$ [$_{\mathrm{NP}}$ John$_1$] [$_{\mathrm{T'}}$ [$_{\mathrm{vP}}$ hurt [$_{\mathrm{VP}}$ [$_{\mathrm{NP}}$ himself$_1$]]]]]
b. [$_{\mathrm{TP}}$ [$_{\mathbf{NP}}$ [His$_1$] colleagues] [$_{\mathrm{T'}}$ [$_{\mathrm{vP}}$ laughed [$_{\mathrm{VP}}$ at [$_{\mathrm{NP}}$ himself$_1$]]]]]

Based on the observation that c-command plays such a crucial role, the notion of syntactic binding was introduced and defined as follows.

(8) *Syntactic binding:*
X binds Y iff X c-commands Y and X and Y are coindexed.

Thus we can say that there are grounds for the assumption that anaphors must be bound. However, example (5-d) (**John$_1$ is convinced that someone pushed himself$_1$ out of the window*) shows that binding as such is not a sufficient restriction on the occurrence of anaphors: In (5-d), *himself* is bound by *John*, but still the sentence is ungrammatical. Hence, the following question remains open: In what respect does (5-d) differ from (5-a)? The most obvious answer is that the distance between the

[3]The relevant branching nodes are boldfaced. Note moreover that it is irrelevant whether the DP-hypothesis is assumed or not (cf. also footnote 1).

antecedent and the anaphor is much smaller in the latter example. Informally it can thus be concluded that the distribution of anaphors is regulated as follows:

(9) Anaphors must be bound in a relatively local domain.

Before specifying this domain more exactly, let us first take a look at the distribution of pronouns and consider the examples in (10) ((10-a) and (10-c) are repeated from (3-c) and (1-b), respectively).

(10) a. *John$_1$ hurt him$_1$ when falling out of the window.
   b. His$_1$ colleagues laughed at him$_1$.
   c. He fell out of the window.
   d. John$_1$ is convinced that someone pushed him$_1$ out of the window.

Here, only the first sentence is ungrammatical, in which the pronoun and its antecedent establish a relatively local binding relation. By contrast, the pronoun is licit in (10-b) and (10-c), where no binding takes place at all, and in (10-d), in which the pronoun is bound, but not as locally as in (10-a). If this situation is compared with the sentences in (5), it can be concluded that anaphors and pronouns are in complementary distribution – at least as far as the syntactic environment given in (5) and (10) is concerned. Hence, the distribution of pronouns may roughly be described as follows:

(11) Pronouns must not be locally bound. (The relevant domain is the same as the one in (9).)

Finally, let us consider the distribution of R-expressions. As (12-a) (repeated from (3-b)) and (12-d) show, R-expressions are generally ruled out if it they are bound, no matter how local the binding relation is. On the other hand, *John* may occur in (12-b) and (12-c) (repeated from (1-a)), where the R-expression is not bound at all. Hence, it can be assumed that the distribution of R-expressions is restricted by the principle in (13).

(12) a. *John$_1$ hurt John$_1$ when falling out of the window.
b. His$_1$ colleagues laughed at John$_1$.
c. John fell out of the window.
d. *John$_1$ is convinced that someone pushed John$_1$ out of the window.

(13) R-expressions must not be bound at all.

2.2. Chomsky (1981)

2.2.1. Government

Let us now turn to the more formal terminology that is used in Chomsky (1981) to capture these observations. The aim of this work was basically to overcome (at least some of) the technical and conceptual problems the theory of binding proposed in Chomsky's (1980) article "On Binding" had brought up (cf. Chomsky (1981), section 3.3.1.).[4]

One of the conceptual problems concerned certain redundancies between this theory and other modules of the grammar. For example, Chomsky observes that both

[4]The two central principles in Chomsky (1980) are the *Opacity Condition* and the *Nominative Island Condition*. The Opacity Condition subsumes the *Specified Subject Condition* and the *Propositional Island* (or *Tensed-S*) *Condition*, which were already proposed in Chomsky (1973).

(i) *Opacity Condition:*
$\ldots [_{\beta} \ldots \alpha \ldots] \ldots$
a. If α is an anaphor in the domain of the tense or the subject of β, β minimal, then α cannot be free in β, β =NP or S$'$.
b. α is in the domain of β if β c-commands α, where β is said to c-command α if β does not contain α (and therefore $\beta \neq \alpha$) and α is dominated by the first branching category dominating β.
c. β is minimal if it is the least (smallest) such domain: if γ has tense or subject and α is in γ, then β is in γ. (cf. Chomsky (1980:10))

Case and Binding Theory single out one particular NP position in a clause, namely the subject position of an infinitive; however, the two theories provide seemingly unrelated reasons for this fact.

> Consider the three basic positions for NP in S: nominative subject of Tense, subject of an infinitive, complement of a verb. The theory of Case singles out the subject of an infinitive as the one position that is not marked for Case. The theory of binding independently selects this position as the single transparent domain.
> (Chomsky (1981:157))

In order to express the close relation between these two modules of grammar, Chomsky (1981) therefore proposes that not only Case but also Binding Theory should be based on the central notion of government, which he defines as follows.

(14) $[_\beta \ldots \gamma \ldots \alpha \ldots \gamma \ldots]$, where

a. $\alpha = X^0$,

b. where ϕ is a maximal projection, if ϕ dominates γ then ϕ dominates α,

c. α is an immediate constituent of β. (cf. Chomsky (1981:163))

(15) α governs γ in (14). (cf. Chomsky (1981:164))

Let us first take a closer look at the configuration described in (14). First of all, as far as the double occurrence of γ in the underlying structure in (14) and later modifications of the definition is concerned, it means that γ may either occur to the right or to the left of α. Furthermore, (14-a) constrains the set of potential governors to heads, and (14-b) and (14-c) make sure that no maximal projection ϕ intervenes between a governor α and its governee γ unless this maximal projection dominates

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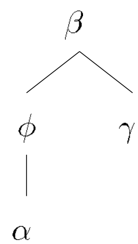
(ii) *Nominative Island Condition (NIC):*

A nominative anaphor cannot be free in S′. (cf. Chomsky (1980:36))

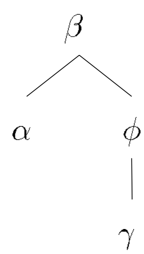
(The notion anaphor refers here to PRO, trace, and reciprocals; lexical NPs are not anaphors (cf. Chomsky (1980:10)).)

both, α and γ (cf. the following illustration). In fact, (14-c) requires even more: In (16), ϕ generally blocks the government relation between α and γ, no matter whether ϕ is a maximal projection or not.

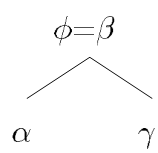
(16) *Here, (14-b) is vacously satisfied, but (14-c) is not fulfilled, independently of the categorial status of ϕ:*



(17) *Here, the requirement in (14-c) is satisfied, but (14-b) is violated if ϕ is a maximal projection:*



(18) *This structure satisfies (14), i.e., α governs γ in this configuration:*

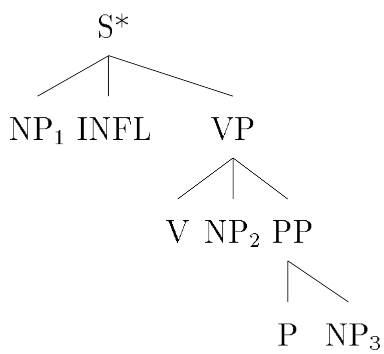


As a concrete example, consider the configurations in the following phrase markers, which have been assumed in the early 1980s for sentences like *they pointed the guns at each other* and *we believed John to be more intelligent*, respectively (cf. Chomsky (1981:153f.)). According to (14-a), V, P, N_1, N_2, and N_3 qualify as potential governors. Moreover, Chomsky argues that AGR, which is contained in INFL (at least if it is marked [+Tense]) "is a lexical category (N) and thus a proper choice for α

in [(14)]" (Chomsky (1981:164)). In fact, in this case Chomsky considers INFL itself as a potential governor, and hence INFL might also be a governor in (19). Taking into account (14-c), N_1, N_2, and N_3 must be excluded from the set of governors, since their immediate constituent, NP_i, is a non-branching node and thus does not dominate any element that could correspond to γ.

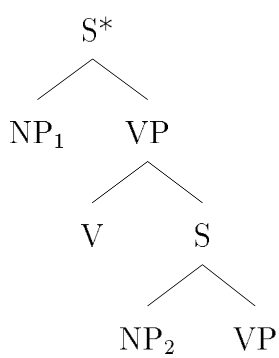
Thus, we are left with V, P, and INFL, and following the definitions in (14) and (15), we can conclude that in (19) INFL governs NP_1 and VP, V governs NP_2 and PP, and P governs NP_3.

(19)



In (19), the government relation could exclusively be observed between sister nodes; that this need not necessarily be the case is illustrated in (20), where NP_2 is governed by V.

(20)



Then, Chomsky introduces an alternative definition of government, originally proposed by D. Sportiche and Y. Aoun, as he points out, according to which a head can also govern its specifier. This new definition (given in (21)) differs from (14) insofar as (14-b) and (14-c) are replaced by the single requirement in (21-b).

(21) $[_\beta \ldots \gamma \ldots \alpha \ldots \gamma \ldots]$, where

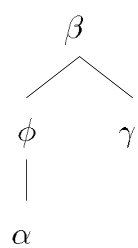
a. $\alpha = X^0$,

b. where ϕ is a maximal projection, ϕ dominates α iff ϕ dominates γ.

(cf. Chomsky (1981:164))

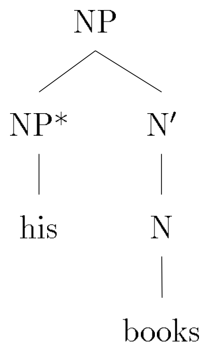
As far as the configurations in (17) and (18) are concerned, the two definitions cannot be distinguished; however, structure (16), repeated here as (22), is evaluated differently. According to (14-c), α cannot govern γ in this configuration; according to (21-b) it depends on whether ϕ is a maximal projection or not. If so, the government relation is blocked, but otherwise, a government relation is established.

(22) *If ϕ is a maximal projection, (21-b) is not fulfilled:*

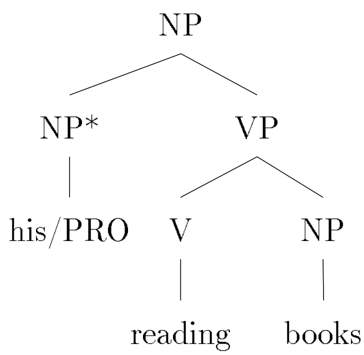


With respect to (19) and (20), there is no empirical difference; however, the following example shows that the modification does have empirical consequences (cf. Chomsky (1981:165)). While the definition in (14) predicts that N does not govern NP* in (23) (here: ϕ = N′), a government relation holds under the definition in (21). On the latter assumption, Chomsky argues, it can be explained why *his* cannot be replaced with PRO in sentences like *I like [$_{NP}$ his/*PRO book]*, whereas this is possible in gerunds (cf. *I like [$_{NP}$ his/PRO reading books]*). This difference can be derived as follows. Since PRO must be ungoverned (cf. Chomsky (1981:60; 191)), definition (21) correctly predicts that PRO must be excluded in structure (23). In (24), the structure assumed for the gerund, PRO is not governed since VP (= ϕ) intervenes between NP* and the only potential governor V. Hence, no government relation is established, and the occurrence of PRO is predicted to be grammatical.

(23)



(24)



Finally, Chomsky introduces a third possibility how to define the notion of government which is based on an extended definition of c-command (cf. (25) and (26)).

(25) $[_\beta \ldots \gamma \ldots \alpha \ldots \gamma \ldots]$, where

a. $\alpha = X^0$,

b. where ϕ is a maximal projection, if ϕ dominates γ then ϕ dominates α,

c. α c-commands γ. (cf. Chomsky (1981:165))

(26) α *c-commands* γ iff

a. α does not contain γ

b. Suppose that $\delta_1, \ldots, \delta_n$ is the maximal sequence such that

(a) $\delta_n = \alpha$

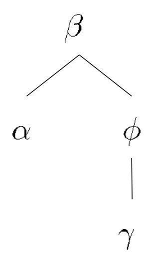
(b) $\delta_i = \alpha^j$

(c) δ_i immediately dominates δ_{i+1}

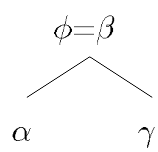
Then if ε dominates α, then either (I) ε dominates γ or (II) $\varepsilon{=}\delta_{\,i}$ and $\delta_{\,1}$ dominates γ. (cf. Chomsky (1981:166))

The formulation in (25) resembles that in (14), because the (a)- and (b)-part are identical. However, (14-c) is replaced with the c-command requirement. As a consequence, the configurations in (17) and (18) (repeated here as (27) and (28)) are evaluated in the same way as under the two previous definitions: α governs γ in (28), but not in (27).

(27) *Here, requirement (25-b) is violated; (25-c) is satisfied following the definition in (26) (with $\varepsilon{=}\beta$, (26-b) (c-I) is fulfilled):*

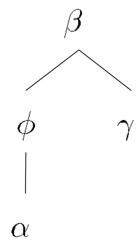


(28) *This structure satisfies both, (25-b) and (25-c) (with $\varepsilon{=}\beta$, (26-b) (c-I) is again fulfilled):*



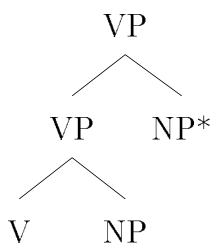
However, as far as the structure in (16)/(21) is concerned, repeated here as (29), the new definition differs again from the previous ones. According to (14-c), this structure generally blocks a government relation between α and γ; following (21-b), it is only blocked if ϕ is a maximal projection; and (25-b) predicts that α governs γ as long as ϕ and β are projections of α. Thus, a government relation can even be established if ϕ is a maximal projection.

(29) *If ϕ and β are projections of α, (25-c) is satisfied (with ε=β, (26-b) (c-I) is fulfilled, with ε=ϕ, (26-b) (c-II) is fulfilled):*



Hence, the new definition is even more liberal than the one in (21), which means that it allows government relations in even more configurations than (21). With respect to the examples considered so far, there is no difference, but the following structure constitutes an example in which only definition (25) predicts a government relation, namely that V governs NP*.

(30)



As Chomsky shows, it is not an easy task to decide which definition of government might be the best one, since what seems reasonable in one case might raise problems in other cases. I will not discuss the pros and cons of the various definitions of government (cf. Chomsky (1981) for this purpose); what I intend to do in this section is just give a short overview of the main proposals that have been made in Chomsky (1981) and thereby show that there is no unified definition of government. However, what can be extracted from the previous discussion is some "general character" of the notion of government, and this should be enough to go on and finally take a closer look at the basics of Chomsky's (1981) Binding Theory.

2.2.2. The Binding Principles

Basically, there are two notions of binding. First, binding can refer to the relation between anaphors/pronouns and their antecedents, and second, operators may bind variables, which means that there is also a logical notion of binding. One way to distinguish between these two types of binding is to look at the position occupied by the binder, since binders of the first type are generally located in A-positions, whereas binders of the second type are located in A′-positions. Thus, we can refer to the two notions of binding as A- *vs* A′-binding and introduce the following definition, where $X \in \{A, A'\}$.

(31) a. α is X-bound by β iff α and β are coindexed, β c-commands α, and β is in an X-position.

b. α is X-free iff it is not X-bound. (cf. Chomsky (1981:185))

In the following, this explicit distinction between A- and A′-binding will be neglected for the sake of convenience, and binding is generally to be understood as A-binding since this is what Binding Theory is concerned with.

As mentioned before, the underlying idea in Chomsky (1981) is to relate Case and Binding Theory by basing both on the notion of government. Hence, Chomsky introduces the notion of governing category (cf. (32)) and proposes the Binding Principles in (33), which are referred to as Principle A, B, and C respectively.[5]

(32) β is the governing category for α iff β is the minimal category containing α and a governor of α, where β =NP or S. (cf. Chomsky (1981:188))

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[5]At the beginning, Chomsky assumes that the Binding Principles apply at LF (cf. Chomsky (1981:188; 194)); however, in the course of the discussion he finally proposes that the level of application should rather be S-Structure (cf. Chomsky (1981:196ff.; fn. 34)). This is mainly motivated by reconstruction sentences, which will be discussed in more detail in chapter 3 and 5 (cf. in particular section 3. in chapter 3).

(33) *Binding Theory:*

Let β be a governing category for α.

(A) If α is an anaphor, it is bound in β.

(B) If α is a pronominal, it is free in β.

(C) If α is an R-expression, it is free. (cf. Chomsky (1981:188; 225))

Let us now consider which predictions these principles make with regard to the examples from section 2.1. In (5-a), (10-a), and (12-a), repeated in (34), the bound element (= α) is in the object position and the subject is the antecedent.

(34) [$_{S^*}$ John$_1$ [$_{VP}$ hurt himself$_1$/*him$_1$/*John$_1$ when falling out of the window]]

As the analysis of the structure in (19) showed, the matrix verb governs α in this configuration, and hence the governing category for α is the matrix clause, S*. Obviously, S* also comprises the subject, thus α is bound in its governing category. This means that Principle A is fulfilled, whereas Principle B and Principle C are violated. Hence, (34) is only grammatical if α is realized as an anaphor.

As far as the examples (5-b), (10-b), and (12-b) (repeated in (35)) are concerned, P is a governor for the object NP (cf. also structure (19)), and hence S* corresponds to the governing category for α.

(35) [$_{S^*}$ His$_1$ colleagues [$_{VP}$ laughed [$_{PP}$ at *himself$_1$/him$_1$/John$_1$]]]

However, since the c-command requirement is not fulfilled, the coindexed possessive pronoun does not bind α; hence, Principle A is violated, whereas Principle B and C are fulfilled. Consequently, only the anaphor is ungrammatical in example (35).

Since INFL governs the subject position in structures like (19), the governing category for the subject NP in (5-c), (10-c), and (12-c) (repeated in (36)) is again S*. However, the subject NP in these examples is not bound at all, thus Principle A rules out the anaphor in (36) (independent of Case), whereas the pronoun and the R-expression are correctly predicted to be grammatical.

(36) $[_{S^*}$ *Himself/He/John fell out of the window]

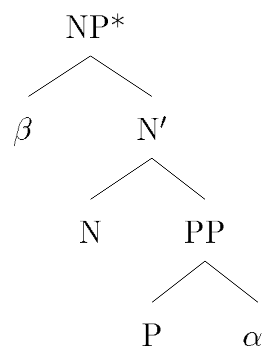
In (5-d), (10-d), and (12-d) (repeated in (37)), the embedded verb serves as a governor for α; its governing category is therefore the embedded S.

(37) $[_{S^*}$ John$_1$ is convinced $[_{S'}$ that $[_{S}$ someone $[_{VP}$ pushed *himself$_1$/him$_1$/ *John$_1$ out of the window]]]]

Thus, anaphors are ruled out by Principle A, since binding takes place outside the governing category, whereas pronouns satisfy Principle B. Moreover, R-expressions violate Principle C, which is independent of the notion of governing category.

As a result, it can be concluded that Chomsky's Binding Principles in (33) make the correct predictions with respect to the examples introduced in section 1. and 2.1. However, it should be pointed out that Chomsky proposes some further refinements as far as the notion of governing category is concerned. The problematic data involve arguments within NPs (cf. (38) as regards the underlying structure).

(38)



Chomsky observes that the Binding Theory proposed so far does not give the right results for sentences like (39-a) and (39-b). According to the definition in (32), NP* is the governing category for the reciprocal, since P serves as a governor for α. Accordingly, α is not bound within its governing category, and hence we should expect Principle A to rule out the reciprocals in (39). However, the two sentences are not that bad, in contrast to the examples in (40).

(39) a. We$_1$ heard [$_{NP*}$ some stories about each other$_1$].

b. We$_1$ thought that [$_{NP*}$ pictures of each other$_1$] would be on sale.

(cf. Chomsky (1981:207f.))

(40) a. *We$_1$ heard [$_{NP*}$ John's stories about each other$_1$].

b. *We$_1$ thought that [$_{NP*}$ John's pictures of each other$_1$] would be on sale.

(cf. Chomsky (1981:207f.))

Interestingly, the principles that have been assumed in earlier work make better predictions with respect to this contrast. Consider first Chomsky's (1980) *Opacity Condition* (cf. footnote 4), repeated here in (41).

(41) *Opacity Condition:*

$\ldots [_\beta \ldots \alpha \ldots] \ldots$

a. If α is an anaphor in the domain of the tense or the subject of β, β minimal, then α cannot be free in β, β =NP or S$'$.

b. α is in the domain of β if β c-commands α, where β is said to c-command α if β does not contain α (and therefore $\beta \neq \alpha$) and α is dominated by the first branching category dominating β.

c. β is minimal if it is the least (smallest) such domain: if γ has tense or subject and α is in γ, then β is in γ. (cf. Chomsky (1980:10))

As far as the examples in (40) are concerned, β =NP*, since NP* contains a subject that c-commands the reciprocal. However, α is not bound within NP*, hence the sentences are correctly predicted to be ungrammatical. In (39-a), β corresponds to the matrix clause, because NP* does not have a subject or tense, and therefore the matrix clause is the minimal category such that *each other* is in the domain of its tense/subject. Thus, the *Opacity Condition* gives again the right result, since α is bound within β. In (39-b), however, β is not the matrix clause. Here, β corresponds to the embedded clause, since the tense of embedded S′ c-commands α,[6] and hence only the embedded clause fulfils the minimality requirement from (41). According to the *Opacity Condition*, α would thus have to be bound within the embedded clause. Since this is not the case, it wrongly predicts that (39-b) should be ill-formed.

However, we do get the correct result if only one part of the *Opacity Condition* is taken into account, namely the *Specified Subject Condition*. This means that in (41) "the domain of the tense or the subject of β" must be reduced to "the domain of the subject of β". On this assumption, the analyses of (40) and (39-a) remain the same, but as far as (39-b) is concerned, the embedded clause no longer qualifies as β, since its subject does not c-command α (it rather contains α) and tense is no longer relevant. Hence, β must be the matrix clause, and the sentence fulfils the requirement that α be bound within β.

What the discussion above showed is that the crucial difference between the examples in (39) and (40) lies in the fact that only in the latter, NP* contains a subject. Based on this observations, Chomsky tries to integrate some of the old insights into the present theory by introducing the notion of SUBJECT and proposes a modification of the definition of governing category, which is given in (43).

(42) a. S $\longrightarrow$ NP INFL VP, where INFL=[[$\pm$ Tense], (AGR)]
b. AGR and the subject of an infinitive, an NP or a small clause are a SUBJECT. (cf. Chomsky (1981:209))

(43) a. AGR is coindexed with the NP it governs.
b. β is a *governing category* for α iff β is the minimal category containing α, a governor of α, and a SUBJECT accessible to α.
(cf. Chomsky (1981:211))

(44) a. $*[_\gamma \ldots \delta \ldots]$, where γ and δ bear the same index.

[6]Chomsky (1980:10) assumes the underlying structure $[_{S'}$ COMP $[_S$ NP Tense VP$]]$.

b. β is *accessible* to α iff α is in the c-command domain of β and assignment to α of the index of β would not violate (44-a).

(cf. Chomsky (1981:212))

According to these definitions, the crucial difference between sentences like (39) and (40) is that only in (40) NP* corresponds to the governing category for α, since it also contains an accessible SUBJECT, namely *John's*, subject of the NP. In (39), on the other hand, NP* does not contain a SUBJECT, and hence cannot function as governing category. Here, the governing category is the matrix clause, S*, which contains AGR as accessible SUBJECT. On these assumptions, the Binding Principles in (33) now give the correct results: In (39), where the relevant governing category is S*, Principle A is fulfilled and hence anaphors are grammatical; in (40), the governing category is NP*, and thus Principle A accounts for the ungrammaticality of the two sentences, since binding takes place outside this domain.[7]

As far as the examples in (34) (*John*$_1$ *hurt himself*$_1$/**him*$_1$/**John*$_1$ *when falling out of the window*), (35) (*His*$_1$ *colleagues laughed at *himself*$_1$/*him*$_1$/*John*$_1$), (36) (**Himself/He/John fell out of the window*), and (37) (*John*$_1$ *is convinced that someone pushed *himself*$_1$/*him*$_1$/**John*$_1$ *out of the window*) are concerned, the modified definition in (43) does not change anything. The governing categories remain the same in all cases (matrix/embedded S), since they all contain an accessible SUBJECT, namely AGR.

At this point the question might arise as to whether the notion of SUBJECT renders the notion of governor superfluous in definition (43-b). Thus, it could be

[7]The definition in (43) does not only capture the contrast between sentences like (39) and (40). It also has the positive side effect that it accounts for the question as to why governing categories are generally $\in$ {NP, S}. While this had to be stipulated in the old definition (32), it now follows from the fact that we usually find SUBJECTS in NP or S (although the new definition in principle also allows for the possibility that other categories might qualify as governing categories).

assumed that the notion of governing category is generally replaced by the binding category as defined in (45) and the Binding Principles are rephrased as in (46).

(45) β is a *binding category* for α iff β is the minimal category containing α and a SUBJECT accessible to α. (cf. Chomsky (1981:220))

(46) *Binding Theory:*
(A) An anaphor is bound in its binding category.
(B) A pronominal is free in its binding category.
(C) An R-expression is free. (cf. Chomsky (1981:220))

However, although the two definitions are empirically very similar, Chomsky points out that there seems to be one example where the former definition is superior.

(47) John_1 tried [[PRO_1 to win]] (cf. Chomsky (1981:221))

In (47), PRO is coindexed with *John*. On the assumption that PRO is ungoverned (PRO Theorem; cf. Chomsky (1981:60; 191)), there is no governing category for PRO either and (47) is not excluded by the Binding Principles in (33). However, if the definition in (45) is applied, the PRO Theorem does not play a role and the matrix clause is the binding category for PRO (with *John* as accessible SUBJECT).[8] Hence, PRO would be bound in its binding category and thereby violate Principle B as formulated in (46). Chomsky therefore argues that the Binding Principles in (33) should be maintained; note however that these findings are no longer conclusive if it is assumed that the distribution of PRO can be derived from Case Theory rather than from Binding Theory (cf., for example, the discussion in Chomsky & Lasnik (1993) and Roberts (1997:137)).

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[8]PRO itself is not an accessible SUBJECT, since it does not fulfil the c-command requirement in (44-b).

2.3. Problems

In this section, I will give a broad outline of the three main problems Chomsky's theory of binding faces. (We will come back to each aspect again in the subsequent sections and chapters.)

First, the way in which Principle A and B have been defined (cf. (33)/(46)) suggests that anaphors and pronouns generally occur in complementary distribution: An anaphor is only licit if it is bound in its binding category;[9] if it is free, it violates Principle A. A pronoun, by contrast, must be free in its binding category; if it is not, it violates Principle B. Hence, since the binding category is the same for anaphors and pronouns (cf. (45)), they cannot occur in the same environment according to this theory.[10] However, although the prediction is correct in most contexts, it is not always borne out, as the English examples in (48)-(52) illustrate.[11]

(48) Max_1 glanced behind himself_1/him_1.

(49) Max_1 saw a gun near himself_1/him_1.

(50) Max_1 saw a picture of himself_1/him_1.

(51) Max_1 likes jokes about himself_1/him_1.

(52) Max_1 counted five tourists in the room apart from himself_1/him_1.

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[9] I stick to the notion of binding category, but the argument remains the same if the binding principles are defined on the basis of governing categories.

[10] That binding/governing categories might be subject to parametrization has been proposed, *inter alia*, by Huang (1983), Manzini & Wexler (1987), and Vikner (1985).

[11] Note that although the BT-compatibility algorithm, which was introduced in Chomsky (1986b), makes it possible to predict a non-complementary distribution in certain configurations, this is not the case in the examples (48)-(52); but cf. Hestvik (1991) as far as a corresponding modification is concerned.

Further problems arise because Chomsky's Binding Theory has been developed against the background of the English language. Hence, it treats all anaphors alike (cf. Principle A) and does not take into account that a language may have different types of anaphors which differ in their distribution. The following Dutch examples serve as an illustration.

(53) Max$_1$ wast zich$_1$/zichzelf$_1$.
Max washes SE/himself
'Max$_1$ washes himself$_1$.'

(54) Max$_1$ haat zichzelf$_1$/*zich$_1$.
Max hates himself/SE
'Max$_1$ hates himself$_1$.'

(55) Max$_1$ keek achter zich$_1$/*zichzelf$_1$.
Max glanced behind SE/himself
'Max$_1$ glanced behind himself$_1$.'

Although the two anaphors *zich* and *zichzelf* can sometimes occur in the same position (cf. (53)), the sentences in (54) and (55) indicate that this is not always possible. This is unexpected if we assume that Principle A regulates the distribution of all kinds anaphors alike.

But this is not the only case where crosslinguistic considerations reveal problems of the theory. The comparison of data from different languages also shows that although the binding behaviour is similar in many respects (for instance, preference for anaphoric binding in local binding relations), it is not completely identical. This is illustrated by the following examples from English, Dutch, German, and Italian, respectively, which indicate that in the same context the different languages choose different realization forms for their bound elements.[12]

[12]Note that some Dutch native speakers prefer the weak pronoun *'m* instead of the strong

(56) a. Max_1 glanced behind himself_1/him_1.

b. Max_1 blickte hinter sich_1/??sich selbst_1/*ihn_1.

c. Max_1 keek achter zich_1/*zichzelf_1/hem_1.

d. Max_1 ha dato un'occhiata dietro di sé_1/*dietro se stesso_1/?dietro di lui_1.

Hence, the question arises as to how Binding Theory can account for the crosslinguistic variation we encounter in this field, and it will be a main goal of this thesis to answer this question.

3. Reinhart & Reuland's (1991, 1993) Theory of Reflexivity

But let us first turn to another influential approach to binding which has been developed as an alternative to the Chomskyan Binding Theory and which addresses some of its drawbacks – Reinhart & Reuland's theory of reflexivity.

3.1. The Theory

Based on Dutch examples like those in (53), (54), and (55) (*Max_1 wast zich_1/$\mathit{zichzelf}_1$; Max_1 haat $\mathit{zichzelf}_1$/*zich_1; Max_1 keek achter zich_1/*$\mathit{zichzelf}_1$*), they point out that many languages exhibit a three-way distinction as regards bound elements, which means that the simple classification into anaphors and pronouns is not sufficient. Instead, they assume that within the former group we have to distinguish between two different types of anaphors which exhibit a different binding behaviour. In Dutch, they correspond to the forms *zich vs zichzelf*, as the Dutch sentences above reveal.

Reinhart & Reuland refer to these two types of anaphors as SE (simplex expression) *vs* SELF anaphors. What these two elements have in common is that they are

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pronoun *hem* in (56-c).

referentially defective, which means that they depend on their antecedents in order to pick out a referent – a property that distinguishes them from pronouns. However, the two anaphors differ from each other in one important aspect. According to Reinhart & Reuland, only SELF anaphors can function as reflexivizers, which means that they can ensure that a coargument of theirs refers to the same thing, which makes the predicate they belong to reflexive. By contrast, SE anaphors and pronouns have no reflexivizing function. On the basis of these assumptions, Reinhart & Reuland propose to replace the Chomskyan binding principles A and B with the following conditions.[13,14]

(57) *Condition A:*

A reflexive-marked (syntactic) predicate is reflexive.

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[13]The *Condition on A-Chains* is also referred to as *Chain Condition.*

[14]The conditions are based on the definitions in (i):

(i)
- a. The *syntactic predicate* of (a head) P is P, all its syntactic arguments, and an external argument of P (subject).
- b. The *syntactic arguments* of P are the projections assigned θ-role or Case by P.
- c. The *semantic predicate* of P is P and all its arguments at the relevant semantic level.
- d. A predicate P is *reflexive* iff two of its arguments are coindexed.
- e. A predicate P is *reflexive-marked* iff either P is lexically reflexive or one of P's arguments is a SELF anaphor.
- f. *Generalized Chain Definition:*
  C=(α_1, ..., α_n) is a chain iff C is the maximal sequence such that there is an index i such that for all j, $1 \leq j \leq n$, α_j carries that index, and for all j, $1 \leq j < n$, α_j governs α_{j+1}.
- g. An NP is +R iff it carries a full specification for ϕ-features (gender, number, person, Case). The absence of contrasts within the domain of a class implies the absence of a specification for that class (cf. Reuland & Reinhart (1995:255)).

(58) *Condition B:*

A reflexive (semantic) predicate is reflexive-marked.

(59) *Condition on A-Chains:*

A maximal A-chain ($\alpha_1, ..., \alpha_n$) contains exactly one link – α_1 – which is +R.

As regards the standard examples from the previous section (repeated in (60)), the new principles make correct predictions.

(60) a. John$_1$ hurt himself$_1$/*him$_1$ when falling out of the window.
b. His$_1$ colleagues laughed at him$_1$/*himself$_1$.
c. He/*heself/*himself fell out of the window.
d. John$_1$ is convinced that someone pushed him$_1$/*himself$_1$ out of the window.

In (60-a), the predicate *hurt* is reflexive because it has two coindexed arguments. Hence, Condition B requires reflexive-marking – however, this requirement is only fulfilled if the bound element is realilzed as SELF anaphor. Pronominal binding in (60-a) violates Condition B. As far as Condition A is concerned, it only applies non-vacuously in (60) if the SELF anaphor is involved. In this case, it is satisfied in (60-a) since the predicate is reflexive. As regards the Chain Condition, the maximal A-chain which contains the bound element is (*John*$_1$*, bound element*$_1$); if the bound element is realized as SELF anaphor, which is [-R], the condition is fulfilled – a pronoun, however, would violate it since it is [+R] in this position (a structural Case position; cf. the discussion in section 3.2.). To sum up, pronominal binding is excluded in (60-a) by both Condition B and the Condition on A-Chains.

In (60-b)-(60-d), the situation is different insofar as no reflexive predicate is involved. (In (60-c), there are no coindexed elements at all, and in (60-b) and (60-d), they are not arguments of the same predicate.) Thus, Condition B applies vacuously and Condition A rules out the SELF anaphor in all three sentences. (In the case of pronominal binding, Condition A is again irrelevant.) As regards the Chain Condition, the maximal A-chain which contains the bound element corresponds in all three examples to a trivial one-member chain: In (60-b) and (60-d), the coindexed elements are not part of it because in this case the government requirement could not be fulfilled. As a result, the Condition on A-Chains excludes the SELF anaphor in all three cases, since it is always [-R]. By contrast, pronominal realization of the bound element satisfies the Chain Condition, since pronouns are [+R] in these positions.

Against the background of these standard examples, it might remain unclear what the Condition on A-Chains is needed for, since it only confirms the results predicted by Condition A and B, and furthermore, one might wonder where the difference between syntactic and semantic predicates plays a role. Let us therefore briefly turn to some examples which shed light on these questions before we come back to the sentences that proved to be problematic for the standard Binding Theory.

In contrast to Condition A and B, the Condition on A-Chains explicitly distinguishes between NPs which are [+R] and those that are [-R]. Hence, it generally helps to differentiate between pronominal and anaphoric binding and furthermore imposes restrictions on the binder; i.e., it makes sure that anaphors do not function as antecedents, and pronouns occur only as bound elements if a barrier intervenes. Here, the question might arise of whether the latter configuration is not generally subsumed under Condition B, which excludes pronouns in a relatively local binding relation (namely if binder and bindee are coarguments of the same semantic predicate). However, although Condition B and the Condition on A-Chains make the same predictions in many contexts (as in (60-a)), this is not always the case. ECM constructions as in (61) serve as an example where only the Chain Condition is violated – the maximal A-chain involved in this sentence is ($Henk_1$, hem_1) and the pronoun is [+R]. However, Condition B is not violated; there is no reflexive semantic predicate because the coindexed elements are not coarguments, hence the condition applies vacuously.

(61) *Henk$_1$ hoorde [hem$_1$ zingen].
Henk heard him sing
'Henk$_1$ heard himself$_1$ sing.' (cf. Reinhart & Reuland (1993:710))

It also happens that only Condition B is violated and the Condition on A-Chains is fulfilled (in which case the ungrammaticality appears to be weaker). A case in point are coordination structures as in (62) and (63), which show moreover why Condition B must refer to semantic predicates and reflexive-marking "at the relevant semantic level". Although there does not seem to occur a reflexive predicate in these examples from a syntactic point of view, the semantic interpretations in (62-b) and (63-b) show that there is indeed a semantic level at which we find a reflexive predicate that is not correctly licensed via reflexive-marking. Hence, Condition B is violated; the Chain Condition, by contrast, is satisfied in these examples.

(62) a. *[Felix but not Lucie$_1$] praised her$_1$.
b. [Felix (λx (x praised her))] but not [Lucie (λx (x praised x))]
(cf. Reinhart & Reuland (1993:676f.))

(63) a. *[The queen$_1$] invited both [Max and her$_1$] to our party.
b. the queen (λx (x invited Max & x invited x))
(cf. Reinhart & Reuland (1993:675))

As regards Condition A, it refers to syntactic predicates and explicitly takes into account external and Case-marked arguments of the predicate under consideration and not only θ-marked arguments. This is motivated by raising and ECM constructions of the type illustrated in (64).

(64) a. Lucie$_1$ seems to herself $_1$ [t_{Lucie} to be beyond suspicion].
b. Lucie$_1$ expects [herself$_1$ to entertain Max].

(cf. Reinhart & Reuland (1993:679f.))

In (64-a), the matrix subject is not θ-marked by the raising verb, but still the former and the anaphor are coarguments from a syntactic point of view and make the syntactic predicate *seem* reflexive; hence, Condition A is fulfilled and the sentence is grammatical. Similarly, in (64-b), the anaphor counts as syntactic argument of the matrix verb *expect* since it is Case-marked by the latter, although it is θ-marked by the embedded verb.[15] Thus, Condition A is again fulfilled, because the syntactic predicate that *herself* reflexive-marks is reflexive.[16]

3.2. Predictions

Let us now come back to those examples which turned out to be problematic for the Chomskyan binding principles (cf. (65)-(69), repeated from (48)-(52)).

(65) Max$_1$ glanced behind himself$_1$/him$_1$.

(66) Max$_1$ saw a gun near himself$_1$/him$_1$.

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[15]Note that the matrix and the embedded subject are not coarguments with respect to the *semantic* predicate *seem*; the latter takes the matrix subject and the embedded TP as argument – hence, Condition B does not apply; cf. also (61).

[16]Being θ-marked by the embedded verb, we should expect that the SELF anaphor also reflexive-marks this predicate and causes a violation of Condition A. Reinhart & Reuland therefore assume that the embedded verb raises at LF and forms a complex predicate with the matrix verb (via adjunction). As a result, *herself* is no longer the external argument of *entertain*, which is therefore not reflexive-marked. However, the SELF anaphor still functions as syntactic argument of the embedding (complex) predicate and thus reflexive-marks it. Hence, Condition A is satisfied at last.

(i) *V-raising at LF:*
Lucie [to-entertain$_i$-expect$_j$]$_j$ [herself t$_i$ Max] (cf. Reinhart & Reuland (1993:708))

(67) Max_1 saw a picture of $\text{himself}_1/\text{him}_1$.

(68) Max_1 likes jokes about $\text{himself}_1/\text{him}_1$.

(69) Max_1 counted five tourists in the room apart from $\text{himself}_1/\text{him}_1$.

In contrast to the standard Binding Theory, the reflexivity approach no longer predicts a complementary distribution of anaphors and pronouns, and with respect to examples like those in (65)-(69), the conditions in (57)-(59) (Condition A, Condition B, and the Condition on A-Chains) make correct predictions: Since the preposition lacks a subject in these sentences, it does not form a syntactic predicate and hence Condition A does not apply, even if a SELF anaphor occurs as an argument of the preposition. Condition B does not apply either, because the coindexed elements are not coarguments; so there is no reflexive predicate involved. As far as chain formation is concerned, Reuland & Reinhart (1995:261) assume that there is a chain between the bound element and its antecedent.[17] Thus, it is clear that the anaphor fulfils the Condition on A-Chain in (65)-(69) because anaphors are generally [-R] – but what about the pronoun? Reinhart & Reuland (1995:262) suggest that since the pronoun bears inherent Case in these positions and English shows no contrast within the inherent Case system, the pronoun is not specified for Case in these sentences. As a result, it is [-R] in (65)-(69) and thus does not violate the Condition on

[17]This is not the case in Reinhart & Reuland (1993:702), where they assume that the preposition in these sentences forms a minimality barrier (following Chomsky (1986a)). (However, on this assumption the Chain Condition would rule out the anaphor, because the trivial chain (*$himself_1$*) would then be a maximal A-chain but would not contain a [+R]-element.)

But since the Chain Condition has to rule out the pronoun in sentences like (65)-(69) in languages like German (cf. (70-b)), Reuland & Reinhart (1995) propose a modified analysis based on Rizzi's (1990) framework, according to which P does not block government.

A-Chains.[18]

The German and Dutch counterparts of example (65) (cf. (70-b) and (70-c), respectively, repeated from (56)) cannot be analysed as straightforwardly.

(70) a. Max_1 glanced behind himself_1/him_1.
b. Max_1 blickte hinter sich_1/??sich selbst_1/*ihn_1.
c. Max_1 keek achter zich_1/*zichzelf_1/hem_1.

As in English, the Dutch pronoun satisfies the Chain Condition, since it is unspecified for (inherent) Case. In German, the situation is different. Since German shows a Case contrast within the inherent Case system, the pronoun is fully specified for all ϕ-features; hence, it is [+R] and violates the Condition on A-Chains.

However, the question remains open as to why SELF anaphors are ungrammatical in both Dutch and German. As argued above, neither Condition A nor Condition B apply, which accounts for the grammaticality of the SE anaphors, since they do not violate any condition. But in order to rule out the SELF anaphors, it would have to be assumed that they violate either Condition A or the Chain Condition. The first possibility must be rejected because the English account crucially relies on the fact that Condition A does not apply; and a violation of the Chain Condition would only occur if there was a barrier between the anaphor and its antecedent and the trivial chain ($anaphor_1$) was a maximal A-chain. However, this solution must also be excluded, because Reinhart & Reuland's (1995) account of the ungrammaticality of pronouns in German sentences like (70-b) is based on the assumption that (Max_1,

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[18]However, it seems to me that this analysis also suggests that sentences like the following should violate the Chain Condition on the assumption that the pronoun is [-R] in this position:

(i) John saw a snake near her.
A-chain violating the Chain Condition: ($her_{[-R]}$)

ihn$_1$) forms a chain that violates the Chain Condition. Hence, the ungrammaticality of the SELF anaphors in (70-b) and (70-c) cannot be derived directly from the three conditions in (57)-(59) – Condition A, Condition B, and the Condition on A-Chains – and something more needs to be said with respect to these cases.[19]

4. Former Approaches to Binding in a Derivational Theory

In the previous two sections, two of the most influential binding theories have been introduced – Chomsky (1981) (which is developed further in Chomsky (1986b)) and Reinhart & Reuland (1993)/Reuland & Reinhart (1995). In view of the fact that the ultimate goal of this thesis is to develop a derivational approach to binding, let us now turn to three more recent proposals which have been developed within a derivational framework – Hornstein (2001), Kayne (2002), and Zwart (2002). In a nutshell, these three theories can be characterized as follows: they all share the underlying assumption that an antecedent and its bindee start out as or even *are* (cf. Hornstein (2001)) one constituent before the antecedent moves away to a higher position.

4.1. Hornstein (2001): Bound Elements as Spelt-Out Traces

Hornstein's (2001) approach to binding seeks to eliminate binding theory as a separate module by subsuming it under the theory of movement. What he basically proposes is that anaphors are "the residues of overt A-movement" (Hornstein (2001:152)); pronouns, on the other hand, are considered to be the elsewhere case: formatives, i.e., no real lexical expressions, which are licensed if the movement option is not available and the derivation cannot converge otherwise.

[19] Further problematic aspects concerning Reinhart & Reuland's theory of reflexivity have been discussed, for example, in Safir (1997), Burzio (1998), and Menuzzi (1999).

4.1.1. The Role of Case Checking

Let us first consider a sentence like (71) (*John likes himself*). A derivation like the one indicated in (71-a), where *John* starts out in the object position, then moves to the subject position, and the remaining copy is phonetically realized as *himself*, must be rejected for Case reasons:[20] As subject, *John* – and hence also the copy – must have Nominative Case features. However, the verb *like* bears Accusative Case features, which cannot be checked by the Nominative Case features on the copy *John*. Hence, Hornstein suggests that it is not the copy *John* which satisfies the verb's Case requirements but the morpheme *self*, a semantically inert morpheme that is adjoined to *John* in the beginning and prevents a Case clash in examples like (71) (cf. (71-b)).[21]

(71) John likes himself.

a. *impossible derivation:*
 [$_{\text{TP}}$ John [$_{\text{vP}}$ <John> likes <John> (PF=*himself*)]]

b. *proposed derivation*:
 [$_{\text{TP}}$ John [$_{\text{vP}}$ <John> likes [[<John>]self]]]

The derivation then proceeds as indicated in (72). After *John* (with Nominative Case features) and *self* (with Accusative Case features) have been merged into the object position (where *John* is assigned the object θ-role), *John* moves to the subject

[20]Note that Hornstein tolerates derivations in which *John* receives two θ-roles (in the object and subject position); in fact, his theory involves movement into θ-positions (cf. the discussion below).

[21]In this section, copies which do not function as the head of a chain occur in pointed brackets for the sake of clarity. Moreover, I follow Hornstein's notation as far as features are concerned: unchecked features are marked as "+", checked features are marked as "–" (hence, these symbols are not used to reflect interpretability/uninterpretability).

θ-position (Specv in (72)),[22] where it receives the subject θ-role. Then it moves on to SpecT, where it finally checks its Nominative Case features and satisfies the EPP. The Accusative Case features of the verb are checked against the Case features on *self*, which therefore has to move to Specv at LF.[23]

(72) a. *overt movement:*

$[_{\text{TP}}$ John$_{[-nom]}$ $[_{\text{vP}}$ <John$_{[+nom]}$> likes $[_{\text{VP}}$ <likes> [[<John$_{[+nom]}$>] self$_{[+acc]}$]]]]

b. *covert movement:*

$[_{\text{TP}}$ John$_{[-nom]}$ $[_{\text{vP}}$ self$_{[-acc]}$ $[_{\text{vP}}$ <John$_{[+nom]}$> likes $[_{\text{VP}}$ <likes> [[<John$_{[+nom]}$>] <self$_{[+acc]}$>]]]]]

What remains to be explained is where the phonetic form *himself* finally comes from. According to (72-a), we find a copy of *John* plus *self* in the object position, which could at most result in the form *Johnself.* However, Hornstein argues that in order to satisfy the LCA (*Linear Correspondence Axiom*; cf. also chapter 3) all copies except for one must be deleted at PF, since otherwise linearization is impossible (cf. Hornstein (2001:79f.; 85; 160) and Nunes (1995, 1999)).[24]

Thus the question arises as to which of the copies are deleted. Since the derivation can only converge if no uninterpretable features survive at the interface (cf. the

[22]Hornstein himself is not consistent with his notation and uses both the IP/VP and the TP/vP/VP model. I restrict myself to the latter and leave the question open as to whether *John* moves via SpecV on its way from the object to the subject position.

[23]As Hornstein points out in his footnote 28, it is not relevant to him as to whether this movement is overt or covert. However, if this movement were overt, the LCA (*Linear Correspondence Axiom*) would require the deletion of the *lower* copy of *self* (not of the higher one) and thus predict the wrong linear order; cf. the argumentation below (72). Hence, this option is not really available.

[24]According to Nunes (1999) this deletion operation is triggered by a principle called *Chain Reduction*:

principle of *Full Interpretation*), the best option is to keep the copy of *John* in SpecT and delete the others, because the former is the only one where the Case features have been checked and are therefore invisible at the interfaces.[25] However,

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(i) *Chain Reduction*

Delete the minimal number of constituents of a nontrivial chain CH that suffices for CH to be mapped into a linear order in accordance with the LCA. (Nunes (2001:228))

As Nunes (1999) points out, there are in fact certain configurations in which not all copies of a chain must be deleted. This refers to *wh*-movement examples of the type in (ii), where intermediate chain links can be argued to be morphologically restructured as phonological words and therefore become invisible to the LCA, which does not apply word-internally.

(ii) *German:* *Mit wem* glaubst du *mit wem* Hans spricht?
with whom think you with whom Hans talks
'With whom do you think Hans is talking?' (cf. Nunes (2001:232))

[25]Hornstein argues that the choice is motivated as follows: The copy in SpecT could not be deleted since it is not defective (– it does not bear an unchecked uninterpretable feature –), which he considers to be a licensing criterion for deletion (cf. also the discussion below). According to Nunes (1999), the choice follows from economy considerations based on the application of *Formal Feature Elimination* (FF-Elimination) (cf. (i)).

(i) a. *Formal Feature Elimination* (FF-Elimination)

Given the sequence of pairs $\sigma=\langle(\mathrm{F}, \mathrm{P})_1, (\mathrm{F}, \mathrm{P})_2, \ldots, (\mathrm{F}, \mathrm{P})_n\rangle$ such that σ is the output of *Linearize*, F is a set of formal features, and P is a set of phonological features, delete the minimal number of features of each set of formal features in order for σ to satisfy *Full Interpretation* at PF. (cf. Nunes (1999:229))

b. *Linearize* corresponds to the operation that maps a phrase structure into a linear order of X° elements in accordance with the LCA. (cf. Nunes (1999:fn. 5))

c. The principle of *Full Interpretation* states that linguistic levels of representation (LF and PF) consist solely of +Interpretable elements. (cf. Martin (1999:1)) if the lowest copy of *John* is deleted, the bound morpheme *self* runs into trouble because it needs some morphological support. Hence, a last resort expression must be inserted to ensure the convergence of the derivation – and this is the pronoun *him*, which agrees in Case with *self*. The correct LF and PF representations of sentence (71) therefore look as follows, where deleted copies are crossed out.[26]

(73) a. *deletion before Spell-Out:*

$[_{TP}\ \text{John}_{[-nom]}\ [_{vP}\ \cancel{\langle\text{John}_{[+nom]}\rangle}\ \text{likes}\ [_{VP}\ \cancel{\langle\text{likes}\rangle}\ [[\cancel{\langle\text{John}_{[+nom]}\rangle}]\ \text{self}_{[+acc]}]]]]$

b. *LF:*

$[_{TP}\ \text{John}_{[-nom]}\ [_{vP}\ \text{self}_{[-acc]}\ [_{vP}\ \text{likes}\ [_{VP}\ [\cancel{\langle\text{self}_{[+acc]}\rangle}]]]]]$

(*John*: bears subject and object θ-role)

c. *PF:*

$[_{TP}\ \text{John}_{[-nom]}\ [_{vP}\ \text{likes}\ [_{VP}\ [\text{HIM+self}_{[+acc]}]]]]$

4.1.2. The Linear Correspondence Axiom and the Scope Correspondence Axiom

What the derivation of example (71) suggests is that *self* is inserted to prevent a Case clash; however, there is more behind it, since SELF anaphors also occur in

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d. Checking operations render −Interpretable features invisible at LF and PF.

(cf. Nunes (1999:229))

If the highest copy of *John* in (71-b) is kept, no unchecked Case feature must be deleted by FF-Elimination (cf. also the illustration in (72-a)). By contrast, if another copy survives instead, its unchecked Case feature will have to be eliminated additionally. Hence, to keep the highest copy is the most economical option.

[26]Hornstein does not explain explicitly what happens to the unchecked uninterpretable Accusative Case feature on the lower copy of *self* at PF. I suppose he has something like Nunes's *Formal Feature Elimination* in mind, according to which this feature would simply be eliminated at PF to ensure convergence (cf. the previous footnote).

contexts in which their antecedents bear the same Case (cf. (74)).

(74) a. I expect John to like himself.
b. *I expect John to like.

If *self* was only needed if there was no other way to check the verb's Accusative Case features, we would expect a sentence like (74-b) to be grammatical, because all copies of *John* would have an Accusative feature, and thus a lower copy could check Case against the features of the embedded verb *like* (cf. (75-b)).[27]

(75) a. *neglecting Case:*
$[_{\mathrm{vP}}$ expect $[_{\mathrm{TP}}$ John$_{[+acc]}$ to $[_{\mathrm{vP}}$ $<$John$_{[+acc]}>$ like $<$John$_{[+acc]}>]]]$
b. *Case-driven movement:*
$[_{\mathrm{vP}}$ John$_{[-acc]}$ expect $[_{\mathrm{TP}}$ $<$John$_{[+acc]}>$ to $[_{\mathrm{vP}}$ John$_{[-acc]}$ $[_{\mathrm{v'}}$ $<$John$_{[+acc]}>$ $[_{\mathrm{v'}}$ like $<$John$_{[+acc]}>]]]]]]$

Now the question arises as to why this derivation is ruled out, independent of whether Accusative Case checking takes place in overt syntax or at LF. According to Hornstein, the answer is that the derivation inevitably results in a violation of the LCA or the LF counterpart he proposes, the so-called *Scope Correspondence Axiom* (SCA), which assigns elements at LF a scope order (cf. Hornstein (2001:85)).[28] Both the LCA and the SCA basically require that all copies but one be deleted to allow lin-

[27]Hornstein suggests that in order to do so, "one of these copies moves to the outer Spec of the lower [vP]" (Hornstein (2001:162)); however, the motivation of this additional movement step is not clear to me, since one of the copies already occurs in the lower Specv, where Accusative Case can be checked (cf. (75-a)).

[28]The *Scope Correspondence Axiom* is defined as follows:

(i) *Scope Correspondence Axiom* (SCA):
If α c-commands β at LF, then α scopes over β.

earization or "scopification" respectively. However, Hornstein argues that deletion can only occur if an expression is defective in some way, for example if it bears an unchecked uninterpretable feature. On the assumption that Accusative Case checking (as indicated in (75-b)) takes place overtly, we find two instances of *John* with checked Case features in the overt syntax already; hence, none of these two copies will be deleted, and both the LCA and the SCA are violated.[29] If Case checking takes place covertly, the uninterpretable Case features are still unchecked at PF; thus deletion of all copies except for one can take place and the LCA will be satisfied.[30] However, at LF, again two of the copies check their Accusative Case feature,

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Scope is assumed to be irreflexive, which means that an expression cannot scope over itself. Hence, in order to be able to assign a coherent scope order, the SCA forces the deletion of all copies but one at LF. If this is not respected, the derivation will crash, since the SCA is a convergence requirement just like the LCA.

[29]Note that in this case the higher one of the two copies would occupy the specifier position of the matrix vP and would thus be predicted to linearly precede the matrix verb *expect* in v.

Note furthermore that in Nunes's (1999) approach it would be predicted that all but one copy were deleted, since *Chain Reduction* takes place prior to *FF-Elimination* (and *Linearize*). Hence, Hornstein cannot rely on these principles to rule out (75-b) and hence (74-b) in his system.

[30]Again, Hornstein is not very explicit about the concrete progress at PF, but he might have in mind something like the following: Since all the copies bear an unchecked uninterpretable Case feature in this case, they are all defective and could therefore in principle be deleted. However, an operation like *Chain Reduction* ensures that not all copies are deleted (which would be possible according to the defectiveness approach) and one member survives. However, in order to guarantee the convergence of the derivation, the remaining unchecked uninterpretable feature on this copy must be rendered invisible at the interface, which can be settled by a rule like *FF-Elimination*. The latter would also ensure that it is the highest copy which is not deleted, because even if all the members share the same amount of unchecked uninterpretable Case features, only the highest copy (in this scenario, the copy in embedded SpecT) has its N-feature checked (against the EPP feature

and as a result they will not be deleted, in violation of the SCA. By contrast, if it is assumed that the morpheme *self* is inserted to check the embedded verb's Case features, these LCA/SCA violations do not occur.

To sum up, it can be concluded that *self* is not only required to avoid a Case clash in sentences like (71) (*John likes himself*); as examples like (74-a) (*I expect John to like himself*) show, it is also needed in order to avoid a violation of the LCA and the SCA.

4.1.3. Inherently Reflexive and Exceptional Case Marking Verbs

As far as inherently reflexive predicates are concerned, Hornstein proposes that they also assign two θ-roles but lack an Accusative Case feature. Hence, the derivation of a sentence like (76-a) proceeds as follows: In the beginning, *John* (bearing a Nominative Case feature) is merged into the object position, where it receives the internal θ-role. Then it moves via the subject θ-position to SpecT, where it checks its Nominative Case feature. The lower (defective) copies are then deleted in order to satisfy the LCA and the SCA, and since there is no unchecked Case feature left on the verb, the derivation converges.

(76) a. John dressed.

[$_{\text{TP}}$ John$_{[-nom]}$ [$_{\text{vP}}$ ~~<John$_{[+nom]}$>~~ dressed ~~<John$_{[+nom]}$>~~]]

b. John dressed himself.

[$_{\text{TP}}$ John$_{[-nom]}$ [$_{\text{vP}}$ ~~<John$_{[+nom]}$>~~ likes$_{[+\mathbf{acc}]}$ ~~<John$_{[+nom]}$>~~ HIM+self$_{[+\mathbf{acc}]}$]]

However, verbs like *dress* can optionally occur with an Accusative Case feature. In this case, *self* must be inserted to avoid a Case clash and enable checking of this feature (cf. (76-b)). Moreover, the last resort expression *him* is inserted such that

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of the embedded T), and therefore it requires the minimal number of features to be eliminated.

self does not have to stand alone (cf. the discussion in 4.1.1.). This derivation is illustrated in (76-b). (Covert movement of *self* to Specv is ignored in this section.)

A similar analysis can be applied to examples of the following type.[31]

(77) a. John expects himself to be elected.

[$_{\text{TP}}$ John$_{[-nom]}$ [$_{\text{vP}}$ ~~<John$_{[+nom]}$>~~ expects$_{[\mathbf{+acc}]}$ [$_{\text{TP}}$ ~~<John$_{[+nom]}$>~~ HIM+self$_{[\mathbf{+acc}]}$ to be elected]]]

b. John expects PRO to be elected.

[$_{\text{TP}}$ John$_{[-nom]}$ [$_{\text{vP}}$ ~~<John$_{[+nom]}$>~~ expects [$_{\text{TP}}$ ~~<John$_{[+nom]}$>~~ to be elected]]]

As Hornstein argues, the ECM verb *expect* can also optionally bear an Accusative Case feature. If it does, the only available convergent derivation is (77-a), since *self* must be inserted to check this feature; if it does not, the unchecked Case feature on *self* would cause the derivation to crash and only the control structure in (77-b) is available. Other ECM verbs, like *believe*, are obligatorily equipped with an Accusative Case feature; hence, these verbs cannot occur in a control structure since the unchecked Case feature on the verb would cause the derivation to crash (cf. (78)).

(78) a. John believes himself to be handsome.

[$_{\text{TP}}$ John$_{[-nom]}$ [$_{\text{vP}}$ ~~<John$_{[+nom]}$>~~ believes$_{[+acc]}$ [$_{\text{TP}}$ ~~<John$_{[+nom]}$>~~ HIM+self$_{[+acc]}$ to be handsome]]]

b. *John believes PRO to be handsome.

[$_{\text{TP}}$ John$_{[-nom]}$ [$_{\text{vP}}$ ~~<John$_{[+nom]}$>~~ believes$_{[\mathbf{+acc}]}$ [$_{\text{TP}}$ ~~<John$_{[+nom]}$>~~ to be handsome]]]

[31]Strictly speaking, PRO does not exist in Hornstein's approach since he considers it to be the residue of NP movement (cf. Hornstein (2001:37)); I still use the notation in (77-b) for illustrative purposes.

4.1.4. Principle B

One basic assumption in Hornstein's approach is that neither reflexives nor bound pronouns are part of the lexicon. They are considered to be inherently grammatical morphemes that can only be used if required for the convergence of a derivation. Hence, they do not occur in the numeration but can be added in the course of the derivation if necessary. This means that sentences which differ only with respect to the question of whether the bound element is realized as pronoun or anaphor have the same underlying numeration, and Hornstein assumes that pronouns only emerge as last resort expressions if reflexivization is not available, i.e., if movement is not possible.[32] Hence, the approach captures the near-complementary distribution of pronouns and anaphors; however, it remains unclear as to how those cases have to be treated that allow both forms (cf. the discussion in section 2. and 3.).

In the examples in (79), the proposal leads to the following result: (79-b) is ungrammatical, because the alternative derivation in (79-a) is licit and therefore blocks pronominalization, which is assumed to be more costly. In (79-c), on the other hand, the bound pronoun occurs in the subject position of an embedded finite clause, a position in which a DP can check its Case and ϕ-features; if it moved on to the matrix subject position, it could therefore not check the features there anymore, which means that the derivation would crash under the movement approach. Hence, instead of an anaphor, the overt residue of DP movement, we find a pronoun in this position which is inserted to save the derivation.

(79) a. John$_1$ likes himself$_1$.
b. *John$_1$ likes him$_1$.
c. John$_1$ said that he$_1$ would come.
d. John$_1$ likes him$_2$.

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[32]As regards the concrete technical implementation, cf. Hornstein (2001:178f.).

However, why is (79-d) not blocked by (79-a), the derivation in which *John* receives both θ-roles and *self* is inserted in the object position? The answer Hornstein provides is that deictic pronouns, unlike bound pronouns, do occur in the numeration and are permitted because they are needed "to support the stress/deixis feature" (Hornstein (2001:176)). Hence, sentences involving pronouns fall into two groups, because those involving unbound pronouns are not based on the same numeration as examples involving bound pronouns. Thus, the derivation of the former cannot be blocked by the latter.

4.2. Kayne (2002): Another Movement-Based Account of Binding

4.2.1. Coreference as a Function of Merger

The basic assumption in Kayne's (2002) theory of binding is that in the case of intended coreference, a pronoun[33] and its antecedent are merged together, then enter the derivation as one constituent, and are subsequently separated by movement of the antecedent.[34] A sentence like (80) is therefore derived as follows:[35] *John* and *he* start out as one constituent (cf. (80-a)) with *John* being in the highest specifier position. (As far as the pronoun is concerned, Kayne notes that it could either be a simple head or be embedded in a more complex structure; cf. Kayne (2002:137).) Since the antecedent is at the edge of the constituent, it is accessible and can move

[33]Here, the term pronoun is used in the broad sense and covers personal pronouns as well as anaphoric forms.

[34]This kind of derivation has also been proposed by Kayne (1972) and Uriagereka (1995) for clitic doubling.

[35]Note that in the examples in this section, coreference is indicated by italics (following Kayne); since it is the initial configuration which expresses antecedent-pronoun relations (cf. also (82)), indices need not be involved.

via the θ-position of the external argument of *think*, where it receives its θ-role, to the matrix subject position (cf. (80-b)).[36]

(80) *John* thinks *he* is smart. (cf. Kayne (2002:135))

a. thinks [John he] is smart

b. John_1 t'_1 thinks [t_1 he] is smart

Hence, the matrix subject position in (80) is filled by movement. By contrast, if *John* and *he* were not coreferent, *John* would simply be merged into the corresponding θ-position (cf. (81)).

(81) John thinks he ($\neq$ John) is smart.

a. [$_{\text{TP}}$ John_1 [$_{\text{vP}}$ t_1 thinks he is smart]]

4.2.2. Principle C Effects

Let us first consider Principle C effects in this type of approach. On the assumption that the principle in (82) holds, there are only two ways in which a sentence like (83) (**He* thinks *John* is smart) could be derived.

(82) Antecedent-pronoun relations as in [(80)] REQUIRE movement out of a constituent of the form [*John-he*]. That is the ONLY way to express an antecedent-pronoun relation. (Kayne 2002:138))

First, *John* and *he* might start out in the θ-position of the lower predicate, as indicated in (83-a). At this stage, the derivation resembles that of sentence (80) (cf. (80-a)). However, in order to derive (83), the pronoun (and not the R-expression)

[36]This does not mean that the antecedent receives two θ-roles, because Kayne points out that "the lower theta-role is assigned, rather, to the larger constituent [*John he*] (conceivably also to the head *he*" (Kayne (2002:135)). Note moreover that the "big constituent" (= doubling constituent) first moves to the embedded SpecT position, and then extraction of the antecedent takes place.

would have to be extracted and raised to the matrix subject position (cf. (83-a_1)), and this is impossible because "the pronominal part of [*John he*] is not extractable (except perhaps by head movement, which would not suffice to get *he* into the subject theta-position of *think*" (Kayne (2002:137)). However, starting with the structure in (83-a), there is another potential derivation that must be excluded, namely that *John* is first moved to the embedded subject position and the remnant doubling constituent containing *he* is subsequently raised into the matrix clause (cf. (83-a_2)). It is not entirely clear what rules out this derivation. It could be argued that *John* does not qualify as goal for the embedded T because the doubling constituent itself is a nearer potential goal and therefore blocks movement of the R-expression; however, it has also been claimed that constituents in SpecX are as close to attracting probes than XP itself (cf., among others, Pesetsky & Torrego (2001), van Koppen (2003)). Anyway, when it comes to accounting for Principle B effects, Kayne (2002:146) notes moreover that it is not licit to move the doubling constituent across the extracted antecedent (– although it is not explicitly explained why this kind of movement is ruled out).

Alternatively, one might attempt to derive sentence (83) by merging the doubling constituent directly in the θ-position of the matrix subject (cf. (83-b)). However, this means that *John* would have to be lowered to the embedded subject position, a step that must be ruled out immediately on the assumption that "rightward movement to a non-c-commanding position is prohibeted by UG" (Kayne (2002:137)).

(83) **He* thinks *John* is smart. (cf. Kayne (2002:137)

a. thinks [John he] is smart

a_1. *he_1 thinks [John t_1] is smart

a_2. *[t_1 he]$_2$ thinks $John_1$ t_2 is smart

b. [John he] thinks is smart

b_1. *[t_1 he] thinks $John_1$ is smart

Thus, Principle C effects of the type illlustrated in (83) can be accounted for straightforwardly.[37]

4.2.3. The Licensing of Pronouns

So far, nothing has been said about the locality relation between antecedent and pronoun. So let us now address the following questions: what accounts for the ungrammaticality of (84-a), and why is (84-b) grammatical?

(84) a. **John* praises *him*. (cf. Kayne(2002:146))
b. *John* praises *himself*.

As to the ungrammaticality of (84-a), Kayne suggests that in order to be properly licensed, the pronoun must move to a position above the subject theta position, and in doing so, it pied-pipes the whole doubling constituent, including the antecedent, which means that there must be an intermediate landing site available before the antecedent reaches its target position. Since this instance of movement is assumed to take place overtly (cf. Kayne's footnote 23), the pronoun itself reflects this intermediate position in grammatical sentences, and moreover, it must be assumed that the verb is raised past this position to derive the correct word order.

A sentence like (84-a) (repeated in (85)) can therefore not be derived (independent of the question of verb movement). Since moving the doubling constituent from its base position in the object position to a legitimate licensing position means moving it past the subject θ-position, the antecedent would afterwards have to be moved

[37]What cannot be captured are those examples from languages like Vietnamese that involve binding of an R-expression by an R-expression (cf. also chapter 2 and 4). Since Kayne emphasizes that there is no accidental coreference, all occurrences of coreference must be derived as outlined above; however, the option that the doubling constituent contains two R-expressions is not available (– and even if this could be implemented somehow, it is unclear how this option could be restricted).

back to the latter position to be assigned the verb's external θ-role. This would be illegitimate downward movement and is illustrated in (85-a). Alternatively, one might think of a derivation in which *John* is extracted from the doubling constituent first, and then the latter is moved across the antecedent in the subject θ-position. However, as mentioned before, Kayne excludes this possibility as well by assuming that due to a locality effect "which needs to be made precise [...] movement past [a DP] of a doubling constituent containing a trace/copy of that same DP" (Kayne (2002:146)) is generally ruled out.[38]

(85) **John* praises *him*.

praises [John him]

a. *[t_2 him]$_1$ John$_2$ praises t_1.

b. *[t_1 him]$_2$ John$_1$ praises t_2.

On the other hand, a sentence like (80) (*John* thinks *he* is smart) can be derived, because the embedded subject position serves as intermediate landing site where the pronoun can be licensed, and the antecedent is θ-marked later in the matrix clause. However, Kayne remains vague about the exact licensing position in general and does not provide a detailed analysis of an example with successful pronominal binding. Presumably, a sentence such as (86) would involve movement of the doubling

[38] However, on this assumption it is unclear how a sentence like (i) could be derived, since it seems to involve topicalization of the remnant doubling constituent across the antecedent (cf. also Zwart's (2002:281) derivation):

(i) *Himself, John* likes.

a. likes [[John him] self]

b. John$_1$ likes [[t_1 him] self]

c. [[t_1 him] self]$_2$ John$_1$ likes t_2

constituent to a licensing position SpecY with YP dominating the embedded vP, then either the verb alone (head movement) or the remnant vP would have to move to a position preceding SpecY (cf. again Kayne's footnote 23), and finally the antecedent *John* would have to be extracted from the doubling constitent and be raised to the matrix subject position.[39] These two alternative derivations are illustrated in (86-a) and (86-b).

(86) *John* thinks that I like *him.*
thinks that I like [John him]
a. *head movement:*
John$_3$ t$'_3$ thinks that I like$_2$ [$_{\mathbf{YP}}$ [t$_3$ him]$_1$ t$''_2$ [$_{\mathrm{vP}}$ t$_I$ t$'_2$ [$_{\mathrm{VP}}$ t$_2$ t$_1$]]]
b. *remnant movement:*
John$_4$ t$'_4$ thinks that I [$_{\mathbf{YP}}$ [$_{\mathrm{vP}}$ t$_I$ like$_2$ [$_{\mathrm{VP}}$ t$_2$ t$_1$]]$_3$ [t$_4$ him]$_1$ t$_3$]

But what about anaphoric forms as in (84-b) (*John* praises *himself*)? Kayne argues that "[t]he answer must be that *self* makes available an intermediate position for the pronoun that is not available in the absence of *self*" (Kayne (2002:147)). So he proposes that "the presence of the noun *self* licenses a possessive-type DP structure [...] one of whose Specs fulfills the pronoun's need" (Kayne (2002:147)). This accounts for the fact that in the case of anaphoric binding the antecedent does not have to move away that far; however, it does not yet explain why the relation *must* be that local. This question is left unanswered.[40]

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[39]As Zwart (2002:283) points out, successive-cyclic movement of *John* to the matrix subject position involves improper movement, since the antecedent has to move via SpecC, an A$'$-position.

[40]It is also mentioned that in contrast to pronominal relations anaphoric binding requires strict c-command (cf. (i)). This is not the case in examples like (ii) (recall that there is no "accidental coreference" in this theory).

(i) a. *John* praises *himself.*

4.2.4. Simple Anaphors

Another issue that arises concerns the occurrence and distribution of morphologically simple anaphors. Since their sensitivity to the distinction between infinitive/subjunctive/indicative (cf. also chapter 2 and 4) seems to resemble that of the French quantifier *tout/rien* ('all/nothing'), Kayne suggests that the following generalization holds.

(87) The antecedent of [a simple anaphor] must always be quantified; when there is no overt quantifier/distributor [(DB)], there must be a covert one; c-command must hold, as with movement of *tout/rien*.

(Kayne (2002:149))

As a result, simple anaphors start out in a doubling constituent, just like pronouns, with its double being the distributor (which can be considered to be an abstract *each*). (88) and (89) illustrate this kind of derivation.

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b. **John*'s sister praises *himself*.

(ii) a. *John* thinks *he* is smart.
b. *John*'s sister thinks *he* is smart.

Note that the latter sentence, (ii-b), can only be derived in this system by means of sideward movement (cf. also Nunes (1995, 2001), Bobaljik & Brown (1997), Hornstein (2001)), i.e., movement of an element (here the antecedent *John*) to a non-c-commanding position into a higher subtree (here the possessive DP). This kind of operation is also involved in a sentence like the following, where Kayne assumes that the antecedent moves "from Spec of the lower *he* to Spec of the higher *he* before moving to a theta-position" (Kayne (2002:fn.36)).

(iii) *John* thinks *he*'ll say *he*'s hungry.

As regards the c-command and locality requirements on anaphoric binding, cf. Kayne (2002:148) for some tentative speculations.

(88) *Gianni* ha parlato di *sé*.
John has spoken of SE
'*John* spoke of *himself*.' (cf. Kayne (2002:150))

(89) *Derivation:*

a. Gianni ha parlato di [*DB* sé]

b. Gianni ha DB_1 parlato di [t_1 sé]

Since there is also a relation between the distributor and the antecedent, the c-command requirement that holds for the relation antecedent/simple anaphor (which does not hold for pronominal binding; cf. footnote 40) can be accounted for by transitivity. On the other hand, the fact that simple anaphors originate in a doubling constituent in the same way as pronouns explains why they generally require a less local relation to their antecedent than complex anaphors. However, although Kayne notes there are also languages in which simple anaphors can be equally locally bound as complex anaphors (cf. his footnote 33), he can neither account for this observation nor for the occurrence of simple anaphors with inherently reflexive predicates.

4.2.5. Reconstruction Effects

Let us finally turn to Kayne's considerations concerning reconstruction effects of the following type:

(90) a. *[How many pictures of *John*] did *he* take (with his new camera)?

b. [Which of the pictures that *John* took yesterday] did *he* destroy today? (cf. Kayne (2002:153))

As to (90-a), the general assumption is that it is ungrammatical because it involves a violation of Principle C. As observed before, Principle C effects can be reduced in this approach to the question of what prohibits movement of the R-expression to the respective position. Against this background, let us take a closer look at the structure in (90-a).

At the point in the derivation before *wh*-movement takes place, the structure resembles a conventional Principle C configuration – the R-expression is in the c-command domain of the pronoun. That such a configuration cannot be derived in Kayne's (2002) model has already been shown before: it would involve downward movement, which is illegitimate (cf. section 4.2.2.). However, it still needs to be clarified why the antecedent cannot be moved to its surface position after *wh*-movement has taken place, since this option seems to be available in (90-b) (which is derived by sideward movement again).

Before turning to (90-a) in more detail, Kayne considers the sentence in (91-a), which exhibits a similar Principle C violation.

(91) a. *[How proud of *Mary*] is *she*?
b. ?She's how proud of him is she? (cf. Kayne (2002:154))

Following Huang (1993), who suggests that in these sentences a subject trace in the *wh*-phrase might affect binding, and inspired by the "almost possible (perhaps dialectal)" (Kayne (2002:154)) sentence in (91-b), Kayne proposes that there is even more "hidden structure" in these examples, namely of the form *subject – main verb*. On this assumption, (91-a) is based on the structure in (92-a), and (90-a) underlyingly looks as indicated in (92-b).

(92) a. [**she's** how proud of *Mary*] is *she*
b. [**he took** how many pictures of *John*] did *he* (cf. Kayne (2002:154f.)

However, there is no way in which these structures could be derived in the present approach, and thus sentences like (90-a) (**How many pictures of John$_1$ did he$_1$ take (with his new camera)?*) and (91-a) (**How proud of Mary$_1$ is she$_1$?*) are ungrammatical. What remains unclear is why sentences like (90-b) (*Which of the pictures that John$_1$ took yesterday did he$_1$ destroy today?*) are not ruled out in the same way, i.e., why they do not have this hidden structure. Here, Kayne only points out that he does not attribute this difference to the argument-adjunct distinction (cf. Kayne (2002:155) and cf. also chapter 3 as regards a detailed analysis of this type of approach).

4.3. Zwart (2002): The Emergence of Anaphoric Relations under Sisterhood

4.3.1. Anaphoric and Pronominal Binding

Based on the observation that the most local configuration in which interpretive relations can be expressed is sisterhood, Zwart (2002) proposes that in order to avoid representational residues, anaphors and their antecedents start out as sisters before the antecedent is then moved to a higher position. To some extent this approach therefore resembles Kayne's (2002) analysis, since in both theories the bound element and its antecedent start out as one constituent and binding is reduced to movement. However, apart from the fact that they differ as far as the concrete implementation is concerned, Zwart argues that this kind of approach (coreference as a function of merger) only works for anaphoric binding, and he attributes pronominal dependencies to accidental coreference instead (which does not exist in Kayne's model).

Two basic assumptions in Zwart's analysis are that in the course of the derivation, additional features can be acquired (in violation of the *Inclusiveness Condition*), and that anaphoricity is such a property that an item can obtain in a certain configuration, namely under sisterhood. Hence, anaphors do not exist as a primitive category in narrow syntax; instead Zwart assumes that there is only one category for both pronouns and anaphors, which he terms PRONOUN. If a PRONOUN is merged with its antecedent, it gets the feature [+coreferential] (cf. (93)), and as a result it is interpreted and spelt out as anaphor at the interface levels (whereas "pronouns are the underspecified "elsewhere" category" (Zwart (2002:274))).

(93) A PRONOUN α is coreferential with β iff α is merged with β.

(Zwart (2002:274))

Let us now turn to the derivation of a sentences like (94) (*John* likes *himself*). Since nonaccidental coreference can only result if the two items under consideration are merged together, *John* and PRONOUN start out as one constituent (with PRONOUN being the head of the phrase), which has the effect that the latter is marked [+coreferential] (cf. (94-a)). Next, the antecedent moves away in order to satisfy licensing requirements (Case/θ-role assignment), which is illustrated in (94-b), and since this is an instance of A-movement, it becomes clear why the binding of complex anaphors is restricted by similar locality constraints as this type of movement.[41] Finally, in a postsyntactic process, Vocabulary Insertion takes place and yields the morphological realization *himself* (cf. also chapter 4 and 5 as regards the latter operation).

(94) *John* likes *himself*. (cf. Zwart (2002:282))

a. likes [[John] [PRONOUN]]
$\longrightarrow$ PRONOUN marked as [+coreferential] (cf. (93))

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[41] However, it does not explain why we can find crosslinguistic variation with respect to the locality conditions on anaphoric binding; cf., for example, the contrast between the English sentence *Max*$_1$ *glanced behind himself*$_1$ and its Dutch counterpart **Max*$_1$ *keek achter zichzelf*$_1$.

Furthermore, Zwart points out that raising constructions like the following pose a problem.

(i) *John* seems to *himself* [to be a genius] (cf. Zwart (2002:293))

Since in the present approach *John* and *himself* would have to start out as sisters, this means that the antecedent would have to originate inside the adjunct PP. Hence, the assumption would have to be given up that the construction involves raising of the antecedent from the embedded subject position to the matrix clause.

b. John likes [<John> [PRONOUN$_{[+coreferential]}$]]
$\longrightarrow$ PF: PRONOUN = anaphor: *himself*

However, what this derivation also shows is that nonlocal coreference, i.e, those cases in which PRONOUN is realized pronominally, must be accounted for differently, since the merging of PRONOUN with its antecedent inevitably leads to its realization as anaphor. Hence, Zwart suggests that this type of coreference is in fact accidental.

(95) *John* thinks that *he* is a genius. (cf. Zwart (2002:288))

a. John thinks that PRONOUN is a genius
$\longrightarrow$ PF: PRONOUN = pronoun: *he*

However, it seems to be a rash move to attribute pronominal binding completely to accidental coreference. First of all, the question of optionality arises: what if a language allows both pronoun and anaphor in a given context (as in *Max*$_1$ *glanced behind himself*$_1$/*him*$_1$)? A potential answer might be that we have the option of merging PRONOUN with its antecedent or insert the antecedent later in the derivation and resort to accidental coreference, as proposed for sentences like (95). However, if we do not *have* to merge PRONOUN with its antecedent if this option yields a grammatical result, it remains unclear why the following derivation is illicit.

(96) **John* likes *him*.

a. John likes PRONOUN
$\longrightarrow$ PF: PRONOUN = pronoun: *him*

4.3.2. Principle C Effects and Licensing Requirements for Accidental Coreference

As far as Principle C is concerned, the following conclusions can be drawn. Since nonaccidental coreference always involves a sisterhood relation between the two relevant items and this inevitably means that PRONOUN is realized as anaphor (cf. (93)), sentences like (97-a) cannot be derived. Moreover, (97-b) is additionally ruled out, because *John* is not a variable referential element (like PRONOUN) and can therefore not be assigned a [+coreferential] feature by its antecedent.

(97) a. **He* likes *John*.
b. **John* likes *John*. (cf. Zwart (2002:276))

However, Zwart points out that there are in fact instances in which coreferent R-expressions may occur in a c-command configuration, namely in certain circumscribed contexts as in example (98-a), and he argues that these are examples of accidental coreference.

(98) a. Not many people like *John*, but I believe *John* likes *John*.
b. Not many people like *John*, but I believe *John* does.
(cf. Zwart (2002:277))

The concrete context in which this is possible seems to involve one element being at the same time "introduced both as "old" [(deaccented topic segment)] and as "new" [(accented focus segment)]" (Zwart (2002:277)). That this is indeed the relation that holds between the last two occurrences of *John* in (98-a) is supported by the ellipsis construction in (98-b), which is based on (98-a) and can be considered to be an even more radical form of deaccenting.

What remains slightly unclear is whether this is also assumed to be the licensing context for accidental coreference with respect to pronominal binding, as in (99-a). And if so, why is accidental coreference possible in (99-a) but not in (99-b)? (As to (99-c), one might argue that the deaccented, old form has to follow the accented, new one, and that the pronoun typically represents the former.) Moreover, if it is accidental coreference in all cases, why is it "much easier to obtain [in sentences like (99-a)] than in local contexts", like (99-d), as Zwart himself notes (cf. Zwart (2002:288)), or in contexts involving coreferent R-expressions (cf. (98-a))? Thus, the issue of accidental coreference seems to raise further questions.

(99) a. *John* thinks that I like *him*.
b. **John* thinks that I like *John*.
c. **He* thinks that I like *John*.
d. (As for John, if everyone likes him, then surely) *John* must like *him*.

4.3.3. Simple Anaphors

With respect to morphologically simple reflexives, Zwart suggests that, like complex anaphors, they start out as PRONOUN which is marked as [+coreferential], since it forms a constituent with its antecedent before the latter moves away. Hence, a [+coreferential] PRONOUN can be spelt out in two different ways, depending on the remaining set of features; if it behaves like a clitic and adjoins to another head in the course of the derivation, which results in the acquisition of further features, a [+coreferential] PRONOUN is spelt out and interpreted as simple anaphor, otherwise it is morphologically realized as complex anaphor.

What remains unclear is what exactly regulates these two possible derivations. If it is the additional feature assigned after adjunction that makes a [+coreferential] PRONOUN an underlying simple reflexive, what triggers head movement in the beginning and why does it occur only sometimes? For the sake of concreteness, let us consider the following Dutch examples (cf. Zwart (2002:285f.)).

(100) a. *Jan* haat *zichzelf/*zich.*
John hates himself/SE
'John_1 hates himself_1.'
b. *Jan* schaamt *zich/*zichzelf.*
John shames SE/himself
'John is ashamed.'

c. *Jan* wast *zichzelf/zich.*

John washes himself/SE
'John$_1$ washes himself$_1$.'

d. *Jan* zag *zichzelf/zich* mij (al) wassen.

John saw himself/SE me already wash
'John$_1$ saw himself$_1$ wash me/John $_1$could already see himself$_1$ wash me.'

(100-a) suggests that it is not always possible that PRONOUN undergoes head movement and acquires the additional feature. In this particular example, one might argue that there is no head available which could function as target position (– unfortunately, it is not really clear what kind of head is generally targeted and what kind of feature is involved, but it could be assumed that PRONOUN must stay postverbally). However, since it is possible in (100-b) and (100-c), which are structurally comparable to (100-a), it does not really seem to be the structural configuration that prohibits this operation. One might argue that the target head position is only available if an inherently reflexive predicate is involved, and if head movement is possible, PRONOUN has to undergo it (although the trigger is still unclear). On this assumption, (100-a)-(100-c) could be accounted for: in (100-a), the option of head movement is not available, hence PRONOUN does not get the additional feature and is later on realized as complex anaphor; in (100-b), movement is possible and therefore obligatory, hence PRONOUN becomes a simple reflexive, and since *wassen* ('wash') is ambiguous between a transitive and an inherently reflexive predicate (cf. also chapter 2 and the references cited there), both options are available in (100-c). However, then what about the optionality in examples like (100-d)? Here we find 'true' optionality which is not based on two different lexical entries as in the case of inherently reflexive predicates. Hence, the option of head movement must be available for the *zich*-variant, whereas it must be blocked in the case of the complex anaphor.

4.3.4. Reconstruction Effects

In this approach, coreference between an R-expression and a pronoun is generally attributed to accidental coreference. However, since R-expressions and pronouns cannot always be interpreted as coreferent (in addition to a noncoreferent reading), the question arises of when accidental coreference is possible and in which context it is prohibited (cf. also section 4.3.2.). This is also the issue at stake if we consider reconstruction effects of the following type. In (101-a) and (101-b), (accidental) coreference can occur, in (101-c), this is excluded.

(101) a. Which book that *John* wrote does *he* like best?
b. Which stories about *Diana* did *she* most object to?
c. *How many stories about *Diana* does *she* want us to invent?
(cf. Zwart (2002:291))

Zwart follows Heycock (1995) in that he notes that the sentences "differ in that *which* in [(101-a) and (101-b)] signif[y] the presupposed existence of a set of stories about Diana [or a book written by John], whereas the fronted noun phrase in [(101-c)] is "nonreferential" " (Zwart (2002:291)).[42] Hence, he concludes that it is

[42]It seems to me that the contrast observed between (101-b) and (101-c) does not arise in German (cf. (i-b) and (ii-b), which are both ungrammatical); this is unexpected on the assumption that a semantic difference accounts for the difference between the two English examples.

(i) a. Welche Geschichten über Diana hat er am meisten missbilligt?
which stories about Diana has he at most objected to
b. *Welche Geschichten über Diana$_1$ hat sie$_1$ am meisten missbilligt?
which stories about Diana has she at most objected to

(ii) a. Wie viele Geschichten über Diana will er dass wir erfinden?
how many stories about Diana wants he that we invent

easier to interpret the R-expressions in (101-a) and (101-b) as discourse familiar, which means that the fronted NPs receive an intonation where the R-expressions are deaccented – and in section 4.3.2. this has been argued to be a context in which accidental coreference can occur. In sentences like (101-c), on the other hand, where accidental coreference is not facilitated by the intonational properties, the sentence can only get the default interpretation, which means that R-expression and pronoun are interpreted as being disjoint.

However, it is not entirely clear how accidental coreference is excluded in sentences like (102), because here the existence of the pictures is also presupposed, and Zwart rejects the possibility that the argument-adjunct distinction plays a role (cf. Zwart (2002:fn.43)).[43]

(102) *Which picture of *John* does *he* like best?

We will come back to the issue of reconstruction in more detail in chapter 3 and 5.

5. Conclusion

Apart from theory-internal problems each of the proposals above faces, in particular the question of how optionality and crosslinguistic variation can be accounted for remains largely unanswered.

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b. *Wie viele Geschichten über Diana$_1$ will sie$_1$ dass wir erfinden?
how many stories about Diana wants she that we invent

[43] Heycock's (1995) account can be considered to be an elaboration of the argument-adjunct approach (hence the ungrammaticality of (102), because Principle C is violated before *wh*-movement takes place). However, she argues that even sentences where the R-expression in the fronted NP is contained in an adjunct do not exhibit antireconstruction effects (= do not allow coreference) in case they involve a nonreferential phrase, since they must take narrow scope at LF. Thus, Principle C is violated at LF in sentences like (101-c), because semantics requires (partial) reconstruction.

Optionality, for instance, is difficult to capture if the underlying mechanisms for anaphoric/pronominal binding exclude each other. Recall that in Hornstein's (2001) analysis, for instance, pronominal binding only emerges as last resort option if movement and thus anaphoric binding is illicit. Similarly, Zwart (2002) suggests that all instances of nonaccidental coreference are based on a sisterhood relation between antecedent and bindee, which inevitably yields anaphoric binding, whereas pronominal binding can only be the result of accidental coreference (which does not involve a single constituent in the beginning).

As regards the broad range of crosslinguistic variation we encounter in the field of binding (cf. also the discussion in section 2.3.), it seems to pose a problem for any theory based on strict principles. On the one hand, a good theory has to provide restrictive principles that all languages obey in order to capture the universal generalizations we can observe with respect to binding; on the other hand, it must be flexible enough to account for all the language-specific differences. (And it does not seem to be attractive from a conceptual point of view if the general rules are simply replaced with more and more specific supplements in order to achieve this goal.)[44]

Therefore, competition-based analyses seem to be a good alternative, since they are based on violable constraints. Here, the underlying principles can be formulated in such a general way that they reflect the universal tendencies, and as far as the numerous exceptions are concerned, they can be attributed to constraint violations. Against this background and in view of the crosslinguistic variation, the theory that might provide the most elegant solution is Optimality Theory (cf. chapter 2, section 1. as regards a general introduction). Hence, I will provide an optimality-theoretic analysis of binding which focuses mainly on crosslinguistic variation and optionality

[44]As Manzini & Wexler (1987) point out, simple parametrization across languages would not suffice to capture all the variation among and within languages; instead, they suggest that parametrization would have to affect single lexical items.

(cf. chapter 2) and which is then adapted to a derivational framework (cf. chapter 4 and 5). However, before I turn to these analyses, let us briefly consider some former competition-based approaches to binding.

6. Competition-Based Approaches to Binding

Many competition-based binding theories have been motivated by the observation that the standard Binding Principles A and B are to a certain extent redundant, because they constitute two isolated principles which refer to exactly the same domain of application and are therefore completely symmetric. As a consequence, it has often been proposed to eliminate one of the two principles and replace it with a more general type of constraint which blocks the respective type of bound element if the more specific principle does not rule out the alternative element (cf., for instance, Pica (1986), Burzio (1989, 1991, 1992, 1994, 1996, 1998), Fanselow (1991), Richards (1997), Wilson (2001); as regards a famous predecessor of blocking theory, cf. also Chomsky's (1981) *Avoid Pronoun Principle*).

As an example, let us first consider Fanselow's (1991) blocking theory. Then we take a look at Burzio's (1989, 1991, 1996, 1998) blocking approach which is based on the central principle *Referential Economy*, before we turn to some optimality-theoretic implementation of it which has been developed in Wilson's (2001) serial optimization account. Menuzzi (1999) serves as an example of a binding theory which is also based on violable constraints but does not strictly adhere to Optimality Theory; instead, it relies on cumulative effects as regards constraint violations. Finally, Newson's (1997) approach represents a 'traditional' optimality-theoretic approach to binding (i.e., one that is based on parallel optimization) according to which bound pronouns emerge as partial pronunciation of traces.[45]

[45] A further optimality-theoretic approach to binding has been developed by Kiparsky (2002), which is based on the interaction of both blocking and obviation constraints.

6.1. Fanselow (1991)

Fanselow (1991) assumes that a generalized version of Principle A is valid which excludes anaphoric binding in non-local contexts. The principle he proposes is called *Vollständige Spezifikation* ('Full Specification') and requires that each XP bear all features which are associated with categories of type X in the respective language (cf. Fanselow (1991:242)). For NPs, this means in particular that they must be associated with ϕ-features. However, since anaphors lack an inherent specification for ϕ-features, they must get them from their antecedent in order to satisfy the principle of *Full Specification*. This is only possible in a relatively local configuration, because relativized minimality with respect to (ϕ-)features ('merkmalsbezogene relativierte Minimalität') prevents this feature transmission if a functional head with ϕ-features of its own intervenes. Since INFL generally qualifies as intervening head of this sort, anaphors must usually be bound within the smallest IP containing it, because only in this domain can the anaphor derive ϕ-features from another NP.[46]

But what about Principle B effects? Following Fanselow (1991), we can dispense with an extra principle that regulates the distribution of pronouns. What he proposes is that pronouns can in principle occur everywhere – however, they only emerge if anaphors are blocked by Principle A (or rather the principle of *Full Specification*). This means that the ungrammaticality of pronominal binding does not result from the violation of a particular principle but rather indicates that anaphoric binding is possible and thus to be preferred in the respective context. (In this respect, the theory resembles Hornstein's (2001) approach, according to which pronominal bind-

[46] In this configuration, INFL does not function as intervenor even if we abstract away from the assumption that the anaphor adjoins to INFL at LF (following the LF movement approach of Chomsky (1986b)): "Im Minimalitätsbereich des nächstliegenden INFL kann die Anapher ϕ-Merkmale von jeder Kategorie derivieren, die von IP nicht exkludiert wird und die Anapher c-kommandiert." (Fanselow (1991:248))

ing is also a last resort option. Hence, the latter can also be considered to be a competition-based approach.)

Technically, this blocking mechanism is regulated by the *Proper Inclusion Principle*, which roughly says that "a more specific rule will block the application of a more general one if its domain of application is properly included within it" (Featherston & Sternefeld (2003:27)).[47] With respect to binding, this means that the successful licensing of anaphoric binding via the principle of *Full Specification* blocks the emergence of pronominal binding, which is not restricted to a specific domain.

Note that this kind of analysis predicts a strictly complementary distribution of anaphors and pronouns. Against this background, Fanselow argues that those cases in which optionality seems to occur are no instances of true optionality but involve structural differences. Hence, although the identical phonetic environment is deceptive, anaphoric binding is blocked by the principle of *Full Specification* in one case but not the other.[48]

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[47] In the original, it is defined as follows:

(i) *Proper Inclusion Principle:*

Konkurrieren *ceteris paribus* in einer strukturellen Konfiguration miteinander zwei Merkmalszuweisungsmechanismen A, B oder zwei Mechanismen A, B der Kontrolle eines Merkmals, so kann A nicht angewendet werden, falls allgemein die Domäne der Anwendung von A die Domäne der Anwendung von B echt umfaßt. (Fanselow (1991:275))

[48] However, the data he refers to do not include all the examples mentioned in section 2.3. (for instance, sentences like *Max*$_1$ *glanced behind himself*$_1$/*him*$_1$ are not discussed). Instead, he mainly focuses on bound elements that are embedded in NPs (cf. (i-a)), long distance binding (as the Icelandic example in (i-b)), and German ECM constructions as in (i-c). (Note, however, that I do not agree with the judgement of the latter (which is based on Grewendorf (1989)); I would reject the anaphoric form as ungrammatical, and although pronominal binding is much better, the sentence does not seem to be perfect either.)

Let us finally turn to an advantage that all approaches have that do not regulate the distribution of pronouns with independent principles but assume that it hinges on the licensing of anaphoric binding. In contrast to the standard Binding Theory, these approaches do not exclude *a priori* that pronouns might occur in a relatively local binding relation – they only reject this possibility if anaphoric binding is available instead. However, it the latter is not the case, pronominal binding is not blocked. Hence, we can account straightforwardly for the occurrence of pronouns in typical anaphoric environments in languages where anaphors are not available, as, for instance, in Middle Dutch (cf. (103-a), which is originally taken from Everaert (1986)) and Old English (cf. (103-b), which is originally taken from Faltz (1977)).

(103) a. Hij$_1$ beschuldight hem$_1$.
he blames him
'He$_1$ blames himself$_1$.'

b. ac wundorlice swydhe geeadhmedde Crist$_1$ hine$_1$ sylfne
but wonderfully very humbled Christ him self$_{intensifier}$
'but magnificently, Christ$_1$ humbled himself$_1$'

(cf. Fanselow (1991:264))

Examples like these generally question the validity of standard Principle B, since

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(i) a. They$_1$ heard stories about them$_1$/themselves$_1$.

b. Jón$_1$ telur að Maria elski hann$_1$/sig$_1$.
John believes that Maria like$_{sub}$ him/SE
'John$_1$ thinks that Mary likes him$_1$.'

c. Er$_1$ sah den Braten ihm$_1$/sich$_1$ schon anbrennen.
he saw the roast meat him/SE already get burnt
'He already saw the roast meat get burnt. (And he is the cook.)'

(cf. Fanselow (1991:265ff.))

it generally excludes local pronominal binding, and serve as an argument for competition-based approaches.

6.2. Burzio (1989, 1991, 1996, 1998)

Burzio's (1989, 1991, 1996, 1998) approach to binding is also based on the assumption that the distribution of pronouns is not regulated by a separate principle; instead, pronouns occur if they are not blocked by an anaphoric form. This idea is generalized in so far as it is proposed that it involves all members of the following referential hierarchy:

(104) *Referential hierarchy:*
anaphor > pronoun > R-expression
(where A > B indicates that B has more referential content than A)

The underlying assumption is that, in the default case, a bound NP must be maximally underspecified referentially (principle of *Referential Economy*). Thus, anaphors are generally preferred to pronouns, which are in turn preferred to R-expressions, unless the preferred elements are blocked by some other principle (cf. Burzio (1989:3), Burzio (1991:93; 95f.), Burzio (1996:3f.), Burzio (1998:93)). (For instance, anaphors might be blocked by a locality requirement if the binding relation is not sufficiently local.)

In his 1998 paper, Burzio argues that there are different hierarchies (including the referential hierarchy above) which have an influence on the well-formedness of binding relations. He proposes that the four universally valid hierarchies in (105) are involved and suggests (as the notation indicates) that they can be interpreted as optimality-theoretic constraints (as regards a general introduction to Optimality Theory, cf. chapter 2, section 1.). As mentioned before, the first hierarchy prefers reflexives as bound elements to pronouns, which are considered to be still better than R-expressions; hence, anaphoric binding comes off best. The second hierarchy specifically refers to binding relations involving SE reflexives and says that impersonal antecedents are better than 3rd person antecedents, which are preferred to 1st or 2nd person antecedents. However, even the lowest-ranked constraint is formulated in such a way that this kind of binding relation should actually be avoided, therefore the hierarchy generally punishes antecedent-SE combinations. The third hierarchy has a similar effect, since it evaluates the blocking effect of different subject antecedents for anaphoric binding. Here, the result is that anaphoric binding is blocked best if an indicative complement intervenes between subject antecedent and anaphor, subjunctive complements block second best, and so forth. Finally, the last hierarchy takes into account the morphological structure of the bound element and argues for minimal realization. Hence, morphologically complex elements like pronominals+intensifier adjuncts (which include, for instance, Italian *se-stesso*, French *lui-même*, English *his-own*) come off worst, and the less structure is involved the better it is.

(105)
a. *Referential economy:*
bound NP=reflexive $\gg$ bound NP=pronoun $\gg$ bound NP=R-expr.
EFFECT: prefer reflexives

b. *Optimal agreement w.r.t. antecedent-SE combinations:*
*1st/2nd person-SE $\gg$ *3rd person-SE $\gg$ *impersonal antecedent-SE
EFFECT: avoid reflexives

c. *Optimal antecedent for reflexives:*
type of complement clause:
*indicative $\gg$ *subjunctive $\gg$ *infinitive $\gg$ *small clause $\gg$ *NP
EFFECT: avoid reflexives

d. **Morphological complexity of the bound element:*
*pronominal+intensifier adjunct $\gg$ *pronominal $\gg$ *clitic $\gg$ *$\emptyset$
(with pronominal $\in$ {true pronoun, reflexive})
EFFECT: avoid structure

Burzio focuses on these underlying subhierarchies as such and points out that they already serve as an argument against a hard constraint approach, but he also notes that "[t]he task of compiling an overall theory of anaphora from this perspective will thus essentially consist of appropriately integrating all individual subhierarchies into a single hierarchy" (Burzio (1998:104)). However, an explicit technical elaboration in this direction is not provided. We will come back to the role of universal subhierarchies within the theory of binding in the next chapter.

6.3. Wilson (2001)

Wilson (2001) proposes an optimality-theortic approach to binding which crucially relies on Burzio's work. His central assumption is that in order to find the optimal bound element in a given context, there must be two optimizations involved: one with respect to interpretation and one with respect to form. These two competitions take place successively (hence, we can talk of serial optimization) and apply to form-meaning pairs. First, the interpretation is optimized, which means that the index on the bound NP might change while the realization form (anaphoric *vs* pronominal realization) is not taken into account at all. The optimal candidate then serves as input for the second competition, where the interpretation (i.e. the index) is not altered anymore, but where different forms compete. In the end, the optimization process thus yields the optimal realization and interpretation of the bound element.

However, as Schäfer (2003) shows, the same empirical results can be obtained if the analysis is restricted to purely expressive optimizations if a slightly modified inventory of constraints is taken into account. Hence, the serial optimization approach to binding cannot be justified from an empirical perspective and thus might be questionable from a conceptual point of view.

6.4. Menuzzi (1999)

Menuzzi's (1999) approach to binding is also based on violable constraints. However, they do not interact in an optimality-theoretic fashion, since the concept of constraint ranking is not applied. Instead, Menuzzi assumes that all principles have equal weight, which means that they can be considered to be tied (cf. in particular chapter 2, section 1.4. as regards the notion of tie).[49] What is relevant in order to determine the optimal bound element is thus the total number of violations a given form incurs. Here, another central assumption comes into play, namely that constraints violations are assigned in a cumulative way. Informally speaking, this means that, depending on the severity of the violation, it might count several times. The algorithm that determines the concrete number of violations with respect to constraint R is defined as follows (cf. Menuzzi (1999:234f.)):

(106) a. If R is a condition on chains, and D an analogical chain, then:
(i) R applies to D, and
(ii) if D violates R, then D violates R k times, $k = r - n$,
where n is the degree of D, and r is the number of violations of R that D would incur if it were a (primitive) chain.

b. D(α, β) is an *analogical chain* of degree n iff α and β are NPs such that:
(i) α and β are coindexed,
(ii) α c-commands β, and
(iii) there are n barriers between α and β.

---

[49] Due to the lack of constraint ranking, crosslinguistic variation cannot be captured by reranking either, thus it is assumed that "it is derived from the intrinsic lexical properties of these forms" (Menuzzi (1999:320)).

What this definition also shows is that, following Reinhart & Reuland (1993), Menuzzi (1999) assumes that “Chain Theory is instrumental in the determination of the properties of anaphoric dependencies” (Menuzzi (1999:320)).

6.5. Newson (1997)

Newson (1997) provides an optimality-theoretic approach which also heavily relies on Reinhart & Reuland’s (1993) theory of reflexivity. On the other hand, it is at first sight reminiscent of Hornstein (2001), since it is assumed that pronouns are spelt out traces. However, the crucial difference is that in this theory pronouns are not considered to be the residue of movement. Instead, the proposal is that “a chain is the multiple appearance of a single element in a structure and that a pronoun is an under-pronunciation of one of those appearances” (Newson (1997:15)), i.e. basically the mere “pronunciation of a set of ϕ-features (Newson (1997:15)). (Under this view traces are those members of a chain which do not correspond to the head, which Newson defines as the most prominent element.)

In general, the occurrence of bound pronouns can be considered to be the result of constraint interaction involving the two competing constraints *Silent Trace* (cf. also Pesetsky (1998)) and *Overt Chain*.

(107) *Silent Trace*: Do not pronounce traces. (cf. Newson (1997:8))

(108) *Overt Chain*: $^*\alpha \ldots \cancel{\alpha}$, where each occurrence of α bears a θ-role. (cf. Newson (1997:18))

On the assumption that *Overt Chain* is higher ranked than *Silent Trace*, the use of a pronominal form turns out to be the optimal choice the latter being “the least that can be pronounced without there being total silence” (Newson (1997:18)). In technical terms, this means that although pronouns violate *Silent Trace*, they only violate it once, whereas R-expressions and reflexives are assumed to violate it more often. Of course, the pronoun and the head of the chain occur in different argument positions and bear different θ-roles – this is what *Overt Chain* refers to and what distinguishes this kind of chain (pronoun chains) from movement chains. Since in movement chains only one member is associated with a θ-position, *Overt Chain* applies vacuously and hence the traces are phonetically not realized in order to satisfy *Silent Trace*.

As regards reflexives, their occurrence is triggered by an additional constraint which is based on Reinhart & Reuland's Condition B (cf. (109)). If this constraint is higher ranked than *Silent Trace*, complex anaphors are predicted to be optimal in those contexts in which a binding relation is established between coarguments, i.e. in the case of local binding.

(109) a. *Reflexive-Marking (R-Marking)*:
*α, where α is a reflexive predicate that is not r-marked.
b. A *reflexive predicate* is one for which two or more of its argument positions are occupied by the same element.
c. A predicate is *r-marked* if one of its arguments is a SELF anaphor.
(cf. Newson (1997:20))

However, one issue that is not sufficiently addressed concerns the status of SE anaphors. Since these are non-reflexive-marking elements, they do not satisfy the latter constraint, and since they violate *Silent Trace* more often than pronouns, they should never emerge as winners of a competition – contrary to the facts.

7. Outlook

Against the background of all these different theories and the various problems they face, the goal of the subsequent chapter will be to develop a new proposal which is also based on the assumption that the principles that regulate binding are violable. Hence, the framework in which the approach is located is Optimality Theory. (A general introduction will be provided at the beginning of the next chapter.)

However, the binding theory worked up in chapter 2 will not yet be able to account for reconstruction effects that involve the obviation of Principle A/C effects. As will be argued in chapter 3, the latter crucially rely on a derivational perspective, therefore the binding theory developed in chapter 2 will have to be modified. Therefore, it will be reinterpreted in a derivational framework in chapter 4. As a result, the theory will also be able to account for the reconstruction effects introduced before, as will be shown in detail in chapter 5.

Chapter 2

Optimal Binding

1. An Introduction to Optimality Theory

Since the goal of this chapter is to develop a new optimality-theoretic approach to binding, let us first consider the core concepts of Optimality Theory (OT) before turning to the analysis of the relevant binding data in the subsequent sections.

1.1. Central Assumptions

The basic characteristics that distinguish OT from other theories of grammar comprise the following assumptions (cf. in particular Prince & Smolensky (1993) and subsequent work like Grimshaw (1997), Müller (2000), Legendre (2001), Vikner (2001)).[1]

(i) Constraints may be violated.

(ii) Constraints are universal.

(iii) Constraints are ordered in a (language-specific) hierarchy.

(iv) The grammaticality of a given structure is determined in a competition in

[1]Since I develop a syntactic analysis, I mainly concentrate on work in OT syntax.

which different competing structures take part. This means that the question as to whether a structure is grammatical or not does not only depend on the structure itself but also on the behaviour of the competing candidates.

(v) Each competition yields an optimal candidate. Only optimal candidates are grammatical.

1.2. The Organization of an OT Grammar

The optimality-theoretic competition is based on the input, which is the common denominator of the competing candidates. There is no uniform definition of the input, but what has been proposed, *inter alia*, is the same numeration (following Chomsky (1995)), the same predicate-argument structure plus identical LF (cf. Grimshaw (1997)), and the same target LF (cf. Legendre *et al.* (1998)). Besides, Heck *et al.* (2002) propose an input-free system.

Based on the input, the so-called Generator (= Gen), i.e., the grammatical component which comprises all constraints that are universally inviolable, generates the candidate set. The structures contained in this set are then evaluated on the basis of the OT constraints, those constraints that are violable and ranked in a language-specific hierarchy. The candidate that comes off best in this competition is called the optimal candidate, all other candidates must be rejected as ungrammatical.

As an illustration, consider the following example. Assume that the candidate set comprises the output candidates O_1-O_3. Let X, Y, and Z be the relevant OT constraints with the ranking X $\gg$ Y $\gg$ Z, which means that X is higher ranked than Y and Y is higher ranked than Z. This ranking is also reflected in the so-called tableaux, the tables that are used to illustrate the optimality-theoretic competition, because higher-ranked constraints are ordered on the left of lower-ranked constraints.

On the assumption that candidate O_1 violates constraint Z twice, O_2 violates X and Y, and O_3 violates Y, the competition yields the following result: O_1 is the optimal and thus the only grammatical candidate. This is illustrated in tableau

T_1 as follows. Constraint violations are indicated by stars ($*$). The fatal violation of a candidate, i.e., the constraint violation that makes the candidate lose against the winner, is additionally marked with an exclamation mark ($*!$). Furthermore, I use the symbol "$\Rightarrow$" to indicate the optimal candidate. Note also that multiple violations of low-ranked constraints (as for example the double violation of Z by O_1) cannot compensate for the violation of a higher-ranked constraint. As long as O_1 does not violate X or Y (in contrast to the competing candidates), it remains optimal, independent of the number of its violations of the low-ranked constraint Z.

T_1: Abstract example

Candidates	X	Y	Z
$\Rightarrow$ O_1			$**$
O_2	$*!$	$*$	
O_3		$*!$	

1.3. Crosslinguistic Variation

Since it is a basic principle that OT constraints are universal, crosslinguistic variation cannot be captured by applying different constraints in different languages. However, although the constraints as such apply in all languages alike, crosslinguistic variation can be derived if it is assumed that the constraint rankings are language-specific.

In the previous example it has been shown that with the ranking $X \gg Y \gg Z$ candidate O_1 is the winner of the competition illustrated in T_1. Let us now rerank the constraints X, Y, and Z in such a way that we get the constraint hierarchy $Z \gg Y \gg X$. If we consider again the candidates O_1-O_3, it turns out that O_3 is optimal in this case (cf. T_2). O_1 must be excluded because it violates the Z, which is high ranked in this constraint order, and O_2 must be ruled out because it does not only violate Y (as does O_3) but in addition constraint X.

T_2: Reranking

Candidates	Z	Y	X
O_1	*!*		
O_2		*	*!
$\Rightarrow O_3$		*	

Thus, this example illustrates how constraint reranking can account for crosslinguistic variation: If a language has the underlying constraint order $X \gg Y \gg Z$, only candidate O_1 is predicted to be grammatical, whereas a language with the ranking $Z \gg Y \gg X$ only allows candidate O_3.

1.4. Optionality

Sometimes, a language permits more than one candidate. Optionality arises. Thus it is important to note that an optimality-theoretic competition can also yield more than one optimal candidate.

One possibility how this result can be achieved is that two candidates have exactly the same constraint profile (cf. T_3).

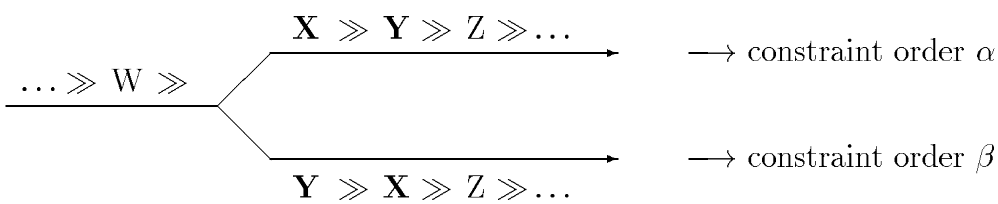
T_3: Identical constraint profiles

Candidates	Z	Y	X
O_1	*!*		
O_2		*	*!
$\Rightarrow O_3$		*	
$\Rightarrow O_4$		*	

But since such a configuration is not very likely to occur, tied constraints provide a much better account of optionality. Informally, a tie can be explained as follows: If two constraints X and Y are tied (notation: $X \circ Y$), a violation of X is as serious as a violation of Y.

In the literature, several definitions of constraint ties can be found (cf. the summary in Müller (2000), chapter 5.4); however, the ties in the subsequent analyses will all be global ties, which can be interpreted as follows. A constraint hierarchy with the global tie X $\circ$ Y stands for two separate hierarchies, one of them containing the dominance relation X $\gg$ Y, the other one containing the relation Y $\gg$ X. (1) serves as a graphic illustration.

(1)



The consequences are the following: If O_1 satisfies X better than O_2 but violates Y more often than O_2 and they behave alike with respect to higher-ranked constraints, but all the other candidates come off worse, then both O_1 and O_2 are optimal – O_1 wins the competition with the underlying constraint order α, O_2 wins with the underlying constraint order β. This is illustrated in T_4 and T_5. What follows over and above is that potential violations of lower-ranked constraints do not play a role (cf. the following tableaux, in which the violations of Z are irrelevant).

T_4: Constraint order α

Candidates	W	X	Y	Z
⇒ O_1			*	
O_2		*!		*
O_3	*!			

T_5: Constraint order β

Candidates	W	Y	X	Z
O_1		$*!$		
$\Rightarrow O_2$			$*$	$*$
O_3	$*!$			

Usually, these tableaux are combined in a single one in which the tied constraints are not separated from each other with a line (cf. T_6). If a constraint violation is only fatal with respect to some of the underlying constraint orders but not for all rankings the tie stands for, this is marked with an exclamation mark in brackets ($*(!)$). In T_6, this is true for the violation of X by O_2 and the violation of Y by O_1: O_2 fatally violates X only with respect to constraint order α (cf. T_4), O_1 fatally violates Y only with respect to ranking β (cf. T_5).

T_6: Global tie

Candidates	W	X	Y	Z
$\Rightarrow O_1$			$*(!)$	
$\Rightarrow O_2$		$*(!)$		$*$
O_3	$*!$			

After these introductory remarks on Optimality Theory, let us now turn to the analysis of the binding data alluded to in the previous chapter.

2. Introduction

As discussed in chaper 1, the standard Binding Theory developed in Chomsky (1981) provides two principles that regulate the distribution of anaphors and pronouns:

Principle A and Principle B, which can be formulated as follows:[2]

(2) *Principle A:*
Anaphors must be A-bound in their binding domain.
Principle B:
Prounouns must be A-free in their binding domain.

(3) The *binding domain* of α is the smallest XP containing α and either
(i) a subject distinct from α which does not contain α, or
(ii) the T with which α checks its (Nominative) Case features.

For sentences like (4) and (5), these two principles make correct predictions. In (4), the binding domain is vP, thus *himself* satisfies Principle A, whereas *him* is ruled out by Principle B. In (5), the binding domain is the embedded vP, which means that the anaphor is not bound in this domain and therefore excluded by Principle A. However, the pronoun fulfils Principle B and is thus allowed.

(4) [$_{\text{TP}}$ Max$_1$ [$_{\text{vP}}$ t$_1$ hates himself$_1$/*him$_1$]]

(5) Max$_1$ knows that [$_{\text{TP}}$ Mary [$_{\text{vP}}$ t$_{Mary}$ likes him$_1$/*himself$_1$]]

In these examples, anaphors and pronouns are in complementary distribution, and – as mentioned before – this is in fact what the two principles in (2) generally suggest. However, this prediction is not always borne out, as (6)-(10) illustrate (cf. also chapter 1, section 2.3.).

(6) Max$_1$ glanced behind himself$_1$/him$_1$.

(7) Max$_1$ saw a gun near himself$_1$/him$_1$.

(8) Max$_1$ saw a picture of himself$_1$/him$_1$.

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[2]The definitions in (2) and (3) are based on Roberts (1997:142; 148).

(9) Max_1 likes jokes about $\text{himself}_1/\text{him}_1$.

(10) Max_1 counted five tourists in the room apart from $\text{himself}_1/\text{him}_1$.

In view of the general tendency illustrated by the sentences in (4) and (5) and the unexpected examples in (6)-(10), there are grounds for the assumption that binding principles are not strict rules, but may be violated. Thus, I propose an optimality-theoretic approach according to which the principles that favour anaphors and those that require pronouns are in conflict with each other, which accounts for the contrasts in (4) and (5); but since these principles are violable, it can be explained why the two elements do not necessarily exclude each other, as observed in (6)-(10).[3]

As regards the candidate set, I assume that sentences which differ only with respect to the question of whether the bound element they contain is realized as anaphor or pronoun are output candidates (O_i) in the same competition. This means that the input must contain the information that a binding relation between the designated antecedent and an element $x \in \{\text{pronoun, anaphor}\}$ will be established.[4] The competition then determines the realization of x, i.e., the optimal bindee.[5]

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[3]Cf. chapter 1, section 6., as regards former competition-based approaches to binding.

[4]This assumption is sufficient as long as only bound pronouns are taken into consideration. If the theory is extended to pronouns in general, the input must be modified in such a way that it does not necessarily presuppose a binding relation (cf. section 10.).

Following Heck *et al.* (2002), it could also be assumed that there is no input in the technical sense. In this case, the identical meaning of the output candidates would be the defining property of the candidate set.

[5]As far as the assumption is concerned that sentences which involve anaphors or pronouns have the same underlying numeration which does not contain their concrete form, cf. also Hornstein (2001) (see chapter 1, section 4.1.4.).

3. The Basic Inventory

It is beyond question that it is the aim of any good theory to capture the empirical facts as accurately as possible while at the same time reducing the axiomatic weight of the underlying principles as much as possible. The first point I want to address is therefore which principles are dispensable and which ones are necessary.

If we start with the principles in (2) and consider again the examples in (6)-(10), the following conclusion can be drawn. Since in all sentences the binding domain is vP, Principle A is fulfilled in all examples, but Principle B is violated. Thus the occurrence of the pronoun should be predicted to be ungrammatical unless there is a further constraint X which is violated by the anaphor and which is tied with Principle B. Tableau T_7 schematically illustrates the situation.[6]

T_7: (6)-(10), e.g., Max_1 glanced behind $himself_1/him_1$

			X	Pr.B
	Input:	Max_1 glanced behind x_1		
⇒	O_1:	Max_1 glanced behind himself_1	*(!)	
⇒	O_2:	Max_1 glanced behind him_1		*(!)

At the same time, it has to be guaranteed that we do not get the same result for sentence (4), where the pronoun has to be ruled out. This means that there must be a crucial difference between examples like (4) and (6)-(10). Reinhart & Reuland (1991, 1993) point out that the sentences in (6)-(10) differ from (4) insofar as the bound elements and their antecedents are arguments of the same predicate only in (4). In (6)-(10), the preposition forms its own predicate, thus the bound elements and their antecedents are not coarguments. This means that the binding relation in (6)-(10) is not as local as the one in (4), although in both cases binding takes

[6]Subsequent tableaux are simplified insofar as the input and the candidates are no longer fully represented.

place within the binding domain of the bound element. This suggests that binding domains as defined in (3) are not the only domains that are relevant for binding;[7] it seems as if binding is also sensitive to a smaller domain, the so-called θ-domain.

(11) The *θ-domain* of α is the smallest XP containing the head that θ-marks α plus its argument positions.

The predicate that θ-marks the bound element in (4) is the verb *hate*, and the argument positions that go with it are the object position and the subject position (= Specv). Hence, the relevant θ-domain is vP. The difference between (4) and (6)-(10) can thus be described as follows. In (4), the bound element is not only bound in its binding domain but also in its θ-domain (by the subject trace), whereas in (6)-(10) the bound element is free in its θ-domain (= PP).

With respect to the question of which principles are needed, the consequence of this observation is that Principle B as defined in (2) should be replaced with a relativized version of Principle B that distinguishes between different domains.

(12) $\mathrm{Pr.B}_{BD}$: Pronouns must be A-free in their binding domain.

(13) $\mathrm{Pr.B}_{ThD}$: Pronouns must be A-free in their θ-domain.

So far, the attempt to restrict the underlying principles has not been very successful. Instead of reducing the number of constraints, we have come to the conclusion that one of the binding principles has to be split up further. However, it has often been observed that we do not need both Principle A and Principle B of Chomsky's Binding Theory (cf., for example, Pica (1986), Burzio (1989, 1991, 1992, 1994, 1996, 1998),

[7]The proposal that domains of different size play a role in Binding Theory is implicitly also made in Manzini & Wexler (1987). In their approach, the notion of governing category is defined on the basis of various parameters that provide a means to distinguish binding relations in different domains (cf. also chapter 1, footnote 10).

Fanselow (1991), Richards (1997), Wilson (2001)). Instead, it is sufficient to keep (some variant of) one of the binding principles and replace the other with a more general type of constraint against the occurrence of certain elements (cf. also chapter 1, section 6.).[8] Against this background, the following two constraints are introduced:

(14) *Anaphor: Avoid anaphors.

(15) *Pron: Avoid pronouns.

The sentences in (4)-(10) can now be accounted for on the basis of the four constraints in (12)-(15) as indicated in T_8-T_{10}.

*T_8: (4) Max$_1$ hates himself$_1$/*him$_1$*

Candidates	Pr.B$_{ThD}$	*Anaphor	Pr.B$_{BD}$	*Pron
⇒ O$_1$: himself$_1$		*		
O$_2$: him$_1$	*!		*	*

[8]Here it is assumed that Principle B is split up and that Principle A effects are the "elsewhere case" (cf. T_9). So far, nothing hinges on this decision. In principle, the binding constraints in this section could as well be reformulated as Principle A constraints, and the reverse ranking within the hierarchies in (16) would yield exactly the same result (in T_8-T_{10}: Pr.A$_{BD}$ ≫ *Pron ∘ Pr.A$_{ThD}$ ≫ *Anaphor). But in the next sections, when the analyses become more complex, it no longer suffices just to reverse the rankings of the hierarchies to get the same result with Principle A. However, although the analysis is probably still reformulable in such a way that Principle A is split up and Principle B is given up, it seems to me that the underlying universal hierarchies would have to be given up, which would be an unwanted result.

Another advantage of the direction taken here is that unbound anaphors can be integrated into the analysis straightforwardly since the approach is not based on a principle that requires anaphors to be bound. This issue will be addressed in section 10.

*T_9: (5) Max$_1$ knows that Mary likes him$_1$/*himself$_1$*

	Candidates	Pr.B$_{ThD}$	*ANAPHOR	Pr.B$_{BD}$	*PRON
	O$_1$: himself$_1$		*!		
⇒	O$_2$: him$_1$				*

T_{10}: (6)-(10), e.g., Max$_1$ glanced behind himself$_1$/him$_1$

	Candidates	Pr.B$_{ThD}$	*ANAPHOR	Pr.B$_{BD}$	*PRON
⇒	O$_1$: himself$_1$		*(!)		
⇒	O$_2$: him$_1$			*(!)	*

T_{10} reveals that the constraint X in T_7 corresponds to *ANAPHOR. Moreover, it shows that the tie between Pr.B$_{BD}$ and *ANAPHOR must be a global tie, since violations of lower-ranked constraints do not play a role.

As far as the underlying constraints are concerned, it can be concluded that they basically belong to two different constraint families. First, there is a group of constraints that have the effect of Chomsky's Principle B and that are only modified with respect to the domain to which they apply. These constraints favour anaphors in more or less local domains. Second, there is a group of markedness constraints that punish the occurrence of certain elements in general. Since these constraints have to counterbalance the effects of the constraints of the other group, they must favour pronouns; thus I assume that *ANAPHOR universally outranks *PRON. Moreover, I propose that the constraints of the other family are also ordered in a universal hierarchy such that the principles that refer to smaller domains are universally higher ranked than those that refer to bigger domains.

(16) *Universal hierarchies:*
*ANAPHOR $\gg$ *PRON; Pr.B$_{ThD}$ $\gg$ Pr.B$_{BD}$

The consequences of these assumptions are twofold. On the one hand, the system is quite restrictive, since it is based on two groups of constraints only, which are inherently universally ordered. Thus, crosslinguistic variation is restricted to different rankings between the two hierarchies. The axiomatic burden is moreover reduced by the fact that the system is only based on one type of binding principle and replaces the other one with a much more general type of constraint. On the other hand, the concept of constraint families makes it possible to get as fine-grained a net of constraints as necessary to capture the empirical facts. Elaborations like these will be examined in the next sections.

4. Different Types of Anaphors

It is not accidental that the examples considered so far are all in English. What has not been taken into account yet – neither by the analysis in the previous section nor by the original binding principles in (2) – is the fact that a language may have different types of anaphors which differ in their distribution. So far, the principles suggest that all anaphors behave alike; however, the following Dutch examples (repeated from chapter 1, section 2.3.) show that this is not always the case.

(17) Max$_1$ wast zich$_1$/zichzelf$_1$.
Max washes SE/himself
'Max$_1$ washes himself$_1$.'

(18) Max$_1$ haat zichzelf$_1$/*zich$_1$.
Max hates himself/SE
'Max$_1$ hates himself$_1$.'

(19) Max$_1$ keek achter zich$_1$/*zichzelf$_1$.
Max glanced behind SE/himself
'Max$_1$ glanced behind himself$_1$.'

Following Reinhart & Reuland (1991, 1993), I will also make use of the terms SE and SELF anaphor. However, unlike Reinhart & Reuland, who assume that this distinction is not necessarily determined by the complexity of the morphological form (cf. Reuland & Reinhart (1995:250)) and who assume moreover that SE anaphors have no reflexivizing function, I consider both forms as reflexivizers and use the terms strictly in the morphological sense; i.e., morphologically simplex anaphors are referred to as SE anaphors and morphologically complex anaphors as SELF anaphors. In order to capture the different behaviour of the two types of anaphors, the general constraint *ANAPHOR is no longer sufficient; however, as mentioned before, the present system can be straightforwardly elaborated by splitting up *ANAPHOR into the two more fine-grained constraints *SE and *SELF.

(20) *SE: Avoid simplex anaphors.

(21) *SELF: Avoid complex anaphors.

In the previous section, it was furthermore argued that *ANAPHOR is universally higher ranked than *PRON. Regarding the ranking between the two new constraints in (20) and (21), I assume that *SELF universally outranks *SE.

This ranking can be motivated as follows. First, there seems to be a tendency that the locality conditions are much stricter for complex anaphors than for simplex anaphors. Thus, the hierarchy can be interpreted as reflecting the decreasing correlation between the respective elements and their requirement for local binding.

Furthermore, König & Siemund (2000) emphasize that SELF anaphors like *zichzelf* are composed of a simplex anaphor plus an adnominal intensifier. From this point of view it could be argued that the latter also intensifies the anaphoric properties of the expression, and hence the hierarchy can be interpreted as an indication of the decrease in anaphoricity.

(22) *Universal hierarchy:* *SELF $\gg$ *SE $\gg$ *PRON

As far as the Principle B constraints are concerned, they also have to be modified in such a way that they are sensitive to different degrees of anaphoricity. Pr.B_{BD}

and Pr.B$_{ThD}$ are therefore replaced with the following constraints, which do not simply refer to pronouns, but to the degree of anaphoricity of a given element. Moreover, since more than one domain seems to play a role in Binding Theory, the term binding domain might be misleading; thus, the name of this particular domain will be replaced with the term subject domain.

(23) The *subject domain* of α is the smallest XP containing α and either
(i) a subject distinct from α which does not contain α, or
(ii) the T with which α checks its (Nominative) Case features.

(24) Reflexivity in SD (Refl.$_{SD}$):
If α is bound in its subject domain, α must be maximally anaphoric.

(25) Reflexivity in ThD (Refl.$_{ThD}$):
If α is bound in its θ-domain, α must be maximally anaphoric.

The constraints in (24) and (25) are gradient, which means the following: If, in a given language, there are n elements that are more anaphoric than α, the element under consideration, and α is bound in its subject/θ-domain, it violates Reflexivity in SD/Reflexivity in ThD n times. The analyses in the following sections will reveal the effects of these constraints.

Apart from the hierarchy in (22), it is furthermore still assumed that Reflexivity in ThD universally outranks Reflexivity in SD; thus, the approach is based on two universal constraint subhierarchies, which restricts language-particular variation to different combinations of these two underlying hierarchies. The concept of universal constraint subhierarchies has already been successfully applied in OT syntax by Aissen (1999, 2000), who derives them by means of local constraint conjunction and harmonic alignment from underlying grammatical hierarchies that express markedness relations (like the Thematic Hierarchy).[9] The question that might therefore arise at this point is whether the universal constraint subhierarchies introduced above can also be derived from simpler constraints by some general means of constraint generation. In fact, the answer will be yes, as will be thoroughly discussed in section 14.

5. An Analysis of English, German, Dutch, and Italian

On the basis of the constraints introduced in the previous section, let us now turn to the analysis of the following English, German, Dutch, and Italian data, which correspond to the English examples discussed in section 3. and which can be characterized as follows: In (26), the binding relation is so local that binding does not only take place within the subject domain but also within the θ-domain. By contrast, (27) serves as an example where the antecedent is in neither of these two domains. Finally, in (28)-(32), the bound element is only bound within its subject domain, but not within its θ-domain.[10]

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[9]These grammatical hierarchies, which have generally emerged from functional linguistics, usually reflect tendencies, and Newmeyer (2002a, b) points out that it might be questionable to what extent these functionally-motivated, exception-ridden hierarchies can serve as a basis for universal constraint hierarchies; moreover, he doubts whether OT constraints should generally be linked to some functional motivation.

On the other hand, Bresnan & Aissen (2002) argue that it is exactly the violability of OT constraints that permits the integration of such tendencies into a formal theory of grammar.

[10]The Dutch and English data are from Koster (1984), Reinhart & Reuland (1991, 1993), Pollard & Sag (1992), Reuland & Reinhart (1995), Reuland & Everaert (2001) as well as from Eric Reuland (p.c.) and Erik Jan van der Torre (p.c.). The Italian data is mainly from Roberta D'Alessandro (p.c.), but cf. also Giorgi (1984). As far as the German data is concerned, cf. also Sternefeld (1985) and Fanselow (1991).

(26) a. Max_1 hates himself_1/*him_1.

b. Max_1 hasst sich selbst_1/sich_1/*ihn_1.

c. Max_1 haat zichzelf_1/*zich_1/*hem_1.

d. Max_1 si_1 odia/ odia se stesso_1/ *lo_1 odia.

(27) a. Max_1 knows that Mary likes him_1/*himself_1.

b. Max_1 weiß, dass Maria ihn_1/*sich_1/*sich selbst_1 mag.

c. Max_1 weet dat Mary hem_1/*zich_1/*zichzelf_1 leuk vindt.

d. Max_1 sa che Maria lo_1 ama /*si_1 ama/ ama *se stesso_1.

(28) a. Max_1 glanced behind himself_1/him_1.

b. Max_1 blickte hinter sich_1/??sich selbst_1/*ihn_1.

c. Max_1 keek achter zich_1/*zichzelf_1/hem_1.

d. Max_1 ha dato un'occhiata dietro di sé_1/*dietro se stesso_1/?dietro di lui_1.

(29) a. Max_1 saw a gun near himself_1/him_1.

b. Max_1 bemerkte eine Pistole neben sich_1/??sich selbst_1/*ihm_1.

Max noticed a gun next.to SE/himself/him

c. Max_1 zag een pistool naast zich_1/*zichzelf_1/hem_1.

d. Max_1 vide un fucile vicino a sé_1/*se stesso_1/lui_1.

(30) a. Max_1 saw a picture of himself_1/him_1.

b. Max_1 sah ein Foto von sich_1/sich selbst_1/*ihm_1.

c. Max_1 zag een foto van *zich_1/zichzelf_1/hem_1.

d. Max_1 vide una foto di ??sé_1/se stesso_1/?lui_1.

(31) a. Max_1 likes jokes about himself_1/him_1.

b. Max_1 mag Späße über sich_1/sich selbst_1/*ihn_1.

c. Max_1 houdt van grappen over *zich_1/zichzelf_1/hem_1.

d. Max_1 ama le barzellette ??su di sé_1/su se stesso_1/su di lui_1.

(32) a. Max_1 counted five tourists in the room apart from himself_1/ him_1.

b. Max_1 zählte fünf Touristen im Raum außer sich_1/sich selbst_1/ *ihm_1.

c. Max_1 telde vijf toeristen in de kamer behalve *zich_1/zichzelf_1/ ??hem_1.

d. Max_1 contò cinque turisti nella stanza oltre a sé_1/se stesso_1/lui_1.

As far as English is concerned, the sentences in (28)-(32) pattern alike; both the anaphor and the pronoun are allowed. However, this is not true for the other languages under consideration. In these languages, the examples in (28) and (29) seem to be different from those in (30)-(32). Koster (1984) suggests that the relevant factor might be the distinction between locational *vs* non-locational PPs. But since in Dutch and Italian, (32) does not really pattern like (30) and (31) either, additional factors (like the degree of logophoricity) might play a role; I therefore restrict the analysis to examples like (28) and (29) and leave the question open in what respect sentences like (30)-(32) might be different.[11]

5.1. English

With respect to the English examples, which have already been discussed before, it can be concluded that the analyses in T_8-T_{10} from section 3. are not affected by the modification of the constraints in (24) and (25), which are repeated in (33) and (34).

(33) Reflexivity in SD (Refl.$_{SD}$):

If α is bound in its subject domain, α must be maximally anaphoric.

[11] As far as Dutch is concerned, note that for some native speakers (28-c) is not grammatical with the strong pronoun *hem* but only with the weak pronoun *'m*. This is also compatible with the theory developed here, since it does not differentiate between different types of pronominal forms. Thus, the difference between weak and strong pronouns must be derived independently.

(34) Reflexivity in ThD (Refl.$_{ThD}$):

If α is bound in its θ-domain, α must be maximally anaphoric.

In particular, the gradience of the reflexivity constraints does not play a role here. Since English lacks simple anaphors, there is only one element which is more anaphoric than the pronoun – the complex anaphor *himself*. Hence, the pronominal candidate gets only one star if it violates a reflexivity constraint, and the constraint *SE can be neglected.

As far as the ranking of the other constraints is concerned, it can be concluded first of all that Reflexivity in ThD must be higher ranked than *SELF (cf. T_{11}). As T_{13} shows, *SELF must be tied with Reflexivity in SD, and T_{12} illustrates that this tie must be higher ranked than *Pron, in accordance with the underlying universal hierarchies. Thus, the ranking for English looks as follows:

(35) *English ranking:*

Refl.$_{ThD}$ $\gg$ *SELF $\circ$ Refl.$_{SD}$ $\gg$ *Pron

*T_{11}: (26-a) Max$_1$ hates himself$_1$/*him$_1$*

	Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{SD}$	*SE	*Pron
⇒	O_1: himself		*			
	O_2: him	*!		*		*

*T_{12}: (27-a) Max$_1$ knows that Mary likes him$_1$/*himself$_1$*

	Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{SD}$	*SE	*Pron
	O_1: himself		*!			
⇒	O_2: him					*

T_{13}: (28-a)-(32-a), e.g., Max$_1$ glanced behind himself$_1$/him$_1$

Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{SD}$	*SE	*Pron
⇒ O$_1$: himself		*(!)			
⇒ O$_2$: him			*(!)		*

5.2. German

As in Dutch, there are two different types of anaphors in German.[12] In sentences like (26-b), where binding takes place within the θ- and therefore also within the subject domain, both anaphors are grammatical, whereas the pronoun must be excluded (as in English). However, if there is neither a binding relation within the θ- nor in the subject domain, as in (27-b), the situation is exactly the reverse: in this case, only the pronoun is grammatical and both anaphors are ungrammatical. In (28-b) and (29-b), binding is more local than in (27-b), but it is not as local as in (26-b) – the bound element is bound in its subject domain, but not in its θ-domain. In

[12] The German anaphors *sich* and *sich selbst* are more interchangeable than Dutch *zich* and *zichzelf*. However, examples like (28-b) and (29-b) show that they do not always have the same distribution. Still, it has therefore often been argued that German *sich selbst* is not a SELF anaphor like Dutch *zichzelf* but rather an intensified SE anaphor (cf., among others, Tibor Kiss (p.c.) and Wolfgang Sternefeld (p.c.)). However, I assume that the combination of simplex anaphor + adnominal intensifier generally yields a morphologically complex = SELF anaphor (cf. also section 4. and the references cited there), because the intensifier makes the anaphor more complex and also intensifies its degree of anaphoricity. Hence, there are no intensified SE anaphors. From this point of view, the distribution of German *sich selbst* is regulated by the present theory along the same lines as the distribution of other complex anaphors (like Dutch *zichzelf*) and no additional principles are required. (Note, however, that the analysis of German *sich selbst* as SE anaphor would in principle also be compatible with the current approach. On this assumption, German would simply lack SELF anaphors – just as English lacks SE anaphors.)

sentences like these, only the simple anaphor is allowed in German, and both the SELF anaphor and the pronoun must be excluded.

On the whole, there are two elements that are more anaphoric than the pronoun, and the violation of a reflexivity constraint by the latter is therefore marked with two stars (as in T_{14}, for example). Since a simple anaphor which violates a reflexivity constraint gets only one star, the system makes the correct prediction for sentences like (26-b) if *SELF and REFLEXIVITY IN THD are tied (cf. T_{14}). T_{16} shows that REFLEXIVITY IN SD must be ranked below this tie and above *SE. Again it is crucial that the reflexivity constraints are gradient, otherwise the pronoun would beat the anaphor. T_{15} finally illustrates that *PRON must be ranked below *SE, which is predicted by the underlying hierarchy.

(36) *German ranking:*

$\text{Refl.}_{ThD} \circ \text{*SELF} \gg \text{Refl.}_{SD} \gg \text{*SE} \gg \text{*PRON}$

*T_{14}: (26-b) Max$_1$ hasst sich selbst$_1$/sich$_1$/*ihn$_1$*

	Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{SD}$	*SE	*PRON
⇒	O_1: sich selbst		*(!)			
⇒	O_2: sich	*(!)		*	*	
	O_3: ihn	**!		**		*

*T_{15}: (27-b) Max$_1$ weiß, dass Maria ihn$_1$/*sich$_1$/*sich selbst$_1$ mag*

	Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{SD}$	*SE	*PRON
	O_1: sich selbst		*!			
	O_2: sich				*!	
⇒	O_3: ihn					*

*T_{16}: (28-b), (29-b), e.g., Max$_1$ blickte hinter sich$_1$/??sich selbst$_1$/*ihn$_1$*

	Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{SD}$	*SE	*PRON
	O_1: sich selbst		*!			
⇒	O_2: sich			*	*	
	O_3: ihn			**!		*

5.3. Dutch

In sentences like (27) (no binding within θ- or subject domain) the situation in Dutch is the same as in English and German; the bound element must be a pronoun. If binding takes place within the θ- and subject domain (cf. (26-c)), Dutch differs from German insofar as the simple anaphor must be excluded in addition to the pronoun. In sentences like (28-c) and (29-c) (binding within the subject but outside the θ-domain), the situation is reversed. In contrast to German, both the SE anaphor and the pronoun are grammatical and only the SELF anaphor must be excluded.

As far as the Dutch ranking is concerned, T_{17} indicates that, unlike in German, REFLEXIVITY IN THD must be higher ranked than *SELF. Moreover, T_{19} shows that REFLEXIVITY IN SD must be tied with *SE, and the tie must be ranked below *SELF. Since the reflexivity constraints are gradient, it is then correctly predicted that both the simple anaphor and the pronoun are winners of the competition. T_{18} confirms once more the universal hierarchy *SE ≫ *PRON.

(37) *Dutch ranking:*

Refl.$_{ThD}$ ≫ *SELF ≫ Refl.$_{SD}$ ∘ *SE ≫ *PRON

*T_{17}: (26-c) Max$_1$ haat zichzelf$_1$/*zich$_1$/*hem$_1$*

Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{SD}$	*SE	*PRON
⇒ O$_1$: zichzelf		∗			
O$_2$: zich	∗!		∗	∗	
O$_3$: hem	∗!∗		∗∗		∗

*T_{18}: (27-c) Max$_1$ weet dat Mary hem$_1$/*zich$_1$/*zichzelf$_1$ leuk vindt*

Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{SD}$	*SE	*PRON
O$_1$: zichzelf		∗!			
O$_2$: zich				∗!	
⇒ O$_3$: hem					∗

*T_{19}: (28-c), (29-c), e.g., Max$_1$ keek achter zich$_1$/*zichzelf$_1$/hem$_1$*

Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{SD}$	*SE	*PRON
O$_1$: zichzelf		∗!			
⇒ O$_2$: zich			∗	∗(!)	
⇒ O$_3$: hem			∗∗(!)		∗

5.4. Italian

With respect to sentences like (26-d) (binding within θ- and subject domain), Italian patterns like German; both anaphors are allowed, but the pronoun is ungrammatical. In sentences like (27-d) (no binding within θ- or subject domain), the opposite is true. As in the other languages under consideration, only the pronoun is grammatical. If binding takes place within the subject but outside the θ-domain (cf. (28-d), (29-d)), Italian patterns like Dutch – both the pronoun and the SE anaphor are grammatical, whereas the SELF anaphor must be excluded.

As far as the Italian ranking is concerned, T_{20} shows that REFLEXIVITY IN THD must be tied with *SELF, as in German (cf. T_{14}). With respect to the sentences in (28) and (29), Italian patterns like Dutch, thus it has to be assumed that REFLEXIVITY IN SD and *SE are tied (cf. T_{19}/T_{22}). Furthermore, T_{22} shows that *SELF must be higher ranked than the second tie, and T_{21} illustrates again that *SE ≫ *PRON.[13]

(38) *Italian ranking:*

Refl.$_{ThD}$ ∘ *SELF ≫ Refl.$_{SD}$ ∘ *SE ≫ *PRON

*T_{20}: (26-d) Max$_1$ si$_1$ odia/ odia se stesso$_1$/ *lo$_1$ odia*

	Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{SD}$	*SE	*PRON
⇒	O_1: se stesso		∗(!)			
⇒	O_2: si	∗(!)		∗	∗	
	O_3: lo	∗∗!		∗∗		∗

*T_{21}: (27-d) Max$_1$ sa che Maria lo$_1$ ama/ *si$_1$ ama/ ama *se stesso$_1$*

	Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{SD}$	*SE	*PRON
	O_1: se stesso		∗!			
	O_2: si				∗!	
⇒	O_3: lo					∗

*T_{22}: (28-d), (29-d), e.g., Max$_1$ vide un fucile vicino a sé$_1$/*se stesso$_1$/lui$_1$*

	Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{SD}$	*SE	*PRON
	O_1: se stesso		∗!			
⇒	O_2: sé			∗	∗(!)	
⇒	O_3: lui			∗∗(!)		∗

[13] Whether the elements occur as clitics or full forms is regulated by different constraints and is not subject to the Binding Theory.

5.5. Predictions

As the analyses above show, the presented binding approach captures straightforwardly the crosslinguistic variation we find in examples like (26)-(29). However, this does not mean that this theory can describe any arbitrary binding system. For example, a language which allows neither the element E_1 nor any element that is more anaphoric than E_1 as bound element in a binding relation within the domain X, but which allows these elements in a less local binding relation (i.e., within a domain Y such that $X \subset Y$), is generally excluded.

situation:	binding in domain X	*SELF ana.	*SELF ana. and *SE-ana.
prediction:	binding in domain $Y \supset X$	*SELF ana.	*SELF ana. and *SE ana.

This can be explained as follows. If in the competition a candidate O_1 loses against a candidate O_2, and O_2 contains a less anaphoric bound element than O_1, the fatal violation of O_1 cannot result from a reflexivity constraint, since these constraints always favour those candidates that contain more anaphoric bindees. Hence, O_1 loses because of a constraint belonging to the *SELF-hierarchy. If binding is even less local, i.e., if the binding relation is restricted to an even bigger domain, the constraint violations of the *SELF-hierarchy remain the same; the only difference is that there are fewer violations concerning the reflexivity constraints. Therefore O_1 cannot be optimal in this competition either.

Conversely, it is predicted that there is no language which allows a pronoun in a relatively local binding relation, but which excludes it if binding is less local.

situation:	binding in domain X	pron. grammatical
prediction:	binding in domain $Y \supset X$	pron. grammatical

It has already been noted that the difference between local and less local binding is reflected in the competition only insofar as the number of violations of the reflexivity constraints is smaller in the latter case. But since these constraints favour anaphors, the pronominal candidate can only improve if violations of this type are lost. Hence the pronoun remains optimal if the binding relation becomes less local – a prediction which is again borne out by natural languages.

6. ECM Verbs

ECM ('exceptional Case-marking') verbs pose a problem for the analysis presented so far, since they only allow anaphors in the embedded subject position. In sentences like (39),[14] the subject domain and the θ-domain of the bound element do not coincide, and the element is only bound in its subject domain (= matrix vP) but not in its θ-domain (= embedded vP).

(39) $[_{\mathrm{TP}}$ Jan$_1$ $[_{\mathrm{vP}}$ t$_1$ heard $[_{\mathrm{vP}}$ himself$_1$/*him$_1$ sing$]]]$

As in (28-a)-(32-a) (cf. T$_{13}$), it is therefore predicted that in English not only anaphors but also pronouns should be allowed in the embedded subject position.

T_{23}: Wrong prediction

Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{SD}$	*PRON
⇒ O$_1$: himself		*(!)		
*⇒ O$_2$: him			*(!)	*

However, there is a crucial difference between the examples in (28)-(32) and (39) concerning Case. In (28)-(32), the bound element checks its Case features against the Case features of the preposition; i.e., Case checking takes place within the θ-domain

[14] This example is chosen because Dutch and German have no *to*-infinitival ECM structures. However, the analysis of English ECM constructions with *to*-infinitive is the same.

(= PP). In (39), on the other hand, Case marking is "exceptional", which means that the bound element checks Case against the features of the matrix v. Hence, Case checking does not take place within the θ-domain but within the matrix vP, the Case domain of the bound element.

(40) The *Case domain* of α is the smallest XP containing α and the head that bears the Case features against which α checks Case.

The difference between ECM structures and the previous examples can thus be described as follows. In all sentences discussed so far, the Case domain has corresponded to the θ-domain (vP in (26), (27); PP in (28)-(32)). The ECM example in (39) is the first sentence where the Case domain and the θ-domain are not identical. Since this property seems to have an impact on the binding behaviour, the following constraint is introduced.

(41) REFLEXIVITY IN CD (Refl.$_{CD}$):
If α is bound in its Case domain, α must be maximally anaphoric.

As (39) illustrates, the relation between the domains introduced so far is as shown in (42-a), which suggests that the underlying universal constraint hierarchy should be extended as in (42-b).

(42) a. θ-domain $\subseteq$ Case domain $\subseteq$ subject domain
b. Refl.$_{ThD}$ $\gg$ Refl.$_{CD}$ $\gg$ Refl.$_{SD}$

Since REFLEXIVITY IN CD is not ranked above REFLEXIVITY IN THD, the introduction of the new constraint does not affect the analyses in the previous sections, where Case domain and θ-domain were identical. However, it does have the desired effect on the analysis of ECM structures. As T_{24} shows, REFLEXIVITY IN CD makes it possible to rule out the pronoun in sentences like (39).

(43) *English:*

Refl.$_{ThD}$ ≫ Refl.$_{CD}$ ≫ *SELF ∘ Refl.$_{SD}$ ≫ *PRON

*T$_{24}$: (39) Jan$_1$ heard himself$_1$/*him$_1$ sing*

Candidates	Refl.$_{ThD}$	Refl.$_{CD}$	*SELF	Refl.$_{SD}$	*PRON
⇒ O$_1$: himself			*		
O$_2$: him		*!		*	*

So far, it looks as if we could dispense with REFLEXIVITY IN THD completely and replace it with REFLEXIVITY IN CD instead. However, consider ECM structures in Dutch.[15]

(44) Jan$_1$ hoorde zichzelf$_1$/zich$_1$/*hem$_1$ zingen.

Jan heard himself/SE/him sing

'Jan$_1$ heard himself$_1$ sing.'

In contrast to English, where REFLEXIVITY IN CD must be higher ranked than *SELF, the two constraints must be tied in Dutch. As a result, both types of anaphors turn out to be winners of the competition, whereas the pronoun is ruled out because it comes off worse with regard to the gradient reflexivity constraints (cf. T$_{25}$).

[15]It has been argued that the simple anaphor is generally excluded if the bound element does not refer to the individual denoted by the antecedent as such but to a separate entity (like a statue or a recording) (cf., for instance, Zwart (2002) and, as regards these examples in English, Jackendoff (1992)). I will ignore these special cases and assume that they are derived differently. (After all, the antecedent and the bound element are not really identical in these cases, and therefore it is not legitimate to use the x-encoding for the binding relation, since it presupposes a different semantic relation (i.e. identity).)

(45) *Dutch:*

$\text{Refl.}_{ThD} \gg \text{Refl.}_{CD} \circ \text{*SELF} \gg \text{Refl.}_{SD} \circ \text{*SE} \gg \text{*P}{\small\text{RON}}$

*T_{25}: (44) Jan$_1$ hoorde zichzelf$_1$/zich$_1$/*hem$_1$ zingen*

	Candidates	Refl._{ThD}	*SELF	Refl._{CD}	Refl._{SD}	*SE	*PRON
⇒	O_1: zichzelf		*(!)				
⇒	O_2: zich			*(!)	*	*	
	O_3: hem			**!	**		*

However, the analysis of sentences like (26-c) (cf. T_{17}) has shown that REFLEXIVITY IN THD must be higher ranked than *SELF in Dutch. Hence, it can be concluded that REFLEXIVITY IN THD is independently needed and cannot be replaced with REFLEXIVITY IN CD.

German also allows both types of anaphors in sentences like the following.

(46) Jan$_1$ hörte sich selbst$_1$/sich$_1$/*ihn$_1$ singen.
Jan heard himself/SE/him sing
'Jan$_1$ heard himself$_1$ sing.'

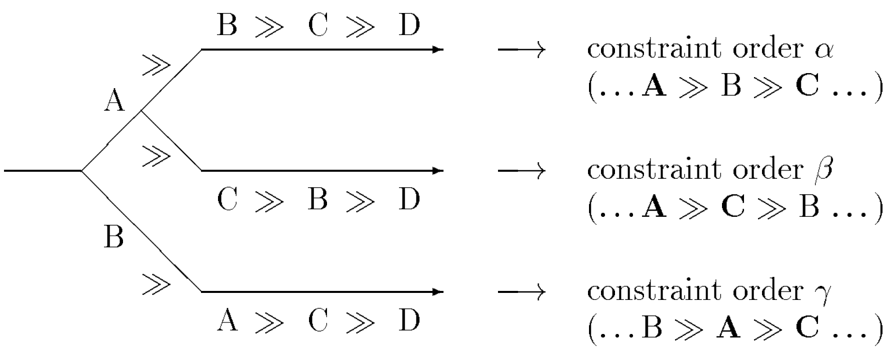
This suggests that *SELF and REFLEXIVITY IN CD must be tied here too. However, this raises a problem with respect to the underlying hierarchy indicated in (42-b), since it has been shown in the previous section (cf. T_{14}) that *SELF must also be tied with REFLEXIVITY IN THD. On the standard assumption that constraint rankings are transitive, this would lead to the conclusion that REFLEXIVITY IN THD must be tied with REFLEXIVITY IN CD, too, which contradicts the ranking in (42-b).[16]

If (42-b) represents a universal hierarchy, the assumption that the notion of tie is transitive must be discarded. I will therefore assume that transitivity is restricted

[16] However, it would not affect the previous analyses from section 5.

to dominance relations, an alternative that has already been explored in Fischer (2001). According to this approach, global ties are not necessarily transitive, which means that A $\circ$ B and B $\circ$ C does not necessarily imply that A $\circ$ C. Instead, it is assumed that a ranking in which A $\circ$ B and B $\circ$ C holds is compatible with a ranking according to which A must always be higher ranked than C. Note that this modification is not a conceptual weakening; after all, A $\circ$ B is just an abbreviation for A $\gg$ B $\vee$ B $\gg$ A, and it is still assumed that the dominance relation is transitive. Hence, transitivity is locally preserved in the constraint orders that result if the ties are resolved. This is graphically illustrated in (47).

(47)



With respect to the analysis of German ECM constructions, this means that although REFLEXIVITY IN THD is tied with *SELF and *SELF is tied with REFLEXIVITY IN CD, it can be assumed that REFLEXIVITY IN THD is still higher ranked than REFLEXIVITY IN CD. In T_{26} (and all subsequent tabeaux), the non-transitivity of ties is indicated by dotted lines, in (48) it is indicated by the brackets.[17]

[17] If the tie in (48) is resolved, we get the following three constraint orders:

(i) Refl.$_{ThD}$ $\gg$ Refl.$_{CD}$ $\gg$ *SELF $\gg$ Refl.$_{SD}$ $\gg$ *SE $\gg$ *PRON

(ii) Refl.$_{ThD}$ $\gg$ *SELF $\gg$ Refl.$_{CD}$ $\gg$ Refl.$_{SD}$ $\gg$ *SE $\gg$ *PRON

(iii) *SELF $\gg$ Refl.$_{ThD}$ $\gg$ Refl.$_{CD}$ $\gg$ Refl.$_{SD}$ $\gg$ *SE $\gg$ *PRON

(48) *German:*

(Refl.$_{ThD}$ $\gg$ Refl.$_{CD}$) $\circ$ *SELF $\gg$ Refl.$_{SD}$ $\gg$ *SE $\gg$ *Pron

*T_{26}: (46) Jan$_1$ hörte sich selbst$_1$/sich$_1$/*ihn$_1$ singen*

	Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{CD}$	Refl.$_{SD}$	*SE	*Pron
⇒	O_1: s. selbst		*(!)				
⇒	O_2: sich			*(!)	*	*	
	O_3: ihn			**!	**		*

7. Long Distance Anaphora

In the previous sections, I have shown that the subject domain is not the only domain relevant for binding. There are also smaller domains to which binding is sensitive. In this section, I will discuss the issue of so-called long distance (LD) anaphora, i.e., anaphors that can be bound outside their subject domain. The following Icelandic sentence illustrates this phenomenon.[18]

(49) Jón$_1$ skipaði Pétri$_2$ PRO$_2$ að raka sig$_1$/??sjálfan sig$_1$/hann$_1$ á
John ordered Peter to shave$_{inf}$ SE/himself/him on
hverjum degi.
every day
'John$_1$ ordered Peter to shave him$_1$ every day.'

This means that a candidate is optimal under the ranking in (48) if it is optimal under at least one of these three orders.

[18] The Icelandic data are from Gunnar Hrafn Hrafnbjargarson (p.c.) and partly from Reuland & Everaert (2001).

Data like these constitute a further problem for the standard Binding Theory, since the latter is solely based on the notion of binding domain (here: subject domain) and is thus unable to handle data that rely on domains of different size. By contrast, it is straightforwardly possible to integrate phenomena like long distance binding into the present approach; we only have to introduce a new domain which comprises the whole sentence, plus the corresponding reflexivity constraint.

(50) The *root domain* of α is the XP that forms the root of the sentence containing α.

(51) REFLEXIVITY IN RD (Refl.$_{RD}$):
If α is bound in its root domain, α must be maximally anaphoric.

Now we can turn to the analysis of example (49). In (49), the bound element is free in its θ-, Case, and subject domain (= embedded vP), but it is bound in its root domain (= matrix TP). Hence, the reflexivity constraints concerning θ-, Case, and subject domain do not play a role in this competition and are therefore ignored in the following tableaux. As far as REFLEXIVITY IN RD is concerned, T_{27} shows that the binding facts are correctly captured if REFLEXIVITY IN RD is ranked below *SELF and tied with *SE.[19]

[19] In older literature on Icelandic (cf., e.g., Thráinsson (1979, 1991), Anderson (1986), Everaert (1986)), the pronoun is usually ruled out in examples like (49) and the simple anaphor is said to be the only admissible bound element. This result would be achieved if the tie in T_{27} were replaced with the ranking Refl.$_{RD}$ $\gg$ *SE.

I leave it open as to whether these different judgements are due to generational differences, as suggested by Gunnar Hrafn Hrafnbjargarson (p.c.), or whether this is some general variation among speakers of Icelandic, as Joan Maling (p.c.) proposes. In the first case, the interpretation would be that the ranking Refl.$_{RD}$ $\circ$ *SE has replaced the ranking Refl.$_{RD}$ $\gg$ *SE; in the latter case, the conclusion would be that both rankings can be found in Modern Icelandic.

T_{27}: (49) Jón$_1$ skipaði Pétri að raka sig$_1$/??sjálfan sig$_1$/hann$_1$ á hverjum degi

	Candidates	*SELF	Refl.$_{RD}$	*SE	*PRON
	O$_1$: sjálfan sig	*!			
⇒	O$_2$: sig		*	*(!)	
⇒	O$_3$: hann		**(!)		*

If REFLEXIVITY IN RD is ranked below *SE, LD anaphora are ruled out in general. This is what we find, for instance, in German, as the analysis of (52) illustrates.

(52) Hans$_1$ befahl Peter, ihn$_1$/*sich$_1$/*sich selbst$_1$ jeden Tag zu rasieren.
John ordered Peter him/SE/himself every day to shave
'John$_1$ ordered Peter to shave him$_1$ every day.'

*T_{28}: (52) Hans$_1$ befahl Peter, ihn$_1$/*sich$_1$/*sich selbst$_1$ jeden Tag zu rasieren*

	Candidates	*SELF	*SE	Refl.$_{RD}$	*PRON
	O$_1$: sich selbst	*!			
	O$_2$: sich		*!	*	
⇒	O$_3$: ihn			**	*

However, things are more complicated than it might seem at first sight, because the possibility of LD binding depends on the type of the intervening complement clause. In Icelandic, only infinitives, as in (49), or subjunctives, as in (53-a), may separate an anaphor from its antecedent. If an indicative complement intervenes, LD binding must be expressed with a pronoun (cf. (53-b)).

Note moreover that in the variant of Icelandic I quote pronominal binding does not get worse in sentences like (49) if *Pétri* is replaced with *mér* ('me') or any other DP that does not agree with the matrix subject in person and/or number.

(53) a. Jón$_1$ segir að Pétur raki sig$_1$/??sjálfan sig$_1$/hann$_1$ á hverjum
John says that Peter shave$_{sub}$ SE/himself/him on every
degi.
day
'John$_1$ says that Peter shaves him$_1$ every day.'

b. Jón$_1$ veit að Pétur rakar ??sig$_1$/*sjálfan sig$_1$/hann$_1$ á
John knows that Peter shaves$_{ind}$ SE/himself/him on
hverjum degi.
every day
'John$_1$ knows that Peter shaves him$_1$ every day.'

In fact, languages may vary with respect to the question of in which type of embedded clause LD binding is allowed. However, languages that allow intervening indicative complements between the antecedent and the LD anaphor will also allow intervening subjunctives, and languages that allow intervening subjunctives will also allow intervening infinitive complements (cf. Burzio (1998)). In Russian, for instance, LD binding may only cross infinitive complements, whereas in Faroese, for example, both finite and non-finite clauses may intervene.[20] Italian patterns like Icelandic insofar as only intervening indicative complements block LD binding.

All this suggests that the root domain is not the only domain bigger than the subject domain to which binding is sensitive. There must be a more fine-grained distinction of domains in order to capture the empirical facts. Following Rappaport (1986), I propose that the relevant missing domains are the finite and the indicative domain.

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[20]Strictly speaking, there is no subjunctive in Faroese; but both infinitive and indicative complements may intervene between Faroese LD anaphora and their antecedents (cf. Petersen *et al.* (1998)).

(54) The *finite domain* of α is the smallest XP that contains α and a finite verb.

(55) The *indicative domain* of α is the smallest XP that contains α and an indicative verb.

(56) REFLEXIVITY IN FD (Refl.$_{FD}$):
If α is bound in its finite domain, α must be maximally anaphoric.

(57) REFLEXIVITY IN ID (Refl.$_{ID}$):
If α is bound in its indicative domain, α must be maximally anaphoric.

Obviously, the finite domain can never be bigger than the indicative domain, since an XP that fulfils the definition in (55) automatically contains a finite verb.[21] If the domains are again interpreted as the sets of nodes that constitute the respective domain, the following relations between all six domains result.

(58) a. θ-domain $\subseteq$ Case domain $\subseteq$ subject domain $\subseteq$ finite domain $\subseteq$ indicative domain $\subseteq$ root domain
b. Refl.$_{ThD}$ $\gg$ Refl.$_{CD}$ $\gg$ Refl.$_{SD}$ $\gg$ Refl.$_{FD}$ $\gg$ Refl.$_{ID}$ $\gg$ Refl.$_{RD}$

Since the reflexivity constraints generally favour anaphoric elements, the following generalization holds: The higher the domain in which binding takes place is placed in the hierarchy in (58-b), the more probable it is that the bound element is realized as a (complex) anaphor. At the same time it is predicted that if an anaphor wins if binding takes place within a certain domain, it also wins if binding is even more local. As a consequence, there can be no language that allows LD anaphora but does not have anaphors in more local binding relations. This means that we can now also account for the widely attested tendency that LD anaphora are of the SE type. In order for a SELF anaphor to be LD bound, *SELF would have to be outranked

[21] Following Chomsky (2001), it is assumed that V-to-v movement is obligatory.

at least by REFLEXIVITY IN FD, a reflexivity constraint concerning a rather large domain. However, this would imply that the complex anaphor would also be the optimal bindee in every smaller domain, whereas bound pronouns could never occur in these domains, and this is a scenario which is not very probable.

As far as the universal subhierarchy Refl.$_{FD}$ $\gg$ Refl.$_{ID}$ $\gg$ Refl.$_{RD}$ is concerned, it correctly predicts that LD binding allows most likely intervening infinitive complements, then subjunctive complements, and least of all indicative complements. If only infinitive complements intervene between the antecedent and the bound element, the finite domain becomes so big that it contains exactly the same binding relations as the root domain, and thus binding takes place within the finite domain. Since REFLEXIVITY IN FD is higher ranked than REFLEXIVITY IN ID and REFLEXIVITY IN RD, LD binding is therefore more probable than if binding would only take place in the indicative domain (which would be the case if subjunctive complements intervened) or in the root domain (which would be the case if indicative complements intervened). Since REFLEXIVITY IN RD is the lowest of these three constraints, LD binding is least probable if indicative complements intervene. However, if a language allows anaphors although binding takes only place in the root domain, it follows that anaphors are also allowed if binding takes place in the more local indicative or finite domain.

Let us now reconsider the Icelandic examples in (49) and (53). In order to capture the split between intervening infinitive/subjunctive complements, which do not block LD binding, and indicative complements, it must be assumed that REFLEXIVITY IN FD and REFLEXIVITY IN ID are tied with *SE,[22] while REFLEXIVITY IN RD is

[22]If we also want to exclude pronouns from sentences like (49) (cf. footnote 19), we have to assume the following ranking instead: Refl.$_{FD}$ $\gg$ *SE $\circ$ Refl.$_{ID}$ $\gg$ Refl.$_{RD}$

ranked below.[23]

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[23]I do not take into account additional factors (like discourse/logophoricity) that might also play a role for LD anaphora in Icelandic (for this purpose cf., for example, Maling (1984), Thrainsson (1991), Reuland & Everaert (2001)) and other languages. Although I am aware of the fact that there are instances of LD anaphora that demand an analysis on the basis of pragmatic conditions like these (consider, for instance, Icelandic and Faroese LD anaphora without any syntactic antecedent), I believe that LD anaphora are not generally exempt from structural requirements (cf. also Reuland & Everaert (2001), who argue that LD anaphora in Icelandic infinitive complements obey syntactic conditions rather than logophoric ones).

Otherwise, it would be unclear why the following sentence allows an LD anaphor in Faroese but not in Icelandic, although they have exactly the same meaning and must thus involve the same pragmatic factors.

Faroese: (cf. Barnes (1986), Anderson (1986))

(i) Gunnvør visti, at tey hildu lítið um seg.
Gunnvør knew that they held little of SE
'Gunnvør knew that they had a poor opinion of her.'

Icelandic:

(ii) Gunnvör vissi að Þau höfðu lítið álit á henni/*sér.
Gunnvör knew that they had little opinion on her/SE
'Gunnvör knew that they had a poor opinion of her.'

However, the difference can be accounted for straightforwardly if it is assumed that Faroese generally allows LD anapora in indicative complements whereas Icelandic does not, which can be expressed with the rankings *SE $\circ$ Refl.$_{RD}$ *vs* *SE $\gg$ Refl.$_{RD}$.

T_{29}: *(49) Jón*$_1$ *skipaði*$_{ind}$ *Pétri að raka*$_{inf}$ *sig*$_1$*/??sjálfan sig*$_1$*/hann*$_1$ *á hverjum degi*

Candidates	*SELF	Refl.$_{FD}$	*SE	Refl.$_{ID}$	Refl.$_{RD}$	*PRON
O_1: sjálfan sig	*!					
⇒ O_2: sig		*	*(!)	*	*	
⇒ O_3: hann		**(!)		**	**	*

T_{30}: *(53-a) Jón*$_1$ *segir*$_{ind}$ *að Pétur raki*$_{sub}$ *sig*$_1$*/??sjálfan sig*$_1$*/hann*$_1$ *á hverjum degi*

Candidates	*SELF	Refl.$_{FD}$	*SE	Refl.$_{ID}$	Refl.$_{RD}$	*PRON
O_1: sjálfan sig	*!					
⇒ O_2: sig			*(!)	*	*	
⇒ O_3: hann				**(!)	**	*

T_{31}: *(53-b) Jón*$_1$ *veit*$_{ind}$ *að Pétur rakar*$_{ind}$ *??sig*$_1$*/*sjálfan sig*$_1$*/hann*$_1$ *á hverjum degi*

Candidates	*SELF	Refl.$_{FD}$	*SE	Refl.$_{ID}$	Refl.$_{RD}$	*PRON
O_1: sjálfan sig	*!					
O_2: sig			*!		*	
⇒ O_3: hann					**	*

In a language like Faroese, where even indicative complement clauses may intervene between LD anaphora and their antecedents (cf. Petersen *et al.* (1998)), REFLEXIVITY IN RD must also be tied with *SE, while in languages like Russian, where only infinitive complements may intervene (cf. Rappaport (1986)), both REFLEXIVITY IN ID and REFLEXIVITY IN RD must be ranked below *SE. A language without LD anaphora must have all three constraints below *SE. This result is summarized in (59).[24]

(59) *Crosslinguistic variation:*

a. *languages without LDA:*

SELF $\gg$ *SE $\gg$ Refl.$_{FD}$ $\gg$ Refl.$_{ID}$ $\gg$ Refl.$_{RD}$ $\gg$ *PRON

b. *languages with intervening infinitive complements only:*

SELF $\gg$ *SE $\circ$ Refl.$_{FD}$ $\gg$ Refl.$_{ID}$ $\gg$ Refl.$_{RD}$ $\gg$ *PRON

c. *languages with intervening infinitive or subjunctive complements:*

SELF $\gg$ *SE $\circ$ (Refl.$_{FD}$ $\gg$ Refl.$_{ID}$) $\gg$ Refl.$_{RD}$ $\gg$ *PRON

d. *languages which even allow intervening indicative complements:*

SELF $\gg$ *SE $\circ$ (Refl.$_{FD}$ $\gg$ Refl.$_{ID}$ $\gg$ Refl.$_{RD}$) $\gg$ *PRON

As further illustration, let us take a look at some Faroese data. As the following examples confirm, Faroese allows LD binding across intervening infinitive and indicative complement clauses. Hence, we expect that Faroese is of type (59-d) and is thus regulated by the underlying constraint orders in (61).

(60) *Faroese:*

a. Jógvan$_1$ bað meg raka *sær sjálvum$_1$/sær$_1$/honum$_1$.
Jógvan asked me shave$_{inf}$ himself$_{dat}$/SE$_{dat}$/him$_{dat}$
'Jógvan$_1$ asked me to shave him$_1$.'

b. Jógvan$_1$ sigur at eg havi sligið *seg sjálvan$_1$/seg$_1$/hann$_1$.
Jógvan says that I have$_{ind}$ hit himself$_{acc}$/SE$_{acc}$/him$_{acc}$
'Jógvan$_1$ says that I hit him$_1$.'

[24]The ties in (59) generally predict optionality between LD anaphora and pronominal binding. If a language excluded pronominal binding in this context, the tie would have to be replaced with a dominance relation in which the respective reflexivity constraint were higher ranked than *SE.

(61) *Underlying constraint orders in Faroese:*

(i) *SELF $\gg$ Refl.$_{FD}$ $\gg$ Refl.$_{ID}$ $\gg$ Refl.$_{RD}$ $\gg$ ***SE** $\gg$ *PRON

(ii) *SELF $\gg$ Refl.$_{FD}$ $\gg$ Refl.$_{ID}$ $\gg$ ***SE** $\gg$ Refl.$_{RD}$ $\gg$ *PRON

(iii) *SELF $\gg$ Refl.$_{FD}$ $\gg$ ***SE** $\gg$ Refl.$_{ID}$ $\gg$ Refl.$_{RD}$ $\gg$ *PRON

(iv) *SELF $\gg$ ***SE** $\gg$ Refl.$_{FD}$ $\gg$ Refl.$_{ID}$ $\gg$ Refl.$_{RD}$ $\gg$ *PRON

Let us now test whether the theory correctly predicts the data in (60). (For the sake of clarity, I use different tableaux for each of the underlying orders in (61); the numbers of the tableaux reflect the respective constraint hierarchy.)

T_{32-i}: *(60-a) Jógvan$_1$ bað meg raka$_{inf}$ *sær sjálvum$_1$/sær$_1$/honum$_1$*

Cand.	*SELF	Refl.$_{FD}$	Refl.$_{ID}$	Refl.$_{RD}$	***SE**	*PRON
O$_1$: s.s.	*!					
⇒ O$_2$: sær		*	*	*	*	
O$_3$: honum		**!	**	**		*

T_{32-ii}: *(60-a) Jógvan$_1$ bað meg raka$_{inf}$ *sær sjálvum$_1$/sær$_1$/honum$_1$*

Cand.	*SELF	Refl.$_{FD}$	Refl.$_{ID}$	***SE**	Refl.$_{RD}$	*PRON
O$_1$: s.s.	*!					
⇒ O$_2$: sær		*	*	*	*	
O$_3$: honum		**!	**		**	*

T_{32-iii}: *(60-a) Jógvan$_1$ bað meg raka$_{inf}$ *sær sjálvum$_1$/sær$_1$/honum$_1$*

Cand.	*SELF	Refl.$_{FD}$	***SE**	Refl.$_{ID}$	Refl.$_{RD}$	*PRON
O$_1$: s.s.	*!					
⇒ O$_2$: sær		*	*	*	*	
O$_3$: honum		**!		**	**	*

T_{32-iv}: *(60-a) Jógvan*$_1$ *bað meg raka*$_{inf}$ **sær sjálvum*$_1$*/sær*$_1$*/honum*$_1$

Cand.	*SELF	***SE**	Refl.$_{FD}$	Refl.$_{ID}$	Refl.$_{RD}$	*PRON
O_1: s.s.	*!					
O_2: sær		*!	*	*	*	
⇒ O_3: honum			**	**	**	*

T_{33-i}: *(60-b) Jógvan*$_1$ *sigur at eg havi*$_{ind}$ *sligið *seg sjálvan*$_1$*/seg*$_1$*/hann*$_1$

Cand.	*SELF	Refl.$_{FD}$	Refl.$_{ID}$	Refl.$_{RD}$	***SE**	*PRON
O_1: s.s.	*!					
⇒ O_2: seg				*	*	
O_3: hann				**!		*

T_{33-ii}: *(60-b) Jógvan*$_1$ *sigur at eg havi*$_{ind}$ *sligið *seg sjálvan*$_1$*/seg*$_1$*/hann*$_1$

Cand.	*SELF	Refl.$_{FD}$	Refl.$_{ID}$	***SE**	Refl.$_{RD}$	*PRON
O_1: s.s.	*!					
O_2: seg				*!	*	
⇒ O_3: hann					**	*

T_{33-iii}: *(60-b) Jógvan*$_1$ *sigur at eg havi*$_{ind}$ *sligið *seg sjálvan*$_1$*/seg*$_1$*/hann*$_1$

Cand.	*SELF	Refl.$_{FD}$	***SE**	Refl.$_{ID}$	Refl.$_{RD}$	*PRON
O_1: s.s.	*!					
O_2: seg			*!		*	
⇒ O_3: hann					**	*

*T_{33-iv}: (60-b) Jógvan$_1$ sigur at eg havi$_{ind}$ sligið *seg sjálvan$_1$/seg$_1$/hann$_1$*

Cand.	*SELF	***SE**	Refl.$_{FD}$	Refl.$_{ID}$	Refl.$_{RD}$	*PRON
O$_1$: s.s.	*!					
O$_2$: seg		*!			*	
⇒ O$_3$: hann					**	*

The result looks as follows: As regards sentence (60-a), the SE anaphor wins under constraint ranking (i), (ii), and (iii) (cf. T_{32-i}-T_{32-iii}, respectively), and the pronoun is predicted to be optimal under ranking (iv) (cf. T_{32-iv}). As to sentence (60-b), the SE anaphor wins under constraint ranking (i) (cf. T_{33-i}) and the pronoun under ranking (ii)-(iv) (cf. T_{33-ii}-T_{33-iv}, respectively).

Hence, it is correctly predicted that in both sentences both the SE anaphor and the pronoun can occur as bound elements, which means that Faroese is a language which has LD binding even across intervening indicative clauses.[25]

[25] As regards binding within the θ-domain and within the Case domain, Faroese seems to pattern like Dutch; it only allows the complex anaphor in the former case (cf. (i-a)) and both types of anaphors in the ECM context illustrated in (i-b) (cf. Barnes (1986)).

(i) a. Jógvan$_1$ bardi seg sjálvan$_1$/*seg$_1$.
Jógvan hit himself$_{acc}$/SE$_{acc}$
'Jógvan$_1$ hit himself$_1$.'

b. Hann$_1$ hoyrdi seg$_1$/seg sjálvan$_1$ svara spurninginum.
he heard SE$_{acc}$/himself$_{acc}$ answer the question
'He$_1$ heard himself$_1$ answer the question.'

Hence, we can conclude that Refl.$_{ThD}$ must be higher ranked than *SELF, and Refl.$_{CD}$ and *SELF must be tied.

8. Principle C

In the previous section I introduced the additional constraint REFLEXIVITY IN RD, which says something about binding in the sentence in general. Thus, it would seem that it should be possible to account for Principle C effects on the basis of this constraint and thereby extend the presented theory of binding also to the third and last traditional binding principle.

Since Principle C of the standard Binding Theory requires that R-expressions be free, a violation comes about if an R-expression is bound somewhere in the sentence. This can be interpreted in such a way that a binding relation is established in (at least) the root domain of the R-expression, but that the R-expression is not the optimal bindee. On the assumption that R-expressions are integrated into the hierarchy of potential bound elements below pronouns and that they are therefore even less anaphoric than pronouns (cf. (62), (63)), Principle C effects, as in the German sentences in (64), can be derived without direct reference to Principle C (cf. T_{34} and T_{35}).[26] To this end, the respective R-expression is added to the candidate set, which is actually just a logical consequence if it is assumed that this set comprises *all* variants that are identical in meaning.[27,28]

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[26]Strictly speaking, it is not necessarily the second violation of REFLEXIVITY IN THD by O_3 and O_4 which is fatal in T_{35}. As shown in footnote 17, the tie stands for three different underlying constraint rankings, and for those orders where Refl.$_{ThD} \gg$ *SELF, already the first violation is fatal. Note moreover that in the subsequent three tableaux the names of the reflexivity constraints are reduced to a minimum for reasons of space.

[27]Again, this is just an abbreviation for the complete sentence containing the R-expression in the position of x.

[28]Since the general idea is to extend this analysis also to unbound anaphors and pronouns, the question arises as to how an unbound pronoun can ever win against an R-expression, given that *PRON is universally higher ranked than *R-EX. What could be assumed is that there are two

(62) *R-EX.: Avoid R-expressions.

(63) *SELF ≫ *SE ≫ *PRON ≫ *R-EX.

(64) a. Max_1 weiß, dass Maria *Max_1/ihn_1/*$sich_1$/*sich $selbst_1$ mag.

Max knows that Mary Max/him/SE/himself likes
'Max_1 knows that Mary likes him_1.'

b. Max_1 mag *Max_1/*ihn_1/$sich_1$/sich $selbst_1$.

Max likes Max/him/SE/himself
'Max_1 likes $himself_1$.'

*T_{34}: (64-a) Max_1 weiß, dass Maria *Max_1/ihn_1/*$sich_1$/*sich $selbst_1$ mag*

Cand.	ThD	*SELF	CD	SD	*SE	FD	ID	RD	*PRON	*R-EX.
O_1: s.s.		*!								
O_2: sich					*!			*		
⇒ O_3: ihn								**	*	
O_4: Max								***!		*

different competitions. If in one of them the input requires that the element that is sought after is a (free) variable, the R-expression must be excluded from the candidate set. In this case, the pronoun will be optimal. If there is no such requirement and the R-expression is contained in the candidate set, it will come off better than the pronoun and will be the winner of the competition. An approach like this also explains why R-expressions and unbound pronouns are generally equally grammatical.

*T_{35}: (64-b) Max_1 mag *Max_1/*ihn_1/$sich_1$/sich $selbst_1$*

Cand.	ThD	*SELF	CD	SD	*SE	FD	ID	RD	*PRON	*R-EX.
⇒ O_1: s.s.		*(!)								
⇒ O_2: sich	*(!)		*	*	*	*	*	*		
O_3: ihn	**!		**	**		**	**	**	*	
O_4: Max	**!*		* * *	* * *		* * *	* * *	* * *		*

Examples like the following can be accounted for similarly. The apparently ambiguous behaviour of possessive pronouns like *seine/his*, which can be bound in their subject domain like an anaphor, as in (65), but may as well be free (as in *Mary likes his books*), is derived from the fact that there is no more anaphoric alternative. Thus it turns out to be the optimal bindee, although it is pronominal.[29]

(65) $Peter_1$ mag $seine_1$/*$Peters_1$ Bücher.
Peter likes his/Peter's books

[29]Paradigmatic gaps like these generally support competition-based approaches (cf. also Burzio (1989, 1991, 1996, 1998) and the discussion in chapter 1, section 6.1.). The distribution of first and second person pronouns in languages like Italian and German (cf. (i-a) and (i-b), respectively) serves as a further illustration.

(i) a. Io_1 mi_1 vedo.
I me see

b. Ich_1 sehe $mich_1$.
I see me
'I see myself.'

While it remains unclear in theories based on inviolable constraints why these pronouns can occur in such local binding relations where third person pronouns are generally ruled out, their occurrence in examples like these follows straightforwardly in a competition-based analysis, according to which these pronouns are allowed due to the lack of a better competing candidate.

'Peter$_1$ likes his$_1$ books.'

*T$_{36}$: (65) Er$_1$ mag seine$_1$/*Peters$_1$ Bücher*

Cand.	ThD	*SELF	CD	SD	*SE	FD	ID	RD	*PRON	*R-EX.
⇒ O$_1$: seine									*	
O$_2$: Peters				*!		*	*	*		*

In contrast to the standard Binding Theory, the account of Principle C effects developed here makes it also possible to integrate languages in which R-expressions may be bound under certain conditions. Vietnamese is a case in point, as (66) illustrates.[30]

(66) John$_1$ tin John$_1$ sẽ thắńg.
John thinks John will win
'John$_1$ thinks he$_1$ will win.'

In (66), an R-expression is bound within its root domain. In languages that do not allow Principle C violations, this possibility is ruled out by the ranking REFLEXIVITY IN RD ≫ *PRON, as T$_{34}$ showed. As a result, the facts in (66) can be easily captured if it is assumed that *PRON is not ranked below REFLEXIVITY IN RD.[31]

[30]The Vietnamese examples are taken from Lasnik (1991).

[31]As Lasnik (1991:19) points out, "[a] less referential expression may not bind a more referential one". Thus, examples like the following are ruled out.

(i) *Nó tin John sẽ thắńg.
he thinks John will win
'John$_1$ thinks he$_1$ will win.'

This restriction can be derived in the following way. In general, the realization form of the bindee x is selected from a set containing those elements that can refer to the same entity like the antecedent. If the antecedent is an R-expression, this means that x might be realized as simple or complex

9. Subject-Object Asymmetries

In section 7., the behaviour of Icelandic LD anaphora has been analysed, but what has been excluded from the discussion so far is their subject orientation. As (67) shows, LD anaphora in Icelandic cannot have object antecedents, irrespective of the type of complement clause.

(67) Ég$_1$ lofaði Önnu$_2$ [PRO$_1$ að kyssa hana$_2$/*sig$_2$/*sjálfa sig$_2$]
I promised Anna to kiss$_{inf}$ her/SE/herself
'I promised Anna$_2$ to kiss her$_2$.'

This subject-object asymmetry with respect to anaphoric binding can also be found if binding is more local; in Norwegian, for example, it can even be observed if binding takes place within the θ-domain (cf. Richards (1997) and Safir (1997)).

(68) a. Karl$_1$ fortalte Jon om seg selv$_1$.
Karl told Jon about himself
'Karl$_1$ told John about himself$_1$.'
b. *Karl fortalte Jon$_2$ om seg selv$_2$.
Karl told Jon about himself
'Karl told John$_2$ about himself$_2$.'

At first sight, it seems to be difficult to relate this contrast to the different syntactic positions of subjects and objects, since an object antecedent is closer to the anaphor than the subject, and the more local a binding relation is, the less problematic anaphoric binding usually is. However, if the difference between object and subject antecedents is tied down to the question as to whether binding takes place within

anaphor, as pronoun or as R-expression. However, if the binder is a pronoun, the set of potential realization forms of x cannot contain an R-expression since the latter contains more semantic information than initially provided by the antecedent (cf. also the discussion in chapter 4).

the next higher VP or not, the observed subject-object asymmetries can be captured by the following constraint, which applies only non-vacuously if the antecedent is an object.

(69) *REFLEXIVITY IN VP (*Refl.$_{VP}$):
If α is bound within the next higher VP, α must be minimally anaphoric.

The subject orientation of LD anaphora in Icelandic is now correctly predicted if it is assumed that *REFLEXIVITY IN VP is ranked above REFLEXIVITY IN FD. This is illustrated in T_{37}, where only the relevant constraints are considered.

*T_{37}: (67) Ég$_1$ lofaði Önnu$_2$ [PRO$_1$ að kyssa hana$_2$/*sig$_2$/*sjálfa sig$_2$]*

Candidates	*SELF	*Refl.$_{VP}$	Refl.$_{FD}$	*SE	*PRON
O$_1$: sjálfa sig	*!	**			
O$_2$: sig		*!	*	*	
⇒ O$_3$: hana			**		*

In order to get the right result for (68), it must be assumed that Norwegian has the ranking *Refl.$_{VP}$ $\gg$ Refl.$_{ThD}$ $\gg$ *SELF. In (68-a), where the subject is the antecedent, *REFLEXIVITY IN VP applies vacuously, and it is then correctly predicted that only the SELF anaphor is optimal, whereas in (68-b) the new constraint rules out this possibility.[32]

As the two examples in (67) and (68) showed, the subject-object asymmetry can affect either type of anaphor. This depends on both the domain in which binding takes place and the ranking of *REFLEXIVITY IN VP. If the binding relation is so local that a reflexivity constraint applies which is higher ranked than *SELF

[32]It also correctly predicts that the SE anaphor must be excluded (– according to Safir (1997:351), only the intensified pronoun is grammatical in sentences like (68-b): *Karl fortalte Jon$_2$ om ham selv$_2$*).

and *Reflexivity in VP is ranked above the reflexivity constraint in question, a subject-object asymmetry concerning the SELF anaphor arises (cf. the situation in (68)). If the reflexivity constraint that is involved is ranked between *SELF and *SE and is dominated by *Reflexivity in VP, the asymmetry concerns the SE anaphor, as illustrated in T_{37}.

Depending on the ranking of *Reflexivity in VP, it is moreover possible that a language which does not show a subject-object asymmetry with relatively local binding relations is subject-oriented if binding is less local. In fact, German seems to be a case in point. In (70-b), where binding takes place within the θ-domain, the object can bind either type of anaphor (unlike the Norwegian object in (68-b)).[33] In (71), on the other hand, where binding takes place within the binding domain but not within the θ-domain, a subject-object asymmetry arises.

(70) a. Peter$_1$ erzählte uns von sich$_1$/sich selbst$_1$/*ihm$_1$.
Peter told us$_{dat}$ of SE/himself/him
'Peter$_1$ told us about himself$_1$.'

b. Wir erzählten Peter$_2$ von sich selbst$_2$/?sich$_2$/*ihm$_2$.
we told Peter$_{dat}$ of himself/SE/him
'We told Peter$_2$ about himself$_2$.'

(71) a. Peter$_1$ zeigte mir die Schlange neben sich$_1$/??sich selbst$_1$/*ihm$_1$.
Peter showed me$_{dat}$ [the snake near SE/himself/him]$_{acc}$
'Peter$_1$ showed me the snake near him$_1$.'

b. Ich zeigte Peter$_2$ die Schlange neben ihm$_2$/??sich$_2$/*sich selbst$_2$.
I showed Peter$_{dat}$ [the snake near him/SE/himself]$_{acc}$
'I showed Peter$_2$ the snake near him$_2$.'

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[33]The reason why the SELF anaphor sounds slightly better than the SE anaphor in sentences like (70-b) is probably that an intensifier is desired for pragmatic reasons; from the discourse, it is unexpected that the object should function here as antecedent (cf. also König & Siemund (2000)).

The following tableaux show how these data can be analysed. By ranking *REFLEXIVITY IN VP above REFLEXIVITY IN BD but below REFLEXIVITY IN ThD, it is correctly predicted that the subject-object asymmetry surfaces only if binding takes place within the binding domain (or a bigger domain).[34]

[34]As regards German double object constructions, I have restricted myself to examples where the bound element is embedded in a PP and does not function as object on its own, because data of the former type are easier to judge, whereas judgements vary considerably with respect to the latter configuration. However, cf. Featherston & Sternefeld (2003) and Sternefeld & Featherston (2003) for a detailed discussion of data like these.

Nevertheless, let me briefly outline the predictions the present theory makes. On the assumption that the underlying structure for double object construction looks as indicated in (i), a subject-object asymmetry is not expected if the indirect object binds the direct object, because binding takes place within the θ-domain.

(i) $[_{\text{vP}}$ subject $[_{\text{VP}}$ indirect object $[_{\text{V}'}$ direct object V]] v]

(As regards the reverse case, it depends on the structural position of the direct object after scrambling has taken place.) Hence, if anaphoric binding is judged deviant if a dative antecedent is involved (as put forward, for example, by Grewendorf (1988)), it must be connected with something else. For instance, this might follow from the fact that German pronouns move to the left edge of vP and do not allow any vP-internal non-pronominal overt material in front of them (cf. Müller (2001) and also chapter 3, section 8.4.); and if a pronoun and an anaphor are involved, the requirement might be stronger for the latter.

Alternatively, however, it might as well be the case that if two objects are coreferent, there is a further competition involved that determines which form is realized by which object.

*T_{38}: (70-b) Wir erzählten Peter$_2$ von sich selbst$_2$/?sich$_2$/*ihm$_2$*

	Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{CD}$	*Refl.$_{VP}$	Refl.$_{BD}$	*SE
⇒	O_1: sich selbst		*(!)		**		
⇒	O_2: sich	*(!)		*	*	*	*
	O_3: ihm	**!		**		**	

*T_{38}: (71-b) Ich zeigte Peter$_2$ die Schlange neben ihm$_2$/ ??sich$_2$/*sich selbst$_2$*

	Candidates	Refl.$_{ThD}$	*SELF	Refl.$_{CD}$	*Refl.$_{VP}$	Refl.$_{BD}$	*SE
	O_1: sich selbst		*!		**		
	O_2: sich				*!	*	*
⇒	O_3: ihm					**	

Generally, it can be concluded that if anaphors of type X can only be bound by subjects in the domain Y, the ranking *Refl.$_{VP}$ $\gg$ Refl.$_Y$ $\gg/\circ$ *X will capture this subject-object asymmetry. Moreover, it is predicted that the subject-object asymmetry also holds for all domains Z, Z $\subseteq$ Y, because the rankings *Refl.$_{VP}$ $\gg$ Refl.$_Y$ and Refl.$_Y$ $\gg$ Refl.$_Z$ imply that *Refl.$_{VP}$ $\gg$ Refl.$_Z$. In a nutshell, this means that if a subject-object asymmetry can be observed in the domain Y, it will also surface in any domain bigger than Y – a prediction which seems to be borne out.

10. Illusory Binding

In this section I want to discuss some constructions that are often mistaken for binding phenomena. I will argue that they do not involve binding relations and show how on this assumption the theory outlined in this chapter can account for these data.

Consider, for instance, the following examples from German.

(72) a. Max benimmt sich.

Max behaves SE
'Max behaves (himself).'

b. Max hasst sich.

Max hates SE
'Max hates himself.'

Superficially, the two sentences in (72) look very similar, but already the English translation indicates that there is a crucial difference. While the German SE anaphor is translated as *himself* in (72-b), this is not necessarily the case in (72-a). The contrast in (73) confirms the supposition that the role of *sich* cannot be the same in (72-a) and (72-b).

(73) a. *Max benimmt Peter.

Max behaves Peter

b. Max hasst Peter.

Max hates Peter
'Max hates Peter.'

The ungrammaticality of (73-a) is due to a violation of the θ-Criterion; the verb in (73-a) cannot take a direct object, in contrast to the verb in (73-b). With respect to (72), it can thus be concluded that only in (72-b) does the anaphor function as a direct object. And since this object is not only c-commanded by the subject but also refers to the same person as the subject, it follows that a binding relation is established. In (72-a), on the other hand, the anaphor is not an argument of the verb, it rather seems to mark the verb itself. Hence, there is no binding relation between the subject and the anaphor; the subject can rather be considered to be the external argument of the predicate *sich benehmen*. Predicates of this kind are usually referred to as inherently (or lexically) reflexive predicates.

The conclusion that can be drawn is that anaphors in inherently reflexive predicates are occurrences of unbound reflexives.[35] Hence, they *a priori* pose a problem for theories that rely on some version of Chomsky's (1981) Principle A, which requires that anaphors be (locally) bound. In contrast, this is unproblematic for an approach like the present one that is based on some version of Principle B and derives Principle A effects from a syntactic competition between anaphors and pronouns. Consider, for instance, the following examples from English, German, and Dutch, respectively.[36]

(74) a. Max behaves like a gentleman.

b. Max benimmt sich/*sich selbst/*ihn wie ein Gentleman.
Max behaves SE/himself/him like a gentleman

c. Max gedraagt zich/*zichzelf/*hem.
Max behaves SE/himself/him

Since no binding relation is established in these examples, it follows that the reflexivity constraints are fulfilled vacuously. Hence, they will be neglected in the tableaux in this section. However, let us assume that inherently reflexive predicates require some marking that reflects their reflexivity, and that any type of anaphor can fulfil

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[35]These examples must not be confused with seemingly unbound English SELF anaphors in sentences like (i) where these elements *are* θ-marked; cf. also section 11.

(i) There were three students in the room apart from himself.

[36]Native speakers of English seem to disagree with regard to the question of whether (74-a) can also occur with the SELF anaphor. Other examples involving *behave* seem to be clearer; thus, sentences like *Did Peter behave himself while I was away?* are grammatical (cf. *Dictionary of Contemporary English, s.v. behave*). I will first restrict the discussion to the case where an inherently reflexive predicate occurs without any anaphor or pronoun and come back to the second possibility in footnote 38.

this requirement.

(75) $V_{inh.refl.}$:

Inherently reflexive predicates must be reflexive-marked.

(76) Anaphors are reflexive-markers.

Once more, the phrasing here is borrowed from Reinhart & Reuland (1993), but it is again interpreted slightly differently, as (76) indicates. In Reinhart & Reuland's (1993) theory, inherently reflexive predicates are reflexive-marked by definition (cf. chapter 1, section 3.); hence their Condition A (repeated in (77)) requires that the predicate be reflexive.

(77) *Condition A:*

A reflexive-marked (syntactic) predicate is reflexive.

(78) a. A predicate P is *reflexive* iff two of its arguments are coindexed.

b. A predicate P is *reflexive-marked* iff either P is lexically reflexive or one of P's arguments is a SELF anaphor.

In the cases at hand, their approach is formally slightly inaccurate, since they define reflexivity explicitly via coindexation of coarguments (cf. (78-a)), and, as argued above, it seems questionable as to whether anaphors that occur with inherently reflexive verbs can be considered to be arguments of these predicates. Moreover, this flaw makes it difficult to compare sentences like (74-b) and (74-c) with their English counterpart in (74-a), which does not require any anaphor or pronoun. Thus, Reinhart & Reuland must refrain from considering English *behave* as an inherently reflexive predicate, since otherwise it would need to have two coindexed arguments in order to fulfil Condition A.

In the present approach, by contrast, there is no need to treat the sentences in (74) differently. In this case, the candidate set contains all kinds of elements that might be able to satisfy the verb's need for reflexive-marking. However, an element which has an extra meaning of its own is not allowed to be added (this is excluded by Gen); thus R-expressions are out of the question, and the candidate set only contains anaphors, pronouns, and $\emptyset$ as potential reflexive-markers.

In German and Dutch, $V_{inh.refl.}$ must be higher ranked than *SE; on this assumption, it is correctly predicted that inherently reflexive predicates only occur with SE anaphors in these languages (cf. T_{39}).[37] If *SELF is higher ranked than $V_{inh.refl.}$, we get the correct result for the English examples in which the inherently reflexive predicate occurs without any anaphor or pronoun (cf. T_{40}).[38]

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[37]The availability of the SE anaphor in Dutch examples like *Max*$_1$ *wast zich*$_1$/*zichzelf*$_1$ (cf. (17) in section 4.) can now also be explained. What is assumed is that verbs like Dutch *wassen* ('wash') are doubly listed in the lexicon (cf., among others, Reuland & Everaert (2001:655)); as a transitive verb, it selects the SELF anaphor as object, as inherently reflexive verb, it occurs with the SE anaphor.

[38]The formulation of (75) and (76) precludes SELF anaphors and pronouns from winning such a competition since SE anaphors always beat the former (due to the underlying universal subhierarchy), and pronouns are harmonically bounded by $\emptyset$ because the latter generally has a better constraint profile. However, this result might be an oversimplification of the facts.

First, there are the well-known data from Frisian, where inherently reflexive predicates indeed occur with pronouns (cf., e.g., Reuland & Reinhart (1995), Reuland & Everaert (2001)).

(i) Max hâld him/*himsels.
Max behaves him/himself

Second, it is possible that English verbs like *behave* occur with a SELF anaphor (cf. footnote 36).

In order to account for these facts as well, (75) and (76) would have to be modified in the following way.

(75′) $V_{inh.refl.}$:
Inherently reflexive predicates must be *maximally* reflexive-marked.

(76′) The more anaphoric an element is, the better it serves as a reflexive-marker.

*T_{39}: (74-b), (74-c), e.g., Max benimmt sich/*sich selbst/*ihn wie ein Gentleman*

	Input: M. benimmt$_{inh.refl.}$ wie ein G.	V$_{inh.refl.}$	*SELF	*SE	*Pron
	O_1: sich selbst		*!		
⇒	O_2: sich			*	
	O_3: ihn	*!			*
	O_4: ∅	*!			

T_{40}: (74-a) Max behaves like a gentleman

	Input: M. behaves$_{inh.refl.}$ like a g.	*SELF	V$_{inh.refl.}$	*SE	*Pron
	O_1: himself	*!			
	O_2: him		*		*!
⇒	O_3: ∅		*		

This kind of analysis can be extended to other uses of the SE anaphor where it is no longer used referentially. Consider, for instance, middle constructions in German, where SE anaphors are used "as markers of derived intransitivity" (cf. König & Siemund (2000:59; 63)):

(79) a. Dieses Hemd bügelt sich leicht.
this shirt irons SE easily
b. This shirt irons easily.

If in the analysis above V$_{inh.refl.}$ is replaced with a constraint like the following, the

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V$_{inh.refl.}$ would thus be a gradient constraint that would not be violated at all by SELF anaphors, once by SE anaphors, twice by pronouns, and three times by ∅. On this assumption, all four candidates could turn out to be optimal; SELF anaphors under the ranking V$_{inh.refl.}$ ≫ *SELF ≫ *SE ≫ *Pron, SE anaphors under the ranking *SELF ≫ V$_{inh.refl.}$ ≫ *SE ≫ *Pron, pronouns under the ranking *SELF ≫ *SE ≫ V$_{inh.refl.}$ ≫ *Pron, and ∅ under the ranking *SELF ≫ *SE ≫ *Pron ≫ V$_{inh.refl.}$.

theory also accounts for the sentences in (79).

(80) $V_{der.intr.}$:
Derived intransitivity must be marked with a reflexive-marker.

Moreover, if it is no longer assumed that the input presupposes a binding relation but is more generally based on the identical meaning of the output candidates, it is possible to account for the following example along the same lines.

(81) a. *Sich friert.
SE is cold
b. Ihn friert.
him_{acc} is cold
'He's cold.'

The ungrammaticality of (81-a) cannot be derived from Case theory, because, as (81-b) shows, the argument must bear Accusative Case, which is available for the German SE anaphor (cf. also Kiss (2001:10)). However, on the assumption that the two variants in (81) are candidates in the same competition, it follows naturally that (81-b) wins against (81-a): If there is no binding relation at all, the reflexivity constraints apply vacuously, and hence, in the unmarked case, the pronoun generally comes off better than the anaphor.[39]

[39] Here, the candidate involving $\emptyset$ is not a competitor because it violates the θ-Criterion, which is part of Gen.

Note moreover that in contrast to the general observation that unbound pronouns and R-expressions are interchangeable (cf. footnote 28), this is not the case in (81) (cf. (i)). But the reason why an R-expression (with Accusative Case) sounds weird in this example seems to me to be related to the fact that the construction in (ii) is the more common way to express this. Thus, (i) might just be obsolete.

*T_{41}: (81) Ihn/*sich friert*

	Candidates	*SELF	*SE	*PRON
	O_1: sich selbst	*!		
	O_2: sich		*!	
⇒	O_3: ihn			*

11. Intensified Pronouns

Examples like the following have also been considered problematic for many versions of the Binding Theory.

(82) a. There were three students in the room apart from himself.

b. Max_1 boasted that the queen invited Lucie and himself_1 for a drink.

c. As for himself_1, John_1 said that he would not need to move.

Since English anaphors must usually be locally bound, it seems to be very mysterious that this need not be the case for *himself* in (82). However, this conclusion is only true if *himself* really functions as a SELF anaphor in (82).

As Baker (1995) and König & Siemund (2000) argue, these locally free SELF forms in English are no reflexives at all but should rather be analysed as intensified pronouns, which are "identical in form, though not in distribution" (cf. König & Siemund (2000:41)). This assumption is supported by the fact that in a language like

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(i) ??Den Mann friert.
[the man]$_{acc}$ is cold
'The man is cold.'

(ii) Der Mann friert.
[the man]$_{nom}$ is cold
'The man is cold.'

German, where intensified and reflexive pronouns differ in form, only the (intensified) pronoun is grammatical in sentences like these (cf. (83)).

(83) a. Außer ihm selbst/ihm/*sich/*sich selbst waren drei Studenten im Raum.

b. Max_1 prahlte damit, dass die Königin Lucie und ihn selbst_1/ ihn_1/*sich_1/*sich selbst_1 auf einen Drink eingeladen hätte.

c. Was ihn selbst_1/ihn_1/*sich_1/*sich selbst_1 anginge, so würde er nicht umziehen müssen, sagte John_1.

This means that, unlike in English, the form pronoun-SELF is not ambiguous in German; it is always an intensified pronoun and cannot be analysed as SELF anaphor. In the Mainland Scandinavian languages the situation is slightly different; here, the form pronoun-SELF can function as an intensified pronoun (as in the Danish example in (84)) or as a SELF anaphor (as in (85-a)). However, the latter is only the case if the SELF anaphor is bound by an object; otherwise, the alternative SELF anaphor SE-SELF is used (cf. (85-b)).[40]

(84) Komponisten_1 sagde at orkestret kun måtte spille symfonien
composer-the said that orchestra-the only could play symphony-the
med ham selv_1/ham_1 som dirrigent.
with pron-SELF/him as conductor
'The composer said that the orchestra could only play the symphony when he_1 conducted them himself_1.'

[40]The Danish examples in (84) and (85) are taken from Vikner (1985).

(85) a. ...at Susan fortalte Anne$_2$ om hende selv$_2$/*hende$_2$/*sig$_2$/ *sig selv$_2$
...that Susan told Ann about pron-SELF/her/SE/ SE-SELF
'...that Susan told Ann$_2$ about herself$_2$'

b. ...at Susan$_1$ fortalte Anne om sig selv$_1$/*hende selv$_1$/*hende$_1$/ *sig$_1$
...that Susan told Ann about SE-SELF/pron-SELF/her/ SE
'...that Susan$_1$ told Ann about herself$_1$'

To come back to the sentences in (82) and (83), our theory should predict that only pronouns are allowed in these contexts. Whether they can/must be intensified or not is not subject to Binding Theory but to other constraints that I will not explore here (cf., for instance, Baker (1995) and König & Siemund (2000) for a more detailed analysis of intensifiers).

The results we get are the following: In the (a)-sentences, the element in question is not bound at all; hence, the system predicts for both English and German that it should be realized as pronoun. As far as the sentences in (b) and (c) are concerned, the element is bound at some point in the derivation but not in its subject domain. Thus, English and German favour again the pronoun, which means that the approach captures the data in (82) and (83) correctly.

12. Outlook – A Note on Crosslinguistic Variation

So far, I have only considered languages that have two different free forms as reflexivizers; a SE and a SELF anaphor, which differ with respect to their morphological complexity. However, other languages may choose different strategies of reflexivation. Another strategy that can often be found involves particular verbal affixes to express reflexivity. In Russian, for instance, we find a combination of the first and the second strategy; there is the free form *sebja* and the verbal affix *-sja* (cf. (86), which is taken from König & Siemund (2000)).

(86) a. Nadja umyvaet-sja.

Nadja washes-REFL
'Nadja is washing herself.'

b. Nadja_1 nenavidit sebja_1.

Nadja hates SELF
'Nadja hates herself.'

But independent of which options are available in a given language, König & Siemund (2000:60; 62) point out that "the distinction between morphologically simplex and morphologically complex anaphors [...] is generally applicable", although "the exact shape of complex and simplex strategies may differ from language to language."

Thus, the question arises as to whether the theory outlined above can be modified in such a way that it does not only capture languages of the first type but also languages that express reflexivization differently. I do not want to explore this question in detail, but since it seems to be generally possible to draw a distinction between a more complex and a simpler strategy, it is imaginable that the system would work if the *SE/*SELF constraints were interpreted as constraints that prohibit the available simplex/complex strategy. Moreover, the notion of binding might have to be avoided in the reflexivity constraints; instead they could refer to a more liberal notion of antecedent.

13. Summary

Let me now summarize the central assumptions of the theory developed so far. I have argued that many apparent exceptions to the standard Binding Theory can be captured in a straightforward way if it is assumed that the principles relevant for binding are violable. Such an approach is furthermore supported by the near-complementary distribution of anaphors and pronouns (optionality can only result from tied constraints), paradigmatic gaps in the anaphoric system of languages, and in particular the broad range of crosslinguistic variation we encounter in this field. Thus I propose an optimality-theoretic analysis which is basically restricted to two groups of constraints.

Based on the insight that binding is sensitive to different kinds of domains, I have introduced the so-called reflexivity constraints. These constraints penalize the binding of non-maximally anaphoric elements in domains of different size. The data considered in this chapter reveal that the set of domains relevant for binding does not only comprise the well-known traditional binding domain (here: subject domain), but also the θ-domain, the Case domain, the finite domain, the indicative domain, and the root domain. Furthermore, it is assumed that the reflexivity constraints associated with smaller domains are universally higher ranked than those associated with bigger domains. Thus, we obtain the following universal hierarchy.

(87) $\text{Refl.}_{ThD} \gg \text{Refl.}_{CD} \gg \text{Refl.}_{SD} \gg \text{Refl.}_{FD} \gg \text{Refl.}_{ID} \gg \text{Refl.}_{RD}$

The constraints of the second group penalize the occurrence of certain elements in general. They are ordered in such a way that less anaphoric elements are generally preferred. This is expressed in the universal hierarchy in (88).

(88) $\text{*SELF} \gg \text{*SE} \gg \text{*P}\textsc{ron} \gg \text{*R-}\textsc{ex}$.

The result is a system which is both restrictive and flexible. As far as crosslinguistic variation is concerned, reranking is restricted to the interaction between the two hierarchies in (87) and (88); but since each group of constraints can be split up into even more fine-grained constraints, the system remains flexible enough to capture all kinds of variation.

The competition itself works as follows. If there is a binding relation in a given sentence, it selects the optimal bindee for the designated antecedent. If there is no binding relation at all, the reflexivity constraints do not play a role, but the occurrence of an element $\in$ {SE anaphor, SELF anaphor, pronoun, $\emptyset$} can still be predicted on the basis of the other constraints. Thus, this theory makes it possible to account for the occurrences of simplex anaphors, complex anaphors, pronouns, and R-expressions in a uniform and straightforward way.

14. Universal Constraint Subhierarchies

Let us now come back to the question of whether the two universal constraint subhierarchies in (87) and (88) can be derived by some established mechanism of constraint generation.

As far as the hierarchy in (88) is concerned, it has already been argued that it is based on a hierarchy that reflects a decrease in anaphoricity.[41] The constraint ranking is then derived by assuming that elements that are less anaphoric are generally preferred.

The second constraint subhierarchy is first of all based on the set-theoretic re-

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[41] If we consider the hierarchy SELF > SE > pronoun > R-expression (where A > B indicates that A is more anaphoric than B), it becomes evident that the decrease in anaphoricity correlates to some extent with an increase in referentiality, a notion that is central to Burzio's (1989, 1991, 1996, 1998) work. As mentioned in chapter 1, section 6.2., his approach to binding (which is also based on violable principles) crucially relies on the referential hierarchy anaphor > pronoun > R-expression. What he assumes is that, in the default case, a bound NP must be maximally underspecified referentially (*Referential Economy*). As a result, anaphors are generally preferred to pronouns, which are in turn preferred to R-expressions, unless the preferred elements are blocked by some other principle, e.g. a locality requirement.

The present approach seems to work exactly the other way round; due to the subhierarchy in (88), less anaphoric elements are generally preferred unless some other constraint (e.g. a reflexivity constraint) intervenes. However, (90-b) shows that the connection between the two types of approaches is closer than one might initially think (cf. also footnote 44).

lation that underlies all the domains involved: If the domains are abbreviated as D_1-D_n ($n \in \mathbf{N}$), it can be concluded that $D_i \subseteq D_j$ or $D_j \subseteq D_i$ $\forall i, j \in \{1, \ldots, n\}$, which means that the domains can be ordered as follows: $D_1 \subseteq \ldots \subseteq D_n$. This relation implies that if a binding relation is established within D_i, it is also established within D_j, $i < j$ (consider for example D_i := θ-domain, D_j := subject domain); and if we assume further that there are constraints that generally penalize binding within certain domains (cf. (89-a)), it follows that violations of constraints that concern smaller domains always imply violations of constraints concerning bigger domains.

(89) a. A: NO BINDING WITHIN D_i
B: NO BINDING WITHIN D_j, $i < j$

b. violation of constraint A $\Rightarrow$ violation of constraint B

Because of this relation (cf. (89-b)) it seems reasonable to assume that constraint A outranks constraint B; otherwise a candidate violating only B (like O_2 in T_{42} and T_{43}) would in many configurations turn out to be as bad as a candidate that violates both A and B (like O_1 in T_{42} and T_{43}), which would inevitably assimilate the effects of the two constraints (cf. the scenario in the following two tableaux, where an additional constraint C is involved).[42]

[42]However, it is not the case that A would no longer have any effect at all if it were ranked below B. In a scenario like the following, for example, it still depends on A whether O_1 or O_2 wins.

T_i: Possible effect of constraint A under the ranking B $\gg$ A

	Candidates	B	A	C
	O_1	*	*!	
$\Rightarrow$	O_2	*		*

T_{42}: $A \gg B$: O_1 and O_2 come off differently because O_1 additionally violates A;

	Candidates	A	C	B
	O_1	*!		*
⇒	O_2			*(!)
⇒	O_3		*(!)	

T_{43}: $B \gg A$: the additional violation of A by O_1 does not have an effect; B alone decides the competition, and thus O_1 and O_2 come off equally bad;

	Candidates	B	C	A
	O_1	*!		*
	O_2	*!		
⇒	O_3		*	

What we have seen so far is that, given the set-theoretic relation between the domains, it is plausible to assume a constraint hierarchy like the following: NO BINDING WITHIN $D_i \gg$ NO BINDING WITHIN D_j, $i < j$. Let us assume further that there is another (gradient) constraint which says that if we do have a binding relation, the bound element should be maximally anaphoric (cf. (90-b)).

(90) a. A $\gg$ B:= NO BIND. WITHIN $D_i \gg$ NO BIND. WITHIN D_j, $i < j$

b. C:= Bound elements must be maximally anaphoric.

If (90-b) is now locally conjoined with the subhierarchy in (90-a), we get, by definition, the subhierarchy A & C $\gg$ B & C.[43] What is unclear so far is how local conjunc-

[43] *Local conjunction:*

(i) The local conjunction of the constraints C_1 and C_2 in domain D, C_1 & C_2, is violated when there is some domain of type D in which both C_1 and C_2 are violated. Universally, C_1 & C_2 dominates C_1 and C_2 (cf. Smolensky (1995), Aissen (1999)).

(ii) The local conjunction of C_1 with subhierarchy $[C_2 \gg C_3 \gg \ldots \gg C_n]$ yields the subhierarchy tion interacts with gradiency. In order to be able to derive gradient constraints by local conjunction, it must be assumed that gradiency is transmitted to the conjoined constraints from its components. Thus I propose that the gradiency of constraint C in (90-b) is passed over to the constraint subhierarchy A & C $\gg$ B & C, which corresponds now exactly to the second universal subhierarchy proposed in the present approach (cf. (87)).[44] This result is illustrated in the following tableaux, where D_i is replaced with ThD (θ-domain) and D_j with SD (subject domain), for the sake of concreteness. As can be seen, A & C then corresponds to REFLEXIVITY IN THD, and B & C corresponds to REFLEXIVITY IN SD.

(91) *Constraints:*

A: NO BINDING WITHIN THD

B: NO BINDING WITHIN SD

C: Bound elements must be maximally anaphoric.

Refl.$_{ThD}$: If α is bound in its ThD, α must be maximally anaphoric.

Refl.$_{SD}$: If α is bound in its SD, α must be maximally anaphoric.

T_{44}: Binding outside SD/ThD

Candidates	A	B	C	A & C	B & C	Refl.$_{ThD}$	Refl.$_{SD}$
O_1: SELF							
O_2: SE			*				
O_3: pron.			**				

[C_1 & $C_2 \gg C_1$ & $C_3 \gg \ldots \gg C_1$ & C_n] (cf. Aissen (1999)).

[44]Constraint C comprises Burzio's Principle of *Referential Economy* (cf. also footnote 41). Hence, the reflexivity constraints can be considered to be an elaboration of this principle that additionally take into account the different domains in which binding can take place and the resulting differences with respect to the realization of the bound element.

T_{45}: Binding within SD but outside ThD

Candidates	A	B	C	A & C	B & C	Refl.$_{ThD}$	Refl.$_{SD}$
O_1: SELF		*					
O_2: SE		*	*		*		*
O_3: pron.		*	**		**		**

T_{46}: Binding within SD/ThD

Candidates	A	B	C	A & C	B & C	Refl.$_{ThD}$	Refl.$_{SD}$
O_1: SELF	*	*					
O_2: SE	*	*	*	*	*	*	*
O_3: pron.	*	*	**	**	**	**	**

15. Problematic Data

So far, the analysis developed above has made pretty good predictions. So let us see what the theory says about the following examples. Here, a binding relation has been established in the course of the derivation, but the resulting surface structures do not exhibit a binding configuration anymore: there is no longer a c-command relation between the two coindexed items.

(92) a. Which claim that John_1 made did he_1 later deny?
b. *Which picture of John_1 does he_1 like?

With respect to example (92-a), our theory yields the following results. It could be assumed that the pronoun is initially encoded as x and an optimality-theoretic competition determines its optimal realization form. Since x is not c-commanded by the coreferential R-expression *John* and hence not bound, the reflexivity constraints apply vacuously and the *SELF-hierarchy determines the outcome of the competition. Depending on whether a variable is required or not (cf. footnote 28), the winner will be the pronoun or the R-expression. This result is not too bad, since at least the pronominal form is indeed licit. (T_{47} illustrates the respective competition.)[45]

T_{47}: First try

	Candidates	*SELF	*SE	*PRON
	O_1: sich selbst	*!		
	O_2: sich		*!	
⇒	O_3: ihn			*

Now, what about sentence (92-b)? Here, the analysis proceeds exactly along the same lines, and as a result, example (92-b) is predicted to be grammatical (cf. T_{47}) – contrary to the facts. However, it is not really clear either which candidate should have won instead; after all, neither an anaphor nor an R-expression would have improved the sentence (cf. (93)). This suggests that we might not be looking at the right competition and that we have to analyse these data in a completely different way.

(93) a. *Which picture of $John_1$ does $heself_1$/$himself_1$ like?
b. *Which picture of $John_1$ does $John_1$ like?

In view of these considerations and the objections raised in footnote 45, it seems that something more needs to be said about examples like (92). Let us therefore take a closer look at this set of data in the subsequent chapter.

[45]What might seem a bit strange is that the form of the *pronoun* is derived in the competition and not the form of the R-expression; after all, it was the latter which functioned as bound element in the course of the derivation. However, if *John* is assumed to start out as x, the second element cannot be a pronoun/x-like element too, because then we would lose semantic information (namely John); cf. also footnote 31.

Chapter 3

Syntactic Reconstruction

1. Introduction

The ungrammaticality of sentences like those in (1) and (2) is standardly accounted for by Principle C of Chomsky's (1981) Binding Theory (cf. chapter 1). In all four examples an R-expression is c-commanded by a coindexed pronoun that is located in the subject position SpecT, which is an A-position. By definition, this means that the R-expression is A-bound. However, Principle C requires that R-expressions be A-free (i.e. not A-bound), and thus the sentences in (1) and (2) are ruled out because they violate Principle C.

(1) *English:*

a. *He$_1$ made a claim that John$_1$ later denied.

b. *He$_1$ likes this picture of John$_1$.

(2) *German:*

a. *Er$_1$ stellte eine Behauptung auf, die Hans$_1$ später bestritt.

he put a claim up that John later denied
'John$_1$ made a claim that he$_1$ later denied.'

b. *Er$_1$ mag dieses Bild von Hans$_1$.

he likes this picture of John

'John$_1$ likes this picture of himself$_1$.'

However, things become more complicated if subsequent movement of the phrase containing the R-expression dissolves the underlying Principle C configuration (cf. the illustration in (3)).

(3) [$_{XP}$ ... R-expression$_1$ ...] ... pronoun$_1$ ... t_{XP}

As the contrast between (4) and (5) shows, the resulting structure might be well formed, as in (4), or ungrammatical, as in (5). On the assumption that the ungrammaticality in (5) results from reconstructing (parts of) the fronted phrase (including the R-expression) to the base position in the c-command domain of the pronoun, which induces a Principle C violation, it is the grammaticality of the sentences in (4) which is unexpected. Hence, the well-formedness of examples like (4) is also referred to as antireconstruction effect.

(4) a. [Which claim that John$_1$ made]$_2$ did he$_1$ later deny t_2?
b. [Welche Behauptung, die Hans$_1$ aufgestellt hat,]$_2$ hat er$_1$ später t_2
which claim that John put up has has he later
bestritten?
denied
'Which claim that John$_1$ made did he$_1$ later deny?'

(5) a. *[Which picture of John$_1$]$_2$ does he$_1$ like t_2?
b. *[Welches Bild von Hans$_1$]$_2$ mag er$_1$ t_2?
which picture of John likes he
'Which picture of himself$_1$ does John$_1$ like?'

What has often been proposed is that the contrast between (4) and (5) crucially depends on the argument-adjunct distinction. The general prediction of this kind of approach is the following: If the R-expression is embedded in an adjunct (like the relative clause in (4)), the sentence is predicted to be grammatical, whereas if it is part of an argument (as in (5)), the sentence will be ill-formed. This analysis can account for the contrast between (4) and (5), but as numerous counterexamples illustrate, it also faces severe problems and thus does not really provide a satisfactory account of antireconstruction effects.

The chapter is structured as follows: Before presenting an alternative reconstruction analysis in section 8., I review the major accounts based on the argument-adjunct distinction (section 2.-5.), discuss how arguments and adjuncts can generally be distinguished (section 6.), and provide evidence against the argument-adjunct approach (section 7.).

2. Lebeaux's (1988, 1991, 2000) Theory of Late Merge

Lebeaux (1988) probably constitutes the most influential work in this field, because it has served as a basis for most of the later argument-adjunct-based analyses.[1] According to Lebeaux (1988, 2000), a fundamental difference between arguments and adjuncts can be derived from the *Projection Principle*. Since the *Projection Principle* says that selectional requirements must be fulfilled at all levels of representation, it follows that arguments must be present at D-Structure already, whereas adjuncts need not. With respect to adjuncts it is assumed that they are merged into the derivation by a rule Adjoin-α, which "applies perfectly freely" (Lebeaux (1988:148)). This means that Adjoin-α does not apply at a particular level but rather can apply at any time in the derivation (in particular before *or* after Move-α).

Of course, the internal structure of adjuncts also involves thematic relations, which are also subject to the *Projection Principle*. Therefore it is important to note that the argument structure that constitutes an adjunct is also already present at D-Structure, even though it has not been merged with the rooted structure yet. Thus

[1] As far as Lebeaux (2000) is concerned, it basically corresponds to the published version of Lebeaux (1988).

it can be concluded that D-Structure consists of several substructures, the so-called argument skeletons, which are "pure representations of the argument-of relation" (Lebeaux (1988:140)). In the course of the derivation these argument structures are then concatenated by application of the rule Adjoin-α and in the end form a single phrase marker. Thus, all except for one substructure represent thematic relations of adjuncts, because they are all merged into the derivation by adjunction. Only the first argument skeleton in the derivation is an exception, since it is not adjoined to anything but rather serves as adjunction site for other substructures. Lebeaux calls this basic argument structure the root. Hence the D-Structure of a sentence consists of the root and the argument skeletons of all adjuncts. (6) serves as an illustration of the model that Lebeaux (1988, 2000) proposes.

(6) a. D-Structure: *argument structure*$_1$ (=: as_1)

$\vdots$

argument structure$_n$

b. D-Structure $\xrightarrow[\text{Adjoin-}\alpha]{\text{Move-}\alpha}$ S-Structure

As far as the (anti)reconstruction effects in the examples above are concerned, Lebeaux claims that they are rooted in the argument-adjunct distinction: "[I]t is the grammatical function or character of the structure within which the name is contained, which determines whether a Condition C violation occurs when it is dislocated." (Lebeaux (1988:147)). On the assumption that Principle C applies throughout the derivation (cf. Lebeaux (1988:151)), the contrast between (4) and (5) can be accounted for as follows. In (5), the R-expression is contained in an argument. This means that it is part of the root and thus of the same argument skeleton as the coindexed pronoun. This, however, induces a violation of Principle C (cf. (7)) and consequently rules out the sentences in (5).

(7) *D-Structure of (5-a):*
as_1 : *he$_1$ likes which picture of John$_1$

In (4), the R-expression is contained in an adjunct. As far as the D-Structure of sentence (4-a) (*Which claim that John*$_1$ *made did he*$_1$ *later deny?*) is concerned, it consists of three argument structures, the root and the argument skeletons of the two adjuncts, i.e., the relative clause and the adverb *later*. This means that the pronoun and the R-expression are not in the same substructure at D-Structure, hence Principle C is not violated at this point in the derivation.

(8) *D-Structure of (4-a):*
as_1 : he$_1$ denied which claim
as_2 : that John$_1$ made
as_3 : later

With respect to the antireconstruction effect, as_3 does not play a role, therefore I will neglect it and assume that it is immediately merged with as_1. What remains then are the two substructures *that John*$_1$ *made* ($=as_2$) and *he*$_1$ *later denied which claim*, which is based on as_1 and as_3 and which I will call the extended root.

Following Lebeaux, there are now in principle two conceivable continuations of the derivation. First, Adjoin-α could precede Move-α, i.e., the adjunct containing the R-expression could be immediately adjoined to the extended rooted structure (cf. (9)). However, the resulting structure would yield a Principle C violation, analogously to the derivation in (7). Alternatively, Move-α could apply prior to Adjoin-α (cf. (10)). This means that the adjunct is adjoined to the extended root after *wh*-movement has taken place, and thus Principle C is not violated at any point in the derivation. According to this analysis, the sentences in (4) are correctly predicted to be grammatical.

(9) *Derivation 1:*

extended root $\xrightarrow{Adjoin\text{-}\alpha}$ *he$_1$ later denied which claim that John$_1$ made

(10) *Derivation 2:*

extended root $\xrightarrow{Move\text{-}\alpha}$ $as_{1/3}$: which claim did he$_1$ later deny
as_2 : that John$_1$ made

$\xrightarrow{Adjoin\text{-}\alpha}$ which claim that John$_1$ made did he$_1$ later deny

Lebeaux (1991) basically presents the same account of (anti)reconstruction effects as Lebeaux (1988, 2000). They only differ slightly from each other with respect to the underlying D-Structure representations. This difference is due to the different application of a further rule that Lebeaux introduces, namely Project-α. Lebeaux (1991) assumes that argument skeletons can be further decomposed into a theta representation, which purely contains the theta relations, and a substructure in which lexical NPs have not been inserted yet (the so-called indexed structure). According to Lebeaux (1991), these substructures constitute the D-Structure and are later merged together by the rule Project-α.[2] If this happens before Move-α and Adjoin-α apply, the resulting structures correspond to the substructures that form the D-Structure in Lebeaux (1988, 2000).

In fact, in sentences like (4) and (5) Project-α always applies before Move-α (and

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[2]As an illustration, consider the sentence in (i). The underlying indexed structure is indicated in (i-a), and the θ-representation is given in (i-b). Project-α then projects (i-b) into the frame of (i-a).

(i) The man saw the woman.

a. substructure 1: the — [saw the —]

b. substructure 2: [man [saw woman]] (cf. Lebeaux (1991:226f.))

as the derivation in (10) revealed, Move-α applies before Adjoin-α). The reasoning goes as follows. On the assumption that elements may enter the derivation only at the point when they are licensed and that lexical NPs are licensed by Case-assignment, lexical NPs cannot be inserted into the derivation before they can receive Case. Thus, the Case Filter, which rules out lexical NPs[3] that are Caseless, can also be viewed as applying derivationally. Since the application of Move-α in the examples (4) and (5) entails that the *wh*-phrase is moved to an A$'$-position, i.e., a position to which Case cannot be assigned, the lexical NPs that are part of the *wh*-phrase must be inserted before. Thus, Project-α must apply first. This means that first all lexical NPs are inserted, and since all the target positions are Case positions, the NPs are immediately licensed and the Case Filter is satisfied. At this point, the derivation corresponds to the D-Structure assumed in Lebeaux (1988, 2000).

In Lebeaux (1988, 2000) it is also proposed that the argument structures are composed of more basic substructures by application of Project-α. However, Project-α applies before D-Structure and projects the theta representation into the so-called Case representation, which purely represents the Case relations and thus differs slightly from the indexed structures in that it does not contain the verb but only its Case assigning features.

To sum up, it can be said that while Project-α is used to make up the D-Structure representation in Lebeaux (1988, 2000), it applies after D-Structure in Lebeaux (1991). However, the account of (anti)reconstruction effects is the same. In both cases the crucial point is that adjuncts, unlike arguments, can be inserted into the derivation after the application of Move-α, and thus a Principle C violation can be avoided.

[3]Although Lebeaux (1991) assumes that NPs are embedded in DPs (unlike Lebeaux (1988, 2000)), he adopts a version of the Case Filter that considers only NPs.

(11) a. *Lebeaux (1988, 2000):*

$$\xrightarrow{\text{Project-}\alpha} \text{D-Structure} \xrightarrow[\text{Adjoin-}\alpha]{\text{Move-}\alpha} \text{S-Structure}$$

b. *Lebeaux (1991):*

$$\text{D-Structure} \xrightarrow{\text{Project-}\alpha\text{, Move-}\alpha\text{, Adjoin-}\alpha} \text{S-Structure}$$

3. Principle C as a Non-Derivational Constraint

As the previous section showed, Lebeaux's analysis crucially relies on the assumption that Principle C applies throughout the derivation. This means that it rules out a structure as soon as it violates Principle C, at any point in the derivation. The derivation in (9) illustrates this point. Neither at D-Structure (cf. (8)) nor at S-Structure (which would correspond to sentence (4-a)) is Principle C violated, but during the mapping from D-Structure to S-Structure a Principle C configuration occurs, and hence the derivation is starred.

Alternatively, it has been proposed that Principle C is not an "everywhere" condition but rather applies at a particular level of representation. However, the question of which level(s) is/are relevant for Principle C or Binding Theory in general has not been answered unanimously. The reason as to why there has been no definite answer is probably that empirical data alone do not suffice to settle the question. Depending on the theoretic assumptions, it seems to be possible to integrate basically all data into any approach. Thus the question at which level Binding Theory applies basically becomes an ideological one, and it must be asked which approach is preferable from a conceptual point of view. Of course it is desirable that the theory that is adopted needs as few extra stipulations as possible, but sometimes it is hard to decide whether an additional principle should be accepted in favour of the ideologically preferred option or not. Consider for instance Minimalism. From a minimalist perspective it is preferable "that conditions involving interpretation apply only at the interface levels" (Chomsky (1995:193)), and only if all conditions only hold at the interface levels can D- and S-Structure be dispensed with, which is a minimalist aim. Thus, Chomsky (1995) assumes that Binding Theory applies only at LF. However, this entails that data that Chomsky himself presented earlier to support the claim that Principle C must (at least) hold at S-Structure (cf., e.g., Chomsky (1981:196f.)) need to be reinterpreted. The following example (cf. Chomsky (1995:192f.)) illustrates how the same set of data can be made compatible with different assumptions about the level at which Principle C applies, depending on the underlying theoretical premises.

(12) a. How many pictures that John_1 took did you say he_1 liked?
b. *Who said he_1 liked [$_\alpha$ how many pictures that John_1 took]?

On the assumption that in (12-b) α adjoins to *who* at LF, the corresponding LF-representation (cf. (13-a)) is parallel to (12-a), which does not violate Principle C. Thus, (12-b) violates Principle C only at S-Structure, and it could be concluded that it is not sufficient to assume that Principle C only holds at LF; it must (at least) hold at S-Structure. However, if it is assumed that LF-movement does not adjoin the whole phrase α to *who* but only extracts *how many*, the resulting LF-structure is compatible with the assumption that Principle C only holds at LF. As (13-b) shows, the resulting structure violates Principle C and thus rules out sentence (12-b).

(13) *Potential LF-representations:*
a. [[$_\alpha$ how many pictures that John_1 took] who] said he_1 liked t_α
b. [[how many]$_\beta$ who] said he_1 liked t_β pictures that John_1 took

The question that needs to be addressed is how theories of this kind handle the reconstruction sentences considered above. Recall that these sentences do not violate Principle C at S-Structure. Thus it is irrelevant for the time being whether it is assumed that Principle C holds only at LF or also at S-Structure. As far as antireconstruction effects as in (4-a) (*Which claim that John*$_1$ *made did he*$_1$ *later deny?*) are concerned, it is not so difficult to imagine that such a sentence can be mapped to an LF-structure that satisfies Principle C. What is more interesting is how these theories account for the ungrammaticality of sentences like (5-a) (**Which picture of John*$_1$ *does he*$_1$ *like?*). In this case it has to be assumed that the configuration at LF violates Principle C.

3.1. Freidin (1986, 1994): An Outline

Two possible derivations of such an LF-representation are already vaguely outlined in Freidin (1986). Chronologically prior to Lebeaux (1988), he also observes antireconstruction effects of the type described above and relates them to the argument-adjunct distinction: "This difference in interpretation appears to be systematic, based on the distinction between the relative clause in [(4)] vs. the [...] complement in [(5)]" (Freidin (1986:179)). However, Freidin does not provide a full account of the data but just speculates how the right result might be achieved.

The first possibility, he argues, is to assume that in the complement case the dislocated constituent that contains the R-expression is literally reconstructed during the mapping from S-Structure to LF. Whether this instance of lowering restores the phrase to its trace position (as proposed in Freidin (1986)) or adjoins it to a position that c-commands the trace and is c-commanded by the coindexed pronoun (in the spirit of May's (1977, 1985) rule of quantifier lowering) does not make a difference. What is relevant is that this mechanism derives an LF-representation at which the R-expression is again bound by the pronoun and thus induces a violation of Principle C. However, it would have to be guaranteed that this kind of reconstruction would only be triggered if an argument was involved and not if the R-expression was embedded in an adjunct. As Freidin himself notes, "[e]xactly how this is to be implemented is far from clear" (Freidin (1986:186)).

The second outline Freidin gives is even sketchier. He just notes that it may be that the subcategorization domain N′ is accessed in the interpretation of the variable bound by the WH-phrase. Presumably this access does not extend to relative clauses, which fall outside the subcategorization domain of the nouns they modify. (Freidin (1986:179))

In his article from 1986, Freidin does not further comment on this proposal. However, the LF-representations he proposes for this kind of sentences in 1994 sheds some light on his considerations. He suggests that "the relative clause modifies the variable and therefore remains as part of the quantifier structure" (Freidin (1994:1384)); this is illustrated in (14-b) (cf. Freidin's (83)). As a result, the adjunct containing the R-expression is not taken into account when the variable x is interpreted; x is only interpreted as *a claim*.

(14) a. Which claim that John_1 made did he_1 later deny?

b. *LF-representation:*

(for which x such that $[_{\text{CP}}$ John_1 made $x]$, $x=$ a claim) did_i $[_{\text{IP}}$ he_1 e_i later deny $x]$

As far as the LF-representation of sentences involving arguments is concerned, the situation is slightly different. As illustrated in (15-b) (cf. Freidin's (84)), x stands for *a picture of* $\textit{John}_1$. Since the variable is in the c-command domain of the pronoun, Principle C will be violated when x is interpreted.

(15) a. *Which picture of John_1 does he_1 like?

b. *LF-representation:*

(for which x, $x=$ a picture of John_1) does_i $[_{\text{IP}}$ he_1 e_i like $x]$

3.2. Chomsky (1993, 1995): The Copy Theory of Movement

The account of (anti)reconstruction effects presented in Chomsky (1993, 1995) is based on Lebeaux's insight that adjuncts, unlike arguments, can be inserted non-cyclically into the derivation. However, the two theories differ with respect to the question at which level Principle C applies. In contrast to Lebeaux's analysis, which rests on the assumption that Principle C applies derivationally, Chomsky assumes that it holds only at LF. Furthermore, Chomsky bases his analysis on the copy theory of movement according to which traces left by movement are complete copies of the moved constituent. With respect to example (5-a) (**Which picture of John$_1$ does he$_1$ like?*) this means that the intermediate derivation looks as illustrated in (16).

(16) [which picture of John$_1$] does he$_1$ like [which picture of John$_1$]

When the structure is mapped to PF, the second copy is deleted and the first one is pronounced. As far as LF is concerned, there are in principle two possible structures to which the intermediate derivation in (16) can be converted. The two conceivable LF representations are illustrated in (17).

(17) a. *LF$_1$:* [which x] does he$_1$ like [x picture of John$_1$]
b. *LF$_2$:* [which x, x picture of John$_1$] does he$_1$ like x

On the assumption that the *wh*-phrase itself must be interpreted in an operator position (e.g. in SpecC), LF$_1$ represents the structure in which as much material as possible is deleted from the first copy. This includes the complement containing the R-expression, which is thus preserved in the second copy. However, the resulting structure, (17-a), violates Principle C. Hence, this derivation provides an account of the ungrammaticality of sentences like (5).

What remains to be shown is how the alternative LF representation illustrated in (17-b), which does not induce a Principle C violation, is ruled out. This is settled by the so-called *Preference Principle.*

(18) *Preference Principle:*
Do it when you can (i.e., try to minimize the restriction in the operator position). (Chomsky (1995:209))

Since in (17-b) the operator position SpecC contains more material than in (17-a) (*'which x' vs 'which x, x picture of John$_1$'*), the restriction is obviously not minimized in (17-b). Thus, according to the *Preference Principle*, LF$_1$ is the preferred LF-representation and LF$_2$ is ruled out.

Let us now turn to the analysis of the antireconstruction effect observed in (4-a) (*Which claim that John$_1$ made did he$_1$ later deny?*). If the adjunct is inserted into the structure cyclically, the derivation does not differ from the one involving an argument, i.e., a Principle C violation is predicted. However, the grammaticality of (4-a) indicates that there must be an alternative derivation that does not violate Principle C. Since Chomsky assumes that adjuncts can be inserted noncyclically into the derivation, it does not have to be part of the copy in the base position of the *wh*-phrase. If it is supposed that the adjunct is merged into the structure *after* *wh*-movement has taken place, the intermediate derivation looks as follows.

(19) [which claim that John$_1$ made] did he$_1$ later deny [which claim]

In this case, a reduction of the restriction in the operator position would yield the LF-representation illustrated in (20-a). However, the deletion of the adjunct in the operator position would be unrecoverable, because the adjunct is not present anywhere else in the structure. Thus, LF$_1$ must be ruled out because it violates *Recoverability of Deletion*, a principle "which requires that no information be lost" (Chomsky (1995:44)). Hence, LF$_2$ is the only possible LF-representation.

(20) a. *LF$_1$:* [which x] did he$_1$ later deny [x claim]
b. *LF$_2$:* [which x, x claim that John$_1$ made] did he$_1$ later deny x

To sum up, this means that there is a derivation of sentence (4-a) (*Which claim that John$_1$ made did he$_1$ later deny?*) which yields an LF that does not violate Principle C – the one in (20-b), which involves noncyclic Merge of the adjunct.

In fact, Chomsky's formulation of the *Preference Principle* is not very straightforward. Although its application reveals how it is meant to be interpreted, it is not inherently clear how the passage "when you can" is restricted. On the one hand, minimization is possible even if it implies a violation of Principle C (cf. (17-a)). On the other hand, the restriction cannot be reduced if it causes a violation of *Recoverability of Deletion* or the θ-Criterion (as pointed out by Epstein *et al.* (1998:50)). What is implicitly assumed is that the *Preference Principle* only chooses between derivations which have the same interpretation. Thus, the restriction "when you can" refers to the premise that competing derivations must have the same interpretation. This is the case in (17), hence the *Preference Principle* picks out the LF representation in (17-a), although it violates Principle C. In (20), by contrast, the two LFs do not have the same interpretation, because (20-a) lacks the adjunct, and therefore the two derivations do not compete at all. Thus, there is only one LF with the intended interpretation, and consequently the *Preference Principle* has no choice but to pick out derivation (20-b), although the restriction in the operator position has not been reduced.

As far as the formulation "try to minimize" in (18) is concerned, it seems to be redundant, because the verb *minimize* already entails that the restriction is reduced *as much as possible*, which is a relative notion. Thus, the *Preference Principle* could simply be defined as follows (cf. also Kitahara (1995:54)).

(21) *Preference Principle (revised):*
The restriction in the operator position must be minimized.

With respect to (17), this means that LF_1 is preferred to LF_2. In (20), on the other hand, the first LF does not compete with the second one, hence (20-b) represents the only possible LF representation with the intended meaning. As a result, the *Preference Principle* is trivially satisfied – the restriction in the operator position has been minimized insofar as there is no alternative structure where it could be reduced any further.

3.3. Fox (1999, 2000): Operator-Variable Economy

Chomsky's (1993, 1995) account of (anti)reconstruction effects has served as a basis for many subsequent minimalist approaches. However, different kinds of modifications have been suggested. As one example, let us briefly consider Fox's (1999, 2000) proposal.

Fox (1999, 2000) basically follows Chomsky's assumptions (cf. Fox (2000:177f.)), but he assumes that the LF-representation that yields a Principle C violation in sentences like (5-a) (**Which picture of John*$_1$ *does he*$_1$ *like?*) looks slightly different than the one proposed by Chomsky, and is thus also interpreted in a different way.

(22) *Relevant LF following Chomsky (1993, 1995) (cf. (17-a)):*
[which x] does he$_1$ like [x picture of John$_1$]

(23) *Relevant LF following Fox (1999, 2000):*
which picture of John$_x$ does he like picture of John x

The details of Fox's interpretation mechanism are not crucial at this point, but what we want to see is how he rules out the alternative LF, *which picture of John*$_x$ *does he like* x (which corresponds to Chomsky's LF in (17-b)). While Chomsky refers to the *Preference Principle*, Fox proposes the following economy condition.

(24) *OV Economy:*
Given an A$'$-chain, α, choose the operator-variable construction that is closest to α given the set of interpretable options.
An operator-variable construction O_1 is closer to a chain α than O_2 if the set of positions at the tail of α that are maintained in O_2 is a proper subset of the parallel set in O_1. (Fox (2000:177f.))

If this principle is applied to sentence (5-a), we get the following situation:

(25) $\alpha = \langle$which picture of John, which picture of John$\rangle$
O_1= which picture of John$_x$ ... picture of John x
O_2= which picture of John$_x$ ... x

Since the only difference between O_1 and O_2 is that in O_2 more material has been deleted, O_1 is closer to α. Thus, O_2 is ruled out by OV Economy, and O_1 is the preferred LF-representation, which violates Principle C if *John* and *he* are coindexed.

As far as the antireconstruction effect in sentences like (4-a) (*Which claim that John*$_1$ *made did he*$_1$ *later deny?*) is concerned, it is again based on the assumption that late insertion of the adjunct containing the R-expression obviates a Principle C configuration.

4. Epstein, Groat, Kawashima & Kitahara (1998): A Derivational Approach

The analysis proposed in Epstein *et al.* (1998) is more remote from Chomsky's (1993, 1995) approach. It also presupposes that adjuncts can be introduced noncyclically into the derivation, but it is not based on the copy theory of movement and dispenses with the *Preference Principle*. What Epstein *et al.* attempt to do in general is develop a completely derivational model of syntax in which independent interface levels of representation are eliminated. Thus, their account of (anti)reconstruction effects resembles much more Lebeaux's (1988, 1991, 2000) analysis, because, like Lebeaux, Epstein *et al.* (1998) assume that Principle C must be fulfilled at every point in the derivation.

The ungrammaticality of sentences like (5-a) (**Which picture of John*$_1$ *does he*$_1$ *like?*) can hence be accounted for straightforwardly. Since the argument containing the R-expression must be introduced cyclically, it is inserted in the object position before *wh*-movement takes place and induces a Principle C violation. So far, the account does not differ from Lebeaux's (1988, 1991, 2000) proposal. However, there is a difference between the two analyses with respect to sentences like (4-a) (*Which claim that John*$_1$ *made did he*$_1$ *later deny?*). In order to account for this antireconstruction effect, Epstein *et al.* (1998) also assume that the crucial point is that adjuncts can be merged into the structure noncyclically, but according to their theory it is not necessary that the insertion of the adjunct takes place after *wh*-movement. Instead, it is only relevant that the adjunct containing the R-expression is introduced after the coindexed pronoun (cf. (26-a), (26-b)). In this respect, Epstein *et al.* (1998) differ from Lebeaux (1988, 1991, 2000), Chomsky (1993, 1995), and Fox (1999, 2000).

(26) *The derivation of (4-a):*

a. he later denied [which claim]

b. he$_1$ later denied [which claim that John$_1$ made]

c. [which claim that John$_1$ made] did he$_1$ later deny

In all analyses discussed so far, the R-expression in (26-b) would be bound by the subject pronoun. However, this is not the case in Epstein *et al.*'s (1998) theory, because they define the notion of c-command in a way that makes reference to the syntactic configuration *at a particular time* in the derivation.

(27) *Derivational c-command:*

X c-commands all and only the terms of the category Y with which X was paired/concatenated by Merge or by Move in the course of the derivation.

(cf. Epstein *et al.* (1998:32))

(28) *Term:*

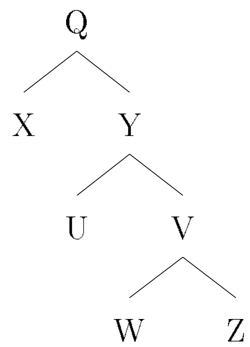
L is a term of Y iff

a. L=Y, or

b. L is a term of the categories concatenated to form Y.

(cf. Epstein *et al.* (1998:62))

(29) *Illustration:*



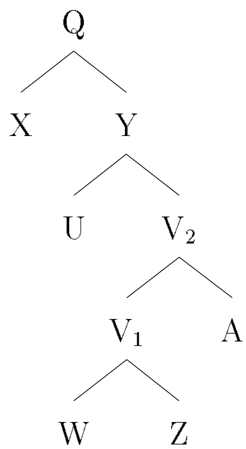
Suppose the derivation has reached the stage illustrated in (29). According to the definition in (27), the c-command domain of the constituent X corresponds to the set CCD(X):= {the terms of Y}, because X was concatenated with Y by Merge. In order to determine what the terms of Y are, definition (28) has to be applied. First, it can be concluded that Y itself is an element of CCD(X) (cf. (28-a)). Since Y is moreover formed by concatenating U and V, the terms of U and V are also part of CCD(X) (cf. (28-b)). Therefore CCD(X)= {Y, the terms of U, the terms of V}. If the definition in (28) is applied again, the set can further be converted into CCD(X)= {Y, U, V, the terms of W, the terms of Z} and finally into CCD(X)= {Y, U, V, W, Z}.

So far, the derivational definition of c-command yields the same result as the representational definition originally formulated by Reinhart.

(30) *Representational c-command (following Reinhart (1976)):*
X c-commands Y iff the first branching node dominating X dominates Y, X does not dominate Y, and X≠Y.

However, there is a difference between the two definitions of c-command if a further constituent A is inserted into the derivation after X and Y have been concatenated by Merge. Suppose that A is adjoined to V after the structure in (29) has already been derived (cf. (31)).

(31) *Illustration:*



According to Reinhart's definition, X c-commands Y, U, V_1, V_2 (i.e., both segments of V), W, Z, and A in (31). However, if the derivational definition of c-command is applied, the situation is different. What counts for determining the c-command domain of X is the syntactic configuration at the point in the derivation when X was merged with Y. At that point, A was not part of the structure yet, and therefore the terms of Y correspond only to Y, U, V, W, and Z. Thus, X does not c-command A. Generally, it can be concluded that the c-command domain of a given constituent is determined as soon as it is introduced into the derivation and can only be extended at some later point if it moves and thereby undergoes another instance of concatenation.[4]

[4]Epstein *et al.*'s motivation for introducing the notion of derivational c-command is mainly based on conceptual grounds. They argue that "[t]he derivational definition of C-command (...) eliminates massive redundancy" and "provides principled answers to an infinite number of unanswered questions confronting the definition of representational C-command". Moreover, it "overcomes empirical inadequacies (...) that result from the interaction of the X′-invisibility hypothesis (Chomsky 1993) and representational C-command (Reinhart 1979)" (Epstein *et al.* (1998:37)). Since it might even "be possible to *deduce* the derivational definition of C-command from independent and conceptually necessary principles" (Epstein *et al.* (1998:10)), they argue that their derivational definition is

Let us now come back to the derivaton of (4-a) (*Which claim that John*$_1$ *made did he*$_1$ *later deny?*), which was already alluded to in (26). Since it is possible to introduce the adjunct containing the R-expression noncyclically into the derivation, it can be inserted when the subject pronoun has already been merged into the structure and has thus already established its c-command relations. Consequently, it is possible in this theory to derive the intermediate structure (26-b), *he*$_1$ *later denied [which claim that John*$_1$ *made]*, such that no c-command relation holds between *he*$_1$ and *John*$_1$. Of course this entails that the pronoun does not bind the R-expression either, which means that Principle C is not violated and the antireconstruction effect in (4-a) is accounted for.

One question that arises at this point is how the theory deals with sentences like the following.

(32) *He$_1$ denied the claim that John$_1$ had made before.

Obviously, the sentence is ungrammatical because Principle C is violated. However, the problematic R-expression is embedded in an adjunct, which can be introduced into the derivation noncyclically. If it is assumed that the adjunct is inserted after the subject pronoun, the latter does not derivationally c-command the R-expression, because the c-command domain of the pronoun is already determined when it is merged into the derivation, i.e. before the insertion of the adjunct. Thus, the R-expression would not be bound, and sentence (32) would be expected to be well-formed. However, this is not the case, hence it must be concluded that it is not possible for some reason to insert the adjunct noncyclically in (32) and thereby obviate the Principle C violation.

Based on a proposal by Kawashima & Kitahara (1996), Epstein *et al.* (1998) argue that it is the *Linear Correspondence Axiom* (LCA) (cf. Kayne (1994)) which

more adequate.

requires the cyclic introduction of the adjunct. The basic idea underlying the LCA is that "phrase structure in fact always completely determines linear order" (Kayne (1994:3)). This means that according to Kayne's LCA[5] only those hierarchical structures are admissible that map unambiguously to a linear order of the terminal elements, where the mapping is defined via the notion of asymmetric c-command. To sum up, the LCA predicts that if X and Y are nonterminals and X asymmetrically c-commands Y, then all terminals dominated by X precede all terminals dominated by Y.

So why is it not allowed to insert the adjunct noncyclically in sentences like (32)? It has already been observed that if the relative clause is introduced after the insertion of the subject pronoun, no derivational c-command relation is established between the subject and the adjunct. However, "[t]he absence of those C-command relations entails that no linear order would be determined between *he* and any term of the relative clause: a violation of the LCA" would arise (Epstein *et al.* (1998:74)). Strictly speaking, this conclusion is drawn a bit rashly, because the lack of a c-command relation between two elements does not necessarily imply that the ter-

[5] *Linear Correspondence Axiom (LCA)* (cf. Kayne (1994:4ff.)):

d(A) is a linear ordering of T, where

(i) T is the set of terminals in a given phrase marker;

(ii) A is the maximal set of ordered pairs $\langle X_i, Y_i \rangle$, X_i, Y_i nonterminals, such that for each i, X_i asymmetrically c-commands Y_i;

(iii) $\mathrm{d}(A) := \bigcup_{i=1}^{n} \mathrm{d}\langle X_i, Y_i \rangle = \bigcup_{i=1}^{n} \{\langle a, b \rangle\}, a \in \mathrm{d}(X_i), b \in \mathrm{d}(Y_i)$, where $A = \{\langle X_i, Y_i \rangle\}$, $0 < i \leq n$, and d(X) is the set of terminals that X dominates;

(iv) linear ordering comprises the following three properties:

transitivity: xLy & $yLz \longrightarrow xLz$

totality: $\forall x, y; x \neq y \longrightarrow$ either xLy or yLx

antisymmetry: $\neg\,(xLy$ & $yLx)$

minals they dominate are not linearly ordered. However, in order to avoid an LCA violation in this case, it is required that there be a further node that dominates one of the two elements and either asymmetrically c-commands the other element or is asymmetrically c-commanded by the latter.[6] With respect to sentence (32) this means that it must also be shown that no node that is asymmetrically c-commanded by the category in the subject position dominates the relative clause in order for the argument to work.[7] If this can be shown, the terminals in the relative clause and the subject pronoun can indeed not be linearly ordered, which means that totality is not respected and the LCA is violated.

In fact, it can easily be shown that there is no node that is asymmetrically c-commanded by the subject and which dominates the relative clause. According to the derivational definition of c-command, all elements that are c-commanded by the subject pronoun must have been present in the derivation at the point when the subject has been inserted. If the adjunct is introduced later, this entails that the nodes that are c-commanded by the subject are already part of the structure before the adjunct is inserted. However, in chapter 6 of their book Epstein *et al.* suggest that the dominance relation should also be defined derivationally (cf. Epstein *et al.* (1998:166ff.)); this means that a category can only dominate categories "of which it is constituted" (Epstein *et al.* (1998:168)), i.e., categories that are already part of the derivation when the former is inserted. On this assumption, the nodes that

[6]The latter scenario (something like [E_1 [[$_X$ [E_2]]]] with X being the node that dominates E_2 and is asymmetrically c-commanded by E_1) would not be worth mentioning if the traditional notion of c-command were used, because it would entail that E_1 also asymmetrically c-command E_2. However, against the background of derivational c-command, it cannot *a priori* be excluded that E_1 might asymmetrically c-command X but not E_2.

[7]The first configuration mentioned before cannot arise in this scenario. In order for a node X to dominate either the subject or the adjunct, it must be part of the main path; in this case, however, it cannot asymmetrically c-command the other element.

are c-commanded by the subject cannot dominate the relative clause, since they are merged into the derivation much earlier. Thus, the noncyclic derivation of sentence (32) is indeed ruled out because it violates the LCA.[8]

However, we have already seen that Epstein *et al.*'s (1998) account of antireconstruction effects crucially relies on the Late Merge option. Hence, it remains to be clarified why the LCA does not rule out Late Merge in general.[9] The crucial difference between sentences like (32), in which noncyclic Merge is not allowed, and sentences like (4-a) (*Which claim that John*$_1$ *made did he*$_1$ *later deny?*), which Epstein *et al.* (1998) can only derive on the assumption that the adjunct is inserted noncyclically, is that in the latter example a further movement operation takes place that affects the adjunct. Recall that the (derivational) c-command domain of a category is extended as soon as the category is moved. With respect to (4-a) this means that the c-command domain of the *wh*-phrase containing the adjunct is extended when it is moved to SpecC. Its c-command domain will now contain all terms of C′ at this point in the derivation, and this also comprises the subject. Thus the situation is quite different after *wh*-movement has taken place: Now there *is* an (asymmet-

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[8]Since the reasoning remains the same if the LCA is defined in terms of c-command instead of asymmetric c-command, the sentence is ruled out in exactly the same way under the revised definition of the LCA that Epstein *et al.* propose in their chapter 5.

(i) *Linear Correspondence Axiom (revised):*
If X C-commands Y, then the terminals in X precede the terminals in Y.
(Epstein *et al.* (1998:151))

[9]In fact, Kawashima & Kitahara (1996) suggest that the LCA entails that the "[i]ntroduction of an overt category must be cyclic" and that the "[n]oncyclic introduction of an overt category necessarily yields a phrase structure violating the LCA" (Kawashima & Kitahara (1996:267f.)). This is not completely true, as Epstein *et al.* (1998) show.

ric) c-command relation between a node containing the adjunct and the category in subject position. Consequently, totality is respected, and the LCA does not rule out the derivation but correctly predicts that the terminals of the *wh*-phrase (and in particular those of the adjunct, including the R-expression) linearly precede the subject pronoun.

5. Chomsky (2001a): Against Noncyclic Merge

In his 2001a paper, Chomsky turns away from the assumption that adjuncts can be inserted noncyclically into the derivation. He refutes noncyclic Merge on conceptual grounds, since it constitutes an additional complication of the underlying system although it would be possible to account for sentences like (4-a) (*Which claim that John*$_1$ *made did he*$_1$ *later deny?*) in a way that does not infringe cyclicity. Hence, noncyclic Merge violates the strong minimalist thesis and should thus be dispensed with.

As far as the derivation of (4-a) is concerned, it is therefore assumed that the adjunct is inserted cyclically. However, since adjunction of α to β, an asymmetric operation, generally involves pair-Merge ($\langle\alpha,\beta\rangle$) and not set-Merge ($\{\alpha,\beta\}$), Chomsky argues that the resulting structure is not simple, which means that c-command is no longer a relation that comes for free but rather turns into a costly operation. It follows that if X c-commands β, it does not necessarily imply that X also c-commands α, because "extension of c-command to the adjoined element α would be a new operation, to be avoided unless empirically motivated" (Chomsky (2001a:16)).

With regard to sentence (4-a) this means that although the adjunct is merged into the derivation cyclically and *he* c-commands *which claim* in its base position, the pronoun does not c-command the adjoined relative clause containing the R-expression, and hence no Principle C configuration arises. Thus, Principle C will not be violated even if obligatory reconstruction takes place.

To some extent this account is reminiscent of Epstein *et al.*'s (1998) approach, namely insofar as both analyses are based on the assumption that the c-command relation that is responsible for the Principle C effect in the argument case does not hold if an adjunct is involved. However, while Epstein *et al.* (1998) derive this property from their definition of derivational c-command, Chomsky (2001a) puts it down to the difference between simple and more complex structures, i.e. to the difference between pair- and set-Merge. But like Epstein *et al.*, Chomsky must then provide an account of sentences like (32), repeated in (33), which show that adjuncts are not always exempt from Principle C effects.

(33) *He$_1$ denied the claim that John$_1$ had made before.

The violation of Principle C in (33) suggests that the pronoun not only c-commands *the claim* but also the adjoined relative clause containing *John*. Chomsky (2001a) captures examples like these by assuming that at some point in the derivation $\langle \alpha, \beta \rangle$ is converted into $\{\alpha, \beta\}$, a simple structure, at which the c-command relation holds again automatically.[10]

6. The Distinction between Arguments and Adjuncts

Obviously, the argument-adjunct approach crucially relies on the distinction argument *vs* adjunct. However, this already poses a basic problem since it is not always easy to determine whether a given constituent functions as argument or adjunct, and many of the tests that have been proposed in the literature are only tentative in nature (cf., among others, Jackendoff (1977), Grimshaw (1990), Schütze (1995)) – all the more considering that "argumenthood [might not be] an all-or-nothing phenomenon, but [...] comes in degrees", as Schütze (1995:100) points out. Moreover, it

[10]The operation that turns $\langle \alpha, \beta \rangle$ into a simple structure is called SIMPL and is part of the operation TRANSFER, which hands a derivation from narrow syntax over to the phonological and the semantic component (cf. Chomsky (2001a:4; 17)).

is sometimes difficult to tell whether additional factors blur the results of the tests.

This has to be kept in mind when we now turn to some of the diagnostics summarized in Schütze (1995) and apply them to the italicized constituents in the following ten examples from English and German.[11]

(34) Ben lay on the desk *in his office.*

(35) Peter blieb *wegen seiner Mutter* weg.
Peter stayed because of his mother away
'Peter stayed away because of his mother.'

(36) John never admitted *that he had seen the movie.*

(37) Hans hat mir natürlich verschwiegen, *dass er verloren hat.*
John has me of course not told that he lost has
'Of course, John did not tell me that he had lost.'

(38) Peter hat Marias Strafe *für sein Zuspätkommen* akzeptiert.
Peter has Mary's punishment for his being late accepted
'Peter accepted Mary's punishment for his being late.'

(39) Peter konnte Marias mutwillige Zerstörung *von seinen Sachen* nicht
Peter could Mary's wilful destruction of his things not
einfach hinnehmen.
just accept
'Peter could not just accept Mary's wilful destruction of his things.'

(40) John successfully refuted the accusation *that he was a murderer.*

(41) The Senator dismissed his opponent's claim *that he had violated the cam-*

[11]Sentence (34) is ambiguous insofar as the constituent in question can modify the verb or the noun *desk*. The reading we will be concerned with is the first one.

paign finance regulations as politically motivated.

(42) Bärbel hat die Behauptung, *dass sie Roman geschlagen habe*, als
Bärbel has the claim that she Roman beaten have_{sub} as
Verleumdung zurückgewiesen.
slander dismissed
'Bärbel dismissed the claim that she had beaten Roman as slander.'

(43) Peter bestreitet natürlich vehement Marias Behauptung, *dass er faul sei.*
Peter denies of course vehemently Mary's claim that he lazy be_{sub}
'Of course, Peter vehemently denies Mary's claim that he is lazy.'

6.1. Optionality

The first test concerns optionality. While adjuncts are always optional, arguments are often obligatory. This leads to the following conclusion: If the constituent under consideration is not optional, it must be an argument. With respect to the examples above, this can be observed with example (36) and (37) (repeated in (44-a) and (45-a)) as (44-b) and (45-b) illustrate.

(44) a. John never admitted *that he had seen the movie.*
b. *John never admitted.

(45) a. Hans hat mir natürlich verschwiegen, *dass er verloren hat.*
John has me of course not told that he lost has
'Of course, John did not tell me that he had lost.'
b. *Hans hat mir natürlich verschwiegen.
John has me of course not told

The other sentences remain grammatical if the italicized constituents are omitted (cf. (46)-(53)), which means that the optionality test does not tell us anything in these cases.

(46) a. Ben lay on the desk *in his office.*

b. Ben lay on the desk.

(47) a. Peter blieb *wegen seiner Mutter* weg.

Peter stayed because of his mother away
'Peter stayed away because of his mother.'

b. Peter blieb weg.

Peter stayed away.
'Peter stayed away.'

(48) a. Peter hat Marias Strafe *für sein Zuspätkommen* akzeptiert.

Peter has Mary's punishment for his being late accepted
'Peter accepted Mary's punishment for his being late.'

b. Peter hat Marias Strafe akzeptiert.

Peter has Mary's punishment accepted
'Peter accepted Mary's punishment.'

(49) a. Peter konnte Marias mutwillige Zerstörung *von seinen Sachen* nicht

Peter could Mary's wilful destruction of his things not

einfach hinnehmen.

just accept
'Peter could not just accept Mary's wilful destruction of his things.'

b. Peter konnte Marias mutwillige Zerstörung nicht einfach hinnehmen.

Peter could Mary's wilful destruction not just accept
'Peter could not just accept Mary's wilful destruction.'

(50) a. John successfully refuted the accusation *that he was a murderer.*

b. John successfully refuted the accusation.

(51) a. The Senator dismissed his opponent's claim *that he had violated the campaign finance regulations* as politically motivated.

b. The Senator dismissed his opponent's claim as politically motivated.

(52) a. Bärbel hat die Behauptung, *dass sie Roman geschlagen habe*, als Verleumdung zurückgewiesen.

Bärbel has the claim that she Roman beaten have$_{sub}$ as slander dismissed

'Bärbel dismissed the claim that she had beaten Roman as slander.'

b. Bärbel hat die Behauptung als Verleumdung zurückgewiesen.

Bärbel has the claim as slander dismissed

'Bärbel dismissed the claim as slander.'

(53) a. Peter bestreitet natürlich vehement Marias Behauptung, *dass er faul sei*.

Peter denies of course vehemently Mary's claim that he lazy be$_{sub}$

'Of course, Peter vehemently denies Mary's claim that he is lazy.'

b. Peter bestreitet natürlich vehement Marias Behauptung.

Peter denies of course vehemently Mary's claim

'Of course, Peter vehemently denies Mary's claim.'

6.2. Head-Dependence

Since an argument receives its semantic role from the head with which it is associated, its semantic contribution to the clause is directly dependent on the head. The semantic contribution of an adjunct, on the other hand, is not determined by the head it modifies. As a consequence,

> a given adjunct can co-occur with a relatively broad range of heads while seeming to make a more-or-less uniform contribution to semantic content across that range. A given optional complement, by contrast, is typically limited in its distribution to

co-occurrence with a small (and often semantically restricted) class of heads.
(Pollard & Sag (1987:136))

If the head-dependence test is applied to the examples above, it indicates that the first two constituents in question are adjuncts while all the others seem to be arguments. (However, it is clear that this test can only give a subtle hint.)

(54) Ben {lay/sneezed/met Paul/gave Mary a kiss} on the desk in his office.

(55) Peter {blieb weg/ nieste/ traf Paul/ gab Maria einen Kuss}
Peter {stayed away/ sneezed/ met Paul/ gave Mary a kiss}
wegen seiner Mutter.
because of his mother
'Peter {stayed away/sneezed/met Paul/gave Mary a kiss} because of his mother.'

(56) John never {admitted/*sneezed/*met Paul/*gave Mary a kiss} that he had seen the movie.

(57) Hans {hat mir verschwiegen/ *nieste/ *traf Paul/ *gab Maria einen
John {has me not told/ sneezed/ met Paul/ gave Mary a
Kuss}, dass er verloren hat.
kiss} that he lost has
'John {did not tell me/*sneezed/*met Paul/*gave Mary a kiss} that he had lost.'

(58) Marias {Strafe/ *Buch/ *Krankheit/ *Bruder} für sein
Mary's {punishment/ book/ illness/ brother} for his
Zuspätkommen
being late
'Mary's {punishment/*book/*illness/*brother} for his being late'

(59) Marias {mutwillige Zerstörung/ *Buch/ *Krankheit/ *Bruder} von
Mary's {wilful destruction/ book/ illness/ brother} of
seinen Sachen
his things
'Mary's {wilful destruction/*book/*illness/*brother} of his things'

(60) the {accusation/*book/*illness/*brother} that he was a murderer

(61) the {claim/*book/*illness/*brother} that he had violated the campaign finance regulations

(62) {die Behauptung/ *das Buch/ *die Krankheit/ *der Bruder}, dass sie
{the claim/ the book/ the illness/ the brother} that she
Roman geschlagen habe
Roman beaten have_{sub}
'the {claim/*book/*illness/*brother} that she had beaten Roman'

(63) Marias {Behauptung/ *Buch/ *Krankheit/ *Bruder}, dass er faul sei
Mary's {claim/ book/ illness/ brother} that he lazy be_{sub}
'Mary's {claim/*book/*illness/*brother} that he is lazy'

Since none of the CPs under consideration allows a wide range of associated heads (cf. (56), (57), (60), (61), (62), (63)), it might be useful to examine whether this is a general property of CP constituents and whether the head-dependence test is applicable at all in this case. However, the following example shows that clear CP adjuncts (like relative clauses) do allow a wider range of heads than the CPs in the examples above.

(64) a. the {claim/book/illness/brother} that John knows
b. {die Behauptung/das Buch/die Krankheit/der Bruder}, {die/das/den} Hans kennt

6.3. Iterativity

The third test is based on the observation that only adjuncts can iterate. Arguments, by contrast, cannot, since their associated head assigns only one θ-role, which cannot be shared by several arguments.

It turns out that the iterativity test yields the same result as the previous test: the first two examples behave like adjuncts, the others like arguments.

(65) Ben lay on the desk in his office in the sun.

(66) Peter blieb weg wegen seiner Mutter trotz ihres Flehens.
Peter stayed away because of his mother in spite of her pleas
'Peter stayed away because of his mother in spite of her pleas.'

(67) *John never admitted that he had seen the movie that he had stolen the car.

(68) *Hans hat mir natürlich verschwiegen, dass er verloren hat, dass er
John has me of course not told that he lost has that he
verheiratet ist.
married is

(69) *Peter hat Marias Strafe für sein Zuspätkommen für seine Lügen
Peter has Mary's punishment for his being late for his lies
akzeptiert.
accepted

(70) *Peter konnte Marias mutwillige Zerstörung von seinen Sachen von seinem
Peter could Mary's wilful destruction of his things of his
Lieblingspullover nicht einfach hinnehmen.
favourite pullover not just accept

(71) *John successfully refuted the accusation that he was a murderer that he had

stolen the car.

(72) *The Senator dismissed his opponent's claim that he had violated the campaign finance regulations that he had stolen a car as politically motivated.

(73) *Bärbel hat die Behauptung, dass sie Roman geschlagen habe, dass sie
Bärbel has the claim that she Roman beaten have$_{sub}$ that she
ihn diskriminieren würde, als Verleumdung zurückgewiesen.
him discriminate against would as slander dismissed

(74) *Peter bestreitet natürlich vehement Marias Behauptung, dass er faul
Peter denies of course vehemently Mary's claim that he lazy
sei, dass er gelogen habe.
be$_{sub}$ that he lied have$_{sub}$

The following example just serves as an illustration that the iterativity test generally can be applied to CPs: In contrast to the CPs considered above, the adjunct CPs in (75) can iterate.

(75) a. This is the man I saw who stole the car.
b. Das ist der Mann, den ich gesehen habe, der das Auto gestohlen
that is the man that I seen have that the car stolen
hat.
has

6.4. Copular Paraphrases

The fourth diagnostic is only applicable to constituents of NPs. What is tested is whether the constituent in question can be paraphrased with a relative clause involving a copular construction. If so, it is an adjunct, if not, it is an argument. (76) illustrates with clear NP-adjuncts (*on the desk/auf dem Schreibtisch*) how the test generally works.

(76) a. the book (that was) on the desk

b. das Buch(, das) auf dem Schreibtisch (war)
the book (that) on the desk (was)

With respect to the data under consideration, the test is only applicable to example (38) (*Marias Strafe für sein Zuspätkommen/Mary's punishment for his being late*) and (39) (*Marias mutwillige Zerstörung von seinen Sachen/Mary's wilful destruction of his things*). The other examples cannot be tested with this diagnostic because they either involve constituents of VP or are CPs themselves and hence not paraphrasable with a relative clause for independent reasons. Applied to the above-mentioned examples, the test yields the following result: (77) is much better than (78), which is completely out. Hence, the test indicates that the NP constituent in (77) might be an adjunct, whereas the one in (78) behaves like an argument.

(77) ?Marias Strafe, die für sein Zuspätkommen war, war angemessen.
Mary's punishment which for his being late was was fair
'Mary's punishment for his being late was fair.'

(78) *Marias mutwillige Zerstörung, die von seinen Sachen war, war unangebracht.
Mary's wilful destruction which of his things was was inappropriate
'Mary's wilful destruction of his things was inappropriate.'

In fact, (77) seems to improves even more if *Marias* ('Mary's') is replaced with the definite article *die* – this is not the case with sentence (78) (cf. (79-a) *vs* (79-b), respectively).

(79) a. Die Strafe, die für sein Zuspätkommen war, war angemessen.
the punishment which for his being late was was fair
'The punishment for his being late was fair.'

b. *Die mutwillige Zerstörung, die von seinen Sachen war, war
The wilful destruction which of his things was was
unangebracht.
inappropriate
'The wilful destruction of his things was inappropriate.'

This result, i.e. the different behaviour of the two NPs under consideration, is confirmed by another, very similar test that is based on the observation that "modifiers can be separated from the head noun by a copula, but arguments [...] cannot" (Schütze (1995:103)). This test usually yields the same results as the relative clause test (cf. (76)/(80) and (78)/(81)).[12]

[12]Cf. also Fabricius-Hansen & von Stechow's (1989) diagnostic according to which only adjuncts can precede the noun they modify (cf. the illustration in (i)).

(i) a. Die Frage, ob das sozial relevant ist, interessiert mich nicht.
the question whether that socially relevant is interests me not

b. Ob das sozial relevant ist, ist eine Frage, die mich nicht interessiert.
whether that socially relevant is is a question that me not interests
'It does not interest me whether this question is socially relevant.'

(cf. Fabricius-Hansen & von Stechow (1989:175))

However, according to this test many CPs which have been considered to be arguments so far would have to be classified as adjuncts. The following two examples serves as an illustration; (ii) is taken from Fabricius-Hansen & von Stechow (1989:175), (iii-a) is repeated from (42). (As they point out, the CP in *'the claim [$_{CP}$ that...]'* has already been classified as adjunct in Stowell (1981).) All this shows once more that it is not easy to come up with reliable tests that draw a clear-cut distinction between arguments and adjuncts.

(80) a. The book was on the desk.

b. Das Buch war auf dem Schreibtisch.

the book was on the desk

(81) *Marias mutwillige Zerstörung war von seinen Sachen.

Mary's wilful destruction was of his things

In fact, it also confirms the results from (77) and (79-a): (82) seems to be not quite as good as (83), but it is much better than (81), and a comparison with (84) suggests that (82) improves even more in a contrastive context.[13]

(ii) a. Der Gedanke, dass ich dich beleidigt habe, beunruhigt mich.

the thought that I you insulted have worries me

b. Dass ich dich beleidigt habe, ist ein Gedanke, der mich beunruhigt.

that I you insulted have is a thought that me worries
'The thought of having insulted you worries me.'

(iii) a. Bärbel hat die Behauptung, dass sie Roman geschlagen habe, als Verleumdung

Bärbel has the claim that she Roman beaten have_{sub} as slander

zurückgewiesen.

dismissed

b. Dass sie Roman geschlagen habe, ist eine Behauptung, die Bärbel als

that she Roman beaten have_{sub} is a claim that Bärbel as

Verleumdung zurückgewiesen hat.

slander dismissed has
'Bärbel dismissed the claim that she had beaten Roman as slander.'

[13]Note that this also seems to be true for the relative clause construction in (77) (repeated in (i-a)):

(i) a. ?Marias Strafe, die für sein Zuspätkommen war, war angemessen.

Mary's punishment which for his being late was was fair

(82) ?Marias Strafe war für sein Zuspätkommen.
Mary's punishment was for his being late

(83) Die Strafe war für sein Zuspätkommen.
the punishment was for his being late

(84) Marias Strafe war für sein Zuspätkommen, Sarahs für seine
Mary's punishment was for his being late Sarah's for his
Lügengeschichten.
lies

Although it is known that different degrees of specificity can have an effect on certain argument-adjunct tests (cf. the extraction test discussed in Schütze (1995:108ff.)), this cannot be observed with the copular paraphrases test in general. Sentence (81) (**Marias mutwillige Zerstörung war von seinen Sachen/'Mary's wilful destruction of his things'*), for instance, remains ungrammatical if *Marias* ('Mary's') is replaced with *die* ('the'), and it does not improve either if it is embedded in a context like (84), as illustrated in (86).

'Mary's punishment for his being late was fair.'

b. Marias Strafe, die für sein Zuspätkommen war, war angemessen,
Mary's punishment which for his being late was was fair
wohingegen Sarahs Strafe für seine Lügengeschichten völlig
whereas Sarah's punishment for his lies completely
unangebracht war.
inappropriate was
'Mary's punishment for his being late was fair, whereas Sarah's punishment for his lies was completely inappropriate.'

(85) *Die Zerstörung war von seinen Sachen.
the destruction was of his things

(86) *Marias mutwillige Zerstörung war von seinen Sachen, Sarahs von seinem
Mary's wilful destruction was of his things Sarah's of his
Garten.
garden

As far as the sentences in (80) are concerned (*The book was on the desk/Das Buch war auf dem Schreibtisch*), which clearly involve adjuncts, they do not get worse if the definite article is replaced with *Mary's*.

(87) a. Mary's book was on the desk.
b. Marias Buch war auf dem Schreibtisch.
Mary's book was on the desk

Hence, it is not really clear where the subtle variation observed in (82)-(84) comes from. As far as the other tests discussed in this section are concerned, their results are not affected if *Marias* ('Mary's') is replaced with the definite article in the corresponding NP.

With respect to the second variant of the test considered above, the question might arise as to whether it is possible to test CPs with it. Applied, for instance, to example (43) (*Peter bestreitet natürlich vehement Marias Behauptung, dass er faul sei/'Of course, Peter vehemently denies Mary's claim that he is lazy'*) the test yields the following well-formed sentence.

(88) Die Behauptung war, dass Peter faul sei.
the claim was that Peter lazy be$_{sub}$
'The claim was that Peter would be lazy.'

However, if the test is applied to the relative clause in (89-a), an adjunct CP, the resulting structure is ungrammatical (cf. (89-b)), contrary to what would be expected according to the test.

(89) a. die Behauptung, die Maria gemacht hat
the claim that Mary made has
'the claim that Mary made'

b. *Die Behauptung war, die Maria gemacht hat.
the claim was that Mary made has

Hence, it can be concluded that the diagnostics described in this secion are not suited to CPs.

6.5. Pro-Form Replacement

A well-known syntactic test to determine the arguments of a given head is the pro-form replacement test, which is based on the observation that there are words that can be substituted for the head plus its internal arguments, whereas adjuncts are not obligatorily deleted if the associated head is replaced. For example, English NPs plus their internal arguments can be replaced with (non-numeral) *one* if the head noun is countable. If this test is applied to (40) (repeated in (90-a)), it predicts that the constituent under consideration is an argument and thus confirms the results of the previous tests (cf. (90-b)).[14]

[14] As regards sentence (41) (*The Senator dismissed his opponent's claim that he had violated the campaign finance regulations as politically motivated*), it does not seem to be a good example for this test. Although one informant even accepted the resulting structure (*The Senator ignored his opponent's claim that he had violated the campaign finance regulations, not the one that he had stolen the car*), Sam Featherston (p.c.) points out that it does not really work: *not the one that* requires contrastive focus, but *claim* is unfocused because it is the content of the claim that contains the actual information.

(90) a. John successfully refuted the accusation that he was a murderer

b. *John successfully refuted the accusation that he was a murderer, but not the one that he was a casanova.

The grammaticality of (91), which contains an adjunct CP, confirms that the test works with CPs.

(91) He denied the claim that John made, not the one that Bill made.

Unfortunately, the test is not applicable to German NP constituents. Unlike in English, the deletion of internal NP arguments is not obligatory if the NP is replaced with the German equivalent of *one*. Consider, for instance, example (92-a), which is presented in Schütze (1995:104), and its German translation in (92-b).

(92) a. *I like the King of Sweden, but I can't stand the one of Denmark.

b. Ich mag den König von Schweden, aber den von Dänemark kann ich
I like the king of Sweden but that of Denmark can I
nicht ausstehen.
not stand

Hence, the grammaticality of constructions like the following is not meaningful for the argument-adjunct distinction.

(93) Peter hat Marias mutwillige Zerstörung von seinem Computer
Peter has Mary's wilful destruction of his computer
hingenommen, aber nicht die von seinem Schallplattenspieler.
accepted but not that of his record player
'Peter put up with Mary's wilful destruction of his computer, but not with her wilful destruction of his record player.'

As far as verbal constituents are concerned, the so-called *do so* test can be applied: "If a constituent is obligatorily deleted when part of a verb phrase is replaced by *do so*, that phrase is an argument; if not, it is a modifier" (Schütze (1995:105)). Accordingly, the following two examples contain arguments.

(94) a. *John admitted that he had seen the movie, and Bill did so that he had read the book.

b. John admitted that he had seen the movie, and Bill did so, too.

(95) a. *Hans hat mir verschwiegen, dass er verloren hat, und Maria tat das,
John has me not told that he lost has and Mary did this
dass sie gewonnen hat.
that she won has
'John did not tell me that he had lost, and Mary did not tell me that she had won.'

b. Hans hat mir verschwiegen, dass er verloren hat, und Maria tat das
John has me not told that he lost has and Mary did this
auch.
too
'John did not tell me that he had lost, and Mary did so, too.'

By contrast, if the test is applied to the sentences (34) and (35) (repeated in (96-a) and (97-a)), it turns out that the constituents under consideration must be adjuncts (cf. (96-b) and (97-b)). The alternative pseudo-clefting test yields the same result (cf. (98) and (99)).

(96) a. Ben lay on the desk in his office.

b. Ben lay on the desk in his office, and Bill did so in his bedroom.

(97) a. Peter blieb wegen seiner Mutter weg.
Peter stayed because of his mother away
'Peter stayed away because of his mother.'

b. Peter blieb wegen seiner Mutter weg, und Maria tat das
Peter stayed because of his mother away and Mary did this
wegen ihrem Bruder.
because of her brother
'Peter stayed away because of his mother, and Mary did so because of her brother.'

(98) What Ben did in his office was lie on the desk.

(99) Was Peter wegen seiner Mutter tat war wegbleiben.
what Peter because of his mother did was stay away
'What Peter did because of his mother was stay away.'

6.6. Ordering and Extraction

Two further diagnostics Schütze (1995) discusses are the ordering and the extraction test. The ordering test is based on the observation that arguments must generally precede adjuncts. If an element which clearly is an adjunct cannot precede but only follow another element, the latter must be an argument. If the test adjunct can occur before or after the relevant constituent, the latter is an adjunct. However, Schütze (1995) points out that the test is not valid for clausal arguments; moreover, the test adjunct must not be a manner adverb, and the relevant constituents must occur in their base order. As regards the extraction test, it is based on the observation that "extraction of arguments and extraction from arguments are freer than extraction of [adjuncts] [...] and extraction from [adjuncts]" (Schütze (1995:108f.)).

I will neglect these two tests here because they involve many complications and restrictions that I do not want to discuss in detail. Moreover, the above-mentioned tests already make relatively uniform predictions, although their discussion also showed that these tests have to be treated with care. However, ultimately it can be concluded that the relevant constituents in the first two examples under discussion, i.e. in (34) and (35) (repeated in (100) and (101)), are most probably adjuncts, whereas the crucial elements in the other examples (repeated in (102)-(109)) are arguments.

(100) Ben lay on the desk *in his office.*

(101) Peter blieb *wegen seiner Mutter* weg.
Peter stayed because of his mother away
'Peter stayed away because of his mother.'

(102) John never admitted *that he had seen the movie.*

(103) Hans hat mir natürlich verschwiegen, *dass er verloren hat.*
John has me of course not told that he lost has
'Of course, John did not tell me that he had lost.'

(104) Peter hat Marias Strafe *für sein Zuspätkommen* akzeptiert.
Peter has Mary's punishment for his being late accepted
'Peter accepted Mary's punishment for his being late.'

(105) Peter konnte Marias mutwillige Zerstörung *von seinen Sachen* nicht
Peter could Mary's wilful destruction of his things not
einfach hinnehmen.
just accept
'Peter could not just accept Mary's wilful destruction of his things.'

(106) John successfully refuted the accusation *that he was a murderer.*

(107) The Senator dismissed his opponent's claim *that he had violated the campaign finance regulations* as politically motivated.

(108) Bärbel hat die Behauptung, *dass sie Roman geschlagen habe,* als
Bärbel has the claim that she Roman beaten have_{sub} as

Verleumdung zurückgewiesen.

slander dismissed

'Bärbel dismissed the claim that she had beaten Roman as slander.'

(109) Peter bestreitet natürlich vehement Marias Behauptung, *dass er faul*

Peter denies of course vehemently Mary's claim that he lazy

sei.

be_{sub}

'Of course, Peter vehemently denies Mary's claim that he is lazy.'

7. Counterevidence against the Argument-Adjunct Approach

Against the background of the results in the previous section, let us now turn to the question of how these examples look like in reconstruction contexts. For this purpose, the positions of the coindexed R-expressions and pronouns are exchanged, and then the constituents containing the R-expressions are moved over the pronouns. The result, which is given in (110)-(117), is interesting.[15] The first two sentences, where the R-expressions are contained in adjuncts, are ungrammatical, contrary to what the argument-adjunct approach predicts. In order to rescue the analysis, it would have to be assumed that in these examples Late Merge of the adjunct is not an available option for some reason or other. However, this move seems to undermine the basic idea of the argument-adjunct approach, namely that the different

[15] Sentences like (110) are noted in Reinhart (1981), and (115) is taken from Phillips (1998), who quotes Lasnik (1998). As a further example, Phillips mentions (i) (cf. also Kuno (1997)); however, as Sam Featherston (p.c.) points out, this sentence is problematic for independent reasons (because of the combination "refute" + "piece of evidence" + *that*-clause).

(i) Which piece of evidence that John_1 was guilty did he_1 successfully refute?

behaviour in reconstruction contexts can be derived directly from the distinction between arguments and adjuncts.[16]

(110) *In Ben_1's office, he_1 lay on the desk.

(111) *Wegen Peters_1 Mutter blieb er_1 weg.
because of Peter's mother stayed he away
'Because of his_1 mother Peter_1 stayed away.'

The sentences in (112)-(117) constitute even stronger empirical counterevidence against the argument-adjunct approach, because they illustrate that there are also grammatical reconstruction sentences where the R-expression is contained in an argument. According to the argument-adjunct approach, arguments are inserted cyclically into the derivation and a resulting Principle C configuration is fatal. In contrast to (110) and (111), where the introduction of an additional principle might in principle facilitate it to rule out the two sentences after all, the situation in (112)-(117) is different; here, one would have to explain why these examples are grammatical contrary to the expectations in view of the argument-adjunct approach.

(112) That John_1 had seen the movie he_1 never admitted.

(113) Dass Hans_1 verloren hat, hat er_1 mir natürlich verschwiegen.
that John lost has has he me of course not told
'That John had lost he did not tell me of course.'

(114) Whose accusation that John_1 was a murderer did he_1 successfully refute?

(115) Whose claim that the Senator_1 had violated the campaign finance regulations did he_1 dismiss as politically motivated?

[16]However, cf. Heycock (1995) for a reasonable elaboration in this direction (cf. also chapter 1, footnote 43).

(116) Wessen Behauptung, dass Bärbel$_1$ Roman geschlagen habe, hat
whose claim that Bärbel Roman beaten would have has
sie$_1$ als Verleumdung zurückgewiesen?
she as slander dismissed
'Whose claim that Bärbel had beaten Roman did she dismiss as slander?'

(117) Marias Behauptung, dass Peter$_1$ faul sei, bestreitet er$_1$ natürlich
Mary's claim that Peter lazy would be denies he of course
vehement.
vehemently
'Mary's claim that Peter was lazy he denies vehemently of course.'

(118) Marias Strafe für Peters$_1$ Zuspätkommen hat er$_1$ akzeptiert.
Mary's punishment for Peter's being late has he accepted
'Peter accepted Mary's punishment for his being late.'

(119) Marias mutwillige Zerstörung von Peters$_1$ Sachen konnte er$_1$ nicht
Mary's wilful destruction of Peter's things could he not
einfach hinnehmen.
just accept
'Peter could not just accept Mary's wilful destruction of his things.'

These examples are therefore incompatible with the argument-adjunct approach, and it must be concluded that it cannot be the argument-adjunct distinction that accounts for reconstruction effects of this type.[17,18]

8. Optimal Reconstruction

8.1. Initial Remark

In this section, I develop an optimality-theoretic account of the relation between pronouns and R-expressions which offers a new way of analyzing apparent Principle C effects in reconstruction contexts. It is argued that this phenomenon can be dealt with in syntax in the course of the derivation. The basic assumption is that the relevant binding principles are violable constraints that are checked in local optimization procedures after the completion of each phrase. Thus, ungrammatical structures are ruled out immediately during the derivation, and reconstruction in the traditional sense might be a superfluous mechanism.

Note, however, that the focus in this chapter is on the reconstruction effects and not on binding as such; hence, for the time being, this approach is based on standard binding-theoretic assumptions and not on the binding theory developed in chapter 2. The theories developed here and in chapter 2 differ moreover with

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[17]Cf. also, among others, Müller (1995), Kuno (1997), Lasnik (1998), Safir (1999), Nunes (2001:fn.27), Kayne (2002), Zwart (2002) as far as the assumption is concerned that the argument-adjunct approach cannot be correct. As regards an alternative to syntactic reconstruction in general, cf., for instance, Sternefeld's (2000a) semantic approach.

[18]Note moreover that some of the ungrammatical sentences which are supposed to show that a sentence is ill-formed because the R-expression is contained in an argument seem to be deviant for independent reasons; cf., for instance, the following example, which is pragmatically very strange from the beginning (as observed, for example, in Heycock (1995) and Lasnik (1998)).

(i) *Which claim that John$_1$ was asleep was he$_1$ willing to discuss?

respect to the mode according to which optimization applies – while the theory of reconstruction presented in this section relies on local optimization in a derivational framework, this has not been the case in chapter 2. However, the main goal of the two remaining chapters, chapter 4 and in particular chapter 5, will be to reconcile these two accounts such that the final theory that will be proposed in the end is based on the binding-theoretic assumptions developed in chapter 2 and is integrated into a derivational framework involving local optimization.

8.2. Background Assumptions

What we have seen so far is that the distinction between grammatical and ungrammatical reconstruction sentences cannot be put down to the argument-adjunct asymmetry. But still we find the asymmetrical pattern that sometimes an underlying Principle C configuration leads to ungrammaticality, while other sentences with this underlying structure are fully grammatical. The conclusion that suggests itself is that Principle C may be a violable condition; that is, the phenomenon lends itself to an optimality-theoretic analysis, in which constraints are violable by definition. Under this view, we could say that although Principle C is violated in all of the sentences considered so far, only in some of them does the violation lead to ungrammaticality. So the question arises of what it is that the grammatical reconstruction sentences have in common and that distinguishes them from the ungrammatical ones.

It has already been observed earlier in the literature that the depth of embedding plays a crucial role in determining the grammaticality of reconstruction sentences (cf., among others, van Riemsdijk & Williams (1981), Huang (1993), Müller (1995), Kuno (1997), Nunes (2001:fn.27)). In fact, what the well-formed sentences seem to have in common is that the R-expression is relatively deeply embedded. In many cases it is embedded in a CP (cf., for instance, (112)-(117) as well as the well-known example *Which claim that John*$_1$ *made did he*$_1$ *later deny?*); but as (118) (repeated in (120-a)) and (119) show, this is not obligatory. Interestingly, (120-a) becomes considerably worse if *Marias Strafe* ('Mary's punishment') is replaced with *die Strafe* ('the punishment'), as illustrated in (120-b).

(120) a. Marias Strafe für Peters_1 Zuspätkommen hat er_1 akzeptiert.
Mary's punishment for Peter's being late has he accepted
'Peter accepted Mary's punishment for his being late.'

b. *Die Strafe für Peters_1 Zuspätkommen hat er_1 akzeptiert.
the punishment for Peter's being late has he accepted
'Peter accepted the punishment for his being late.'

c. *Er_1 hat Marias Strafe für Peters_1 Zuspätkommen akzeptiert.
he has Mary's punishment for Peter's being late accepted
'Peter accepted Mary's punishment for his being late.'

If (120-a) is compared with (120-b) at the point in the derivation before movement takes place, the following difference can be observed. In (120-a), the pronoun binds *Peter*, but the R-expression is not bound in its binding domain, since *Maria* is an intervening subject.[19] This seems to be the relevant property that rescues the sentence, because in (120-b) the pronoun binds the R-expression in its binding domain, which seems to be much worse.[20]

As far as (120-c) is concerned, it has the same underlying structure as (120-a); however, it still violates Principle C after movement has taken place, which is fatal. On the other hand, the underlying structure of (120-a) shows that Principle C can be violated in the course of the derivation. Hence, the goal in this section is

[19]Recall that in this section the notion of 'binding domain' refers to the terminology of the standard Binding Theory as developed in Chomsky (1981, 1986b).

[20]Note that with anaphors we find the opposite effect; cf. the *Specified Subject Condition* (cf. Chomsky (1973, 1981)).

to develop an optimality-theoretic analysis that does not hinge on the argument-adjunct distinction (thus, the option of Late Merge will no longer be taken into account either), but rather on the question in which domain the R-expression is bound in the course of the derivation.

As far as the theoretical assumptions are concerned that underly this analysis, I assume that syntactic structure is built up derivationally (cf. Chomsky (1995 and subsequent work)), and that it is subject to repeated local optimization as proposed in Heck & Müller (2000), Fanselow & Ćavar (2000), and subsequent work on derivational OT syntax. In particular, I assume that optimization takes place after the completion of each phrase.

Moreover, for the analysis to work, it is necessary that vP-internal phrases that move later in the derivation do not have to move to the edge of vP in order to be accessible. Unlike Chomsky (2000, 2001a, 2001b), I will therefore not assume that vPs are phases (only CPs are). (At least it must be assumed that the *Phase Impenetrability Condition* only applies to CPs.) These assumptions are relevant for the derivation of sentences like (120-b), as will be illustrated in the next subsection.[21]

Finally, it is assumed that the input for the first optimization process is selected from the numeration, which also contains the indices. Later in the derivation, the optimal output of the preceding optimization process plus further items from the numeration serve as input for the following optimization.

8.3. The Derivation of the Crucial Contrast

In order to derive sentences like (120-a) and (120-b), the following constraints are introduced, which are ranked as indicated in (124).

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[21]As regards a more detailed description of the *Phase Impenetrability Condition*, cf. chapter 4. Note moreover that the above-mentioned restrictions on movement will not hold in the revised reconstruction analysis in chapter 5.

(121) PRINCIPLE B* (Pr.B*):
Non-anaphors must not be bound in their binding domain.[22]

(122) FAITH REFERENCE (FR):
If two NPs are coindexed in the input, they must also be coindexed in the output.

(123) PRINCIPLE C (Pr.C):
R-expressions must be free.

(124) PRINCIPLE B* $\gg$ FAITH REFERENCE $\gg$ PRINCIPLE C

T_1 and T_2 illustrate the derivation of (120-a): *Marias Strafe für Peters*$_1$ *Zuspätkommen hat er*$_1$ *akzeptiert.* The only difference between the two candidates in T_1 concerns the index of the subject pronoun, which has been changed in the second candidate, O_2. This change, however, results in a fatal violation of FAITH REFERENCE; thus candidate O_1 wins in T_1, which illustrates vP optimization.

T_1: vP optimization

(120-a) Marias Strafe für Peters$_1$ *Zuspätkommen hat er*$_1$ *akzeptiert.*

		Pr.B*	FR	Pr.C
Input:	[$_{VP}$ Marias Strafe für Peters$_1$ Zuspätkommen akzeptiert], {er$_1$, ...}			
⇒ O_1:	[$_{vP}$ er$_1$ [$_{VP}$ Marias Strafe für Peters$_1$ Zuspätkommen t$_{akz}$] akzeptiert]			*
O_2:	[$_{vP}$ er$_2$ [$_{VP}$ Marias Strafe für Peters$_1$ Zuspätkommen t$_{akz}$] akzeptiert]		*!	

[22] That Principle B of the Binding Theory should be extended to non-anaphors in general has also been proposed in Kuno (1987) and Sternefeld (1993).

What is important to note is that once a structure has been optimized, this part of the derivation cannot be changed anymore. Thus, later in the derivation, when CP is optimized (cf. T_2), it is no longer possible to change the index of the subject pronoun. There is only the option of moving either the object or the subject to SpecC. However, in the latter case PRINCIPLE C is fatally violated (cf. O_2), hence the candidate involving topicalization of the object NP wins in T_2.

T_2: CP optimization (simplified illustration)

	Pr.B*	FR	Pr.C
Input: $[_{TP}$ er$_1$ $[_{vP}$ t$_{er}$ $[_{VP}$ $[_{NP}$ Marias Strafe für Peters Zuspätkommen t$_{akz}]$ akzeptiert$]$ hat$]$			
⇒ O_1: $[_{CP}$ Marias Strafe für Peters$_1$ Zuspätkommen $[_{C'}$ hat $[_{TP}$ er$_1$ $[_{vP}$ t$_{er}$ $[_{VP}$ t$_{obj.NP}$ t$_{akz}]$ akzeptiert$]$ t$_{hat}]]]$			
O_2: $[_{CP}$ Er$_1$ $[_{C'}$ hat $[_{TP}$ t$_{er}$ $[_{vP}$ t$_{er}$ $[_{VP}$ Marias Strafe für Peters$_1$ Zuspätkommen t$_{akz}]$ akzeptiert$]$ t$_{hat}]]]$			*!

T_3 illustrates the derivation of (120-b): **Die Strafe für Peters$_1$ Zuspätkommen hat er$_1$ akzeptiert.* Here, the situation is as follows. When vP is optimized, the first candidate fatally violates PRINCIPLE B*. So already at this point in the derivation candidate O_1 is ruled out, and the index of the subject pronoun is changed.

T_3: vP optimization

*(120-b) *Die Strafe für Peters$_1$ Zuspätkommen hat er$_1$ akzeptiert.*

	Pr.B*	FR	Pr.C
Input: $[_{VP}$ die Strafe für Peters$_1$ Zuspätkommen akzeptiert$]$, {er$_1$, ...}			
O_1: $[_{vP}$ er$_1$ $[_{VP}$ die Strafe für Peters$_1$ Zuspätkommen t$_{akz}]$ akzeptiert$]$	*!		*
⇒ O_2: $[_{vP}$ er$_2$ $[_{VP}$ die Strafe für Peters$_1$ Zuspätkommen t$_{akz}]$ akzeptiert$]$		*	

In T_3 it also becomes clear why it is necessary to adopt a local optimization approach and why vPs must not count as phases (at least if the *Phase Impenetrability Condition* is adopted without further modification). If vP were a phase, the object NP would have to move to its specifier position in order to be accessible for further movement transformations (like topicalization in the sentences under discussion). However, in the resulting configuration PRINCIPLE B* would no longer be violated, which means that the violation of PRINCIPLE B* would not be taken into account when optimization would take place, and as a result, (120-b) could no longer be distinguished from (120-a). Exactly the same argument would hold if a global optimization approach were adopted; this is illustrated in T_4.

T_4: Global optimization: wrong prediction

	Pr.B*	FR	Pr.C
*⇒ O_1: $[_{CP}$ Die Strafe für Peters_1 Zuspätkommen hat $[_{TP}$ er_1 $[_{vP}$ t_{er} $[_{VP}$ $t_{obj.NP}$ $t_{akz}]$ akzeptiert$]$ $t_{hat}]]$			
O_2: $[_{CP}$ Die Strafe für Peters_1 Zuspätkommen hat $[_{TP}$ er_2 $[_{vP}$ t_{er} $[_{VP}$ $t_{obj.NP}$ $t_{akz}]$ akzeptiert$]$ $t_{hat}]]$		*!	

Here again, the fatal PRINCIPLE B* configuration no longer holds at the point when the structure is optimized, and the first candidate is incorrectly predicted to be optimal. The general conclusion that can be drawn is that the constraints must be checked before the fatal configurations are dissolved by further movement transformations, and thus local optimization is crucial.

As far as T_2 is concerned, it has already been mentioned that it is only a simplified illustration of CP optimization. Strictly speaking, at this point in the derivation another constraint, LAST RESORT, becomes relevant. However, this constraint has not been taken into account yet, because it has not played a crucial role in the derivation of the sentences above.

(125) LAST RESORT (LR):
Movement must be feature-driven.

Since T_2 illustrates the derivation of a sentence which involves topicalization – (120-a) (*Marias Strafe für Peters*$_1$ *Zuspätkommen hat er*$_1$ *akzeptiert*) – it can be assumed that the object NP has a [+top]-feature, whereas the subject NP is not associated with any feature that would motivate movement of the subject pronoun to SpecC. Thus, O_2 in T_2 has at least one further constraint violation: it violates LAST RESORT. This fact is worth mentioning because the distribution of LAST RESORT violations is basically the only difference between the derivation that targets at (120-a) and the one that targets at (120-c) (**Er*$_1$ *hat Marias Strafe für Peters*$_1$ *Zuspätkommen akzeptiert*). This issue will be addressed in more detail in the following subsection.

8.4. Fatal Principle C Violations

In the previous section, the two reconstruction sentences (120-a) (*Marias Strafe für Peters*$_1$ *Zuspätkommen hat er*$_1$ *akzeptiert*) and (120-b) (**Die Strafe für Peters*$_1$ *Zuspätkommen hat er*$_1$ *akzeptiert*) have been derived. What is left to show is how fatal Principle C violations as in (120-c) (**Er*$_1$ *hat Marias Strafe für Peters*$_1$ *Zuspätkommen akzeptiert*) can be accounted for within this approach.

Considering again the candidates in T_2, it can be seen that (120-c) basically corresponds to the second candidate in this competition, which loses against the candidate involving topicalization. Let us therefore assume that sentences like (120-c) are generally beaten by the candidate in which the object is topicalized (cf. also the notion of *Free Topicalization* in Chomsky (2001b:31; fn.57)). However, the competition that aims at deriving (120-c) differs from the one in T_1 and T_2 insofar as the object NP is marked [+top] only in the latter case, i.e., topicalization in the derivation targeting at (120-c) induces an additional violation of LAST RESORT (cf. T_5). But on the assumption that a violation of LAST RESORT is cheaper than a PRINCIPLE

C violation (i.e., PRINCIPLE C $\gg$ LAST RESORT), topicalization of the object still turns out to be the preferred option.

T_5 illustrates the derivation of (120-c) (**Er₁ hat Marias Strafe für Peters₁ Zuspätkommen akzeptiert*). At the point in the derivation when CP is optimized, the candidate involving topicalization wins despite its LAST RESORT violation, because the PRINCIPLE C violation of the second candidate (= (120-c)) is worse.

T_5: CP optimization

Input: $[_{TP}$ er$_1$... $[_{VP}$ $[_{NP[-top]}$ Marias Strafe für Peters$_1$ Zuspätkommen]...]], ...	Pr.B*	FR	Pr.C	LR
⇒ O$_1$: $[_{CP}$ $[_{NP[-top]}$ Marias Strafe für Peters$_1$ Zuspätkommen]... $[_{TP}$ er$_1$...]]				*
O$_2$: $[_{CP}$ Er$_1$... $[_{VP}$ $[_{NP[-top]}$ Marias Strafe für Peters$_1$ Zuspätkommen]...]]			*!	

However, if topicalization takes place in the derivation above in order to avoid a PRINCIPLE C violation, the question arises as to why the object NP is not moved over the pronoun in vP already. That is, why is the following phrase not the optimal output of vP optimization?

(126) $[_{\mathrm{vP}}$ Marias Strafe für Peters$_1$ Zuspätkommen $[_{\mathrm{v'}}$ er$_1$ $[_{\mathrm{v'}}$ $[_{\mathrm{VP}}$ t$_{obj.NP}$ t$_{akz}$] akzeptiert]]]

The problem that would arise if this were the case is the following: Sentences like (120-b) (**Die Strafe für Peters₁ Zuspätkommen hat er₁ akzeptiert*) could no longer be excluded, since PRINCIPLE B*, which rules out (120-b), would no longer be violated when vP optimization takes place (cf. also the remark above concerning the *Phase Impenetrability Condition*). Thus, (126) must be ruled out as a possible derivation.

This can be achieved if it is assumed that there is a general requirement that

German pronouns move to the left edge of vP and do not allow any vP-internal non-pronominal overt material in front of them (cf. Müller (2001)). That is, pronouns do not only want to be at the left edge of vP, but also at its phonological border. The following example corroborates this assumption. The German sentences in (127-b) and (127-c) contain double object constructions in which the direct object is pronominal, whereas the indirect object is not. Although the linear order *indirect object > direct object* is generally available (cf. (127-a)), object shift is obligatory if the second object is pronominalized, as the contrast between (127-b) and (127-c) shows.[23]

(127) a. Ich denke, dass [$_{TP}$ Hans [$_{vP}$ Maria den Brief gegeben] hat.]
I think that John Mary$_{dat}$ the letter$_{acc}$ given has
'I think that John gave Mary the letter.'

b. *Ich denke, dass [$_{TP}$ Hans [$_{vP}$ Maria ihn gegeben] hat.]
I think that John Mary$_{dat}$ him$_{acc}$ given has
'I think that John gave it to Mary.'

c. Ich denke, dass [$_{TP}$ Hans [$_{vP}$ ihn Maria gegeben] hat.]
I think that John him$_{acc}$ Mary$_{dat}$ given has
'I think that John gave it to Mary.'

If it is assumed that the constraint that captures this observation is higher ranked than FAITH REFERENCE, the candidate in (126) is ruled out immediately.

(128) PRONOUNS AT EDGE(vP) (Pr-E(vP)):
Pronouns must occur both at the edge and at the phonological border of vP.

This is illustrated in $T_{1'}$, with candidate (126) as O_3 and a fourth candidate which

[23]Since it is the S-Structure representation that is relevant in these examples, traces have been omitted in (127) for the sake of simplicity.

does not only involve vP-internal fronting of the object NP but also an index change on the subject pronoun.[24] In the end, O_1 remains the optimal candidate and thus confirms the results of T_1.

$T_{1'}$: vP optimization

(120-a) Marias Strafe für Peters$_1$ Zuspätkommen hat er$_1$ akzeptiert.

	Pr-E(vP)	FR	Pr.C
Input: [$_{VP}$ Marias Strafe für Peters$_1$ Zuspätkommen akzeptiert], {er$_1$, ...}			
⇒ O_1: [$_{vP}$ er$_1$ [$_{VP}$ Marias Strafe für Peters$_1$ Zuspätkommen t$_{akz}$] akzeptiert]			*
O_2: [$_{vP}$ er$_2$ [$_{VP}$ Marias Strafe für Peters$_1$ Zuspätkommen t$_{akz}$] akzeptiert]		*!	
O_3: [$_{vP}$ Marias Strafe für Peters$_1$ Zuspätkommen [$_{v'}$ er$_1$ [$_{VP}$ t$_{obj.NP}$ t$_{akz}$] akzeptiert]]	*!		
O_4: [$_{vP}$ Marias Strafe für Peters$_1$ Zuspätkommen [$_{v'}$ er$_2$ [$_{VP}$ t$_{obj.NP}$ t$_{akz}$] akzeptiert]]	*!	*	

Note that the necessity to rank PRONOUNS AT EDGE(VP) higher than FAITH REFERENCE follows if a sentence like (120-b) (**Die Strafe für Peters$_1$ Zuspätkommen hat er$_1$ akzeptiert*) is considered where the winner of vP optimization should involve an index change (cf. T_3). In order to rule out (126), which corresponds to a potential intermediate derivation of sentence (120-a) (*Marias Strafe für Peters$_1$ Zuspätkommen hat er$_1$ akzeptiert*), it would have been sufficient to rank PRONOUNS AT EDGE(VP) above PRINCIPLE C, because here the winner of vP optimization does not violate FAITH REFERENCE.

[24] LAST RESORT violations are again ignored; hence, $T_{1'}$ is representative for both the derivation targeting at (120-a) and the one aiming at (120-c).

$T_{3'}$ illustrates vP optimization of the derivation targeting at (120-b), which determines the ranking between PRONOUNS AT EDGE(VP) and FAITH REFERENCE. (Here I assume that the former is higher ranked than PRINCIPLE B*, but this is not relevant.)

$T_{3'}$: vP optimization

*(120-b) *Die Strafe für Peters$_1$ Zuspätkommen hat er$_1$ akzeptiert.*

	Pr-E(vP)	Pr.B*	FR	Pr.C
Input: [$_{VP}$ die Strafe für Peters$_1$ Zuspätkommen akzeptiert], {er$_1$, ...}				
O$_1$: [$_{vP}$ er$_1$ [$_{VP}$ die Strafe für Peters$_1$ Zuspätkommen t$_{akz}$] akzeptiert]		*!		*
⇒ O$_2$: [$_{vP}$ er$_2$ [$_{VP}$ die Strafe für Peters$_1$ Zuspätkommen t$_{akz}$] akzeptiert]			*	
O$_3$: [$_{vP}$ Marias Strafe für Peters$_1$ Zuspätk. [$_{v'}$ er$_1$ [$_{VP}$ t$_{obj.NP}$ t$_{akz}$] akzeptiert]]	*!			
O$_4$: [$_{vP}$ Marias Strafe für Peters$_1$ Zuspätk. [$_{v'}$ er$_2$ [$_{VP}$ t$_{obj.NP}$ t$_{akz}$] akzeptiert]]	*!		*	

8.4.1. Embedded V2-Clauses in German

Another question that arises is what happens if topicalization does not yield a grammatical structure either? Consider, for instance, topicalization in embedded V2-clauses in German. Here, topicalization is only licensed in bridge contexts (cf. (129-a)). This raises the question of how sentences like (129-b), which involves a non-bridge verb and thus does not allow topicalization, can be ruled out.

(129) a. Ich denke, [$_{CP}$ Marias Strafe für Peters$_1$ Zuspätkommen hat
I think Mary's punishment for Peter's being late has
er$_1$ akzeptiert.]
he accepted
'I think Peter accepted Mary's punishment for his being late.'

b. *Ich bezweifle, [$_{CP}$ Marias Strafe für Peters$_1$ Zuspätkommen
I doubt Mary's punishment for Peter's being late
hat er$_1$ akzeptiert.]
has he accepted
'I doubt that Peter accepted Mary's punishment for his being late.'

As far as the embedded CP in (129-b) is concerned, it must be well-formed, because this derivation must rule out Principle C effects in the embedded sentence. Hence, topicalization cannot yet be ruled out at the point in the derivation when the embedded CP is optimized; on the contrary – it wins CP optimization and thereby blocks the candidate in which the object stays in situ, i.e., the candidate with the following Principle C configuration: **Ich denke/bezweifle, er$_1$ hat Marias Strafe für Peters$_1$ Zuspätkommen akzeptiert.* As a result, it can be concluded that it must during the derivation of the matrix clause that (129-b) is ruled out.

Generally speaking, it can be assumed that whatever excludes topicalization in non-bridge contexts is captured by a constraint that is even higher ranked than Avoid Null Parse (cf. Prince & Smolensky (1993)). Thus, at some point in the derivation of sentences like (129-b), the null parse, $\emptyset$, is the winner of the competition.

(130) Avoid Null Parse (ANP):
$\emptyset$ is prohibited.

As far as the German examples in (129) are concerned, it is usually assumed that in (129-a) the embedded CP is L-marked and therefore no barrier for government, whereas the embedded CP in (129-b) is not L-marked and thus blocks government by the matrix verb (cf., among others, Haider (1984), Kayne (1984), Cinque (1990), Frampton (1990), Kroch & Iatridou (1992)). So it could be assumed that the following constraint captures this observation.

(131) $C_{[+top]}$:
$C_{[+top]}$ must be minimally c-commanded by a governing head.[25]

(132) *Extended ranking:*
$C_{[+top]}$ $\gg$ AVOID NULL PARSE $\gg$ PRONOUNS AT EDGE(vP), PRINCIPLE B* $\gg$ FAITH REFERENCE $\gg$ PRINCIPLE C $\gg$ LAST RESORT

To come back to example (129-b) (**Ich bezweifle, Marias Strafe für Peters$_1$ Zuspätkommen hat er$_1$ akzeptiert*), it can now be derived in the following way. When the matrix VP is optimized (cf. the illustration in T_6), the first candidate, O_1, violates the high-ranked $C_{[+top]}$ constraint, hence the null parse wins. So after having won the embedded CP optimization, the candidate involving topicalization is itself ruled out in the next optimization process. (In T_6, only the two decisive constraints are taken into account).

T_6: Optimization of the matrix VP

Input: [$_{CP}$ [$_{NP[+top]}$ Marias Strafe für Peters$_1$ Zuspätkommen]... [$_{TP}$ er$_1$...]], ...	$C_{[+top]}$	ANP
O_1: [$_{VP}$ bezweifle [$_{CP}$ [$_{NP[+top]}$ Marias Strafe für Peters$_1$ Zuspätkommen] $C_{[+top]}$... [$_{TP}$ er$_1$...]]]	*!	
⇒ O_2: ∅		*

[25]Strictly speaking, the constraint $C_{[+top]}$ does not only apply if the feature [+top] is involved but also if topicalization to SpecC takes place in violation of LAST RESORT.

8.4.2. Embedded that-Clauses in German

What is still unclear is how sentences like the ones in (133) can be ruled out, because – in contrast to embedded V2-clauses – topicalization in embedded *that*-clauses is not possible in German, as illustrated in (134).[26]

(133) a. *Ich denke, dass er_1 Marias Strafe für $Peters_1$ Zuspätkommen
I think that he Mary's punishment for Peter's being late
akzeptiert hat.
accepted has
'I think that Peter accepted Mary's punishment for his being late.'

b. *Ich bezweifle, dass er_1 Marias Strafe für $Peters_1$
I doubt that he Mary's punishment for Peter's
Zuspätkommen akzeptiert hat.
being late accepted has
'I doubt that Peter accepted Mary's punishment for his being late.'

(134) *Ich denke, Marias Strafe für $Peters_1$ Zuspätkommen dass er_1 t
I think Mary's punishment for Peter's being late that he
akzeptiert hat.
accepted has
'I think that he accepted Mary's punishment.'

Let us assume that this observation is captured by the following constraint.

(135) DOUBLY FILLED COMP FILTER (DCF):
Overt complementizers must be at the phonological border of CP.

[26] In contrast to English, topicalization to SpecT (between *dass* ('that') and the subject) is not possible in German. This possibility might be ruled out by a higher-ranked constraint that prohibits multiple TP specifiers in German.

If it is furthermore assumed that embedded *that*-clauses and embedded V2-clauses are candidates in the same competition, the sentences in (133) can now also be ruled out because they lose against a candidate involving topicalization when the embedded CP is optimized, namely the V2-candidate in which the object is topicalized. (136) is introduced as further constraint in order to punish those candidates that are unfaithful to the input.

(136) FAITHLEX (FL):
Realize exactly the lexical material that is present in the input.

T_7 illustrates the relevant competition. When the embedded CP is optimized, four candidates fatally violate PRINCIPLE C, and the third candidate is ruled out by the DOUBLY FILLED COMP FILTER. The only candidate that does not violate either of these two constraints is O_6, the V2-candidate with topicalization of the object.

T_7: Optimization of the embedded CP

Input: $[_{TP}$ er$_1$ $[_{vP}$ t$_{er}$ $[_{VP}$ Marias Strafe für Peters$_1$ Zuspätkommen t$_{akz}]$ akzeptiert$]$ hat$]$, {dass, ...}	Pr.C	DCF	FL
O_1: $[_{CP}$ dass $[_{TP}$ subj.$_1$ $[_{vP}$ t$_{subj.}$ $[_{VP}$ obj.$_1]]$ V$_{fin}]]$	*!		
O_2: $[_{CP}$ subj.$_1$ dass $[_{TP}$ t$_{subj.}$ $[_{vP}$ t$_{subj.}$ $[_{VP}$ obj.$_1]]$ V$_{fin}]]$	*!	*	
O_3: $[_{CP}$ obj.$_1$ dass $[_{TP}$ subj.$_1$ $[_{vP}$ t$_{subj.}$ $[_{VP}$ t$_{obj.}]]$ V$_{fin}]]$		*!	
O_4: $[_{CP}$ V$_{fin}$ $[_{TP}$ subj.$_1$ $[_{vP}$ t$_{subj.}$ $[_{VP}$ obj.$_1]]$ t$_V]]$	*!		*
O_5: $[_{CP}$ subj.$_1$ V$_{fin}$ $[_{TP}$ t$_{subj.}$ $[_{vP}$ t$_{subj.}$ $[_{VP}$ obj.$_1]]$ t$_V]]$	*!		*
⇒ O_6: $[_{CP}$ obj.$_1$ V$_{fin}$ $[_{TP}$ subj.$_1$ $[_{vP}$ t$_{subj.}$ $[_{VP}$ t$_{obj.}]]$ t$_V]]$			*

In the end, the derivations aiming at (133-a) and (133-b) thus yield the following results: As regards sentence (133-a), it is ruled out because the embedded V2-clause O_6 has a better constraint profile when the embedded CP is optimized. Hence, the derivation that wins corresponds to sentence (129-a): *Ich denke, Marias Strafe für Peters$_1$ Zuspätkommen hat er$_1$ akzeptiert.*

If the target sentence is (133-b), the situation is as follows. At the point in the derivation when the embedded CP is optimized, embedded topicalization is the preferred option as well (i.e., the winner is a V2-candidate). But when the matrix VP is optimized, the derivation crashes because it loses against the null parse, in analogy to the derivation of (129-b): **Ich bezweifle, Marias Strafe für Peters$_1$ Zuspätkommen hat er$_1$ akzeptiert.*

8.4.3. Loose Ends

What is interesting is that ill-formed reconstruction sentences seem to improve if a relative or complement clause is inserted in the NP that contains the coindexed R-expression (cf. (137) and (138), respectively). This is unexpected since the additional CP does not seem to intervene syntactically between the pronoun and the R-expression in any relevant way.

(137) a. *Die Strafe für Peters$_1$ Zuspätkommen hat er$_1$ akzeptiert.
the punishment for Peter's being late has he accepted
'Peter accepted the punishment for his being late.'

b. Die Strafe für Peters$_1$ Zuspätkommen, die Maria sich
the punishment for Peter's being late that Mary SE
ausgedacht hat, hat er$_1$ akzeptiert.
thought up has has he accepted
'Peter accepted the punishment for his being late that Mary had thought up.'

(138) a. *Marias$_1$ Aussage hat sie$_1$ inzwischen zurückgenommen.
Mary's statement has she meanwhile taken back
'Meanwhile, Mary has taken back her statement.'

b. ?Marias$_1$ Aussage, dass Peter erst nach 11 Uhr heimgekommen
Mary's statement that Peter only after 11 o'clock come home

sei, hat sie_1 inzwischen zurückgenommen.

be_{sub} has she meanwhile taken back
'Meanwhile, Mary has taken back her statement that Peter had come home only after 11 o'clock.'

The contrasts observed in (137) and (138) indicate that there are probably more factors involved than those discussed so far.[27] I will not provide a detailed analysis of these data, but let me add some further remarks concerning this observation.

First, it should be pointed out that these data provide further evidence that the argument-adjunct approach is on the wrong track. If the (a)-sentences are ungrammatical because the R-expression is embedded in an argument and therefore induce a Principle C violation, it is completely unclear why the (b)-sentences should be any better; however, it is possible to integrate additional factors in the approach developed above.

Moreover, the contrast in (139) shows that the additional factors that seem to be relevant in sentences like (137-b) or (138-b) are compatible with a derivational approach: In (139-b), material has also been inserted between the R-expression and the pronoun, but the sentence remains ill-formed. The difference between (139-a) and (139-b) is that only in the (a)-sentence the additional material (a relative clause in this case) is present in the VP before movement takes place.[28] In (139-b), parentheticals have been inserted, which are not base-generated VP-internally. So it can be concluded that the relevant material that rescues sentences like (139-a) is already visible at the point in the derivation when the subject pronoun is inserted and the decision in favour of or against coindexation must be made.

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[27]As Peter Sells (p.c.) points out logophoricity might play a crucial role here (cf. also Sells (1987)).

[28]Recall that I have dispensed with the option of Late Merge.

(139) a. Die Strafe für Peter$_1$, die Maria sich ausgedacht hat, hat
the punishment for Peter that Mary REFL thought up has has
er$_1$ akzeptiert.
he accepted
'Peter accepted the punishment for himself that Mary had thought up.'

b. *Die Strafe für Peter$_1$, das weiß ich von Maria, hat er$_1$
the punishment for Peter, that know I from Mary, has he
akzeptiert.
accepted
'The punishment for himself, I know that from Mary, Peter accepted.'

Still, I am not sure to what extent parsing considerations play a role in examples like (137)-(139), and since these data are moreover not easy to judge, their status might require further testing.

8.5. Conclusion

According to the analysis presented above, the situation is as follows: Whether reconstruction sentences are well-formed or not is generally determined in the course of the syntactic derivation by local optimization procedures. Thus, using the term 'reconstruction effects' for the asymmetries that can be observed is misleading, because the ill-formed sentences are already excluded before the reconstruction process would take place. Besides, I have shown that the argument-adjunct contrast cannot be held responsible for the distinction between grammatical and ungrammatical reconstruction sentences; instead, depth of embedding plays a crucial role, although the previous section also showed that more factors might be relevant.

However, as a rule of thumb, I assume that the following generalization holds: If a pronoun binds an R-expression within its binding domain in the course of the derivation, the resulting sentence is ungrammatical; if binding occurs outside the R-expression's binding domain and the Principle C configuration is dissolved in the course of the derivation by further movement transformations, the resulting structure is grammatical.

The goal of the two remaining chapters will now be to unify the local derivational approach outlined here with the binding theory developed in chapter 2. In the final chapter we will therefore come back to reconstruction effects and reanalyse the data against the background of the modified approach.

Chapter 4

Binding in a Local Derivational Approach

1. Introduction

In the previous chapter, a derivational analysis of reconstruction has been proposed, which means that optimization takes place in the course of the derivation when the syntactic structure has not yet been completely built up. In contrast, the analysis of binding data in chapter 2 was based on different premises. There it has been assumed that complete sentences are part of the input and thus completely accessible during the optimization procedure. Hence, it can be characterized as a global, representational analysis. However, this kind of approach is not straightforwardly applicable to examples involving reconstruction (cf. chapter 2, section 15.), since the grammaticality status of this type of sentences crucially depends on intermediate derivation steps which might no longer be recoverable once the derivation has been completed.

In this chapter, I will therefore address the question of whether the binding theory outlined in chapter 2 can be integrated into a local derivational syntactic approach. I explore what must be assumed for binding once we restrict ourselves to a derivational framework and discuss the theoretical consequences of such an enterprise.[1] Moreover, I set out to propose a theory that is empirically not inferior to the approach developed in chapter 2 but captures the same amount of data as well as some universal generalizations that can be observed with respect to binding.

This chapter is organized as follows. In section 2., I take a closer look at derivational theories in general and explore their theoretical implications. In section 3., I discuss how much the accessible domain can be restricted in a derivational approach to binding. The conclusion that will be drawn is that the theory with the most restrictive notion of accessibility does not raise more problems than a more liberal theory and is therefore to be preferred from a conceptual point of view. In section 4., I address some technical issues of the new analysis according to which binding corresponds to feature checking between the bound element and its antecedent. Finally, section 5. constitutes the main part of the chapter, because here I develop an optimality-theoretic approach to binding in a derivational framework and show that it captures the same data as the theory presented in chapter 2.

2. Theoretical Considerations on Derivational Theories

It has been argued in the literature that derivational theories are not only superior to global ones from a conceptual point of view, because they induce a reduction of complexity (cf. Chomsky (1995) and subsequent work, Epstein *et al.* (1998), Ep-

[1]Former derivational approaches to binding include Hornstein (2001), Kayne (2002), and Zwart (2002), which share the underlying assumption that an antecedent and its bindee start out as one constituent and the binding relation is created by movement (cf. chapter 1). In contrast to these proposals, the present approach focuses on crosslinguistic variation and optionality and neither assumes movement into θ-positions (cf. Hornstein (2001)) nor a single phrase containing both the bound element and its antecedent at some stage of the derivation. Moreover, the domain accessible in the course of the derivation will be reduced to a minimum.

stein & Seely (2002)),[2] but that they are furthermore supported by strong empirical evidence (cf., for example, Epstein & Seely (2002), Heck & Müller (2000), Müller (2002), Müller (2003a, b)). Let us therefore take a closer look at the underlying architecture of derivational theories.

A derivational theory differs from a representational approach in the following way. In a representational theory, a sentence is not built up stepwise in a derivational manner; instead, it is represented by a static structure that can be compared to the outcome, i.e., the final stage, of the derivation of a sentence in a derivational model. Syntactic principles can therefore only refer to this representation, and derivational notions like 'movement' have to be replaced with notions like 'chain'. In a derivational approach, by contrast, it is assumed that sentences are built up step by step using the operations Merge and Move, and consequently we can already start computing the structure in the course of the derivation. As a result, at each point in the derivation, material that has not yet been used is in principle not accessible.[3] This means that there is no possibility of look-ahead with respect to syntactic structures that have not been created yet. Moreover, it is possible that access to earlier parts of the derivation is also restricted, and this is what I refer to as 'local derivational approach'.

In the literature, such a local theory has first been proposed by Chomsky (2000 and subsequent work), who introduces the so-called *Phase Impenetrability Condition* in order to restrict the accessible domain 'downwards' (figuratively spoken if we think of syntactic trees).[4] The first version he comes up with is given in (1), which is

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[2]However, cf. Brody (1995, 2002) for a different point of view.

[3]Of course, the derivation has access to the remaining numeration, but the crucial point is that the syntactic structure that is going to be built up is not available.

[4]But cf. also van Riemsdijk (1978) and Koster (1987) as far as the general idea is concerned that operations are restricted to some local domain.

based on the definitions below (cf. Chomsky (2000:106; 108), Chomsky (2001a:4f.), Chomsky (2001b:12f.); cf. also Müller (2003b)).

(1) *Phase Impenetrability Condition 1* (PIC_1):
The domain of a head X of a phase XP is not accessible to operations outside XP; only X and its edge are accessible to such operations.

(2) The *domain* of a head corresponds to its c-command domain.

(3) CP and vP are *phases*.

(4) The *edge* of a head X is the residue outside X′; it comprises specifiers and elements adjoined to XP.

As a result, the accessible domain is reduced as soon as a phase is completed; material below the head of a completed phase is no longer accessible (cf. (5), where underlined XPs represent phases and material that is not accessible is crossed out).

(5) *Accessible domain under PIC_1*:

a. $[_{YP} \ldots Y\ [_{\underline{XP}} \ldots X\ \cancel{[_{WP} \ldots W\ [_{\underline{UP}} \ldots U \ldots]]}]]$

b. $[_{\underline{ZP}} \ldots Z\ [_{YP} \ldots Y\ [_{\underline{XP}} \ldots X\ \cancel{[_{WP} \ldots W\ [_{\underline{UP}} \ldots U \ldots]]}]]]$

However, Chomsky weakens this version of the *Phase Impenetrability Condition*, because he considers it too restrictive if VP-internal Nominative NPs are taken into account (which occur, for example, in Icelandic): In order to be licensed, they have to establish an Agree relation with T; however, following the PIC as defined in (1), these Nominative objects are no longer accessible when T enters the derivation (cf. (5-a) with Y=T, X=v, W=V). Hence, he proposes the modified version given in (6), which expressly makes reference to the next phase and thus enlargens the accessible domain since material is only rendered inaccessible when the next phase has been completed (cf. (7)). Thus, VP-internal material (for instance, a Nominative object) is still accessible when T is merged into the derivation, because the next phase, CP, has not yet been reached (cf. (7-a) with Y=T, X=v, W=V).

(6) *Phase Impenetrability Condition 2* (PIC_2):

The domain of a head X of a phase XP is not accessible to operations outside ZP (the next phase); only X and its edge are accessible to such operations.

(7) *Accessible domain under* PIC_2:

a. $[_{\text{YP}} \ldots \text{Y}\ [_{\underline{\text{XP}}} \ldots \text{X}\ [_{\text{WP}} \ldots \text{W}\ [_{\underline{\text{UP}}} \ldots \text{U}\ \cancel{[\ldots]}]]]]$

b. $[_{\underline{\text{ZP}}} \ldots \text{Z}\ [_{\text{YP}} \ldots \text{Y}\ [_{\underline{\text{XP}}} \ldots \text{X}\ \cancel{[_{\text{WP}} \ldots \text{W}\ [_{\underline{\text{UP}}} \ldots \text{U} \ldots]]}]]]$

However, from a conceptual point of view this weakening of the *Phase Impenetrability Condition* undermines the whole enterprise of a local derivational syntactic theory, since it enlarges the "representational residue" (cf. Brody (1995, 2002)), and moreover, the question arises as to whether the integration of further constructions would not require a further weakening of the PIC (for example, the integration of binding phenomena; cf. section 3.).

In order to overcome the conceptual objections, Müller (2003b) therefore proposes a strengthened version of the PIC which does not refer to phases but to all kinds phrases and is thus called *Phrase Impenetrability Condition*:[5]

(8) *Phrase Impenetrability Condition* (PIC_3):

The domain of a head X of a phrase XP is not accessible to operations outside XP; only X and its edge are accessible to such operations.

(9) *Accessible domain under* PIC_3:

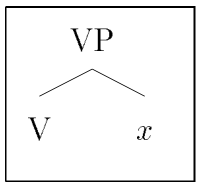
a. $[_{\text{YP}} \ldots \text{Y}\ [_{\underline{\text{XP}}} \ldots \text{X}\ \cancel{[_{\text{WP}} \ldots \text{W}\ [_{\underline{\text{UP}}} \ldots \text{U} \ldots]]}]]$

b. $[_{\underline{\text{ZP}}} \ldots \text{Z}\ [_{\text{YP}} \ldots \text{Y}\ \cancel{[_{\underline{\text{XP}}} \ldots \text{X}\ [_{\text{WP}} \ldots \text{W}\ [_{\underline{\text{UP}}} \ldots \text{U} \ldots]]]}]]$

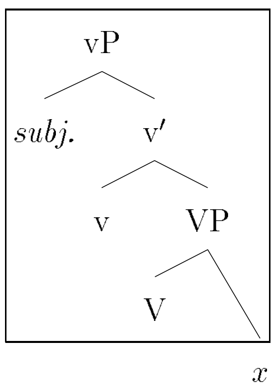
[5]Long-distance agreement, as in the case of Nominative objects, would then have to be reinterpreted as involving successive-cyclic feature movement, because the object position and T are obviously not accessible at the same time (cf. (9) with Y=T, X=v, W=V).

The effect of the *Phrase Impenetrability Condition* is also exemplified in the following trees, which illustrate how the accessible domain – marked by the frame – shifts when the derivation proceeds. As (10)-(12) show, an item x in the object position will already be unaccessible when vP is completed.

(10) *x still accessible:*

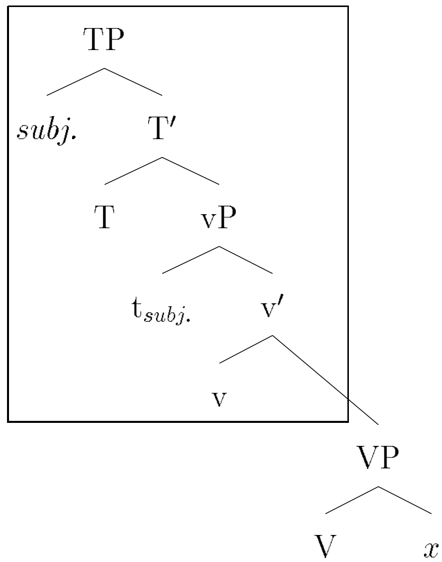


(11) *x no longer accessible:*



We will come back to this crucial observation in section 4., but first it will be investigated how much we can restrict the accessible domain if we try to address binding from a derivational perspective.

(12) *x no longer accessible:*



3. Minimizing the Accessible Domain – Comparing $\mathbf{PIC_1}$, $\mathbf{PIC_2}$, and $\mathbf{PIC_3}$

3.1. General Considerations

If we want to integrate Binding Theory into a derivational framework, we first have to understand how binding principles generally work. What we usually do if we evaluate a binding relation is consider the configuration that holds between the bound element and its antecedent, and based on this information the binding principles allow us to draw conclusions about the grammaticality status of the binding relation. Consider, for instance, the sentences in (13).

(13) a. I know that [$_{\text{TP}}$ Max$_1$ [$_{\text{vP}}$ t$_{Max}$ hates himself$_1$/*him$_1$]]

b. Max$_1$ knows that [$_{\text{TP}}$ Mary [$_{\text{vP}}$ t$_{Mary}$ likes him$_1$/*himself$_1$]]

According to the standard analysis following Chomsky (1981) (cf. the outline in chapter 1 and 2), we have to find out what the binding domain for the bound element is, check whether binding takes place within this domain, and finally Principle A and B of the Binding Theory tell us whether the bound element must be realized as anaphor or pronoun. With respect to (13) we would thus find out that the embedded vP corresponds to the binding domain (– it contains a subject $\neq x$ –) and therefore get the result that the bound element is bound within this domain in (13-a) but not in (13-b), which correctly predicts that we must use the anaphor in the first case and the pronoun in the latter. Similarly, the analysis proposed in chapter 2 presupposes that we know the domain in which binding takes place; only then can we evaluate which realization form the bound element is assigned: In (13-a) we have binding within the θ-domain, hence the anaphor turns out to be the optimal form, in (13-b) the element is only bound in its root domain, therefore it must be realized as pronoun.

In short, in order to be able to draw these conclusions, we must at least know the embedded vP in (13); knowing this part of the derivation, we can then infer that binding takes place within the governing/θ-domain in the case of (13-a), or that binding must take place outside the governing/indicative domain in the case of (13-b), and the binding principles can apply successfully. Thus it seems that we need to be familiar with a certain amount of structure in order to evaluate binding relations. However, the previous section has shown that principles like the PIC restrict access to parts of the derivation. It remains to be seen how this dilemma can be solved.

3.2. Local Binding in English

As described above, there are three different versions of the PIC in the literature, PIC_2 being the most liberal one in the sense that it tolerates a relatively large accessible domain, and PIC_3 being the most restrictive version because it reduces the accessible domain to a minimum. In the following, I will discuss the consequences for binding under the different PIC versions and focus on the question of how much we can restrict the accessible domain if we want to integrate binding into a strictly local derivational theory.

The subsequent derivations are to be read as follows: those parts that are no longer accessible are crossed out; in order to facilitate a direct comparison between the different PIC versions, the examples are ordered in such a way that a_1-z_1 represents the derivation under PIC_1, a_2-z_2 refers to PIC_2, and a_3-z_3 corresponds to the derivation under PIC_3. If the accessible domain is the same under all three PIC versions, the index is omitted. As in chapter 2, the bound element is generally abbreviated as x, and it is assumed that the information as to which items are engaged in a binding relation is indicated by (co-)indexation (with the indices being part of the numeration already).

Let us now consider the derivations of the sentences in (13), starting with (13-a) (repeated in (14)).

(14) I know that Max_1 hates himself_1/*him_1.

a. $[_{\text{VP}}\ \text{hates}\ x_1]$

b_1. $[_{\text{vP}}\ \text{Max}_1\ \text{hates}\ [_{\text{VP}}\ t_{hates}\ x_1]]$

c_1. $[_{\text{TP}}\ \text{Max}_1\ [_{\text{vP}}\ t_{Max}\ \text{hates}\ \cancel{[_{\text{VP}}\ t_{hates}\ x_1]}]]$

d_1. $[_{\text{CP}}\ \text{that}\ [_{\text{TP}}\ \text{Max}_1\ [_{\text{vP}}\ t_{Max}\ \text{hates}\ \cancel{[_{\text{VP}}\ t_{hates}\ x_1]}]]]$

e_1. $[_{\text{VP}}\ \text{know}\ [_{\text{CP}}\ \text{that}\ \cancel{[_{\text{TP}}\ \text{Max}_1\ [_{\text{vP}}\ t_{Max}\ \text{hates}\ [_{\text{VP}}\ t_{hates}\ x_1]]]}]]$

f_1. $[_{\text{vP}}\ \text{I know}\ [_{\text{VP}}\ t_{know}\ [_{\text{CP}}\ \text{that}\ \cancel{[_{\text{TP}}\ \text{Max}_1\ [_{\text{vP}}\ t_{Max}\ \text{hates}\ [_{\text{VP}}\ t_{hates}\ x_1]]]}]]]$

g_1. $[_{\text{TP}}\ \text{I}\ [_{\text{vP}}\ t_I\ \text{know}\ [_{\text{VP}}\ t\cancel{_{know}\ [_{\text{CP}}\ \text{that}\ [_{\text{TP}}\ \text{Max}_1\ [_{\text{vP}}\ t_{Max}\ \text{hates}\ [_{\text{VP}}\ t_{hates}\ x_1]]]]}]]]$

b_2. $[_{\text{vP}}\ \text{Max}_1\ \text{hates}\ [_{\text{VP}}\ t_{hates}\ x_1]]$

c_2. $[_{\text{TP}}\ \text{Max}_1\ [_{\text{vP}}\ t_{Max}\ \text{hates}\ [_{\text{VP}}\ t_V\ x_1]]]$

d_2. $[_{\text{CP}}\ \text{that}\ [_{\text{TP}}\ \text{Max}_1\ [_{\text{vP}}\ t_{Max}\ \text{hates}\ \cancel{[_{\text{VP}}\ t_{hates}\ x_1]}]]]$

e_2. $[_{\text{VP}}\ \text{know}\ [_{\text{CP}}\ \text{that}\ [_{\text{TP}}\ \text{Max}_1\ [_{\text{vP}}\ t_{Max}\ \text{hates}\ \cancel{[_{\text{VP}}\ t_{hates}\ x_1]}]]]]$

f_2. $[_{\text{vP}}\ \text{I know}\ [_{\text{VP}}\ t_{know}\ [_{\text{CP}}\ \text{that}\ \cancel{[_{\text{TP}}\ \text{Max}_1\ [_{\text{vP}}\ t_{Max}\ \text{hates}\ [_{\text{VP}}\ t_{hates}\ x_1]]]}]]]$

g_2. $[_{\text{TP}}\ \text{I}\ [_{\text{vP}}\ t_I\ \text{know}\ [_{\text{VP}}\ t_{know}\ [_{\text{CP}}\ \text{that}\ [_{\text{TP}}\cancel{\text{Max}_1\ [_{\text{vP}}\ t_{Max}\ \text{hates}}$

~~[$_{\text{VP}}$ t$_{hates}$ x_1]]]]]~~]]]

b$_3$. [$_{\text{vP}}$ Max$_1$ hates [$_{\text{VP}}$ t$_{hates}$ ~~x_1~~]]

c$_3$. [$_{\text{TP}}$ Max$_1$ [$_{\text{vP}}$ t$_{Max}$ hates ~~[$_{\text{VP}}$ t$_{hates}$ x_1]~~]]

d$_3$. [$_{\text{CP}}$ that [$_{\text{TP}}$ Max$_1$ ~~[$_{\text{vP}}$ t$_{Max}$ hates [$_{\text{VP}}$ t$_{hates}$ x_1]]~~]]

e$_3$. [$_{\text{VP}}$ know [$_{\text{CP}}$ that ~~[$_{\text{TP}}$ Max$_1$ [$_{\text{vP}}$ t$_{Max}$ hates [$_{\text{VP}}$ t$_{hates}$ x_1]]]~~]]

f$_3$. [$_{\text{vP}}$ I know [$_{\text{VP}}$ t$_{know}$ ~~[$_{\text{CP}}$ that [$_{\text{TP}}$ Max$_1$ [$_{\text{vP}}$ t$_{Max}$ hates [$_{\text{VP}}$ t$_{hates}$ x_1]]]]~~]]

g$_3$. [$_{\text{TP}}$ I [$_{\text{vP}}$ t$_I$ know [$_{\text{VP}}$ t~~$_{know}$ [$_{\text{CP}}$ that [$_{\text{TP}}$ Max$_1$ [$_{\text{vP}}$ t$_{Max}$ hates [$_{\text{VP}}$ t$_{hates}$ x_1]]]]]~~]]]

With respect to PIC$_1$ and PIC$_2$, the crucial point in the derivation is represented in (14-b$_1$) and (14-b$_2$), respectively. At this point, the binder is merged into the structure, and the bound element is still accessible. Hence, the binding relation can be evaluated although we do not know yet the complete derivation.[6] With the more restrictive PIC$_3$, it is slightly different; when the binder enters the derivation in (14-b$_3$), the bound element is no longer accessible. Let us therefore go one step back and discuss whether the stage represented in (14-a) allows us to draw conclusions about the binding relation in this example.

Apart from that part of the derivation that has already been built in (14-a), certain subsets of the numeration provide us with some more information. Following Chomsky (2000 and subsequent work), all derivations are based on a so-called lexical array (LA), a set comprising all lexical items that are going to be used in the derivation. In the course of the derivation,

> each phase is determined by a subarray LA$_i$ of LA, placed in "active memory". When the computation exhausts LA$_i$, forming the syntactic object K, L [language]

[6]The considerations here in section 3. are independent of the version of binding principles we choose. I will therefore not refer to any particular Binding Theory but keep the discussion as general as possible, since the problems binding faces in a derivational approach seem to be valid universally. However, a concrete technical implementation will be proposed in the subsequent sections.

returns to LA, either extending K to K′ or forming an independent structure M to be assimilated later to K or to some extension of K. (Chomsky (2001b:11f.))

This means that at a given point in the derivation we are not only familiar with that part of the already built structure which is in the accessible domain, but we also know the material that is going to be merged into the present phase.

(15) a. LA (lexical array):= set of lexical items used in a derivation;

b. LA_i (subarray):= 'subset' of LA which is selected at that point in the derivation when phase number i begins; it contains the material used for the construction of phase number i; (strictly speaking, LA_i is not necessarily a subset of LA since it can also contain more complex objects composed of elements of LA).

(cf. Chomsky (2000:106, 2001b:11; fn.22))

With respect to the example above, this means that at the stage represented in (14-a) there is only one lexical item left in the current subarray LA_1: *Max*, which is coindexed with x. Hence, *Max* must be merged into a position within vP that c-commands x – there is no other possibility. As a consequence, it can be concluded that x will be bound within the current phase, although binding has not yet taken place, and thus PIC_3 does not pose a problem to examples like these.

3.3. Pronominal Binding in English

Let us now turn to the derivation of (13-b), repeated in (16).

(16) Max_1 knows that Mary likes him_1/*$himself_1$.

a. $[_{VP}$ likes $x_1]$

b_1. $[_{vP}$ Mary likes $[_{VP}\ t_{likes}\ x_1]]$

c_1. $[_{TP}$ Mary $[_{vP}\ t_{Mary}$ likes $\cancel{[_{VP}\ t_{likes}\ x_1]}]]$

d_1. $[_{CP}$ that $[_{TP}$ Mary $[_{vP}\ t_{Mary}$ likes $\cancel{[_{VP}\ t_{likes}\ x_1]}]]]$

e$_1$. $[_{VP}$ knows $[_{CP}$ that ~~$[_{TP}$ Mary $[_{vP}$ t_{Mary} likes $[_{VP}$ t_{likes} x_1]]]~~]]

f$_1$. $[_{vP}$ Max$_1$ knows $[_{VP}$ t_{knows} $[_{CP}$ that $[_{TP}$ ~~Mary $[_{vP}$ t_{Mary} likes $[_{VP}$ t_{likes} x_1]]]~~]]]

g$_1$. $[_{TP}$ Max$_1$ $[_{vP}$ t_{Max} knows ~~$[_{VP}$ t_{knows} $[_{CP}$ that $[_{TP}$ Mary $[_{vP}$ t_{Mary} likes $[_{VP}$ t_{likes} x_1]]]]]~~]]

b$_2$. $[_{vP}$ Mary likes $[_{VP}$ t_{likes} x_1]]

c$_2$. $[_{TP}$ Mary $[_{vP}$ t_{Mary} likes $[_{VP}$ t_{likes} x_1]]]

d$_2$. $[_{CP}$ that $[_{TP}$ Mary $[_{vP}$ t_{Mary} likes ~~$[_{VP}$ t_{likes} x_1]~~]]]

e$_2$. $[_{VP}$ knows $[_{CP}$ that $[_{TP}$ Mary $[_{vP}$ t_{Mary} likes ~~$[_{VP}$ t_{likes} x_1]~~]]]]

f$_2$. $[_{vP}$ Max$_1$ knows $[_{VP}$ t_{Max} $[_{CP}$ that $[_{TP}$ ~~Mary $[_{vP}$ t_{Mary} likes $[_{VP}$ t_{likes} x_1]]]~~]]]

g$_2$. $[_{TP}$ Max$_1$ $[_{vP}$ t_{Max} knows $[_{VP}$ t_{knows} $[_{CP}$ that ~~$[_{TP}$ Mary $[_{vP}$ t_{Mary} likes $[_{VP}$ t_{likes} x_1]]]~~]]]]

b$_3$. $[_{vP}$ Mary likes $[_{VP}$ t_{likes} ~~x_1~~]]

c$_3$. $[_{TP}$ Mary $[_{vP}$ t_{Mary} likes ~~$[_{VP}$ t_{likes} x_1]~~]]

d$_3$. $[_{CP}$ that $[_{TP}$ Mary ~~$[_{vP}$ t_{Mary} likes $[_{VP}$ t_{likes} x_1]]~~]]

e$_3$. $[_{VP}$ knows $[_{CP}$ that ~~$[_{TP}$ Mary $[_{vP}$ t_{Mary} likes $[_{VP}$ t_{likes} x_1]]]~~]]

f$_3$. $[_{vP}$ Max$_1$ knows $[_{VP}$ t_{knows} $[_{CP}$ t~~hat $[_{TP}$ Mary $[_{vP}$ t_{Mary} likes $[_{VP}$ t_{likes} x_1]]]]~~]]

g$_3$. $[_{TP}$ Max$_1$ $[_{vP}$ t_{Max} knows ~~$[_{VP}$ t_{knows} $[_{CP}$ that $[_{TP}$ Mary $[_{vP}$ t_{Mary} likes $[_{VP}$ t_{likes} x_1]]]]]~~]]

The last point in the derivation when the bound element x is still accessible under PIC$_1$ is represented in (16-b$_1$). In contrast to the previous example, the antecedent has not yet been merged into the derivation at this stage. However, one can see that in (16-b$_1$), the current phase has just been completed (LA$_1$={}); hence it can be concluded that binding does not take place within this phase, and this information might be sufficient for the binding principles to evaluate this binding relation.[7] Basically the same considerations hold for the derivation under PIC_2.

Regarding PIC_3, the last point in the derivation when x is still accessible is represented in (16-a). However, we know furthermore that the only element left in LA_1 is *Mary*, which is not coindexed with x. Therefore it can be concluded that x will not be bound within the current phase (= embedded vP), which means that the restrictive PIC_3 basically leaves us with the same information as the more liberal PIC_1 and PIC_2.

In the previous two examples, the subarray LA_1 played a crucial role; however, one might doubt whether it always contains enough information to ensure such an early evaluation of the binding relation. Let us therefore turn to some more complex examples.

3.4. The Complex NP Problem

Since in the analyses above, LA_1 contained at most one element at the crucial stage, let us first examine what happens if more than one element is left in LA_1. In (17), we have the following situation: As far as PIC_1 and PIC_2 are concerned, there is again a point in the derivation when both coindexed elements are accessible (cf. (17-$\text{b}_{1,2}$)); hence the example does not offer any new insights. However, under PIC_3 the example differs from the previous ones insofar as at the last point at which x is accessible (i.e., in (17-a)), LA_1 contains more than one lexical item – what we need

[7]For instance, it can be concluded that binding takes place outside the subject domain (i.e., the traditional binding domain), thus both the traditional Principle B and the constraints from chapter 2 would predict that x must be a pronoun. Note, however, that in other languages the information "binding takes place outside the subject domain" might not suffice to conclude that the bound element must be realized as pronoun (cf. chapter 2 and the discussion of long distance anaphora below).

to complete the first phase is the complex NP *the man whom* Max_1 *saw.*

(17) The man whom Max_1 saw threatens him_1/*himself_1.

a. $[_{\text{VP}}$ threatens $x_1]$

$b_{1,2}$. $[_{\text{vP}}$ the man whom Max_1 saw threatens $[_{\text{VP}}$ $t_{threatens}$ $x_1]]$

c_1. $[_{\text{TP}}$ the man whom Max_1 saw $[_{\text{vP}}$ $t_{subj.}$ threatens $\cancel{[_{\text{VP}}\ t_{threatens}\ x_1]}]]$

c_2. $[_{\text{TP}}$ the man whom Max_1 saw $[_{\text{vP}}$ $t_{subj.}$ threatens $[_{\text{VP}}$ $t_{threatens}$ $x_1]]]$

b_3. $[_{\text{vP}}$ the man whom Max_1 saw threatens $[_{\text{VP}}$ $t_{threatens}$ $\cancel{x_1}]]$

c_3. $[_{\text{TP}}$ the man whom Max_1 saw $[_{\text{vP}}$ $t_{subj.}$ threatens $\cancel{[_{\text{VP}}\ t_{threatens}\ x_1]}]]$

There are now two possibilities. Since the construction of the complex NP proceeds in parallel (cf. Chomsky (2001b:fn.22)), LA_1 might already contain the full structure when VP is completed. On this assumption, we can foresee in (17-a) that although the coindexed element Max_1 will be merged into the current phase, it will not c-command and therefore not bind x – and thus it should be possible to determine the realization of x at this stage.

However, there is a second possibility. Of course, the complex NP must be built before it can be merged into the derivation, and thus it must be part of LA_1 at some stage; but this might as well happen *after* the completion of VP (the last stage in the derivation when x is still accessible under PIC_3).[8] On this assumption, we

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[8]For instance, the derivation might proceed as follows:

(i) a. $[_{\text{VP}}$ threatens $x_1]$

LA_1={the, man, whom, Max_1, saw}

→ x still accessible, but complex NP not built yet

b. $[_{\text{vP}}$ $[_{\text{v}}$ threatens$]$ $[_{\text{VP}}$ $t_{threatens}$ $\cancel{x_1}]]$

LA_1={$[_{\text{NP}}$ the man whom Max_1 saw$]$}

→ complex NP built, but x no longer accessible cannot know at the stage of (17-a) whether x will be bound by *Max* within the embedded vP or not; the material in LA_1 does not allow us to draw any conclusions – for instance, the complex NP might turn out to be *Max*$_1$*, whom the man saw*, in which case x would indeed be bound.

Hence, it seems that we are forced to conclude that for sentences like this one PIC_1 or PIC_2 are more suitable and that PIC_3 might be too restrictive. However, further examples will reveal that it is an illusion that the two more liberal PIC variants do not face problems like these.

3.5. German *A.c.I.*-Constructions: Binding Across Two Successive Phases

If we take a closer look at the examples in (14) (*I know that Max*$_1$ *hates himself*$_1$*/*him*$_1$) and (17) (*The man whom Max*$_1$ *saw threatens him*$_1$*/*himself*$_1$), we find one crucial similarity. In (14), we have a relatively local binding relation; binding occurs within one phase. In (17), there is no binding relation at all, but the two coindexed elements also enter the derivation within the same phase. Thus, the two coindexed elements are in both examples part of the same phase; and since under both PIC_1 and PIC_2 the whole phase is accessible at the stage when it is completed, there is a point in the derivation when both elements are accessible. This explains why these examples do not pose a problem for these two PIC versions. However, the question arises as to what happens if the coindexed elements enter the derivation in different phases.

Let us therefore consider German *A.c.I.*-constructions. In sentences like (18), the bound element is realized as an anaphor; but in comparison to example (14),

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c. [$_{vP}$ [$_{NP}$ the man whom Max$_1$ saw] [$_{v}$ threatens] [$_{VP}$ t$_{threatens}$ $\cancel{x_1}$]]
   LA_1={}

which also involved anaphoric binding, binding is not as local in this case: x and its antecedent occur in different phases.

This becomes evident if we contrast (18-c) with (18-e); x_1 is part of the embedded vP, whereas Max_1 is merged into the next phase, another vP.[9]

(18) *Ger.* Sarah glaubt, dass Max_1 Peter für sich_1 arbeiten lässt.
Sarah believes that Max Peter for SE work let
'Sarah believes that Max_1 makes Peter work for him_1.'

a. $[_{\text{PP}}$ für $x_1]$

b$_1$. $[_{\text{VP}}\ [_{\text{PP}}$ für $x_1]$ arbeiten]
c$_1$. $[_{\text{vP}}$ Peter $[_{\text{VP}}\ [_{\text{PP}}$ für $x_1]\ t_{arbeiten}]$ arbeiten]
d$_1$. $[_{\text{VP}}\ [_{\text{vP}}$ Peter $\cancel{[_{\text{VP}}\ [_{\text{PP}}\ \text{für}\ x_1]\ t_{arbeiten}]}$ arbeiten] lässt]
e$_1$. $[_{\text{vP}}\ \text{Max}_1\ [_{\text{VP}}\ [_{\text{vP}}$ Peter $\cancel{[_{\text{VP}}\ [_{\text{PP}}\ \text{für}\ x_1]\ t_{arbeiten}]}$ arbeiten] $t_{lässt}]$ lässt]

b$_2$. $[_{\text{VP}}\ [_{\text{PP}}$ für $x_1]$ arbeiten]
c$_2$. $[_{\text{vP}}$ Peter $[_{\text{VP}}\ [_{\text{PP}}$ für $x_1]\ t_{arbeiten}]$ arbeiten]
d$_2$. $[_{\text{VP}}\ [_{\text{vP}}$ Peter $[_{\text{VP}}\ [_{\text{PP}}$ für $x_1]\ t_{arbeiten}]$ arbeiten] lässt]
e$_2$. $[_{\text{vP}}\ \text{Max}_1\ [_{\text{VP}}\ [_{\text{vP}}$ Peter $\cancel{[_{\text{VP}}\ [_{\text{PP}}\ \text{für}\ x_1]\ t_{arbeiten}]}$ arbeiten] $t_{lässt}]$ lässt]

b$_3$. $[_{\text{VP}}\ [_{\text{PP}}$ für $\cancel{x_1}]$ arbeiten]
c$_3$. $[_{\text{vP}}$ Peter $[_{\text{VP}}\ \cancel{[_{\text{PP}}\ \text{für}\ x_1]}\ t_{arbeiten}]$ arbeiten]
d$_3$. $[_{\text{VP}}\ [_{\text{vP}}$ Peter $\cancel{[_{\text{VP}}\ [_{\text{PP}}\ \text{für}\ x_1]\ t_{arbeiten}]}$ arbeiten] lässt]
e$_3$. $[_{\text{vP}}\ \text{Max}_1\ [_{\text{VP}}\ \cancel{[_{\text{vP}}\ \text{Peter}\ [_{\text{VP}}\ [_{\text{PP}}\ \text{für}\ x_1]\ t_{arbeiten}]\ \text{arbeiten}]}\ t_{lässt}]$ lässt]

What are the consequences for the different PIC versions? Starting with PIC_2, the most liberal variant, we can observe that the last point in the derivation at which x is accessible is given in (18-d$_2$), and at this stage the antecedent has not yet entered the derivation. However, the second phase is already being built, and in LA_2 there

[9]In the following, not the complete but only the relevant parts of the derivations are illustrated.

is only one element left, namely Max_1. Hence, we can infer that x_1 will be bound in the current phase.

This is reminiscent of the analyses of (14) (*I know that* Max_1 *hates* $himself_1$/*him_1) and (16) (Max_1 *knows that Mary likes* him_1/*$himself_1$) under PIC_3; and similarly, we face the same problem if Max_1 is replaced with a more complex NP.

(19) Ich will nicht, dass [der Mann, der gesagt hat, dass Max_1 ein guter
I want not that the man who said has that Max a good
Mitarbeiter sei], mich für ihn_1 arbeiten lässt.
employee be_{sub} me for him work let
'I don't want the man who said that Max_1 was a good employee make me work for him_1.'

As in example (17) above, the subarray LA_2 no longer contains only one element at the last stage in the derivation when x is accessible – LA_2 rather contains all the material needed to build the complex NP (on the assumption that this has not yet been done), and hence we cannot foresee at this point whether the coindexed item Max_1 will finally c-command and thus bind x_1.

Now what about PIC_1 and PIC_3? As to PIC_3, the last point in the derivation at which x is accessible is given in (18-a). At this stage not even the first phase has been completed, so we are left with LA_1={Peter, arbeiten} while the coindexed item Max_1 is in the remaining LA. Therefore we only know that x will not be bound within the current phase; any further predictions are not possible.

For PIC_1, the last point in the derivation at which x is accessible is represented in (18-c_1). This means that the first phase has just been completed, i.e., LA_1={}. On the basis of this information, it is not possible either to make any predictions about the final binding configuration, which means that PIC_1 faces exactly the same problem as PIC_3 in view of sentences like (18).

To sum up, in examples in which the two coindexed elements are no longer part of the same phase but of two successive phases, both PIC_1 and PIC_3 cannot say anything about the binding configuration. By contrast, the more liberal version PIC_2 provides us with the same information as PIC_3 did in the previous examples, when the coindexed items were merged into the same phase; it allows a prediction under certain circumstances, namely if the subarray to which the second element belongs does not contain "too much" material such that we can foresee its designated structural position when x is still accessible.

But what if a binding relation extends over more than two successive phases?

3.6. Long Distance Binding in Icelandic – Binding Across More than Two Phases

In languages like English, this is not that problematic, because here we know that if an element is not bound at least within its subject domain, it cannot be realized as anaphor anyway (cf. example (16) (*Max*$_1$ *knows that Mary likes him*$_1$/**himself*$_1$)). But in languages with long distance binding, the situation is different.[10]

In the following Icelandic example, even the most liberal PIC version, PIC_2, does not provide enough information to evaluate the binding relation in the course of the derivation. The last point in the derivation at which x is accessible under PIC_2 is represented in (20-c_2), where the second phase has already begun and LA_2={að}; hence we know that x will not be bound within the second phase either, but this information is not enough to draw any conclusions about possible realizations of x. And if this is true for PIC_2, it must definitely be true for the more restrictive PIC_1

[10] In fact, if we assume that the competition does not only choose between anaphoric and pronominal binding but also decides whether x can be realized as pronoun or R-expression (cf. chapter 2, section 8.), we face the same problems in English-type languages; in this case, we need to know whether x will be bound in its root domain or not.

and PIC_3.

(20) *Ice.* Jón$_1$ segir að Pétur raki sig$_1$/*sjálfan sig$_1$/hann$_1$.
John says that Peter shave$_{sub}$ SE/himself/him
'John$_1$ says that Peter would shave him$_1$.'

a. [$_{\text{VP}}$ raki x_1]

b$_1$. [$_{\text{vP}}$ Pétur raki [$_{\text{VP}}$ t$_{raki}$ x_1]]

c$_1$. [$_{\text{TP}}$ Pétur raki [$_{\text{vP}}$ t$_{Pétur}$ t$_{raki}$ ~~[$_{\text{VP}}$ t$_{raki}$ x_1]~~]]

d$_1$. [$_{\text{CP}}$ að [$_{\text{TP}}$ Pétur raki [$_{\text{vP}}$ t$_{Pétur}$ t$_{raki}$ ~~[$_{\text{VP}}$ t$_{raki}$ x_1]~~]]]

e$_1$. [$_{\text{VP}}$ segir [$_{\text{CP}}$ að ~~[$_{\text{TP}}$ Pétur raki [$_{\text{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\text{VP}}$ t$_{raki}$ x_1]]]~~]]

f$_1$. [$_{\text{vP}}$ Jón$_1$ segir [$_{\text{VP}}$ t$_{segir}$ [$_{\text{CP}}$ að [$_{\text{TP}}$ ~~Pétur raki [$_{\text{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\text{VP}}$ t$_{raki}$ x_1]]]~~]]]

b$_2$. [$_{\text{vP}}$ Pétur raki [$_{\text{VP}}$ t$_{raki}$ x_1]]

c$_2$. [$_{\text{TP}}$ Pétur raki [$_{\text{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\text{VP}}$ t$_{raki}$ x_1]]]

d$_2$. [$_{\text{CP}}$ að [$_{\text{TP}}$ Pétur raki [$_{\text{vP}}$ t$_{Pétur}$ t$_{raki}$ ~~[$_{\text{VP}}$ t$_{raki}$ x_1]~~]]]

e$_2$. [$_{\text{VP}}$ segir [$_{\text{CP}}$ að [$_{\text{TP}}$ Pétur raki [$_{\text{vP}}$ t$_{Pétur}$ t$_{raki}$ ~~[$_{\text{VP}}$ t$_{raki}$ x_1]~~]]]]

f$_2$. [$_{\text{vP}}$ Jón$_1$ segir [$_{\text{VP}}$ t$_{segir}$ [$_{\text{CP}}$ að [$_{\text{TP}}$ ~~Pétur raki [$_{\text{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\text{VP}}$ t$_{raki}$ x_1]]]~~]]]

b$_3$. [$_{\text{vP}}$ Pétur raki [$_{\text{VP}}$ t$_{raki}$ ~~x_1~~]]

c$_3$. [$_{\text{TP}}$ Pétur raki [$_{\text{vP}}$ t$_{Pétur}$ t$_{raki}$ ~~[$_{\text{VP}}$ t$_{raki}$ x_1]~~]]

d$_3$. [$_{\text{CP}}$ að [$_{\text{TP}}$ Pétur raki ~~[$_{\text{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\text{VP}}$ t$_{raki}$ x_1]]~~]]

e$_3$. [$_{\text{VP}}$ segir [$_{\text{CP}}$ að ~~[$_{\text{TP}}$ Pétur raki [$_{\text{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\text{VP}}$ t$_{raki}$ x_1]]]~~]]

f$_3$. [$_{\text{vP}}$ Jón$_1$ segir [$_{\text{VP}}$ t$_{segir}$ [$_{\text{CP}}$ a~~ð [$_{\text{TP}}$ Pétur raki [$_{\text{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\text{VP}}$ t$_{raki}$ x_1]]]]~~]]

However, the argumentation above only holds if it is assumed that LA as a whole is not accessible during the derivation of phase i (but only LA$_i$). If we consider the remaining elements in LA in (20-b$_1$), (20-c$_2$), and (20-a), we can see that it only contains *Jón*$_1$, *segir*, and, depending on the PIC version, *að* – all the other lexical items have either already been merged into the derivation or are part of the current subarray LA$_i$. And this information would suffice to conclude that the conditions for Icelandic long distance anaphors will be met in the end: *Jón*$_1$ will c-command x_1, and only a subjunctive complement will intervene between the bound element and its antecedent.

But again, we could modify the example in such a way that even this information would no longer be available. Consider the following two Icelandic sentences, which have identical underlying numerations; the only difference is that in (21-a) *Jón*$_1$ is merged into the derivation earlier than in (21-b) (in the third phase instead of the fifth phase), and as a result, only the first one allows anaphoric binding.

(21) a. Max veit$_{ind}$ að Jón$_1$ segir$_{ind}$ að Pétur raki$_{sub}$ sig$_1$.
Max knows that Jón says that Pétur shave$_{sub}$ SE
'Max knows that John$_1$ says that Peter would shave him$_1$.'

b. *Jón$_1$ veit$_{ind}$ að Max segir$_{ind}$ að Pétur raki$_{sub}$ sig$_1$.
Jón knows that Max says that Pétur shave$_{sub}$ SE
'John$_1$ knows that Max says that Peter would shave him$_1$.'

If we now turn to the derivation of (21-a) (illustrated in (22)), we can make the following observation. As in example (20), *Jón*$_1$ is still in LA at the last point in the derivation when x is accessible, independent of the PIC version we choose. However, this time even the remaining items in LA do not allow us to draw any conclusions about the binding configuration. Under PIC$_2$, for instance, LA={Jón$_1$, Max, veit$_{ind}$, segir$_{ind}$, að} (cf. (22-c$_2$)), and thus we cannot yet decide whether long distance binding will be possible or not, because at this stage the derivations of sentence (21-a) and (21-b) are still completely identical. This means that not until LA$_3$ is selected can we decide whether (21-a) or (21-b) is derived and hence evaluate the binding relation. However, when this selection takes place, x is no longer accessible, even under the liberal PIC$_2$.

(22) Max veit$_{ind}$ að Jón$_1$ segir$_{ind}$ að Pétur raki$_{sub}$ sig$_1$.

a. $[_{\mathrm{VP}}$ raki $x_1]$

b$_1$. $[_{\mathrm{vP}}$ Pétur raki $[_{\mathrm{VP}}$ t$_{raki}$ $x_1]]$

c$_1$. $[_{\mathrm{TP}}$ Pétur raki $[_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ ~~$[_{\mathrm{VP}}$ t$_{raki}$ $x_1]$~~$]]$

d$_1$. $[_{\mathrm{CP}}$ að $[_{\mathrm{TP}}$ Pétur raki $[_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ ~~$[_{\mathrm{VP}}$ t$_{raki}$ $x_1]$~~$]]]$

e$_1$. $[_{\mathrm{VP}}$ segir $[_{\mathrm{CP}}$ að ~~$[_{\mathrm{TP}}$ Pétur raki $[_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ $[_{\mathrm{VP}}$ t$_{raki}$ $x_1]]]$~~$]]$

f$_1$. $[_{\mathrm{vP}}$ Jón$_1$ segir $[_{\mathrm{VP}}$ t$_{segir}$ $[_{\mathrm{CP}}$ að $[_{\mathrm{TP}}$ ~~Pétur raki $[_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ $[_{\mathrm{VP}}$ t$_{raki}$ $x_1]]$~~$]]]]$

g$_1$. $[_{\mathrm{TP}}$ Jón$_1$ segir $[_{\mathrm{vP}}$ t$_{Jón_1}$ t$_{segir}$ $[_{\mathrm{VP}}$ t~~$_{segir}$ $[_{\mathrm{CP}}$ að $[_{\mathrm{TP}}$ Pétur raki $[_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ $[_{\mathrm{VP}}$ t$_{raki}$ $x_1]]]]]$~~$]]]$

h$_1$. $[_{\mathrm{CP}}$ að $[_{\mathrm{TP}}$ Jón$_1$ segir $[_{\mathrm{vP}}$ t$_{Jón_1}$ t$_{segir}$ $[_{\mathrm{V}}$~~$_{\mathrm{P}}$ t$_{segir}$ $[_{\mathrm{CP}}$ að $[_{\mathrm{TP}}$ Pétur raki $[_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ $[_{\mathrm{VP}}$ t$_{raki}$ $x_1]]]]]$~~$]]]]$

i$_1$. $[_{\mathrm{VP}}$ veit $[_{\mathrm{CP}}$ að $[_{\mathrm{TP}}$ Jó~~n$_1$ segir $[_{\mathrm{vP}}$ t$_{Jón_1}$ t$_{segir}$ $[_{\mathrm{VP}}$ t$_{segir}$ $[_{\mathrm{CP}}$ að $[_{\mathrm{TP}}$ Pétur raki $[_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ $[_{\mathrm{VP}}$ t$_{raki}$ $x_1]]]]]]]$~~$]]]$

j$_1$. $[_{\mathrm{vP}}$ Max veit $[_{\mathrm{VP}}$ t$_{veit}$ $[_{\mathrm{CP}}$ að $[_{\mathrm{TP}}$ ~~Jón$_1$ segir $[_{\mathrm{vP}}$ t$_{Jón_1}$ t$_{segir}$ $[_{\mathrm{VP}}$ t$_{segir}$ $[_{\mathrm{CP}}$ að $[_{\mathrm{TP}}$ Pétur raki $[_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ $[_{\mathrm{VP}}$ t$_{raki}$ $x_1]]]]]]]$~~$]]]]$

b$_2$. $[_{\mathrm{vP}}$ Pétur raki $[_{\mathrm{VP}}$ t$_{raki}$ $x_1]]$

c$_2$. $[_{\mathrm{TP}}$ Pétur raki $[_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ $[_{\mathrm{VP}}$ t$_{raki}$ $x_1]]]$

d$_2$. $[_{\mathrm{CP}}$ að $[_{\mathrm{TP}}$ Pétur raki $[_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ ~~$[_{\mathrm{VP}}$ t$_{raki}$ $x_1]$~~$]]]$

e$_2$. $[_{\mathrm{VP}}$ segir $[_{\mathrm{CP}}$ að $[_{\mathrm{TP}}$ Pétur raki $[_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ ~~$[_{\mathrm{VP}}$ t$_{raki}$ $x_1]$~~$]]]]$

f$_2$. $[_{\mathrm{vP}}$ Jón$_1$ segir $[_{\mathrm{VP}}$ t$_{segir}$ $[_{\mathrm{CP}}$ að $[_{\mathrm{TP}}$ ~~Pétur raki $[_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ $[_{\mathrm{VP}}$ t$_{raki}$ $x_1]]$~~$]]]]$

g$_2$. $[_{\mathrm{TP}}$ Jón$_1$ segir $[_{\mathrm{vP}}$ t$_{Jón_1}$ t$_{segir}$ $[_{\mathrm{VP}}$ t$_{segir}$ $[_{\mathrm{CP}}$ að $[_{\mathrm{T}}$~~$_{\mathrm{P}}$ Pétur raki $[_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ $[_{\mathrm{VP}}$ t$_{raki}$ $x_1]]]$~~$]]]]]$

h$_2$. $[_{\mathrm{CP}}$ að $[_{\mathrm{TP}}$ Jón$_1$ segir $[_{\mathrm{vP}}$ t$_{Jón_1}$ t$_{segir}$ $[_{\mathrm{V}}$~~$_{\mathrm{P}}$ t$_{segir}$ $[_{\mathrm{CP}}$ að $[_{\mathrm{TP}}$ Pétur raki $[_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ $[_{\mathrm{VP}}$ t$_{raki}$ $x_1]]]]]$~~$]]]]$

i$_2$. [$_{\mathrm{VP}}$ veit [$_{\mathrm{CP}}$ að [$_{\mathrm{TP}}$ Jón$_1$ segir [$_{\mathrm{vP}}$ t$_{Jón_1}$ t$_{segir}$ [$_{\mathrm{VP}}$ ~~t$_{segir}$ [$_{\mathrm{CP}}$ að [$_{\mathrm{TP}}$ Pétur raki [$_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\mathrm{VP}}$ t$_{raki}$ x_1]]]]]~~]]]]

j$_2$. [$_{\mathrm{vP}}$ Max veit [$_{\mathrm{VP}}$ t$_V$ [$_{\mathrm{CP}}$ að [$_{\mathrm{TP}}$ ~~Jón$_1$ segir [$_{\mathrm{vP}}$ t$_{Jón_1}$ t$_{segir}$ [$_{\mathrm{VP}}$ t$_{segir}$ [$_{\mathrm{CP}}$ að [$_{\mathrm{TP}}$ Pétur raki [$_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\mathrm{VP}}$ t$_{raki}$ x_1]]]]]]]~~]]]

b$_3$. [$_{\mathrm{vP}}$ Pétur raki [$_{\mathrm{VP}}$ t$_{raki}$ ~~x_1~~]]

c$_3$. [$_{\mathrm{TP}}$ Pétur raki [$_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ ~~[$_{\mathrm{VP}}$ t$_{raki}$ x_1]~~]]

d$_3$. [$_{\mathrm{CP}}$ að [$_{\mathrm{TP}}$ Pétur raki ~~[$_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\mathrm{VP}}$ t$_{raki}$ x_1]]~~]]

e$_3$. [$_{\mathrm{VP}}$ segir [$_{\mathrm{CP}}$ að ~~[$_{\mathrm{TP}}$ Pétur raki [$_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\mathrm{VP}}$ t$_{raki}$ x_1]]]~~]]

f$_3$. [$_{\mathrm{vP}}$ Jón$_1$ segir [$_{\mathrm{VP}}$ t$_{segir}$ [$_{\mathrm{CP}}$ að ~~[$_{\mathrm{TP}}$ Pétur raki [$_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\mathrm{VP}}$ t$_{raki}$ x_1]]]~~]]]

g$_3$. [$_{\mathrm{TP}}$ Jón$_1$ segir [$_{\mathrm{vP}}$ t$_{Jón_1}$ t$_{segir}$ [$_{\mathrm{VP}}$ ~~t$_{segir}$ [$_{\mathrm{CP}}$ að [$_{\mathrm{TP}}$ Pétur raki [$_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\mathrm{VP}}$ t$_{raki}$ x_1]]]]~~]]]

h$_3$. [$_{\mathrm{CP}}$ að [$_{\mathrm{TP}}$ Jón$_1$ segir [$_{\mathrm{vP}}$ ~~t$_{Jón_1}$ t$_{segir}$ [$_{\mathrm{VP}}$ t$_{segir}$ [$_{\mathrm{CP}}$ að [$_{\mathrm{TP}}$ Pétur raki [$_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\mathrm{VP}}$ t$_{raki}$ x_1]]]]]~~]]]

i$_3$. [$_{\mathrm{VP}}$ veit [$_{\mathrm{CP}}$ að [$_{\mathrm{TP}}$ Jón$_1$ ~~segir [$_{\mathrm{vP}}$ t$_{Jón_1}$ t$_{segir}$ [$_{\mathrm{VP}}$ t$_{segir}$ [$_{\mathrm{CP}}$ að [$_{\mathrm{TP}}$ Pétur raki [$_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\mathrm{VP}}$ t$_{raki}$ x_1]]]]]]~~]]]

j$_3$. [$_{\mathrm{vP}}$ Max veit [$_{\mathrm{VP}}$ t$_V$ [$_{\mathrm{CP}}$ ~~að [$_{\mathrm{TP}}$ Jón$_1$ segir [$_{\mathrm{vP}}$ t$_{Jón_1}$ t$_{segir}$ [$_{\mathrm{VP}}$ t$_{segir}$ [$_{\mathrm{CP}}$ að [$_{\mathrm{TP}}$ Pétur raki [$_{\mathrm{vP}}$ t$_{Pétur}$ t$_{raki}$ [$_{\mathrm{VP}}$ t$_{raki}$ x_1]]]]]]]~~]]]

3.7. Conclusion

Let us now come back to the question of how much we can restrict the accessible domain if we want to integrate binding into a strictly local derivational approach.

As the discussion above has shown, all three PIC variants eventually face the same problem. As it stands, they do not seem to provide enough information to evaluate binding relations. This means that we have to find a way how the relevant information can be transferred into the accessible domain. As this move is inevitable independent of the PIC variant we assume, we are free to choose the version that is most attractive from a conceptual point of view, and this is the most restrictive version; henceforth, I will therefore assume that the accessible domain is defined by PIC_3, the *Phrase Impenetrability Condition.*

4. Binding as Feature Checking

4.1. Introduction

Against this background, the question arises of whether it is possible to capture an *a priori* non-local phenomenon like binding in such a theory at all. There are two reasons why binding seems to pose a problem for a local derivational approach. First, binding is obviously not a strictly local phenomenon, as the following well-known examples show, which illustrate pronominal binding in English and long distance binding in Icelandic, respectively.[11]

(23) $John_1$ knows that Mary told Sally that Max hit him_1.

(24) $Jón_1$ segir að Pétur raki sig_1/$hann_1$/*sjálfan sig_1.
John says that Peter $shave_{sub}$ SE/him/himself
'$John_1$ says that Peter would shave him_1.'

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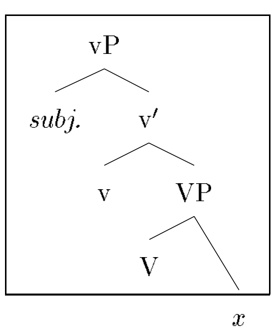
[11]In fact, even if we consider a relatively local binding relation as in *$John_1$ hates $himself_1$*, the anaphor in the object position is no longer accessible when the subject enters the derivation; cf. the illustration in (i), repeated from section 2.

(i) *x no longer accessible:*



Moreover, the locality degree of the binding relation determines the shape of the bound element, which might surface as SE anaphor, as SELF anaphor, or as pronoun. This is exemplified by the following German sentences (repeated from chapter 2), where the bound element becomes less anaphoric the less local the binding relation gets.

(25) *German:*

a. Max_1 hasst sich selbst_1/sich_1/*ihn_1.

Max hates himself/SE/him
'Max_1 hates himself_1.'

b. Max_1 hört sich selbst_1/sich_1/*ihn_1 singen.

Max hears himself/SE/him sing
'Max_1 hears himself_1 sing.'

c. Max_1 schaut hinter sich_1/??sich selbst_1/*ihn_1.

Max glanced behind SE/himself/him
'Max_1 glanced behind him_1/himself_1.'

d. Max_1 weiß, dass Maria ihn_1/*sich_1/*sich selbst_1 mag.

Max knows that Mary him/SE/himself likes
'Max_1 knows that Mary likes him_1.'

What these examples show is that the solution to the locality problem cannot just be to split up the non-local relation into several local ones, as it is done, for example, in the case of *wh*-movement. With respect to binding, something more needs to be said.

4.2. Phrase Balance and Feature Checking

Generally, it can be concluded that in order to evaluate a binding relation, it is necessary that all information concerning this relation is accessible at the same time at some point in the derivation. In short, it is necessary that there is a point in the derivation when both the bound element and its antecedent are accessible.

Since the bound element is merged into the derivation first, such a configuration can only arise after the binder has also entered the derivation. However, as this might happen at a stage when the base position of the bound element is no longer accessible (independent of the PIC version we choose, as the previous section showed), it seems to be necessary that the bound element is "dragged along" until it reaches a position which is still accessible when the binder comes in. Thus, the question arises of what triggers movement of the bound element?

In general, movement can be characterized as follows. The ultimate goal of all movement operations is feature checking; thus we are led to conclude that bound elements bear particular features which have to be checked in the course of the derivation. As far as the target of movement is concerned, it is always a position which stands in a very local relation to the element bearing the attracting features, and it is this local relation which licenses feature checking. Regarding the case of binding, we have said that the bound element must move to a position which is still accessible when its antecedent is merged into the derivation. When this happens, we reach a stage in the derivation where the binding relation can be evaluated, which means that afterwards the bound element no longer needs to be moved along (unless it serves as a goal for some higher probe). The position the bound element will have reached at this point can be precisely specified: Assuming that the accessible domain is restricted by the *Phrase Impenetrability Condition* (PIC_3) (cf. the conclusions drawn in the previous section), its target position must be one specifier position below its antecedent – for example, if the binder is a subject, which is merged in Specv, the bound element must be raised at least to SpecV in order to be accessible at the same time.

This means that the relation between the bound element and its antecedent is very similar to that of other probes and goals: goals are generally attracted to a position sufficiently close to the probe for feature checking, and unless the goal bears further features that are attracted by some other higher probe, it stops moving at this point. Let us briefly think about it what "sufficiently close for feature checking" actually means. Following Chomsky (1995), the standard situation looks as follows. The probe is a head and the goal is an XP which is attracted to the probe's specifier position such that feature checking takes place in a spec-head relation (cf., for example, feature checking involving *wh*-features, EPP features, Case features, scrambling features etc.).[12] But does this mean that spec-head relations are the only configurations under which feature checking can take place? Against the background of the *Phrase Impenetrability Condition* (PIC_3), which imposes severe locality restrictions on all operations, it seems redundant to introduce a further locality constraint and assume that feature checking is restricted to spec-head relations; instead, it is more attractive to subsume the locality conditions for feature checking under the PIC_3. As a consequence, not only the specifier of the probe serves as potential target for attracted XPs, but also the specifier of the next lower maximal projection.[13] Moreover (and more importantly), if feature checking is not dependent on a spec-head relation, in principle nothing prevents the probe from being a maximal projection;

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[12]In contrast, Chomsky (2000, 2001b) assumes that movement of the goal to the probe's specifier position is not necessary unless EPP features are involved; the relation Agree (under which feature checking takes place in this approach) does not presuppose a spec-head relation. Similarly to the assumptions developed here it is sufficient that probe and goal are in a c-command relation which is "local enough", the latter being restricted by the *Phase Impenetrability Condition* (PIC_2) and the MLC.

[13]Cf. also Heck (2004) as regards the assumption that feature checking only requires some "sufficiently local" configuration.

i.e., feature checking needs no longer involve heads.[14,15]

(26) *Feature Checking:*

The pair of features [∗F∗]/[F] stands in a feature checking relation iff

(i) the element bearing the feature [∗F∗] (= *probe*) c-commands the element bearing the feature [F] (= *goal*) and

(ii) both probe and goal are accessible.

(27) *Possible configuration in which feature checking can take place:*

$[_{\mathrm{ZP}}\ \mathrm{WP}_{[*F*]}\ \mathrm{Z}\ [_{\mathrm{YP}}\ \mathrm{XP}_{[F]}\ \mathrm{Y}]]$

Against this background it seems to be a natural assumption that binding can be encoded as feature checking, with the antecedent as probe and the bound element as goal.[16] Let us therefore assume that items that function as bound elements in a derivation bear a feature [β], and their designated antecedents are equipped with a corresponding feature [$*\beta*$]. Because of the PIC_3 the element bearing the [β]-feature will be forced to move successive-cyclically via all intermediate specifier positions to its checking position, which is the first specifier position below the element bearing the [$*\beta*$]-feature. Following Müller (2003b), I assume that the intermediate movement steps are triggered by the constraint *Phrase Balance*.[17]

[14] In principle, it would be possible to assume an even more local configuration for feature checking involving two XPs: a spec-spec relation between multiple specifiers of the same maximal projection. But as outlined above, from a conceptual point of view it seems to be more reasonable to link feature checking to the PIC_3, under which the next lower specifier position is local enough.

[15] I adopt Sternefeld's (2000b) notation according to which features on probes are starred.

[16] Note in particular that the c-command requirement of binding is thus encoded in the more general definition of *Feature Checking*; cf. (26).

[17] Since the underlying idea is to restrict look-ahead to the numeration (which does not divulge syntactic structure), the concept of subarrays (LA_i) is abandoned.

(28) *Phrase Balance* (PB):

Every XP has to be balanced: For every feature [$*$F$*$] in the numeration there must be a potentially available feature [F] at the XP level.

(cf. Müller (2003b:8))

(29) *Potential availability*:

A feature [F] is potentially available if (i) or (ii) holds:

(i) [F] is on X or edgeX of the present root of the derivation.

(ii) [F] is in the workspace of the derivation. (cf. Müller (2003b:8))

(30) The *workspace* of a derivation D comprises the numeration N and material in the trees that have been created earlier (with material from N) and have not yet been used in D. (cf. Müller (2003b:9))

The following abstract derivation serves as an illustration. *Phrase Balance* forces the bound element to move to SpecU (cf. (31-b)) and SpecY (cf. (31-c)), which turns out to be a position in which the element can enter into a checking relation with the binder, because SpecY is still accessible when the binder is merged into the derivation (cf. (31-d)).

(31) a. workspace: {U, $x_{[\beta]}$ (=bound element), Y, Z, binder$_{[*\beta*]}$}

b. [$_{\text{UP}}$ $x_{[\beta]}$ U t$_x$]; workspace: {Y, Z, binder$_{[*\beta*]}$}

c. [$_{\text{YP}}$ $x_{[\beta]}$ Y [$_{\text{UP}}$ t$_x{}'$ U $\cancel{\text{t}_x}$]]; workspace: {Z, binder$_{[*\beta*]}$}

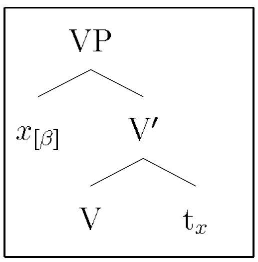
d. [$_{\text{ZP}}$ binder$_{[*\beta*]}$ Z [$_{\text{YP}}$ $x_{[\beta]}$ Y $\cancel{[_{\text{UP}}\ \text{t}_x{}'\ \text{U}\ \text{t}_x]}$]]

In short, *Phrase Balance* triggers movement of $x_{[\beta]}$ to the edge of the current phrase

Note furthermore that *Phrase Balance* refers to completed XPs. This means that it applies at the point when there is no further material left in the numeration that is merged into XP. Hence, even if a head is merged with its complement and the result is considered to be a maximal projection at this stage, *Phrase Balance* does not yet apply if there is a specifier left in the numeration.

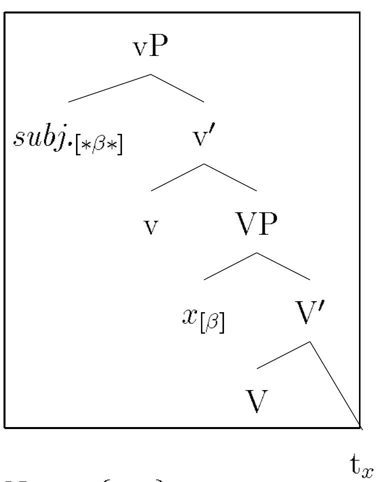
as long as its antecedent (with the feature [$*\beta*$]) is still in the numeration and thus makes sure that $x_{[\beta]}$ remains accessible. This is illustrated in the following trees. Since *Phrase Balance* forces $x_{[\beta]}$ to move to the edge of VP in (32), $x_{[\beta]}$ is still in the accessible domain at the next derivational stage (cf. (33) and (34)). When vP is built, it depends on the probe as to whether $x_{[\beta]}$ moves on or not: If the probe is merged into the derivation (as in (33)), $x_{[\beta]}$ stays in its position and feature checking takes place; if the probe remains in the numeration (as in (34)), *Phrase Balance* triggers again movement of $x_{[\beta]}$ to the edge of vP.

(32) *Phrase Balance:*



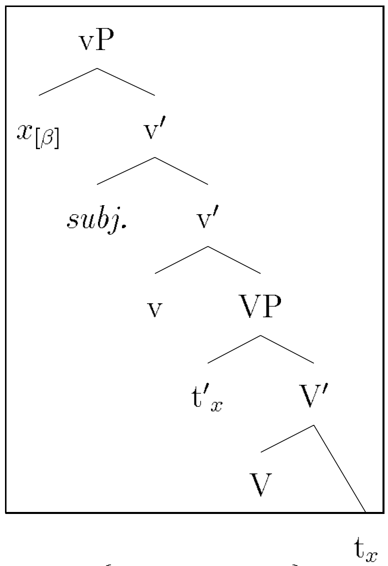
Num={subj.$_{[*\beta*]}$, ...}

(33) *[β]-feature checking:*



Num={...}

(34) *Phrase Balance:*



Num={subj.$_{[*\beta*]}$, ...}

In the next section I will address the question of how a concrete implementation of such a binding theory might look like.

5. Optimal Binding in a Derivational Approach

5.1. An Outline

In the previous section, it has been explained how x gets into the accessible domain; in this section, the issue will be addressed of how the concrete form of x is determined.

As argued in chapter 2, there are good reasons to assume that the concrete realization of bound elements is determined in an optimality-theoretic competition. I will therefore investigate how the approach outlined there can be integrated into a strictly local derivational theory.

The underlying idea is that the numeration of a sentence in which a binding relation is established does not contain the concrete lexical item which will later function as bound element; instead, it is only encoded that there will be a binding relation between a designated antecedent (identifiable by the [$*\beta*$]-feature) and a bindee x bearing the corresponding [β]-feature.[18] However, even if we do not know the concrete form of x at this stage, we know its possible realizations: Depending on the locality degree of the binding relation, x will be realized as SELF anaphor, as SE anaphor, or as a pronoun. Hence, I propose that in the beginning, x is equipped with a realization matrix, i.e., a list which contains all possible realizations of x. I will refer to it with the following notation: [SELF, SE, pron].[19] In the course of the derivation, x's concrete realization will then be determined as follows.

First of all recall that a basic insight in chapter 2 was that binding is sensitive to domains of different size (cf. also, among others, Manzini & Wexler (1987), Dalrymple (1993)). In essence, the following generalization holds: The smaller the domain is in which binding takes place, the more likely it is that the bound element is realized as an anaphor, or, to put it differently, the more anaphoric x is.[20]

Let us now come back to the strictly local derivational approach. In which domain x will eventually be bound can in principle only be inferred when the binder is merged into the derivation and the checking relation is established. However, even if we do not know in the course of the derivation in which domain x will eventually be bound, we do know earlier in which domains x is *not* bound. Hence, if a domain relevant for binding is reached in the course of the derivation and x is still free, we can conclude that it becomes more and more unlikely that x will be realized as an anaphor. On the assumption that in the beginning x is equipped with the complete

[18]Regarding unbound pronouns and inherently reflexive predicates, some slight modifications will be in order; I will come back to these issues in section 5.11. and 5.12.

[19]Copies of R-expressions and $\emptyset$ might also be included; cf. section 5.10. and 5.11.

[20]The following hierarchy illustrates how anaphoricity decreases, with A $>$ B indicating that A is more anaphoric than B: SELF anaphor $>$ SE anaphor $>$ pronoun $>$ R-expression (cf. also chapter 2).

realization matrix, this observation has the following consequence: Each time when x reaches one of these domains to which binding is sensitive and x remains unbound, its realization matrix might be reduced insofar as the most anaphoric specification is deleted and henceforth no longer available. Whether deletion takes place or not hinges on the respective domain and the language under consideration. Note that due to the introduction of realization matrices, the *Inclusiveness Condition* can thus be respected, which requires that "no new objects are added in the course of the computation" (Chomsky (1995:228)). Although the concrete form of x is determined in the course of the derivation, all possible realizations underly the derivation, and those which must be excluded are gradually deleted.

As alluded to before, x finally stops moving when it can establish a checking relation with its antecedent. Again, the realization matrix is optimized (which means that certain specifications might be deleted), and the result is mapped to PF.[21] Before Late Insertion takes place (cf. Halle and Marantz (1993) and subsequent work on Distributed Morphology), the concrete realization of x can finally be determined, which must match one of the remaining forms in the realization matrix. If there is only one element left in the matrix, the choice is clear, otherwise the remaining form that is most anaphoric is selected.

Once the realization of x is known, the whole chain it heads can be aligned and x can then be spelled out in the appropriate position. This constitutes a minimal violation of the *Phrase Impenetrability Condition* and the *Strict Cycle Condition*,[22] but apparently this is what we have to accept if we want to integrate such a non-local

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[21] As will become clearer in the subsequent sections, once x is bound, the matrix will not change anymore. (This follows from the formulation of the constraints.) Hence, it can immediately be mapped to PF.

[22] *Strict Cycle Condition* (SCC):

Within the current XP α, a syntactic operation may not target a position that is included within another XP β that is dominated by α.

phenomenon as binding into a local derivational approach.

Note, however, that this violation of the locality requirements is restricted to PF and does not occur in narrow syntax. Moreover, it is clear that this step is and must not be abused to carry arbitrary information back to those parts of the structure that are no longer in the accessible domain, or to use this information to change parts of the derivation in a way that could not be foreseen at the point when that part was being built, and thereby undermine the derivational approach as such. Instead, this kind of reference to earlier parts of the derivation is strictly restricted to items that have some connection to the current stage of the derivation via chain formation, and the only thing that happens is that the lower chain members are specified more precisely in accordance with the predispositions they already had before.

Thus, chains are like wormholes in physics – they are "hypothetical "tube[s]" [...] connecting widely separated positions", "allowing an object that passes through it to appear instantaneously in some other part of the Universe – not just in a different place, but also in a different time", so to speak.[23] As a result, through this tube lower chain members can be aligned with their head, but other parts of the already built structure are not affected at all.

5.2. Domains, Constraints, and Candidates

Let us now turn to the technical implementation of the analysis. In chapter 2, six different domains have been distinguished which were shown to be relevant for binding: the θ-domain, the Case domain, the subject domain, the finite domain, the indicative domain, and the root domain.[24] Two remarks concerning these domains

[23]These are quotations from http://scienceworld.wolfram.com/physics/Wormhole.html and http://www.lcsd.gov.hk/CE/Museum/Space/FAQ/universe/e_faq_universe_1.htm (November 23, 2003).

[24]Recall that this order reflects their increasing size.

are in order. First, the definitions of the domains have to be slightly modified, since we have to take into account that the analysis in chapter 2 was a global one, and hence the domain definitions need to be adjusted to the derivational model.

Second, note that according to the considerations in the previous section, it is no longer relevant in which domain binding takes place, instead, we are now interested in the last domain in which x is *not yet* bound. The consequences are twofold. On the one hand, we can dispense with the notion of root domain, because if the smallest domain in which binding takes place is the root domain, it suffices to know that x is not yet bound in the indicative domain, the next smaller domain; that x will be eventually bound can then be inferred from the unchecked [β]-feature on x and the [$*\beta*$]-feature in the numeration. On the other hand, for the case that the binding relation is established in the smallest domain from chapter 2, the θ-domain, we have to introduce a new constraint that refers to the situation before the θ-domain is reached, because languages also differ with respect to their binding possibilities in this small domain.

Let me now introduce the relevant definitions, before we can then turn to the analysis of concrete examples.[25]

(35) XP is the *θ-domain* of x if it contains x and the head that θ-marks x plus its external argument (if there is one).

(36) XP is the *Case domain* of x if it contains x and the head that bears the Case features against which x checks Case.

(37) XP is the *subject domain* of x if it contains x and either
(i) a subject distinct from x which does not contain x, or
(ii) the T with which x a checks its (Nominative) Case features.

[25]Note that in section 5.12., the definitions of finite and indicative domain will have to be slightly revised.

(38) XP is the *finite domain* of x if it contains x, a finite verb, and a subject.

(39) XP is the *indicative domain* of x if it contains x, an indicative verb, and a subject.

The main difference between the old domain definitions and the ones introduced above is that we often find the additional requirement that the domain contain a subject. This is generally necessary in order to guarantee that the respective domain is not VP, where verbs are usually base-generated, but vP, where a potential binder can be merged into the derivation. Due to obligatory V-to-v movement, this was not necessary in a global approach, where the verb could be considered in its landing site.[26]

Moreover, it does no longer make sense to refer to the *smallest* XP with a particular property; after all we cannot know at a given stage in the derivation whether an XP in the inaccessible domain has before qualified as one of the relevant domains. As a consequence, there are no longer unambiguously defined sets of nodes that constitute the different domains; instead, it is possible that several XPs in the derivation qualify, for instance, as θ-domain, the only requirement being that the accessible domain contains at the same time x, its θ-marker and the corresponding external argument. However, the underlying idea that the domains are ordered in a subset relation can still be maintained if it is understood in such a way that for two domains D_1 and D_2 the relation $D_1 \subseteq D_2$ holds iff the smallest XP that qualifies as D_2 contains the smallest YP that qualifies as D_1.

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[26]As an alternative, one could try to define the domains via concrete categories (for example, vP= finite domain). However, this does not really simplify things, because there are on the one hand XPs that correspond to different domains (vP can qualify as all kinds of domains), and on the other hand the θ-domain, for example, can be a vP in one sentence and a PP in another one. Hence, at least further specifications such as $\mathrm{vP}_{[finite]}$= finite domain would be needed, and it is unclear to me how a categorial definition of the θ-domain would have to look like.

Let us now take a closer look at the optimization procedure. The theory I propose relies on serial optimization, which means that optimization applies more than once (cf. Müller (2003a)); and since we adopt the *Phrase Impenetrability Condition*, it is almost self-evident that optimization takes place after the completion of each phrase (in the sense alluded to before in footnote 17). The optimal output of each competition (plus additional material from the remaining numeration) serves as input for the next optimization process (cf. Heck & Müller (2000) and subsequent work on derivational OT syntax and recall also the analysis proposed in chapter 3, section 8.). As far as the initial input is concerned, it basically consists of the numeration, which contains in particular the designated binder with the [$*\beta*$]-feature and the bound element x, which bears the feature [β] and has the realization matrix [SELF, SE, pron]. Let us now focus on the latter. In the beginning, we start with the maximal realization matrix. Assume then that when the first optimization takes place, we have the option to reduce the matrix by deleting one or two of the most anaphoric elements such that we get the following three candidates: O_1: $\ldots x_{[SELF,SE,pron]} \ldots$; O_2: $\ldots x_{[SE,pron]} \ldots$; O_3: $\ldots x_{[pron]} \ldots$. If O_2 wins the competition, only $x_{[SE,pron]}$ and $x_{[pron]}$ compete when the next optimization takes place, since the realization matrix cannot be extended in the course of the derivation (otherwise it would violate the *Inclusiveness Condition*); it can only be further reduced.

As far as the constraints are concerned, the reflexivity constraints from chapter 2 are now replaced with a universal constraint subhierarchy that does not punish binding of non-maximally anaphoric elements in a given domain; instead, as argued above, the new constraints require x to be minimally anaphoric if binding has not yet taken place. To put it another way, anaphors are punished if they occur unbound in a more or less local domain – and this sounds rather familiar, because it is very similar to the traditional Principle A, which requires that anaphors be locally bound. Hence, the new constraints that replace the reflexivity constraints from chapter 2 (which could be regarded as a version of Principle B) can be considered to be a version of Principle A. Thus, they will be called PRINCIPLE $\mathcal{A}$-constraints.

They have the form outlined in (40), with XD $\in$ {θ-domain, Case domain, subject domain, finite domain, indicative domain}, and are universally ordered in such a way that constraints referring to bigger domains outrank those referring to smaller ones.

(40) PRINCIPLE $\mathcal{A}_{XD}$ (Pr.$\mathcal{A}_{XD}$):
If $x_{[\beta]}$ remains unchecked in its XD, x must be minimally anaphoric.

These constraints work as follows: If the derivation reaches one of the relevant domains and no binding relation is established, i.e., if one can infer from the material in the accessible domain that this is the case, they apply non-vacuously and are violated twice by the candidate with the realization matrix [SELF, SE, pron] and once by O_2, with the matrix [SE, pron]. Hence, the effect of these constraints is that they reduce anaphoric realization possibilities.

As it stands, (40) does not yet suffice to account for languages that have different binding options if binding takes place within the θ-domain, the smallest domain relevant for binding (cf. the remark at the beginning of this section). In order to distinguish between those languages, we need a constraint that applies *before* the θ-domain is reached; thus, the PRINCIPLE $\mathcal{A}$-constraint subhierarchy is extended by the following constraint, which applies non-vacuously in all optimization processes as long as x remains unbound since it refers to maximal projections in general. Hence, it can already apply before the θ-domain is reached and punish unbound anaphors even in such a local domain; informally spoken, it can thus be characterized as an extremely local PRINCIPLE $\mathcal{A}$-constraint.[27]

(41) PRINCIPLE $\mathcal{A}_{XP}$ (Pr.$\mathcal{A}_{XP}$):
If $x_{[\beta]}$ remains unchecked in XP, x must be minimally anaphoric.

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[27]Note in particular that if the generic label PRINCIPLE $\mathcal{A}_{XD}$ is used, it henceforth also subsumes PRINCIPLE $\mathcal{A}_{XP}$.

As far as the ranking of the PRINCIPLE $\mathcal{A}$-constraints is concerned, (41) is outranked by the rest of the subhierarchy because it refers to the most local domain. The complete universal hierarchy is given in (42), with those constraints referring to bigger domains dominating the constraints referring to smaller domains.[28] This reflects that it is worse if anaphoric x reaches a relatively big domain and is still free.

(42) *Universal subhierarchy 1:*

$$\text{Pr.}\mathcal{A}_{ID} \gg \text{Pr.}\mathcal{A}_{FD} \gg \text{Pr.}\mathcal{A}_{SD} \gg \text{Pr.}\mathcal{A}_{CD} \gg \text{Pr.}\mathcal{A}_{ThD} \gg \text{Pr.}\mathcal{A}_{XP}$$

There are two cases in which the PRINCIPLE $\mathcal{A}$-constraints apply vacuously – either if the binder is merged into the accessible domain and $x_{[\beta]}$ is checked, or if the accessible domain does not contain any material that corresponds to one of the relevant domains.

In these cases, a second group of constraints decides the competition (cf. (43)). They also form a universal constraint subhierarchy, which is the counterpart of the *SELF-hierarchy from chapter 2. They punish candidates involving a realization matrix for x that does not contain a particular specification. However, while the *SELF-hierarchy preferred non-maximally anaphoric elements, the new constraints are ordererd in such a way that they basically favour anaphoric specifications. This is achieved by the ranking in (44), since it favours realization matrices that have not been reduced.[29] Thus, these constraints function as a counterbalance to the

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[28]As mentioned before, the domain definitions are no longer unique in a derivational approach in the sense that an unambiguously specified set of nodes constitutes a particular domain of x in a given sentence; this is in particular true for the domain referred to in (41). The notions "bigger/smaller domains" are therefore to be understood in such a way that a domain X is smaller than a domain Y if the derivation first reaches a maximal projection that qualifies as X before a maximal projection is reached that qualifies as Y.

[29]Maximal realization matrices do not violate any of the FAITH-constraints, but the more spec-

PRINCIPLE $\mathcal{A}$-constraints.

(43) a. FAITH$_{SELF}$ (F$_{SELF}$):
The realization matrix for x must contain [SELF].

b. FAITH$_{SE}$ (F$_{SE}$):
The realization matrix for x must contain [SE].

c. FAITH$_{pron}$ (F$_{pron}$):
The realization matrix for x must contain [pron].

(44) *Universal subhierarchy 2:*
FAITH$_{pron}$ $\gg$ FAITH$_{SE}$ $\gg$ FAITH$_{SELF}$

None of the constraints introduced so far says anything about the concrete realization of x; they only help to determine an optimal realization matrix. Hence, we need an additional rule which applies at PF and determines the final form on the basis of the optimal matrix. Assume that this task is fulfilled by the following principle.

(45) MAXIMALLY ANAPHORIC BINDING (MAB):
Checked $x_{[\beta]}$ must be realized maximally anaphorically.

So let us now apply the theory outlined above and turn to some concrete examples.

5.3. Derivational Binding in German

In this and the following three sections, I provide analyses of the German, English, Dutch, and Italian binding data introduced in chapter 2 to illustrate how the theory works in detail. Let us first turn to the German sentences in (46), repeated from (25). As we saw in chapter 2, these four sentences involve binding relations of different locality degree. In (46-a), the binding relation is already established when

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ifications are deleted, the more (higher-ranked) FAITH-constraints are violated. (Recall that first the SELF specification and then the SE specification is deleted.)

the smallest XP that qualifies as θ-domain (i.e., the minimal θ-domain) is reached, namely vP. In (46-b), the antecedent is not contained in the minimal θ-domain (= embedded vP); it enters the derivation in the matrix vP, which qualifies as Case domain. In (46-c), the minimal θ- and Case domain coincide (= PP), but the binder is not part of it; the binding relation is only established when the minimal subject domain (= vP) is reached. Finally, in (46-d), where the embedded vP corresponds to the minimal θ-, Case, subject, finite, and indicative domain, the binding relation is least local, since the binder only enters the derivation in the matrix vP.

(46) *German:*

a. Max$_1$ hasst sich selbst$_1$/sich$_1$/*ihn$_1$.

   Max hates himself/SE/him
   'Max$_1$ hates himself$_1$.'

b. Max$_1$ hört sich selbst$_1$/sich$_1$/*ihn$_1$ singen.

   Max hears himself/SE/him sing
   'Max$_1$ hears himself$_1$ sing.'

c. Max$_1$ schaut hinter sich$_1$/??sich selbst$_1$/*ihn$_1$.

   Max glanced behind SE/himself/him
   'Max$_1$ glanced behind him$_1$/himself$_1$.'

d. Max$_1$ weiß, dass Maria ihn$_1$/*sich$_1$/*sich selbst$_1$ mag.

   Max knows that Mary him/SE/himself likes
   'Max$_1$ knows that Mary likes him$_1$.'

Let us now consider the derivation of each of these sentences, starting with (46-a) (repeated in (47)).

First, the verb and its direct object, $x_{[\beta]}$, merge (cf. (47-a)) and form VP. However, this phrase is not yet balanced, because there is a starred feature in the remaining numeration, namely [$*\beta*$], for which there is no corresponding [β]-feature potentially available (cf. (29)). The only feature that could satisfy this requirement is the [β]-feature on x, but x is neither in V nor in edgeV nor in the workspace of the derivation. Hence, *Phrase Balance* (cf. (28)) triggers movement of x to the edge of VP. This is indicated in (47-b).

(47) Max$_1$ hasst sich selbst$_1$/sich$_1$/*ihn$_1$.

a. [$_{\mathrm{VP}}$ $x_{[\beta]}$ hasst]; workspace: {Max$_{[*\beta*]}$, ...}

b. [$_{\mathrm{VP}}$ $x_{[\beta]}$ [$_{\mathrm{V'}}$ t$_x$ hasst]]

At this stage, the first optimization takes place (cf. T$_1$).[30] Since $x_{[\beta]}$ is still unchecked and a maximal projection is completed, PRINCIPLE $\mathcal{A}_{XP}$ applies non-vacuously; further domains to which binding is sensitive have not yet been reached.[31] Moreover, the FAITH-constraints are relevant in the first competition.

As far as the candidates are concerned, the question arises as to whether x keeps the full realization matrix [SELF, SE, pron], with which it is equipped in the beginning, or whether it is reduced to [SE, pron] or [pron].

As to the ranking of the constraints, the universal hierarchy FAITH$_{pron}$ $\gg$ FAITH$_{SE}$ $\gg$ FAITH$_{SELF}$ must be respected; and since in the end both types of anaphors must be optimal in German sentences of this kind, both O$_1$ and O$_2$ must win this competition. This is achieved if FAITH$_{SELF}$ and PRINCIPLE $\mathcal{A}_{XP}$ are tied.[32,33]

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[30]In the subsequent analyses I ignore the maximal projection(s) that makes up x itself, because at this early stage nothing of interest happens. Moreover, the candidates will be abbreviated and only the different realization matrices will be represented in the subsequent tableaux.

[31]Those PRINCIPLE $\mathcal{A}$-constraints that apply vacuously are generally neglected in the tableaux.

[32]Again, all ties in this analysis are global ties.

[33]Strictly speaking, it cannot yet be excluded that the crucial ranking is FAITH$_{SELF}$ $\gg$ PRINCIPLE $\mathcal{A}_{XP}$; in this case only O$_1$ would win, which still comprises all possible realizations. However, it would also turn out to be the only optimal candidate in the next optimization, in which case MAB would wrongly predict that only the complex anaphor is licit in sentences like these.

T_1: VP optimization

(XP reached - $x_{[\beta]}$ unchecked)

Input: $[_{VP}\ x_{[\beta]/[SELF,SE,pron]}\ [_{V'}\ t_x$ hasst]]	F_{pron}	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{XP}$
⇒ O_1: $[_{VP}\ x_{[\beta]/[SELF,SE,pron]}\ [_{V'}\ t_x$ hasst]]				**(!)
⇒ O_2: $[_{VP}\ x_{[\beta]/[SE,pron]}\ [_{V'}\ t_x$ hasst]]			*(!)	*
O_3: $[_{VP}\ x_{[\beta]/[pron]}\ [_{V'}\ t_x$ hasst]]		*!	*	

T_1 yields two optimal outputs; this means that there are two possibilities as to how the derivation can proceed (= two optimal derivations). However, since they only differ with respect to the realization matrix of x, the continuation of both variants basically looks as follows.

(48) c. $[_{vP}$ Max$_{[*\beta*]}$ $[_{VP}\ x_{[\beta]}\ [_{V'}\ \cancel{t_x}\ t_{hasst}]]$ hasst]

At this stage, the θ-domain of x is reached, but since at the same time x's binder enters the derivation, all PRINCIPLE $\mathcal{A}$-constraints apply vacuously when vP is optimized. This optimization is illustrated in $T_{1.1}$ with O_1 from T_1 as input (notation in the tableaux: O_1/T_1), and in $T_{1.2}$ with O_2 from T_1 as input.[34]

Hence, $T_{1.1}$ involves again three candidates, whereas in $T_{1.2}$, only two candidates compete. In $T_{1.1}$, the [SELF, SE, pron] candidate wins; in $T_{1.2}$, this matrix is no longer available and the matrix [SE, pron] is predicted to be optimal.

[34]The derivational history of the candidates is reflected by their indices. Thus a candidate O_{xy} is the y-th candidate in the second optimization process based on the winner O_x from the first competition; O_{xyz} would then be the z-th candidate in the third competition based on the previous winner O_{xy}, and so on.

$T_{1.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: O_1/T_1	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{11}: [SELF, SE, pron]			
	O_{12}: [SE, pron]			*!
	O_{13}: [pron]		*!	*

$T_{1.2}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: O_2/T_1	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{21}: [SE, pron]			*
	O_{22}: [pron]		*!	*

Moreover, now that $x_{[\beta]}$ has been checked, MAB can determine the concrete realization of x. According to the derivation in which O_{11}=[SELF, SE, pron] is optimal, MAB selects the complex anaphor; in the derivation where [SE, pron] is optimal (cf. O_{21}), the SE anaphor is chosen as realization of x. Hence, the analysis makes correct predictions.

Let us now consider the derivation of sentence (46-b), which is repeated in (49). (49-a) represents the derivation when the first phrase is completed and the first optimization takes place.

(49) Max$_1$ hört sich selbst$_1$/sich$_1$/*ihn$_1$ singen.

a. [$_{\text{vP}}$ $x_{[\beta]}$ singen]

At this stage, the θ-domain of x is reached, and since x remains unchecked, both PRINCIPLE $\mathcal{A}_{XP}$ and PRINCIPLE $\mathcal{A}_{ThD}$ apply non-vacuously. As in T_1, both O_1 and O_2 should turn out to be optimal, because both types of anaphors are licit in sentences like these. Hence, PRINCIPLE $\mathcal{A}_{ThD}$ cannot be ranked above FAITH$_{SELF}$;

but since the latter is tied with PRINCIPLE $\mathcal{A}_{XP}$ (cf. T_1) and PRINCIPLE $\mathcal{A}_{ThD}$ must be universally higher ranked than PRINCIPLE $\mathcal{A}_{XP}$, it must be assumed that PRINCIPLE $\mathcal{A}_{ThD}$ and FAITH$_{SELF}$ are also tied.[35] Thus, we get the following partial ranking for German:

(50) $\quad$ FAITH$_{pron}$ $\gg$ FAITH$_{SE}$ $\gg$ (PR.$\mathcal{A}_{ThD}$ $\gg$ PR.$\mathcal{A}_{XP}$) $\circ$ FAITH$_{SELF}$

T_2: vP optimization
(XP/ThD reached – $x_{[\beta]}$ unchecked)

Candidates	F_{pron}	F_{SE}	PR.$\mathcal{A}_{ThD}$	F_{SELF}	PR.$\mathcal{A}_{XP}$
⇒ O_1: [SELF, SE, pron]			**(!)		**
⇒ O_2: [SE, pron]			*	*(!)	*
O_3: [pron]		*!		*	

Since we have again two optimal outputs, there are two competitions when the next phrase is completed.[36]

(51) $\quad$ b. $\quad$ [$_{\text{VP}}$ $x_{[\beta]}$ [$_{\text{vP}}$ t_x singen] hört]

At this point, no new domain is reached, but note that unlike in the global approach in chapter 2, this maximal projection still counts as θ-domain since all defining

[35] Recall from chapter 2, section 6. that I assume that ties are not transitive (cf. Fischer (2001)). The brackets in the ranking in (50) indicate that although both PRINCIPLE $\mathcal{A}$-constraints are tied with FAITH$_{SELF}$, the dominance relation between them is not given up. Thus, (50) is an abbreviation for the following three constraint orders:

(i) FAITH$_{pron}$ $\gg$ FAITH$_{SE}$ $\gg$ PR.$\mathcal{A}_{ThD}$ $\gg$ PR.$\mathcal{A}_{XP}$ $\gg$ FAITH$_{SELF}$

(ii) FAITH$_{pron}$ $\gg$ FAITH$_{SE}$ $\gg$ PR.$\mathcal{A}_{ThD}$ $\gg$ FAITH$_{SELF}$ $\gg$ PR.$\mathcal{A}_{XP}$

(iii) FAITH$_{pron}$ $\gg$ FAITH$_{SE}$ $\gg$ FAITH$_{SELF}$ $\gg$ PR.$\mathcal{A}_{ThD}$ $\gg$ PR.$\mathcal{A}_{XP}$

[36] Recall that *Phrase Balance* generally triggers movement of $x_{[\beta]}$ to the edge until its binder is merged into the derivation.

criteria are met. Thus, the same constraints as in T_2 remain relevant. As a result, we get the realization matrices [SELF, SE, pron] and [SE, pron] as optimal output candidates in $T_{2.1}$, and [SE, pron] in $T_{2.2}$.

$T_{2.1}$: VP optimization

(XP/ThD reached – $x_{[\beta]}$ unchecked)

	Input: O_1/T_2	F_{pron}	F_{SE}	PR.$\mathcal{A}_{ThD}$	F_{SELF}	PR.$\mathcal{A}_{XP}$
⇒	O_{11}: [SELF, SE, pron]			**(!)		**
⇒	O_{12}: [SE, pron]			*	*(!)	*
	O_{13}: [pron]		*!		*	

$T_{2.2}$: VP optimization

(XP/ThD reached – $x_{[\beta]}$ unchecked)

	Input: O_2/T_2	F_{pron}	F_{SE}	PR.$\mathcal{A}_{ThD}$	F_{SELF}	PR.$\mathcal{A}_{XP}$
⇒	O_{21}: [SE, pron]			*	*	*
	O_{22}: [pron]		*!		*	

In the next phrase, the binder is merged into the derivation; hence, the PRINCIPLE $\mathcal{A}$-constraints apply vacuously and again the matrices [SELF, SE, pron] and [SE, pron] win (cf. $T_{2.1.1}/T_{2.1.2/2.2.1}$). As a result, MAB determines that x is realized as SELF anaphor if the optimal candidate is O_{111} and as SE anaphor otherwise (cf. $O_{121/211}$). This prediction is again correct.

(52) c. $[_{\text{vP}}$ Max$_{[*\beta*]}$ $[_{\text{VP}}$ $x_{[\beta]}$ $\cancel{[_{\text{vP}}\ t_x\ \text{singen}]}$ $t_{h\ddot{o}rt}]$ hört]

$T_{2.1.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{11}/T_{2.1}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{111}: [SELF, SE, pron]			
	O_{112}: [SE, pron]			*!
	O_{113}: [pron]		*!	*

$T_{2.1.2/2.2.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{12}/T_{2.1}$ or $O_{21}/T_{2.2}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{121}/O_{211}: [SE, pron]			*
	O_{122}/O_{212}: [pron]		*!	*

As far as example (46-c) is concerned (repeated in (53)), the first optimization step is illustrated in T_3.

(53) Max$_1$ schaut hinter sich$_1$/*sich selbst$_1$/*ihn$_1$.

a. [$_{PP}$ $x_{[\beta]}$ hinter t_x]

In sentences like these, where binding takes place in the subject domain, only the SE anaphor is licit in German. As the following tableaux show, this is captured if PRINCIPLE $\mathcal{A}_{CD}$ is ranked below FAITH$_{SE}$ and above FAITH$_{SELF}$. Due to the fact that the PRINCIPLE $\mathcal{A}$-constraints are gradient, O_2 wins in the first competition, and since [SE, pron] remains optimal in the subsequent optimizations, MAB finally selects the SE anaphor as optimal realization for x.

T_3: PP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Candidates	F_{pron}	F_{SE}	$\text{Pr.}\mathcal{A}_{CD}$	$\text{Pr.}\mathcal{A}_{ThD}$	F_{SELF}	$\text{Pr.}\mathcal{A}_{XP}$
O_1: [SELF, SE, pron]			**!	**		**
⇒ O_2: [SE, pron]			*	*	*	*
O_3: [pron]		*!			*	

(54) b. $[_{\text{VP}}\ x_{[\beta]}\ [_{\text{PP}}\ \text{t}_x \text{ hinter } \cancel{\text{t}_x}]\ \text{schaut}]$

$T_{3.1}$: VP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Input: O_2/T_3	F_{pron}	F_{SE}	$\text{Pr.}\mathcal{A}_{CD}$	$\text{Pr.}\mathcal{A}_{ThD}$	F_{SELF}	$\text{Pr.}\mathcal{A}_{XP}$
⇒ O_{21}: [SE, pron]			*	*	*	*
O_{22}: [pron]		*!			*	

(55) c. $[_{\text{vP}}\ \text{Max}_{[*\beta*]}\ [_{\text{VP}}\ x_{[\beta]}\ \cancel{[_{\text{PP}}\ \text{t}_x{}' \text{ hinter t}_x]}\ \text{t}_{schaut}]\ \text{schaut}]$

$T_{3.1.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

Input: $O_{21}/T_{3.1}$	F_{pron}	F_{SE}	F_{SELF}
⇒ O_{211}: [SE, pron]			*
O_{212}: [pron]		*!	*

The analysis of example (46-d) (repeated in (56)) is illustrated in the tableaux T_4-$T_{4.2}$.

(56) Max_1 weiß, dass Maria ihn_1/*sich_1/*sich selbst_1 mag.

a. $[_{\text{VP}}\ x_{[\beta]}\ [_{\text{V}'}\ \text{t}_x \text{ mag}]]$

When the first optimization procedure takes place, only PRINCIPLE $\mathcal{A}_{XP}$ and the FAITH-constraints apply non-vacuously; and since the former is tied with FAITH$_{SELF}$, both O_1 and O_2 turn out to be optimal in this competition (cf. T_4).

T_4: VP optimization

(XP reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{pron}	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{XP}$
⇒	O_1: [SELF, SE, pron]				**(!)
⇒	O_2: [SE, pron]			*(!)	*
	O_3: [pron]		*!	*	

The next phrase that is completed is vP. $x_{[\beta]}$ is still free, but since a subject (*Maria*) enters the derivation, the defining criteria for all domains (θ-, Case, subject, finite and indicative domain) are met at this stage, and therefore *all* PRINCIPLE $\mathcal{A}$ constraints apply non-vacuously.

On the assumption that PRINCIPLE $\mathcal{A}_{ID}$, PRINCIPLE $\mathcal{A}_{FD}$, and PRINCIPLE $\mathcal{A}_{SD}$ (in a word, PRINCIPLE $\mathcal{A}_{ID/FD/SD}$) are ranked above FAITH$_{SE}$, only the candidates with the maximally reduced matrix [pron] win in $T_{4.1}$ and $T_{4.2}$.[37]

(57) b. $[_{\text{vP}}\ x_{[\beta]}$ Maria $[_{\text{VP}}\ \text{t}_x{}'\ [_{\text{V}'}\ \cancel{\text{t}_x}\ \text{t}_{mag}]]$ mag]

$T_{4.1}$: vP optimization

(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

Input: O_1/T_4	F_{pron}	PR.$\mathcal{A}_{ID/FD/SD}$	F_{SE}	PR.$\mathcal{A}_{CD}$	PR.$\mathcal{A}_{ThD}$	F_{SELF}	PR.$\mathcal{A}_{XP}$
O_{11}: [S, S, pr]		*!*		**	**		**
O_{12}: [SE, pr]		*!		*	*	*	*
⇒ O_{13}: [pron]			*			*	

[37] For reasons of space, the candidates are abbreviated in some of the subsequent tableaux.

$T_{4.2}$: vP optimization

(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

Input: O_2/T_4	F_{pron}	$\text{Pr.}\mathcal{A}_{ID/FD/SD}$	F_{SE}	$\text{Pr.}\mathcal{A}_{CD}$	$\text{Pr.}\mathcal{A}_{ThD}$	F_{SELF}	$\text{Pr.}\mathcal{A}_{XP}$
O_{21}: [S, pr]		*!		*	*	*	*
⇒ O_{22}: [pron]			*			*	

As a result, x will have to be realized as pronoun in the end – since the realization matrix cannot be further reduced, [pron] remains optimal in the following optimizations until $x_{[\beta]}$ is checked, and the pronominal form must be selected.

5.4. Derivational Binding in English

Let us now turn to English. One particularity we find in English is that English does not have simple anaphors. As a consequence, we can find examples in which both the complex anaphor and the pronoun are licit, as (58-a) shows; this particular type of optionality cannot be found in languages that exhibit a three-way contrast, like German, Dutch, or Italian, where optionality can only arise between SELF and SE anaphors, or SE anaphors and pronouns ((58-b), (58-c), and (58-d) serve as an illustration; cf. also section 5.3., 5.5., and 5.6., respectively).

(58) a. Max_1 glanced behind himself_1/him_1.

b. Max_1 hasst sich selbst_1/sich_1/*ihn_1.

Max hates himself/SE/him
'Max_1 hates himself_1.'

c. Max_1 hoorde zichzelf_1/zich_1/*hem_1 zingen.

Max heard himself/SE/him sing
'Max_1 heard himself_1 sing.'

d. Max_1 ha dato un'occhiata dietro di sé_1/*dietro se stesso_1/?dietro di

Max has given a glance behind SE/behind himself/behind

lui_1.

him

'Max_1 glanced behind him_1/$himself_1$.'

This restriction is in fact predicted by the present theory, because according to this system only two 'adjacent' candidates can win at the same time. This can be derived as follows: In a single optimization process, only tied constraints can yield two optional candidates (identical constraint profiles cannot arise). However, ties must always involve one FAITH-constraint and one PRINCIPLE $\mathcal{A}$-constraint, because within their group the constraints are universally ordered in dominance relations. Furthermore, the gradience of the PRINCIPLE $\mathcal{A}$-constraints has the effect that the difference between non-adjacent candidates amounts to "two stars", whereas adjacent candidates differ from each other only with respect to "one star". As a result, depending on whether FAITH_{SE} or FAITH_{SELF} is involved in the tie, only the matrix pairs [SELF, SE, pron]/[SE, pron] or [SE, pron]/[pron] can win at the same time.[38]

$T_{5.1}$: Optionality – possibility 1

	Candidates	F_{SE}	F_{SELF}	$\text{PR}.\mathcal{A}_{XD}$
⇒	O_1: [SELF, SE, pron]			**(!)
⇒	O_2: [SE, pron]		*(!)	*
	O_3: [pron]	*!	*	

[38]Since FAITH_{pron} is not violated by either of the three candidates, it does not play a role here.

$T_{5.2}$: Optionality – possibility 2

	Candidates	F_{SE}	PR.$\mathcal{A}_{XD}$	F_{SELF}
	O_1: [SELF, SE, pron]		**!	
⇒	O_2: [SE, pron]		*(!)	*
⇒	O_3: [pron]	*(!)		*

What remains to be investigated is whether optionality between O_1 and O_3 could arise as outcome of two different continuations when [SELF, SE, pron] and [SE, pron] have been optional earlier in the derivation (as in $T_{5.1}$). This presupposes that the derivation which is based on [SELF, SE, pron] as input does not reduce the matrix any further until binding takes place, whereas reduction would have to take place in the parallel derivation based on the input [SE, pron]. However, this is not possible, because the two derivations only differ with respect to the input and the resulting candidates; otherwise they are the same. Hence the following conclusion can be drawn: If [SE, pron] is reduced to [pron] at some stage of the derivation, a PRINCIPLE $\mathcal{A}$-constraint that is higher ranked than FAITH$_{SE}$ must have applied non-vacuously. However, this means that this must also be true for the parallel derivation originally based on the input [SELF, SE, pron], and hence the matrix would have to be reduced here as well.

The question therefore arises as to how we can account for languages like English. One possibility would be to assume that in this case the realization matrix lacks the SE form from the beginning. However, if we assume that the matrix does not yet contain the language-specific forms but rather some universal features that correspond to the SE, SELF, and pronominal form in a more abstract sense, the realization matrices in English would contain a SE form. If [SE, pron] is predicted to be optimal, we then have the following situation: According to MAB, the ideal realization form would be a simple anaphor; however, since there is no lexical item in English that fits this description, the most anaphoric realization must be chosen that is (i) available in English and (ii) compatible with the optimal matrix. Hence, the pronominal form would have to be selected in English, because the available forms comprise the SELF anaphor and the pronoun, but only the latter is compatible with the matrix [SE, pron].

This means that MAB is minimally violable in the sense that it can only select the most anaphoric form that is *available* in a language. Hence, the selection procedure is reminiscent of principles like the *Subset Principle* as we know it from Distributed Morphology.[39]

Consider now the following English examples. As to their binding behaviour, the first sentence is again an example where binding takes place in the minimal θ-domain; in (59-b), the antecedent enters the derivation when the minimal Case domain is reached; in (59-c), the binding relation is established in the minimal subject domain, and in (59-d), the finite and indicative domain have been reached when binding takes place.

(59) *English:*

a. Max$_1$ hates himself$_1$/*him$_1$.

b. Max$_1$ heard himself$_1$/*him$_1$ sing.

c. Max$_1$ glanced behind himself$_1$/him$_1$.

d. Max$_1$ knows that Mary likes him$_1$/*himself$_1$.

Starting with the first sentence, the first derivation step yields the structure in (60-a).

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[39] *Subset Principle*:

The phonological exponent of a Vocabulary item is inserted into a morpheme...if the item matches all or a subset of the grammatical features specified in the terminal morpheme. Insertion does not take place if the Vocabulary item contains features not present in the morpheme. Where several Vocabulary items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen.

(cf. http://www.ling.upenn.edu/∼rnoyer/dm/#spell-out%20of%20f-morphemes, January 24, 2004)

(60) Max_1 hates $\mathrm{himself}_1$/*him_1.

a. [$_{\mathrm{VP}}$ $x_{[\beta]}$ hates t_x]

If it is assumed that, in contrast to German, $\textsc{Faith}_{SELF}$ is higher ranked than $\textsc{Principle}\ \mathcal{A}_{XP}$, only O_1 is optimal in the first competition (cf. T_6), because apart from XP no other domain relevant for binding is reached at this stage.

T_6: VP optimization

(XP reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{pron}	F_{SE}	F_{SELF}	$\mathrm{P}\textsc{r}.\mathcal{A}_{XP}$
⇒	O_1: [SELF, SE, pron]				$**$
	O_2: [SE, pron]			$*!$	$*$
	O_3: [pron]		$*!$	$*$	

(61) b. [$_{\mathrm{vP}}$ $\mathrm{Max}_{[*\beta*]}$ hates [$_{\mathrm{VP}}$ $x_{[\beta]}$ t_{hates} $\cancel{\mathrm{t}_x}$]]

In the next phrase, $x_{[\beta]}$ is already bound, hence the $\textsc{Principle}\ \mathcal{A}_{XD}$ constraints apply vacuously at this stage, and the matrix [SELF, SE, pron] remains optimal (cf. $\mathrm{T}_{6.1}$). Thus, MAB selects the complex anaphor as optimal realization, which is the correct prediction.

$T_{6.1}$: vP optimization

($x_{[\beta]}$ checked: $\textsc{Principle}\ \mathcal{A}_{XD}$ apply vacuously)

	Input: $\mathrm{O}_1/\mathrm{T}_6$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{11}: [SELF, SE, pron]			
	O_{12}: [SE, pron]			$*!$
	O_{13}: [pron]		$*!$	$*$

In example (59-b) (repeated in (62)), XP and the θ-domain have been reached when the first optimization takes place.

(62) Max$_1$ heard himself$_1$/*him$_1$ sing.

a. [$_{\text{vP}}$ $x_{[\beta]}$ sing]

Hence, both PRINCIPLE $\mathcal{A}_{XP}$ and PRINCIPLE $\mathcal{A}_{ThD}$ apply non-vacuously at this stage of the derivation; and since only the complex anaphor should win the competition, both constraints must be ranked below the FAITH-constraints, as T$_7$ illustrates.

T$_7$: vP optimization

(XP/ThD reached – $x_{[\beta]}$ unchecked)

Candidates	F_{pron}	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
⇒ O$_1$: [SELF, SE, pron]				**	**
O$_2$: [SE, pron]			*!	*	*
O$_3$: [pron]		*!	*		

When VP is completed, $x_{[\beta]}$ is still free, and since its θ-role assigner is still accessible, the accessible domain can still be classified as $x_{[\beta]}$'s θ-domain. Hence, the same constraints apply as in the previous competition, and as a result, the matrix [SELF, SE, pron] remains optimal (cf. T$_{7.1}$).

(63) b. [$_{\text{VP}}$ $x_{[\beta]}$ heard [$_{\text{vP}}$ t_x sing]]

T$_{7.1}$: VP optimization

(XP/ThD reached – $x_{[\beta]}$ unchecked)

Input: O$_1$/T$_7$	F_{pron}	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
⇒ O$_{11}$: [SELF, SE, pron]				**	**
O$_{12}$: [SE, pron]			*!	*	*
O$_{13}$: [pron]		*!	*		

In the next phrase, the binder enters the derivation, and thus only the FAITH-constraints are relevant in the competition illustrated in T$_{7.1.1}$. Consequently, the first candidate wins again, and MAB correctly predicts the complex anaphor to be the optimal realization.

(64) c. $[_{\text{vP}}$ Max$_{[*\beta*]}$ heard $[_{\text{VP}}$ $x_{[\beta]}$ t$_{heard}$ $\cancel{[_{\text{vP}}\ \text{t}_x\ \text{sing}]}$]]

$T_{7.1.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

Input: $O_{11}/T_{7.1}$	F_{pron}	F_{SE}	F_{SELF}
⇒ O_{111}: [SELF, SE, pron]			
O_{112}: [SE, pron]			*!
O_{113}: [pron]		*!	*

Let us now turn to (59-c) (repeated in (65)), where optionality between the complex anaphor and the pronominal form arises

(65) Max$_1$ glanced behind himself$_1$/him$_1$.

a. $[_{\text{PP}}$ $x_{[\beta]}$ behind t$_x$]

When the prepositional phrase is completed, XP, the θ-domain *and* the Case domain are reached, because the accessible domain does not only contain x's θ-role assigner but also its Case marker (= P). Hence, PRINCIPLE $\mathcal{A}_{XP}$, PRINCIPLE $\mathcal{A}_{ThD}$, and PRINCIPLE $\mathcal{A}_{CD}$ apply non-vacuously; and if we assume that the latter is tied with FAITH$_{SELF}$, both O_1 and O_2 win at this stage of the derivation (cf. T_8) – and this is crucial in order to get the desired optionality in the end.

T_8: PP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Candidates	F_{pron}	F_{SE}	PR.$\mathcal{A}_{CD}$	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
⇒ O_1: [SELF, SE, pron]			**(!)		**	**
⇒ O_2: [SE, pron]			*	*(!)	*	*
O_3: [pron]		*!		*		

As a consequence, there are two competitions when the next optimization takes place. At this stage, $x_{[\beta]}$ is still free and *behind* is still accessible, so the same constraints are relevant as before. As a result, the first two candidates win again in the competition based on the input [SELF, SE, pron] (cf. $T_{8.1}$), whereas in $T_{8.2}$, which represents the second competition, [SE, pron] is predicted to be optimal.

(66) b. [$_{VP}$ $x_{[\beta]}$ glanced [$_{PP}$ $t_x{}'$ behind $\cancel{t_x}$]]

$T_{8.1}$: VP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Input: O_1/T_8	F_{pron}	F_{SE}	PR.$\mathcal{A}_{CD}$	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
⇒ O_{11}: [SELF, SE, pron]			**(!)		**	**
⇒ O_{12}: [SE, pron]			*	*(!)	*	*
O_{13}: [pron]		*!		*		

$T_{8.2}$: VP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Input: O_2/T_8	F_{pron}	F_{SE}	PR.$\mathcal{A}_{CD}$	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
⇒ O_{21}: [SE, pron]			*	*(!)	*	*
O_{22}: [pron]		*!		*		

In the next phrase, the binder is merged into the derivation, and so the FAITH-constraints determine the outcome of the next optimization procedure. In the competition based on the input [SELF, SE, pron] the maximally specified realization matrix wins again, which means that MAB correctly predicts the complex anaphor to be the optimal realization. In the competition based on the input [SE, pron], a further reduction is also excluded, because this would only be possible if another domain had been reached (– but in this case the constraint would also have reduced the winner in $T_{8.1.1}$). Hence, [SE, pron] is the optimal candidate in $T_{8.1.2}$, and since English does not have a simple anaphor, x is here correctly predicted to be realized pronominally.

(67) c. $[_{\text{vP}}$ Max$_{[*\beta*]}$ glanced $[_{\text{VP}}$ $x_{[\beta]}$ t$_{glanced}$ $\cancel{[_{\text{PP}}\ \text{t}_x{}'\ \text{behind}\ \text{t}_x]}$]]

$T_{8.1.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{11}/T_{8.1}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{111}: [SELF, SE, pron]			
	O_{112}: [SE, pron]			*!
	O_{113}: [pron]		*!	*

$T_{8.2.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{12}/T_{8.1}$ or $O_{21}/T_{7.2}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{211}: [SE, pron]			*
	O_{212}: [pron]		*!	*

Let us finally come to the analysis of sentence (59-d), repeated in (68). The first optimization procedure is illustrated in T_9: No other domain than XP is reached and $x_{[\beta]}$ remains unbound, hence only the FAITH-constraints and PRINCIPLE $\mathcal{A}_{XP}$ apply non-vacuously, and as a result O_1 is the winner of the competition.

(68) Max$_1$ knows that Mary likes him$_1$/*himself$_1$.

a. [$_{VP}$ $x_{[\beta]}$ likes t_x]

T_9: VP optimization

(XP reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{pron}	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{XP}$
⇒	O_1: [SELF, SE, pron]				**
	O_2: [SE, pron]			*!	*
	O_3: [pron]		*!	*	

Before the next phrase, vP, is completed, a subject enters the derivation, and since *likes* is also still accessible when optimization takes place, we can conclude that we have reached the θ-domain, Case domain, subject domain, finite domain, and the indicative domain at this stage.

(69) b. [$_{vP}$ $x_{[\beta]}$ Mary likes [$_{VP}$ $t_x{}'$ t_{likes} $\cancel{t_x}$]]

In the analyses of the previous examples, we have already fixed the order of the first three constraints, so we know that they cannot be ranked above the FAITH-constraints. However, if we want the pronoun to be optimal in the end, [pron] must be the optimal realization matrix to which MAB applies.[40] Thus I assume that PRIN-

[40] As the previous example showed, the pronoun is also the optimal realization form if [SE, pron] wins in the end. However, if binding is so non-local that it takes place even outside the indicative domain, I assume that the pronominal realization is based on the optimal matrix [pron].

CIPLE $\mathcal{A}_{SD}$, PRINCIPLE $\mathcal{A}_{FD}$, and PRINCIPLE $\mathcal{A}_{ID}$ are ranked above FAITH$_{SE}$.[41] On this assumption, the reduced realization matrix [pron] becomes optimal (cf. $T_{9.1}$) – and since this matrix cannot be reduced any further, [pron] also remains optimal in the following optimizations until $x_{[\beta]}$ is checked. At this stage, MAB will finally select the pronoun as optimal realization form, which is again the correct prediction.

$T_{9.1}$: vP optimization

(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

Input: O_1/T_9	F_{pron}	PR.$\mathcal{A}_{ID/FD/SD}$	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{CD}$	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
O_{11}: [S, S, pr]		*!*			**	**	**
O_{12}: [SE, pr]		*!		*	*	*	*
⇒ O_{13}: [pron]			*	*			

5.5. Derivational Binding in Dutch

Consider now the Dutch data in (70). (In analogy to the previous sections, they represent again examples with the following binding behaviour: (a) binding within the minimal θ-domain; (b) binding within the minimal Case domain; (c) binding within the minimal subject domain; (d) binding within the minimal finite/indicative domain.)

(70) *Dutch:*

a. Max$_1$ haat zichzelf$_1$/*zich$_1$/*hem$_1$.
Max hates himself/SE/him
'Max$_1$ hates himself$_1$.'

[41] At this point it might not yet be evident why all three constraints must be higher ranked than FAITH$_{SE}$; this issue will be addressed in more detail in section 5.8. and 5.9.

b. Max_1 hoorde zichzelf_1/zich_1/*hem_1 zingen.
Max heard himself/SE/him sing 'Max_1 heard himself_1 sing.'

c. Max_1 keek achter *zichzelf_1/zich_1/hem_1.
Max looked after himself/SE/him
'Max_1 glanced behind him_1/himself_1.'

d. Max_1 weet dat Mary *zichzelf_1/*zich_1/hem_1 leuk vindt.
Max knows that Mary himself/SE/him nice finds
'Max_1 knows that Mary likes him_1.'

As far as example (70-a) is concerned (repeated in (71)), it differs from German insofar as it only allows the complex anaphor as bound element. This is correctly predicted if PRINCIPLE $\mathcal{A}_{XP}$ is ranked below FAITH$_{SELF}$. On this assumption, O_1 is the sole winner of the first competition (cf. T_{10}), and when the binder is merged into the derivation in the next phrase, [SELF, SE, pron] is predicted to be the optimal realization matrix (cf. $T_{10.1}$). Hence, MAB finally selects the SELF anaphor as optimal realization.

(71) Max_1 haat zichzelf_1/*zich_1/*hem_1.

a. $[_{\text{VP}}\ x_{[\beta]}\ t_x$ haat]

T_{10}: VP optimization
(XP reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{pron}	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{XP}$
⇒	O_1: [SELF, SE, pron]				**
	O_2: [SE, pron]			*!	*
	O_3: [pron]		*!	*	

(72) b. $[_{\text{vP}}$ $\text{Max}_{[*\beta*]}$ $[_{\text{VP}}\ x_{[\beta]}\ [_{\text{V}'}\ \cancel{t_x}\ t_{haat}]]$ haat]

$T_{10.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: O_1/T_{10}	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{11}: [SELF, SE, pron]			
	O_{12}: [SE, pron]			*!
	O_{13}: [pron]		*!	*

In example (70-b) (repeated in (73)), both anaphors can function as bound elements. In order to derive this optionality, PRINCIPLE $\mathcal{A}_{ThD}$ must be tied with FAITH$_{SELF}$: As a result, both O_1 and O_2 win in the first competition (cf. T_{11}), because when optimization takes place not only an XP but also the θ-domain of x has been reached.

(73) Max$_1$ hoorde zichzelf$_1$/zich$_1$/*hem$_1$ zingen.

a. [$_{vP}$ $x_{[\beta]}$ zingen]

T_{11}: vP optimization

(XP/ThD reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{pron}	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
⇒	O_1: [SELF, SE, pron]				**(!)	**
⇒	O_2: [SE, pron]			*(!)	*	*
	O_3: [pron]		*!	*		

When the next phrase is completed, no new domain relevant for binding has been reached, but x's θ-role assigner (*zingen*) is still accessible, hence, both PRINCIPLE $\mathcal{A}_{XD}$ and PRINCIPLE $\mathcal{A}_{ThD}$ apply again non-vacuously. In the competition based on the input [SELF, SE, pron], the first two candidates are therefore again predicted to be optimal (cf. $T_{11.1}$), and in the second competition, the matrix [SE, pron] wins (cf. $T_{11.2}$).

(74) b. $[_{\text{VP}}\ x_{[\beta]}\ [_{\text{vP}}\ \text{t}_x$ zingen] hoorde]

$T_{11.1}$: VP optimization

(XP/ThD reached – $x_{[\beta]}$ unchecked)

Input: O_1/T_{11}	F_{pron}	F_{SE}	F_{SELF}	Pr.$\mathcal{A}_{ThD}$	Pr.$\mathcal{A}_{XP}$
⇒ O_{11}: [SELF, SE, pron]				**(!)	**
⇒ O_{12}: [SE, pron]			*(!)	*	*
O_{13}: [pron]		*!	*		

$T_{11.2}$: VP optimization

(XP/ThD reached – $x_{[\beta]}$ unchecked)

Input: O_2/T_{11}	F_{pron}	F_{SE}	F_{SELF}	Pr.$\mathcal{A}_{ThD}$	Pr.$\mathcal{A}_{XP}$
⇒ O_{21}: [SE, pron]			*	*	*
O_{22}: [pron]		*!	*		

Now the binder enters the derivation, and so the FAITH-constraints alone determine the optimizations at the vP level. In $T_{11.1.1}$, the maximally specified matrix [SELF, SE, pron] wins, and according to $T_{11.1.2}$, [SE, pron] is optimal. Thus, MAB finally correctly predicts that either the SELF or the SE anaphor is the optimal realization of x.

(75) c. $[_{\text{vP}}\ \text{Max}_{[*\beta*]}\ [_{\text{VP}}\ x_{[\beta]}\ \cancel{[_{\text{vP}}\ \text{t}_x\ \text{zingen}]}\ \text{t}_{hoorde}]$ hoorde]

$T_{11.1.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{11}/T_{11.1}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{111}: [SELF, SE, pron]			
	O_{112}: [SE, pron]			*!
	O_{113}: [pron]		*!	*

$T_{11.1.2/11.2.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{12}/T_{11.1}$ or $O_{21}/T_{11.2}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{121}/O_{211}: [SE, pron]			*
	O_{122}/O_{212}: [pron]		*!	*

(76) (repeated from (70-c)) is interesting insofar as it is the first example that exhibits optionality between the pronominal and the simple anaphoric form. (Neither did this occur in German nor in English, for obvious reasons.)[42]

(76) Max$_1$ keek achter zich$_1$/*zichzelf$_1$/hem$_1$.

a. [$_{PP}$ $x_{[\beta]}$ achter t_x]

This type of optionality can be captured if PRINCIPLE $\mathcal{A}_{CD}$ and FAITH$_{SE}$ are tied: When the prepositional phrase is completed, the domains XP, ThD, and CD are reached, which means that in addition to PRINCIPLE $\mathcal{A}_{XP}$ and PRINCIPLE $\mathcal{A}_{ThD}$, PRINCIPLE $\mathcal{A}_{CD}$ is now involved in the competition. On the assumption that the latter is tied with FAITH$_{SE}$, optionality between O_2 and O_3 is predicted (cf. T_{12}).

[42] Recall that some native speakers prefer the weak pronoun instead of *hem* in (76).

T_{12}: PP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Candidates	F_{pron}	F_{SE} ¦ Pr.$\mathcal{A}_{CD}$	F_{SELF} ¦ Pr.$\mathcal{A}_{ThD}$	Pr.$\mathcal{A}_{XP}$
O_1: [SELF, SE, pron]		¦ **!	¦ **	**
⇒ O_2: [SE, pron]		¦ *(!)	* ¦ *	*
⇒ O_3: [pron]		*(!) ¦	* ¦	

As a result, there are two optimization procedures when the next phrase boundary, VP, is reached.

(77) b. [$_{\text{VP}}$ $x_{[\beta]}$ [$_{\text{PP}}$ t_x achter $\cancel{t_x}$] keek]

The competition based on the matrix [SE, pron] yields again two optimal outputs (cf. $T_{12.1}$), whereas in the competition based on the input [pron] a further reduction is not possible and this matrix remains optimal (cf. $T_{12.2}$).

$T_{12.1}$: VP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Input: O_2/T_{12}	F_{pron}	F_{SE} ¦ Pr.$\mathcal{A}_{CD}$	F_{SELF} ¦ Pr.$\mathcal{A}_{ThD}$	Pr.$\mathcal{A}_{XP}$
⇒ O_{21}: [SE, pron]		¦ *(!)	* ¦ *	*
⇒ O_{22}: [pron]		*(!) ¦	* ¦	

$T_{12.2}$: VP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Input: O_3/T_{12}	F_{pron}	F_{SE} ¦ Pr.$\mathcal{A}_{CD}$	F_{SELF} ¦ Pr.$\mathcal{A}_{ThD}$	Pr.$\mathcal{A}_{XP}$
⇒ O_{31}: [pron]		* ¦	* ¦	

In the next phrase, the binder is merged into the derivation, hence the FAITH-constraints predict that [SE, pron] is optimal in $T_{12.1.1}$, and [pron] wins in $T_{12.1.2/12.2.1}$.

(78) c. [$_{vP}$ Max$_{[*\beta*]}$ [$_{VP}$ $x_{[\beta]}$ $\cancel{[_{PP}\ t_x{}'\ \text{achter}\ t_x]}$ t_{keek}] keek]

According to MAB, the optimal choice is therefore the SE anaphor in the former derivation, and the pronoun in the latter.

$T_{12.1.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{21}/T_{12.1}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{211}: [SE, pron]			*
	O_{212}: [pron]		*!	*

$T_{12.1.2/12.2.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{22}/T_{11.1}$ or $O_{31}/T_{11.2}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{221}/O_{311}: [pron]		*	*

(70-d) (repeated in (79)) patterns again like its German and English counterparts: In sentences in which binding takes place outside the Case domain, x must be realized as a pronoun, and this is captured by ranking PRINCIPLE $\mathcal{A}_{SD}$ (and hence also PRINCIPLE $\mathcal{A}_{FD}$ and PRINCIPLE $\mathcal{A}_{ID}$) above FAITH$_{SE}$ (cf. $T_{13.1}$).[43]

(79) Max$_1$ weet dat Mary hem$_1$/*zich$_1$/*zichzelf$_1$ leuk vindt.

a. [$_{VP}$ $x_{[\beta]}$ t_x leuk vindt]

When the first optimization process takes place (cf. T_{13}), only PRINCIPLE $\mathcal{A}_{XP}$ and the FAITH-constraints apply non-vacuously, which means that O_1 serves as input for the next competition.

[43]I treat the verbal predicate *leuk vindt* like a simple verb and ignore its inherent syntactic structure.

T_{13}: VP optimization

(XP reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{pron}	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{XP}$
⇒	O_1: [SELF, SE, pron]				**
	O_2: [SE, pron]			*!	*
	O_3: [pron]		*!	*	

When vP is completed, we reach at once all domains relevant for binding, which means that all PRINCIPLE $\mathcal{A}$-constraints are involved in the next competition. According to the ranking assumed above, [pron] is therefore predicted to be the optimal realization matrix (cf. $T_{13.1}$).

(80) b. $[_{\text{vP}}\ x_{[\beta]}$ Mary $[_{\text{VP}}\ t_x{}'\ \cancel{t_x}\ t_{leuk\ vindt}]$ leuk vindt]

$T_{13.1}$: vP optimization

(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

Input: O_1/T_{13}	F_{pron}	PR.$\mathcal{A}_{ID/FD/SD}$	F_{SE}	PR.$\mathcal{A}_{CD}$	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
O_{11}: [S, S, pr]		*!*		**		**	**
O_{12}: [SE, pr]		*!		*	*	*	*
⇒ O_{13}: [pron]			*		*		

Since [pron] serves now as input for the next optimization procedure, it remains the only candidate, because the matrix cannot be further reduced. Hence, [pron] remains optimal in the following optimizations, and when $x_{[\beta]}$ is checked, MAB correctly predicts that x must be realized as a pronoun.

5.6. Derivational Binding in Italian

Last but not least, let us take a look at the corresponding Italian sentences. (Recall that in (81-a) the binding relation is established in the minimal θ-domain, in (81-b) in the minimal Case domain, in (81-c) in the minimal subject domain, and in (81-d) in the minimal finite/indicative domain.)

(81) *Italian:*

a. Max_1 si_1 odia/ odia se stesso_1/ *lo_1 odia.
'Max_1 hates $\mathrm{himself}_1$.'

b. Max_1 ha udito ?se stesso_1/ si_1 è udito/ *lo_1 ha udito cantare alla radio.
'Max_1 heard $\mathrm{himself}_1$ sing on the radio.'

c. Max_1 ha dato un'occhiata dietro di $\mathrm{sé}_1$/*dietro se stesso_1/?dietro di lui_1.
'Max_1 glanced behind him_1/$\mathrm{himself}_1$.'

d. Max_1 sa che Maria lo_1 ama /*si_1 ama/ ama *se stesso_1.
'Max_1 knows that Mary likes him_1.'

As observed before, Italian patterns partly like German and partly like Dutch. In example (81-a) (repeated in (82)), where the binding relation is very local, Italian allows both types of anaphors, like its German counterpart (cf. (46-a)). This result is achieved if $\text{F}\textsc{aith}_{SELF}$ and $\text{P}\textsc{rinciple}$ $\mathcal{A}_{XP}$ are tied; on this assumption both O_1 and O_2 win in the first optimization process (cf. T_{14}). Hence, there are two competitions after the completion of the next phrase, one based on the input [SELF, SE, pron] and the other one on the input [SE, pron]. Since at this stage the binder has already been merged into the derivation, the $\text{F}\textsc{aith}$-constraints determine the outcome of the competitions, which means that no reduction of the matrices takes place, and therefore MAB selects the complex anaphor as optimal realization according to $T_{14.1}$ and the simple anaphor in the case of $T_{14.2}$.

(82) Max_1 si_1 odia/ odia se stesso_1/ *lo_1 odia.

a. $[_{\mathrm{VP}}\ x_{[\beta]}$ odia $\mathrm{t}_x]$

T_{14}: VP optimization

(XP reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{pron}	F_{SE}	F_{SELF}	$\text{Pr.}\mathcal{A}_{XP}$
⇒	O_1: [SELF, SE, pron]				**(!)
⇒	O_2: [SE, pron]			*(!)	*
	O_3: [pron]		*!	*	

(83) b. $[_{vP}$ Max$_{[*\beta*]}$ odia $[_{VP}$ $x_{[\beta]}$ t_{odia} $\cancel{t_x}]]$

$T_{14.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: O_1/T_{14}	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{11}: [SELF, SE, pron]			
	O_{12}: [SE, pron]			*!
	O_{13}: [pron]		*!	*

$T_{14.2}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: O_2/T_{14}	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{21}: [SE, pron]			*
	O_{22}: [pron]		*!	*

(84) (repeated from (81-b)) is an Italian ECM-construction. As in German and Dutch, both the SELF and the SE anaphor is licit in this context, which is correctly predicted if FAITH$_{SELF}$ and PRINCIPLE $\mathcal{A}_{ThD}$ are tied.[44] As a result, both O_1 and O_2

[44]In fact, one informant of mine preferred the complex anaphor and ruled out the simple anaphor in this example. This is unexpected against the background that *si* is licit in (81-a), where the

are optimal when the embedded vP is optimized, which corresponds to x's θ-domain (cf. T_{15}).

(84) Max$_1$ ha udito ?se stesso$_1$/ si$_1$ è udito/ *lo$_1$ ha udito cantare (alla radio).

a. $[_{\mathrm{vP}}\ x_{[\beta]}$ cantare$]$

T_{15}: vP optimization

(XP/ThD reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{pron}	F_{SE}	PR.$\mathcal{A}_{ThD}$	F_{SELF}	PR.$\mathcal{A}_{XP}$
⇒	O_1: [SELF, SE, pron]			**(!)		**
⇒	O_2: [SE, pron]			*	*(!)	*
	O_3: [pron]		*!		*	

When VP is completed, all parts of the derivation are still accessible, but no further domain is reached; hence, the same constraints apply non-vacuously as before, which yields again two optimal outputs in $T_{15.1}$ and [SE, pron] as optimal matrix in $T_{15.2}$.

(85) b. $[_{\mathrm{VP}}\ x_{[\beta]}$ udito $[_{\mathrm{vP}}\ t_x$ cantare$]]$

$T_{15.1}$: VP optimization

(XP/ThD reached – $x_{[\beta]}$ unchecked)

	Input: O_1/T_{15}	F_{pron}	F_{SE}	PR.$\mathcal{A}_{ThD}$	F_{SELF}	PR.$\mathcal{A}_{XP}$
⇒	O_{11}: [SELF, SE, pron]			**(!)		**
⇒	O_{12}: [SE, pron]			*	*(!)	*
	O_{13}: [pron]		*!		*	

binding relation is even more local.

$T_{15.2}$: VP optimization

(XP/ThD reached – $x_{[\beta]}$ unchecked)

Input: O_2/T_{15}	F_{pron}	F_{SE}	$\text{Pr}.\mathcal{A}_{ThD}$	F_{SELF}	$\text{Pr}.\mathcal{A}_{XP}$
⇒ O_{21}: [SE, pron]			*	*	*
O_{22}: [pron]		*!		*	

In the next phrase, the binder enters the derivation. Thus, the FAITH-constraints determine the competitions at this stage and predict the matrices [SELF, SE, pron] and [SE, pron] to be optimal (cf. $T_{15.1.1}$ and $T_{15.1.2/15.2.1}$ respectively). As a result, MAB selects the two anaphors as optimal realizations.

(86) c. $[_{\text{vP}}$ Max$_{[*\beta*]}$ udito $[_{\text{VP}}$ $x_{[\beta]}$ t_{udito} $\cancel{[_{\text{vP}}\ t_x\ \text{cantare}]}$$]]$

$T_{15.1.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

Input: $O_{11}/T_{15.1}$	F_{pron}	F_{SE}	F_{SELF}
⇒ O_{111}: [SELF, SE, pron]			
O_{112}: [SE, pron]			*!
O_{113}: [pron]		*!	*

$T_{15.1.2/15.2.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

Input: $O_{12}/T_{15.1}$ or $O_{21}/T_{10.2}$	F_{pron}	F_{SE}	F_{SELF}
⇒ O_{121}/O_{211}: [SE, pron]			*
O_{122}/O_{212}: [pron]		*!	*

In the following example (repeated from (81-c)), Italian patterns like Dutch since it only excludes the complex anaphor in sentences like these. Hence, as has been shown for Dutch in T_{12}, FAITH$_{SE}$ must be tied with PRINCIPLE $\mathcal{A}_{CD}$. On this assumption,

O_2 and O_3 are both optimal in the competition illustrated in T_{16}.

(87) Max$_1$ ha dato un'occhiata dietro di sé$_1$/*dietro se stesso$_1$/?dietro di lui$_1$.

a. $[_{PP}\ x_{[\beta]}$ dietro di $t_x]$

T_{16}: PP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Candidates	F_{pron}	F_{SE}	$PR.\mathcal{A}_{CD}$	$PR.\mathcal{A}_{ThD}$	F_{SELF}	$PR.\mathcal{A}_{XP}$
O_1: [SELF, SE, pron]			**!	**		**
⇒ O_2: [SE, pron]			*(!)	*	*	*
⇒ O_3: [pron]		*(!)			*	

The optimization procedure after the completion of VP yields the same results, since no further domain relevant for binding is reached (cf. $T_{16.1}$ and $T_{16.2}$).

(88) b. $[_{VP}\ x_{[\beta]}$ un'occhiata $[_{V'}$ dato $[_{PP}\ t_x'$ dietro di $\cancel{t_x}]]]$

$T_{16.1}$: VP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Input: O_2/T_{16}	F_{pron}	F_{SE}	$PR.\mathcal{A}_{CD}$	$PR.\mathcal{A}_{ThD}$	F_{SELF}	$PR.\mathcal{A}_{XP}$
⇒ O_{21}: [SE, pron]			*(!)	*	*	*
⇒ O_{22}: [pron]		*(!)			*	

$T_{16.2}$: VP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Input: O_3/T_{16}	F_{pron}	F_{SE}	$PR.\mathcal{A}_{CD}$	$PR.\mathcal{A}_{ThD}$	F_{SELF}	$PR.\mathcal{A}_{XP}$
⇒ O_{31}: [pron]		*			*	

In the next phrase, the binder is merged into the derivation, hence only the FAITH-constraints apply non-vacuously in the subsequent competitions, which means that a further reduction of the input matrices is barred. In $T_{16.1.1}$, this means that [SE, pron] wins and MAB selects the SE anaphor as optimal realization; in $T_{16.1.2/16.2.1}$ it is self-evident that [pron] is optimal because there are no competing candidates, and thus a prononimal realization is also licit.

(89) c. $[_{\text{vP}}$ Max$_{[*\beta*]}$ dato $[_{\text{VP}}$ $x_{[\beta]}$ un'occhiata t_{dato} $[_{\text{PP}}$ $t_x{}'$ dietro di $\cancel{t_x}]]$

$T_{16.1.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{21}/T_{16.1}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{211}: [SE, pron]			*
	O_{212}: [pron]		*!	*

$T_{16.1.2/16.2.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{22}/T_{16.1}$ or $O_{31}/T_{16.2}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{221}/O_{311}: [pron]		*	*

The last Italian example (repeated from (81-d)), illustrates binding into a finite embedded clause. Like German, English, and Dutch, Italian exhibits pronominal binding in this case, which is correctly predicted if PRINCIPLE $\mathcal{A}_{SD}$ (and therefore also PRINCIPLE $\mathcal{A}_{FD}$ and PRINCIPLE $\mathcal{A}_{ID}$) are ranked above FAITH$_{SE}$. When the embedded VP is optimized, these constraints are not involved yet, and O_1 and O_2 are predicted to be optimal (cf. T_{17}). However, when the next phrase (= vP) is completed the accessible domain corresponds to the subject, finite, and indicative domain, and all PRINCIPLE $\mathcal{A}$-constraints apply non-vacuously. As a result, [pron] is the winner of all subsequent optimizations (cf., for example, $T_{17.1}$ and $T_{17.2}$) and x will finally have to be realized as pronoun.

(90) Max$_1$ sa che Maria lo$_1$ ama /*si$_1$ ama/ ama *se stesso$_1$.

a. $[_{\mathrm{VP}}\ x_{[\beta]}$ ama $\mathrm{t}_x]$

T_{17}: VP optimization

(XP reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{pron}	F_{SE}	F_{SELF}	$\text{PR}.\mathcal{A}_{XP}$
⇒	O_1: [SELF, SE, pron]				**(!)
⇒	O_2: [SE, pron]			*(!)	*
	O_3: [pron]		*!	*	

(91) b. $[_{\mathrm{vP}}\ x_{[\beta]}$ Maria ama $[_{\mathrm{VP}}\ \mathrm{t}_x{}'\ \mathrm{t}_{ama}\ \cancel{\mathrm{t}_x}]]$

$T_{17.1}$: vP optimization

(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

Input: O_1/T_{17}	F_{pron}	$\text{PR}.\mathcal{A}_{ID/FD/SD}$	F_{SE}	$\text{PR}.\mathcal{A}_{CD}$	$\text{PR}.\mathcal{A}_{ThD}$	F_{SELF}	$\text{PR}.\mathcal{A}_{XP}$
O_{11}: [S, S, pr]		*!*		**	**		**
O_{12}: [SE, pr]		*!		*	*	*	*
⇒ O_{13}: [pron]			*			*	

$T_{17.2}$: vP optimization

(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

Input: O_2/T_{17}	F_{pron}	$\text{PR}.\mathcal{A}_{ID/FD/SD}$	F_{SE}	$\text{PR}.\mathcal{A}_{CD}$	$\text{PR}.\mathcal{A}_{ThD}$	F_{SELF}	$\text{PR}.\mathcal{A}_{XP}$
O_{21}: [S, pr]		*!		*	*	*	*
⇒ O_{22}: [pron]			*			*	

5.7. Summary: Crosslinguistic Variation I

In the previous sections, the four languages German, English, Dutch, and Italian have been analysed in detail. This section provides an overview of their main differences and common patterns.

In a nutshell, the following observations could be made. If binding takes place within the θ-domain (as in sentences of the type *Max*$_1$ *hates* x_1), the bound element can be realized as SELF anaphor in all languages. This is correctly predicted if FAITH$_{SELF}$ is not ranked below PRINCIPLE $\mathcal{A}_{XP}$. However, some languages allow in addition the SE anaphor (cf. German and Italian), while others do not (cf. Dutch). In order to account for the former type of language, the ranking FAITH$_{SELF}$ $\circ$ PRINCIPLE $\mathcal{A}_{XP}$ must be assumed, whereas in languages like Dutch, FAITH$_{SELF}$ must be ranked above PRINCIPLE $\mathcal{A}_{XP}$.

If the binding relation is slightly less local and occurs within the Case domain, the crucial constraint which determines the outcome of the competition is PRINCIPLE $\mathcal{A}_{ThD}$. If it is tied with FAITH$_{SELF}$, both types of anaphors are licit in this context (cf. ECM-constructions in German, Dutch, and Italian). In languages like English where only the complex anaphor is licit (as in *Max*$_1$ *heard* x_1 *sing*), FAITH$_{SELF}$ must be higher ranked than PRINCIPLE $\mathcal{A}_{ThD}$.

In sentences like *Max*$_1$ *glanced behind* x_1, x is bound in its subject domain; hence, the ranking of PRINCIPLE $\mathcal{A}_{CD}$ is decisive. In German, where only the SE anaphor is licit, it must be ranked below FAITH$_{SE}$ and above FAITH$_{SELF}$. If FAITH$_{SE}$ is tied with PRINCIPLE $\mathcal{A}_{CD}$, both anaphors are predicted to be optimal (cf. English, on the assumption that the pronominal realization in examples like these is based on the optimal matrix [SE, pron]). In languages that pattern like Dutch and Italian in allowing a SE anaphor or a pronoun, PRINCIPLE $\mathcal{A}_{CD}$ must be tied with FAITH$_{SE}$.

Finally, none of the languages discussed so far exhibited long-distance anaphora; this behaviour is captured if the three constraints PRINCIPLE $\mathcal{A}_{SD}$, PRINCIPLE $\mathcal{A}_{FD}$, and PRINCIPLE $\mathcal{A}_{ID}$ are ranked above FAITH$_{SE}$. All in all, this yields the following constraint orders for German, English, Dutch, and Italian. Once more, it can be seen immediately that they only differ with respect to different interactions of the two underlying universal constraint subhierarchies, which provide a general frame for possible rankings.

(92) *German ranking:*

$\textsc{Faith}_{pron} \gg \textsc{Pr}.\mathcal{A}_{ID} \gg \textsc{Pr}.\mathcal{A}_{FD} \gg \textsc{Pr}.\mathcal{A}_{SD} \gg \textsc{Faith}_{SE} \gg \textsc{Pr}.\mathcal{A}_{CD} \gg \textsc{Faith}_{SELF} \circ (\textsc{Pr}.\mathcal{A}_{ThD} \gg \textsc{Pr}.\mathcal{A}_{XP})$

(93) *English ranking:*

$\textsc{Faith}_{pron} \gg \textsc{Pr}.\mathcal{A}_{ID} \gg \textsc{Pr}.\mathcal{A}_{FD} \gg \textsc{Pr}.\mathcal{A}_{SD} \gg \textsc{Faith}_{SE} \gg \textsc{Pr}.\mathcal{A}_{CD} \circ \textsc{Faith}_{SELF} \gg \textsc{Pr}.\mathcal{A}_{ThD} \gg \textsc{Pr}.\mathcal{A}_{XP}$

(94) *Dutch ranking:*

$\textsc{Faith}_{pron} \gg \textsc{Pr}.\mathcal{A}_{ID} \gg \textsc{Pr}.\mathcal{A}_{FD} \gg \textsc{Pr}.\mathcal{A}_{SD} \gg \textsc{Faith}_{SE} \circ \textsc{Pr}.\mathcal{A}_{CD} \gg \textsc{Faith}_{SELF} \circ \textsc{Pr}.\mathcal{A}_{ThD} \gg \textsc{Pr}.\mathcal{A}_{XP}$

(95) *Italian ranking:*

$\textsc{Faith}_{pron} \gg \textsc{Pr}.\mathcal{A}_{ID} \gg \textsc{Pr}.\mathcal{A}_{FD} \gg \textsc{Pr}.\mathcal{A}_{SD} \gg \textsc{Faith}_{SE} \circ \textsc{Pr}.\mathcal{A}_{CD} \gg \textsc{Faith}_{SELF} \circ (\textsc{Pr}.\mathcal{A}_{ThD} \gg \textsc{Pr}.\mathcal{A}_{XP})$

T_{18}: General predictions[45]

ranking					*optimal realization if binding relation within XD+1*
FAITH$_{SE}$	$\gg$	FAITH$_{SELF}$	$\gg$	**PR.**$\mathcal{A}_{XD}$	SELF anaphor
FAITH$_{SE}$	$\gg$	FAITH$_{SELF}$	$\circ$	**PR.**$\mathcal{A}_{XD}$	SELF/SE anaphor
FAITH$_{SE}$	$\gg$	**PR.**$\mathcal{A}_{XD}$	$\gg$	FAITH$_{SELF}$	SE anaphor
FAITH$_{SE}$	$\circ$	**PR.**$\mathcal{A}_{XD}$	$\gg$	FAITH$_{SELF}$	SE anaphor/pronoun
PR.$\mathcal{A}_{XD}$	$\gg$	FAITH$_{SE}$	$\gg$	FAITH$_{SELF}$	pronoun

Ideally, a theory of binding does not only account for the binding patterns of a particular language but also captures generalizations that seem to hold universally. For example, it can be observed that complex anaphors surface only if the binding relation is relatively local, and the less local the binding relation gets, the more probable it is that first complex anaphors and later also simple anaphors are ruled out, and only pronouns are licit.

These generalizations are captured by the present approach in the following way: If we deal with a local binding relationship, only few, low-ranked PRINCIPLE $\mathcal{A}$-constraints can apply non-vacuously before checking takes place; and since only these constraints favour a reduction of the realization matrix, it is very likely that the candidate with the full specification [SELF, SE, pron] is optimal and the SELF anaphor is finally selected as optimal realization. On the other hand, if the binding relation is less local, more PRINCIPLE $\mathcal{A}$-constraints apply non-vacuously, because x enters bigger and bigger domains unchecked; and since the constraints referring

[45]Recall that if binding takes place within domain Y, the crucial PRINCIPLE $\mathcal{A}$-constraint that determines the outcome of the competition is the one which refers to the next smaller domain relevant for binding – hence the notation "XD+1" in T_{18}.

to these domains are higher ranked, it becomes more and more likely that the specification matrix of x is gradually reduced in the course of the derivation and a less anaphoric form is selected as optimal realization. (In the end, only [pron] might be left, and in this case MAB can only choose the pronominal form as optimal form for x.)

Furthermore, it is predicted that if x is realized as SELF/SE anaphor if binding takes place in domain XD, these realizations are also licit if binding is more local, because an anaphoric specification can only win if the corresponding matrix has been in the candidate set – and if it had not won the competitions before, only reduced matrices could have served as competitors. On the other hand, if x is realized as pronoun, pronominal binding is also possible if binding occurs in a bigger domain, because the reduced matrix [pron] will serve as input for the subsequent competitions, which inevitably yields a pronominal winner.

This shows that the theory developed here is both flexible enough to account for crosslinguistic variation and optionality and restrictive enough to capture universal binding properties and restrict possible binding scenarios (cf. also chapter 2, section 5.5.).

5.8. Long-Distance Anaphora (LDA) in Icelandic

So far, there has been no need to distinguish between the three highest-ranked PRINCIPLE $\mathcal{A}$-constraints, PRINCIPLE $\mathcal{A}_{SD}$, PRINCIPLE $\mathcal{A}_{FD}$, and PRINCIPLE $\mathcal{A}_{ID}$. However, the ranking of these constraints is crucial if we want to capture the different behaviour of languages that exhibit long-distance anaphora. Let us start once more with the Icelandic examples in (96).

(96) *Icelandic:*

a. Jón$_1$ skipaði Pétri$_2$ PRO$_2$ að raka sig$_1$/??sjálfan sig$_1$/hann$_1$ á
John ordered Peter to shave$_{inf}$ SE/himself/him on
hverjum degi.
every day
'John$_1$ ordered Peter to shave him$_1$ every day.'

b. Jón$_1$ segir að Pétur raki sig$_1$/??sjálfan sig$_1$/hann$_1$ á hverjum
John says that Peter shave$_{sub}$ SE/himself/him on every
degi.
day
'John$_1$ says that Peter shaves him$_1$ every day.'

c. Jón$_1$ veit að Pétur rakar ??sig$_1$/*sjálfan sig$_1$/hann$_1$ á
John knows that Peter shave$_{ind}$ SE/himself/him on
hverjum degi.
every day
'John$_1$ knows that Peter shaves him$_1$ every day.'

In a sentence like (96-a) (repeated in (97)), where the binding relation is not established unless the finite domain is reached, optimization occurs relatively frequently until x is finally checked. In the following discussion, I ignore these ealier parts of the derivation, since the goal of this section is to investigate what determines long-distance binding; assume therefore that we have already reached the stage when the minimal subject domain (= embedded vP) is reached.

(97) Jón$_1$ skipaði Pétri$_2$ PRO$_2$ að raka$_{inf}$ sig$_1$/??sjálfan sig$_1$/hann$_1$ á hverjum degi.

a. $[_{\mathrm{vP}}\ x_{[\beta]}$ PRO raka $[_{\mathrm{VP}}\ \mathrm{t}_x{}'\ \mathrm{t}_{raka}\ \cancel{\mathrm{t}_x}]]$

(97-a) illustrates the point in the derivation when the embedded vP is optimized. At this stage, the material in the accessible domain allows us to classify this phrase as x's θ-domain, Case domain, and subject domain; and as x remains unchecked, the following four PRINCIPLE $\mathcal{A}$-constraints apply non-vacuously: PRINCIPLE $\mathcal{A}_{XP}$, PRINCIPLE $\mathcal{A}_{ThD}$, PRINCIPLE $\mathcal{A}_{CD}$, and PRINCIPLE $\mathcal{A}_{SD}$. Since we know that the latter outranks the first three constraints (due to the underlying universal sub-hierarchy), its ranking will determine the optimal realization of x. (Note that the remaining optimizations until the binder enters the derivation in (98-b) can be neglected because no further domain relevant for binding is reached.) If PRINCIPLE $\mathcal{A}_{SD}$ is ranked above FAITH$_{SE}$, [pron] is the optimal matrix, if it is ranked below FAITH$_{SE}$, [SE, pron] is optimal, and if PRINCIPLE $\mathcal{A}_{SD}$ and FAITH$_{SE}$ are tied, both matrices win, and x might therefore be realized as pronoun or SE anaphor. The latter option is chosen in Icelandic (cf. T_{19}-$T_{19.2}$).[46,47]

[46]As mentioned in chapter 2, another (possibly older) variant of Icelandic seems to favour the SE anaphor in this context, which is predicted by the ranking FAITH$_{SE}$ $\gg$ PR.$\mathcal{A}_{SD}$.

[47]For reasons of space, I combine the lower-ranked constraints PR.$\mathcal{A}_{CD}$, PR.$\mathcal{A}_{ThD}$, and PR.$\mathcal{A}_{XP}$ in the subsequent tableaux.

Although I do not want to present a detailed analysis of local binding relations in Icelandic, the following Icelandic data provide conclusive information as regards the ranking of the lower-ranked constraints. (The data are again from Gunnar Hrafn Hrafnbjargarson (p.c.).)

(i) a. Max$_1$ hatar sig$_1$/sjálfan sig$_1$/*hann$_1$.
Max hates SE/himself/him
'Max$_1$ hates himself$_1$.'

b. Max$_1$ heyrði sig$_1$/sjálfan sig$_1$/*hann$_1$ syngja.
Max heard SE/himself/him sing
'Max$_1$ heard himself$_1$ sing.'

c. Max$_1$ leit aftur fyrir sig$_1$/sjálfan sig$_1$/*hann$_1$.
Max glanced behind SE/himself/him
'Max$_1$ glanced behind himself$_1$/him$_1$.'

T_{19}: vP optimization

(XP/ThD/CD/SD reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{pron}	F_{SE}	$\text{Pr}.\mathcal{A}_{SD}$	$\text{Pr}.\mathcal{A}_{CD/ThD/XP}$	F_{SELF}
	O_1: [SELF, SE, pron]			$**!$	$**$	
⇒	O_2: [SE, pron]			$*(!)$	$*$	$*$
⇒	O_3: [pron]		$*(!)$			$*$

(98) b. [$_{\text{vP}}$ Jón$_{[*\beta*]}$ skipaði [$_{\text{VP}}$ $x_{[\beta]}$ Pétri$_2$ t$_{skip.}$ ~~[$_{\text{CP}}$ ...]~~]]

$T_{19.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: O_1/T_{19}	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{21}: [SE, pron]			$*$
	O_{22}: [pron]		$*!$	$*$

In all three examples, which illustrate binding within the θ-, Case, and subject domain, respectively, both types of anaphors are licit while the pronoun is excluded. (Note that (i-a) patterns like German and Italian, (i-b) like German, Italian, and Dutch, and (i-c) basically like English in allowing the complex anaphor and the next less anaphoric element.) As can be read off T_{18}, this result is predicted if the constraints $\text{Pr}.\mathcal{A}_{XP}$, $\text{Pr}.\mathcal{A}_{ThD}$, and $\text{Pr}.\mathcal{A}_{CD}$ are tied with Faith_{SELF}. Hence, we get the ranking in (ii-a) for Icelandic, which is an abbreviation for the four underlying constraint orders in (ii-b).

(ii) a. $(\text{Pr}.\mathcal{A}_{CD} \gg \text{Pr}.\mathcal{A}_{ThD} \gg \text{Pr}.\mathcal{A}_{XP}) \circ \text{Faith}_{SELF}$

b. (i) $\text{Pr}.\mathcal{A}_{CD} \gg \text{Pr}.\mathcal{A}_{ThD} \gg \text{Pr}.\mathcal{A}_{XP} \gg \text{Faith}_{SELF}$

(ii) $\text{Pr}.\mathcal{A}_{CD} \gg \text{Pr}.\mathcal{A}_{ThD} \gg \text{Faith}_{SELF} \gg \text{Pr}.\mathcal{A}_{XP}$

(iii) $\text{Pr}.\mathcal{A}_{CD} \gg \text{Faith}_{SELF} \gg \text{Pr}.\mathcal{A}_{ThD} \gg \text{Pr}.\mathcal{A}_{XP}$

(iv) $\text{Faith}_{SELF} \gg \text{Pr}.\mathcal{A}_{CD} \gg \text{Pr}.\mathcal{A}_{ThD} \gg \text{Pr}.\mathcal{A}_{XP}$

$T_{19.2}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

Input: O_2/T_{19}	F_{pron}	F_{SE}	F_{SELF}
⇒ O_{31}: [pron]		*	*

The next example (repeated from (96-b)) involves binding into a subjunctive complement clause. This means that at the stage when the finite domain is reached (= embedded vP), x is still free (cf. (99-a)). As a result, all PRINCIPLE $\mathcal{A}$-constraints except PRINCIPLE $\mathcal{A}_{ID}$ apply non-vacuously when this phrase is optimized. Hence, the highest PRINCIPLE $\mathcal{A}$-constraint that is involved in this competition is PRINCIPLE $\mathcal{A}_{FD}$, and if it is tied with FAITH$_{SE}$, both O_2 and O_3 are predicted to be optimal (cf. T_{20}).

(99) Jón$_1$ segir að Pétur raki$_{sub}$ sig$_1$/??sjálfan sig$_1$/hann$_1$ á hverjum degi.

a. [$_{vP}$ $x_{[\beta]}$ Pétur raki [$_{VP}$ $t_x{}'$ t_{raki} $\cancel{t_x}$]]

T_{20}: vP optimization

(XP/ThD/CD/SD/FD reached – $x_{[\beta]}$ unchecked)

Candidates	F_{pron}	PR.$\mathcal{A}_{FD}$	F_{SE}	PR.$\mathcal{A}_{SD}$	PR.$\mathcal{A}_{CD/ThD/XP}$	F_{SELF}
O_1: [SELF, SE, pr]		**		**	**	
⇒ O_2: [SE, pron]		*(!)		*	*	*
⇒ O_3: [pron]			*(!)			*

During the next optimization processes (TP, CP, VP), the outcome remains unchanged: Since no new domain is reached, no higher-ranked PRINCIPLE $\mathcal{A}$-constraint gets involved and might force a further reduction of the matrix.[48] Hence, the matri-

[48]Note that even if the new accessible domains no longer qualify as θ-, Case, subject, or finite domain (for example, the matrix VP), the result is not blurred, because as long as no new higher-

ces [SE, pron] and [pron] function as input when the matrix vP is optimized (cf. $T_{20.1}$ and $T_{20.2}$ respectively), and since x is checked at this point in the derivation, [SELF, pron] wins in the former competition and [pron] in the latter. Thus, according to MAB both the SE anaphor and the pronoun turn out to be optimal realizations in this example, which is the desired result.

(100) b. $[_{\text{vP}}$ Jón$_{[*\beta*]}$ segir $[_{\text{VP}}$ $x_{[\beta]}$ t_{segir} $\cancel{[_{\text{CP}} \ldots]}$$]]$

$T_{20.1}$: vP optimization

($x_{[\beta]}$ checked: Principle $\mathcal{A}_{XD}$ *apply vacuously)*

Input: O_2/T_{20}	F_{pron}	F_{SE}	F_{SELF}
⇒ O_{21}: [SE, pron]			*
O_{22}: [pron]		*!	*

$T_{20.2}$: vP optimization

($x_{[\beta]}$ checked: Principle $\mathcal{A}_{XD}$ *apply vacuously)*

Input: O_3/T_{19}	F_{pron}	F_{SE}	F_{SELF}
⇒ O_{31}: [pron]		*	*

(101) (repeated from (96-c)) differs from the previous examples insofar as already the embedded vP qualifies as indicative domain; but since it does not include x's antecedent, all Principle $\mathcal{A}$-constraints apply non-vacuously when vP is optimized (cf. T_{21}). What is crucial here is that Principle $\mathcal{A}_{ID}$ is ranked above Faith$_{SE}$: On this assumption, O_3 is the winner of the competition, which leads to the result that [pron] remains the only optimal candidate when x is finally checked (cf. $T_{21.1}$), and MAB finally correctly predicts that x must be realized as a pronoun.

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ranked Principle $\mathcal{A}$-constraint is activated, the matrices are not reduced any further.

(101) Jón$_1$ veit að Pétur rakar$_{ind}$??sig$_1$/*sjálfan sig$_1$/hann$_1$ á hverjum degi.

a. [$_{\text{vP}}$ $x_{[\beta]}$ Pétur rakar [$_{\text{VP}}$ t$_x{}'$ t$_{rakar}$ ~~t$_x$~~]]

T_{21}: vP optimization

(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

Candidates	F$_{pron}$	PR.$\mathcal{A}_{ID}$	PR.$\mathcal{A}_{FD}$	F$_{SE}$	PR.$\mathcal{A}_{SD}$	PR.$\mathcal{A}_{CD/ThD/XP}$	F$_{SELF}$
O$_1$: [S, S, pr]		*!*	**		**	**	
O$_2$: [SE, pr]		*!	*		*	*	*
⇒ O$_3$: [pron]				*			*

(102) b. [$_{\text{vP}}$ Jón$_{[*\beta*]}$ veit [$_{\text{VP}}$ $x_{[\beta]}$ t$_{veit}$ ~~[$_{\text{CP}}$ ...]~~]]

$T_{21.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

Input: O$_3$/T$_{21}$	F$_{pron}$	F$_{SE}$	F$_{SELF}$
⇒ O$_{31}$: [pron]		*	*

5.9. Summary: Crosslinguistic Variation II

Basically, we can distinguish between four different types of languages as regards their behaviour with respect to long distance binding (cf. also chapter 2, section 7.). There are languages which do not allow anaphoric binding in this case (like English and German), some languages only allow long anaphoric binding into infinitive complements (like Russian), type 3 prohibits LDA only if indicative complements intervene (like Icelandic), and the last type even allows intervening indicative complement clauses (like Faroese). This crosslinguistic variation is captured by reranking the constraint subhierarchy (PRINCIPLE $\mathcal{A}_{ID}$ ≫ PRINCIPLE $\mathcal{A}_{FD}$ ≫ PRINCIPLE $\mathcal{A}_{SD}$) with FAITH$_{SE}$ in different ways; the respective predictions are represented in

(103)-(106). The ties in (104-a)-(106-a) predict optionality between anaphoric and pronominal binding; if the pronominal realization is illicit, Faith_{SE} must be ranked above the respective Principle $\mathcal{A}$-constraint(s).[49]

(103) *Languages without LDA:*

$\text{Pr.}\mathcal{A}_{ID} \gg \text{Pr.}\mathcal{A}_{FD} \gg \text{Pr.}\mathcal{A}_{SD} \gg \text{Faith}_{SE}$

(104) *Languages with intervening infinitive complements only:*

a. *anaphoric or pronominal binding possible:*

$\text{Pr.}\mathcal{A}_{ID} \gg \text{Pr.}\mathcal{A}_{FD} \gg \text{Faith}_{SE} \circ \text{Pr.}\mathcal{A}_{SD}$

b. *only anaphoric binding licit:*

$\text{Pr.}\mathcal{A}_{ID} \gg \text{Pr.}\mathcal{A}_{FD} \gg \text{Faith}_{SE} \gg \text{Pr.}\mathcal{A}_{SD}$

(105) *Languages with intervening infinitive or subjunctive complements:*

a. *anaphoric or pronominal binding possible:*

$\text{Pr.}\mathcal{A}_{ID} \gg \text{Faith}_{SE} \circ (\text{Pr.}\mathcal{A}_{FD} \gg \text{Pr.}\mathcal{A}_{SD})$

b. *only anaphoric binding licit:*

$\text{Pr.}\mathcal{A}_{ID} \gg \text{Faith}_{SE} \gg \text{Pr.}\mathcal{A}_{FD} \gg \text{Pr.}\mathcal{A}_{SD}$

(106) *Languages which even allow intervening indicative complements:*

a. *anaphoric or pronominal binding possible:*

$\text{Faith}_{SE} \circ (\text{Pr.}\mathcal{A}_{ID} \gg \text{Pr.}\mathcal{A}_{FD} \gg \text{Pr.}\mathcal{A}_{SD})$

b. *only anaphoric binding licit:*

$\text{Faith}_{SE} \gg \text{Pr.}\mathcal{A}_{ID} \gg \text{Pr.}\mathcal{A}_{FD} \gg \text{Pr.}\mathcal{A}_{SD}$

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[49] However, as far as (106-b) is concerned, it is highly unlikely that there is a language with such a ranking, because such a language would basically never allow pronominal binding.

5.10. Principle C Derivationally

By now, the distribution of bound anaphors and pronouns has been extensively discussed. The effects of Principle A and B of the standard Binding Theory have been derived by means of two universal, but violable, constraint subhierarchies, which made it possible to integrate the phenomenon of binding into a derivational model and improve at the same time descriptive adequacy. What remains to be shown is how the third traditional binding principle, Principle C, can be integrated into this approach. Since Principle C refers to R-expressions, let us first think about the status of full NPs in this model in general.

We have come across R-expressions in this chapter before, namely the antecedents in the previous examples, and it has tacitly been assumed that these R-expressions are simply part of the numeration. However, if we consider R-expressions that function as potential bindees, something more must be said. If we stick to the assumption that bound elements do not occur in the numeration as concrete items but are represented by means of a realization matrix, bound R-expressions must result from an optimization procedure which is based on a matrix that contains not only the pronominal and two anaphoric forms, but also the R-expression.

However, a realization matrix can only contain different forms whose semantic contribution to the sentence is the same and does not change the underlying meaning of the sentence in any way. Therefore a matrix can only contain an R-expression if its designated antecedent is an R-expression and it can be considered to be a copy of it. For the sake of concreteness, consider the following examples. If we want to say that John likes himself, this meaning is expressed unambiguously with the following form: *John*$_1$ *likes* x_1; whether we have to realize x as *himself*, *him*, or *John* basically depends on the language under consideration and is a question that is answered by the syntactic component in the course of the derivation. However, in a sentence such as *He*$_1$ *likes* x_1, the situation is slightly different. Whether x_1=*him*$_1$ or *himself*$_1$ does not make any difference with respect to semantics, but if x were realized as an R-expression such as *John*, additional information would be added and *John* would not just be an equivalent variant of *him* or *himself* in this case. Thus the R-expression cannot be part of the realization matrix in the latter example.

Hence, we can draw the following conclusion. If the designated antecedent of x is an R-expression, x's realization matrix additionally contains a copy of this R-expression and the maximal realization matrix is then [SELF, SE, pron, R-ex]. Thus, there are in principle two possibilities how R-expressions can emerge. If they do not function as a bound element, they directly form part of the numeration; as bound elements, on the other hand, they are encoded as x in the numeration and can turn out to be optimal if the matrix [R-ex] wins in the end.

Against this background, one type of Principle C effect can be accounted for straightforwardly: The system predicts that R-expressions cannot be bound by pronouns, because in this scenario the realization matrix of x cannot contain an R-expression at all (cf. (107)).

(107) a. *He$_1$ likes John$_1$.

b. *Underlying scenario:*

he$_1$ likes x_1; x=[SELF, SE, pron]

$\rightarrow$ x= R-expression impossible

However, there will have to be another explanation as to why Principle C effects that involve R-expressions being bound by R-expressions must be ruled out. Such a configuration is not prohibited *a priori*, because in this case x's realization matrix contains a copy of the binding R-expression (cf. (108)). Hence, this configuration must be ruled out in the course of the derivation (which is illustrated below).

(108) a. *John$_1$ likes John$_1$.

b. *Underlying scenario:*

John$_1$ likes x_1; x=[SELF, SE, pron, R-ex]

$\rightarrow$ x= R-expression in principle possible

At first sight, it might look unattractive to have different accounts of Principle C effects, but if we think again of those languages where Principle C is violable in certain contexts, this split turns out to be an advantage, because it accounts for the following observation: Although it is possible in languages like Vietnamese that R-expressions are bound by R-expressions, they can never be bound by pronouns (cf. (109); see also chapter 2, section 8.). The former scenario might come about if the constraints are ranked accordingly, but the latter is ruled out in general due to the nature of realization matrices as such.[50]

(109) *Vietnamese:*

John$_1$/*nó$_1$ tin John$_1$ sẽ thắńg.
John/he thinks John will win
'John$_1$ thinks he$_1$ will win.'

Let us now turn to those examples in which R-expressions are bound by R-expressions, as, for instance, in the following German sentences (also repeated from chapter 2).

(110) a. Max$_1$ weiß, dass Maria *Max$_1$/ihn$_1$/*sich$_1$/*sich selbst$_1$ mag.
Max knows that Mary Max/him/SE/himself likes
'Max$_1$ knows that Mary likes him$_1$.'

b. Max$_1$ mag *Max$_1$/*ihn$_1$/sich$_1$/sich selbst$_1$.
Max likes Max/him/SE/himself
'Max$_1$ likes himself$_1$.'

(111) Peter$_1$ mag seine$_1$/*Peters$_1$ Bücher.
Peter likes his/Peter's books
'Peter$_1$ likes his$_1$ books.'

[50]Example (109) is repeated from chapter 2, section 8. and was quoted from Lasnik (1991).

Since this type of examples involves realization matrices of the sort [SELF, SE, pron, R-ex], the number of candidates in the subsequent tableaux is increased to maximally four different output candidates: O_{n1}=[SELF, SE, pron, R-ex], O_{n2}=[SE, pron, R-ex], O_{n3}=[pron, R-ex], and O_{n4}=[R-ex] (with n=0, 1, 2, ...). Following the assumptions in chapter 2, R-ex counts as the least anaphoric possible realization, hence only the last candidate does not violate the PRINCIPLE $\mathcal{A}$-constraints; the first candidate violates them three times, the second one twice, and the third candidate once. As far as the faithfulness constraints are concerned, the matrix [R-ex] does not only violate FAITH$_{SELF}$ and FAITH$_{SE}$, but also FAITH$_{pron}$. For the sake of completeness, the FAITH-subhierarchy can be complemented along the following lines:

(112) a. FAITH$_{R-ex}$ (F_{R-ex}):
The realization matrix for x must contain [R-ex].

b. FAITH$_{R-ex}$ $\gg$ FAITH$_{pron}$ $\gg$ FAITH$_{SE}$ $\gg$ FAITH$_{SELF}$

Against this background, the derivation of (110-a) (repeated in (113)) proceeds as follows. When the first phrase is completed, only PRINCIPLE $\mathcal{A}_{XP}$ applies non-vacuously, and O_1 and O_2 are predicted to be optimal (cf. T_{22}), which means that there are two competitions after the completion of the next phrase.

(113) Max$_1$ weiß, dass Maria *Max$_1$/ihn$_1$/*sich$_1$/*sich selbst$_1$ mag.

a. [$_{VP}$ $x_{[\beta]}$ [$_{V'}$ t_x mag]]

T_{22}: VP optimization

(XP reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{R-ex}	F_{pron}	F_{SE}	F_{SELF}	$PR.\mathcal{A}_{XP}$
⇒	O_1: [SELF, SE, pron, R-ex]					$***(!)$
⇒	O_2: [SE, pron, R-ex]				$*(!)$	$**$
	O_3: [pron, R-ex]			$*!$	$*$	$*$
	O_4: [R-ex]		$*!$	$*$	$*$	

When the embedded vP is optimized, x is still free, and since the accessible domain fulfils all domain definitions, all PRINCIPLE $\mathcal{A}$-constraints are involved in this competition.[51] The crucial ranking is now FAITH$_{pron}$ $\gg$ PRINCIPLE $\mathcal{A}_{ID}$; since the matrix [R-ex] violates this FAITH-constraint, it loses against the matrix [pron, R-ex]. Hence, a maximal reduction of the realization matrix is prevented, which would result in the eventual selection of the R-expression as optimal realization, and [pron, R-ex] is predicted to be optimal in both $T_{22.1}$ and $T_{22.2}$.[52]

(114) b. $[_{vP}$ $x_{[\beta]}$ Maria $[_{VP}$ $t_x{}'$ $[_{V'}$ $\cancel{t_x}$ $t_{mag}]]$ mag$]$

[51]Since German does not have long distance anaphora, $PR.\mathcal{A}_{ID}$, $PR.\mathcal{A}_{FD}$, and $PR.\mathcal{A}_{SD}$ need not be distinguished in the subsequent tableaux.

[52]Since it is not violated by any candidate anyway, the constraint FAITH$_{R-ex}$ is neglected in these tableaux.

$T_{22.1}$: vP optimization

(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

Input: O_1/T_{22}	F_{pron}	$PR.\mathcal{A}_{ID/FD/SD}$	F_{SE}	$PR.\mathcal{A}_{CD}$	$PR.\mathcal{A}_{ThD}$	F_{SELF}	$PR.\mathcal{A}_{XP}$
O_{11}: [S, S, pr, R]		**!*		***	***		***
O_{12}: [S, pr, R]		**!		**	**	*	**
⇒O_{13}: [pr, R]		*	*	*	*	*	*
O_{14}: [R-ex]	*!		*			*	

$T_{22.2}$: vP optimization

(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

Input: O_2/T_{22}	F_{pron}	$PR.\mathcal{A}_{ID/FD/SD}$	F_{SE}	$PR.\mathcal{A}_{CD}$	$PR.\mathcal{A}_{ThD}$	F_{SELF}	$PR.\mathcal{A}_{XP}$
O_{21}: [S, pr, R]		**!		**	**	*	**
⇒ O_{23}: [pr, R]		*	*	*	*	*	*
O_{24}: [R-ex]	*!		*			*	

Since there is no further domain that could be reached and could therefore force a further reduction of the matrix, the subsequent optimizations can be neglected. So let us turn to the point in the derivation when the binder is finally merged in, which is illustrated in (115-c). Since the [β]-feature is checked at this stage, only the FAITH-constraints apply non-vacuously in $T_{24.1.1/24.2.1}$, which yields [pron, R-ex] as optimal matrix, and according to the MAB-principle this means that x must be realized as pronoun. Hence, bound R-expressions are excluded in this type of example, because pronouns are the better choice.

(115) c. [$_{vP}$ Max$_{[*\beta*]}$ [$_{VP}$ $x_{[\beta]}$ ~~[$_{CP}$ ...]~~ t_w.] weiß]

$T_{22.1.1/22.2.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{13}/T_{22.1}$ or $O_{23}/T_{22.2}$	$F_{R-ex.}$	F_{pron}	F_{SE}	F_{SELF}
⇒	$O_{131/231}$: [pron, R-ex]			*	*
	$O_{132/232}$: [R-ex]		*!	*	*

The next example (repeated from (110-b)) patterns similarly; the only difference is that here the anaphoric forms turn out to be the better alternative.

(116) Max$_1$ mag *Max$_1$/*ihn$_1$/sich$_1$/sich selbst$_1$.

a. [$_{\text{VP}}$ $x_{[\beta]}$ [$_{\text{V}'}$ t$_x$ mag]]

As in the previous example, O_1 and O_2 win when the embedded VP is optimized, as T_{23} shows.

T_{23}: VP optimization

(XP reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{R-ex}	F_{pron}	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{XP}$
⇒	O_1: [S, S, pr, R]					***(!)
⇒	O_2: [S, pr, R]				*(!)	**
	O_3: [pr, R]			*!	*	*
	O_4: [R-ex]		*!	*	*	

Already in the next phrase, the antecedent enters the derivation and $x_{[\beta]}$ is checked; hence, the PRINCIPLE $\mathcal{A}$-constraints apply vacuously, and the matrices [SELF, SE, pron, R-ex]/[SE, pron, R-ex] remain optimal (cf. $T_{23.1}$ and $T_{23.2}$, respectively). As a result, MAB predicts the two anaphoric forms to be the optimal realizations.

(117) b. [$_{\text{vP}}$ Max$_{[*\beta*]}$ [$_{\text{VP}}$ $x_{[\beta]}$ [$_{\text{V}'}$ $\cancel{t_x}$ t$_{mag}$]] mag]

$T_{23.1}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: O_1/T_{23}	F_{R-ex}	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{11}: [SELF, SE, pron, R-ex]				
	O_{12}: [SE, pron, R-ex]				*
	O_{13}: [pron, R-ex]			*!	*
	O_{14}: [R-ex]		*!	*	*

$T_{23.2}$: vP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: O_2/T_{23}	$F_{R-ex.}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{22}: [SE, pron, R-ex]				*
	O_{23}: [pron, R-ex]			*!	*
	O_{24}: [R-ex]		*!	*	*

The example in (118) (repeated from (111)) can be derived similarly. When the NP in (118-a) is optimized, the matrix [SE, pron, R-ex] is predicted to be optimal (cf. T_{24}), and until the antecedent is merged into the derivation, no further domain relevant for binding is reached. As a result, [SE, pron, R-ex] remains the optimal matrix (cf. $T_{24.1}$), and since German anaphors lack a genitive form , MAB finally selects the most anaphoric form available that is compatible with this matrix – the pronominal form *seine* ('his').

(118) Peter$_1$ mag seine$_1$/*Peters$_1$ Bücher.

a. [$_{NP}$ $x_{[\beta]}$ Bücher]

T_{24}: NP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{pron}	F_{SE}	Pr.$\mathcal{A}_{CD}$	Pr.$\mathcal{A}_{ThD}$	F_{SELF}	Pr.$\mathcal{A}_{XP}$
	O_1: [S, S, pr, R]			***!	***		***
⇒	O_2: [S, pr, R]			**	**	*	**
	O_3: [pr, R]		*!	*	*	*	*
	O_4: [R-ex]	*!	*			*	

(119) b. [$_{vP}$ er$_{[*\beta*]}$ [$_{VP}$ [$_{NP}$ $x_{[\beta]}$ Bücher] t_{NP} t_{mag}] mag]

$T_{24.1}$: vP optimization

($x_{[\beta]}$ checked: Principle $\mathcal{A}_{XD}$ apply vacuously)

	Input: O_2/T_{24}	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{21}: [SE, pron, R-ex]			*
	O_{22}: [pron, R-ex]		*!	*
	O_{23}: [R-ex]	*!	*	*

As the previous examples showed, it is always the high-ranked constraint Faith$_{pron}$ which rules out bound R-expressions (with R-expressions as antecedents). However, if this type of Principle C effect is derived by a particular ranking, it should in principle be possible to obviate these effects if Faith$_{pron}$ is ranked sufficiently low. This is exactly what we find in languages like Vietnamese, where R-expressions may be bound by R-expressions. Hence we can account for the grammaticality of the Vietnamese example in (120) (repeated from (109)) if we assume that (at least) Principle $\mathcal{A}_{ID}$ is not ranked below Faith$_{pron}$ in languages of this type (cf. $T_{25.1}$ and $T_{25.2}$).

(120) *Vietnamese:*

John$_1$ tin John$_1$ sẽ thắng.

John thinks John will win

'John$_1$ thinks he$_1$ will win.'

$T_{25.1}$: *The emergence of bound R-expressions I*

	Candidates	PR.$\mathcal{A}_{ID}$	F_{pron}
	O$_1$: [SELF, SE, pron, R-ex]	*!**	
	O$_2$: [SE, pron, R-ex]	*!*	
	O$_3$: [pron, R-ex]	*!	
⇒	O$_4$: [R-ex]		*

$T_{25.2}$: *The emergence of bound R-expressions II*

	Candidates	PR.$\mathcal{A}_{ID}$	F_{pron}
	O$_1$: [SELF, SE, pron, R-ex]	**!*	
	O$_2$: [SE, pron, R-ex]	**!	
⇒	O$_3$: [pron, R-ex]	*(!)	
⇒	O$_4$: [R-ex]		*(!)

5.11. Inherently Reflexive Predicates Revisited

Let us now come back to those cases where anaphors and pronouns occur without establishing a binding relation, as, for instance, in the following examples involving inherently reflexive predicates.

(121) a. *German:*

Max benimmt sich/*sich selbst/*ihn (wie ein Gentleman).

Max behaves SE/himself/him like a gentleman

b. *Dutch:*

Max gedraagt zich/*zichzelf/*hem.

Max behaves SE/himself/him

c. *Frisian:*

Max hâld him/*himsels.

Max behaves him/himself

(122) *English:*

a. Max behaves like a gentleman.

b. Max behaves himself.

As argued in chapter 2, anaphors that occur together with inherently reflexive predicates do not function as arguments and are not bound by an antecedent. If this is translated into the present derivational approach, it means that no [β]-feature is involved. Let us therefore assume that inherently reflexive predicates are predicates that enter the numeration with an x that does not bear a [β]-feature. As a result, they might occur with an anaphoric or pronominal form, but they do not have to, since x does not stand for an argument. And since no [β] is involved, it follows moreover that the PRINCIPLE $\mathcal{A}$-constraints apply vacuously throughout the derivation.

However, if the universally equally ranked FAITH-constraints were the only constraints relevant for the derivation of the sentences in (121) and (122), we would not expect any crosslinguistic variation and the complex anaphor would be predicted to be optimal in general. Hence, there must be another constraint that can interact with this universal constraint subhierarchy in differnt ways and which prefers less anaphoric elements. Let us therefore introduce the constraint in (123); on the assumption that anaphoric specification reflexive-marks a predicate, it is violated three times by the matrix [SELF, SE, pron], twice by [SE, pron], once by [pron] and not at all by the fourth candidate, [–], where the realization matrix has been emptied completely.[53]

(123) *REFLMARK$_{inh}$:
Inherently reflexive predicates must be minimally reflexive-marked.

Let us first consider languages like German and Dutch, where inherently reflexive predicates occur with SE anaphors. So let us derive the German example in (124) (repeated from (121-a)). After the verb has been merged with x, VP optimization takes place. (Note that in these examples, x is not moved to the edge of the phrase as it lacks the [β]-feature.) If *REFLMARK$_{inh}$ is now ranked between FAITH$_{SE}$ and FAITH$_{SELF}$, the matrix [SE, pron] is predicted to be optimal (cf. T$_{26}$) – and on the assumption that the optimal realization is based on the most anaphoric specification that is left in the optimal matrix, the SE anaphor is chosen as optimal realization of x.

(124) Max benimmt sich.

a. [$_{\text{VP}}$ benimmt x]

T$_{26}$: VP optimization

	Candidates	F$_{pron}$	F$_{SE}$	*REFLMARK$_{inh}$	F$_{SELF}$
	O$_1$: [SELF, SE, pron]			∗∗∗!	
⇒	O$_2$: [SE, pron]			∗∗	∗
	O$_3$: [pron]		∗!	∗	∗
	O$_4$: [–]	∗!	∗		∗

[53][–] has not been a candidate in the previous analyses, because in those cases the θ-Criterion would have been violated if x had not been realized at all. Note moreover that if inherently reflexive predicates are involved, there is no R-expression in the realization matrix; since x does not have an antecedent in these examples, the matrix cannot contain a corresponding copy.

Note that the last step – from the optimal matrix to the optimal realization – cannot be directly derived from the MAB principle as formulated in (45) (repeated in (125)). In order to make it compatible with derivations involving inherently reflexive predicates, the formulation must be modified in such a way that it does not necessarily presuppose a [β]-feature on x; cf. (126).

(125) MAXIMALLY ANAPHORIC BINDING (MAB) (repeated from (45)):
Checked $x_{[\beta]}$ must be realized maximally anaphorically.

(126) MAXIMALLY ANAPHORIC BINDING (MAB) (revised):
When all [β]-features of x are checked, it is realized maximally anaphorically.

In Frisian, inherently reflexive predicates occur with pronouns (cf. (127), repeated from (121-c)). This is correctly predicted if *REFLMARK$_{inh}$ is higher ranked than FAITH$_{SE}$ but lower ranked than FAITH$_{pron}$ (cf. T$_{27}$). On this assumption, [pron] is predicted to be the optimal matrix, and MAB selects the pronominal form as optimal realization.

(127) Max hâld him/*himsels.
a. [$_{\text{VP}}$ hâld x]

T$_{27}$: VP optimization

	Candidates	F$_{pron}$	*REFLMARK$_{inh}$	F$_{SE}$	F$_{SELF}$
	O$_1$: [SELF, SE, pron]		**!*		
	O$_2$: [SE, pron]		**!		*
⇒	O$_3$: [pron]		*	*	*
	O$_4$: [–]	*!		*	*

The English example in (128) (repeated from (122-a)) lacks any realization of x. This is captured if *REFLMARK$_{inh}$ outranks all FAITH-constraints, as T$_{28}$ shows.

(128) Max behaves like a gentleman.

a. [$_{\text{VP}}$ behaves x]

T_{28}: VP optimization

	Candidates	*REFLMARK$_{inh}$	F$_{pron}$	F$_{SE}$	F$_{SELF}$
	O_1: [SELF, SE, pron]	*!**			
	O_2: [SE, pron]	*!*			*
	O_3: [pron]	*!		*	*
⇒	O_4: [–]		*	*	*

By contrast, if the SELF anaphor occurs with inherently reflexive predicates, as in (129) (repeated from (122-b)), *REFLMARK$_{inh}$ must be lower ranked than the FAITH-constraints. On this assumption, O_1 wins the competition (cf. T_{29}), and MAB selects the complex anaphor as optimal realization of x.

(129) Max behaves himself.

a. [$_{\text{VP}}$ behaves x]

T_{29}: VP optimization

	Candidates	F$_{pron}$	F$_{SE}$	F$_{SELF}$	*REFLMARK$_{inh}$
⇒	O_1: [SELF, SE, pron]				* * *
	O_2: [SE, pron]			*!	**
	O_3: [pron]		*!	*	*
	O_4: [–]	*!	*	*	

To sum up, the crosslinguistic variation we find with respect to inherently reflexive predicates is derived by different interaction between the constraint *REFLMARK$_{inh}$ (=*RM$_{inh}$) and the FAITH-constraint subhierarchy. The respective predictions are summarized in the following table.

T_{30}: Summary

ranking	*realization of x with inherently reflexive predicates*
$F_{pron} \gg F_{SE} \gg F_{SELF} \gg$ ***RM**$_{inh}$	SELF anaphor
$F_{pron} \gg F_{SE} \gg$ ***RM**$_{inh}$ $\gg F_{SELF}$	SE anaphor
$F_{pron} \gg$ ***RM**$_{inh}$ $\gg F_{SE} \gg F_{SELF}$	pronoun
***RM**$_{inh}$ $\gg F_{pron} \gg F_{SE} \gg F_{SELF}$	$\emptyset$

5.12. Pronouns without Antecedents

Talking about contexts in which anaphoric and pronominal forms seem to occur unbound, let us now pursue the question of how examples of the following type can be derived in this system. (130-a) and (130-b) show that x cannot be realized as anaphor if it lacks an antecedent. (Recall that (130-a) rules out the possibility that the ungrammaticality of anaphors in these examples is connected with the fact that German simply lacks Nominative anaphoric forms.) Moreover, we have to say something about the relation between (130-b) and (130-c).

(130) a. Ihn/*sich friert.
him/SE is cold
'He is cold.'

b. Er schläft.
he sleeps
'He is sleeping.'

c. Peter schläft.
Peter sleeps
'Peter is sleeping.'

Let us start with the latter. (130-c) contains an unbound R-expression; hence we can conclude that the numeration does not contain any x at all, but simply looks as follows: Num_c= {Peter (= 'genuine R-expression'), schläft} (ignoring additional functional material). By contrast, if we assume that pronouns generally emerge as the result of a competition between different realization matrices, the underlying numeration in (130-b) corresponds to Num_b= {$x_{[SELF,SE,pron]}$, schläft} – since the sentence does not contain a coindexed R-expression, the matrix lacks a potential copy of it. Hence, the two sentences in (130-b) and (130-c) are based on completely different numerations and do not compete at all. This explains why they are basically interchangeable.

The restriction 'basically' refers to the fact that – although both (130-b) and (130-c) are grammatical – their distribution is dependent on the broader context. If people are talking about Peter anyway, it is more natural to utter (130-b), while (130-c) might sound redundant; however, if Peter has not been mentioned before, it is odd to use the pronominal form. Hence, it can be concluded that although sentence (130-b) does not contain an antecedent, the pronoun must be anchored in discourse, i.e., it must be discourse-bound, and it is therefore not really true that (130-b) and (130-a) contain unbound pronouns. So let us assume that the x in these sentences is also equipped with a [β]-feature and that it is checked by the head in the root phrase if discourse binding is involved. Thus, the numeration of (130-b) contains, *inter alia*, $x_{[\beta]}$ and $C_{[*\beta*]}$. Against this background, let us take a closer look at the derivation of (130-b) (repeated in (131)).

(131) Er schläft.

a. [$_{\text{vP}}$ $x_{[\beta]}$ [$_{\text{VP}}$ $\text{t}_{schläft}$] schläft]; workspace: {$C_{[*\beta*]}$, ...}

x is merged into the derivation in the second phrase; at this stage, the verb is also accessible, hence we reach x's θ-domain; since x is Case-marked by T, vP does not correspond to its subject and Case domain. However, considering how finite and indicative domain have been defined, it is suggested that vP already fulfils these definitions since it contains a finite/indicative verb and a subject. So if we want to stick to the assumption that the finite and indicative domain are not reached before the subject and Case domain, their definitions have to be slightly modified; therefore, the following revised versions are introduced.

(132) XP is the *finite domain* of x if it contains a finite verb and Case-marked x.

(133) XP is the *indicative domain* of x if it contains an indicative verb and Case-marked x.

According to these definitions, TP is the first XP which qualifies as x's finite/indicative domain in sentence (131), and it is correctly predicted that x must be realized as a pronoun: When TP is optimized, $x_{[\beta]}$ is still unchecked, and since TP not only corresponds to x's θ- and Case domain but also to its subject, finite, and indicative domain, the high-ranked constraints PRINCIPLE $\mathcal{A}_{SD}$, PRINCIPLE $\mathcal{A}_{FD}$, and PRINCIPLE $\mathcal{A}_{ID}$ apply non-vacuously; as a result, [pron] is predicted to be optimal (cf. $T_{31.1}$ and $T_{31.2}$).[54] In the next phrase, $C_{[*\beta*]}$ finally enters the derivation and x is checked. Thus, only the FAITH-constraints apply non-vacuously in $T_{31.1.1/31.2.1}$, but since [pron] is the only candidate anyway, it remains optimal, and MAB selects the pronoun as optimal realization.

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[54]Here, we can clearly see that [$*\beta*$] must be associated with C and not with T if we consider discourse binding. If x functions as subject, only its θ-domain and an XP have been reached before TP is completed – if x were already checked at this stage, this would have the consequence that PR.$\mathcal{A}_{XP}$ and PR.$\mathcal{A}_{ThD}$ would be the only PR.$\mathcal{A}$-constraints that would apply non-vacuously before the realization of x would be determined. However, since these two constraints are relatively low ranked, the matrix would not have been reduced to [pron] and an anaphoric realization would be predicted to be optimal. (Recall from section 5.7., T_{18}, that we can only avoid anaphoric specifications if a PR.$\mathcal{A}$-constraint applies non-vacuously which is higher ranked than FAITH$_{SE}$.)

T_{31}: VP optimization

(XP/ThD reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{pron}	F_{SE}	$\text{Pr.}\mathcal{A}_{ThD}$	F_{SELF}	$\text{Pr.}\mathcal{A}_{XP}$
⇒	O_1: [SELF, SE, pron]			**(!)		**
⇒	O_2: [SE, pron]			*	*(!)	*
	O_3: [pron]		*!		*	

(134) b. $[_{TP}\ x_{[\beta]}\ [_{vP}\ t_x\ \cancel{[_{VP}\ t_{schläft}]}\ t'_{schläft}]$ schläft];
workspace: $\{C_{[*\beta*]}, \ldots\}$

$T_{31.1}$: TP optimization

(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

	Input: O_1/T_{31}	F_{pron}	$\text{Pr.}\mathcal{A}_{ID/FD/SD}$	F_{SE}	$\text{Pr.}\mathcal{A}_{CD}$	$\text{Pr.}\mathcal{A}_{ThD}$	F_{SELF}	$\text{Pr.}\mathcal{A}_{XP}$
	O_{11}: [S, S, pr]		*!*		**	**		**
	O_{12}: [SE, pr]		*!		*	*	*	*
⇒	O_{13}: [pron]			*			*	

$T_{31.2}$: TP optimization

(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

	Input: O_2/T_{31}	F_{pron}	$\text{Pr.}\mathcal{A}_{ID/FD/SD}$	F_{SE}	$\text{Pr.}\mathcal{A}_{CD}$	$\text{Pr.}\mathcal{A}_{ThD}$	F_{SELF}	$\text{Pr.}\mathcal{A}_{XP}$
	O_{21}: [SE, pr]		*!		*	*	*	*
⇒	O_{22}: [pron]			*			*	

(135) c. $[_{CP}\ x_{[\beta]}\ [_{C_{[*\beta*]}}$ schläft$]\ [_{TP}\ t'_x\ \cancel{[_{vP}\ t_x\ [_{VP}\ t_{schläft}]\ t'_{schläft}]}\ t''_{schläft}]]$

$T_{31.1.1/31.2.1}$: CP optimization

($x_{[\beta]}$ checked: PRINCIPLE $\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{13}/T_{31.1}$ or $O_{22}/T_{31.2}$	F_{pron}	F_{SE}	F_{SELF}
⇒	$O_{131/221}$: [pron]		*	*

5.13. On the Distribution of the Beta-Features

So far, we have mainly considered examples in which binding relations between two elements have been established (if we abstract away from inherently reflexive predicates and the examples in the previous section). This means that sentences have been excluded which involve elements that are coreferent but do not stand in a c-command relationship (cf. (136)), and sentences in which more than two elements are coreferent (cf. (137) and (138)).

(136) a. Peter$_1$'s sister adores him$_1$/*himself$_1$.

b. His$_1$ sister adores Peter$_1$.

(137) John$_1$ wonders whether he$_1$ should shave himself$_1$/*him$_1$.

(138) John$_1$ only shaves himself$_1$/*him$_1$ in his$_1$ bathroom.

In this section, the question is therefore addressed of how sentences of this type can be derived, and how unwanted derivations resulting from numerations with a different distribution of beta-features can be excluded.

Let us first consider sentence (136-a). What does the underlying numeration look like? As far as the direct object is concerned, we have assumed that pronouns like *him* are encoded as $x_{[\beta]}$ in the beginning, and that its concrete realization form is determined in the course of the derivation. And since in a derivational model we do not know in advance that the coreferent R-expression *Peter* will never c-command x, we might want to try the numeration Num$_1$=\{Peter$_{[*\beta*]}$, $x_{[\beta]}$, ...\}. However, in the course of the derivation it emerges that x is never c-commanded by *Peter*, hence x

can never check its [β]-feature (since feature checking requires a c-command relation between probe and goal in the accessible domain (cf. (26) in section 4.2.)), and therefore the derivation will eventually crash.

This means that (136-a) must be based on a different numeration. For obvious reasons, the [$*\beta*$]-feature cannot be associated with the NP *Peter's sister* either (after all, it is not coreferent with x) – hence there is only one possibility left: discourse binding. On this assumption, the numeration is Num_2=$\{\text{C}_{[*\beta*]}$, $x_{[\beta]}$, Peter, $\ldots\}$, x eventually checks its [β]-feature against $\text{C}_{[*\beta*]}$, and the pronoun is correctly predicted to be the optimal realization form (cf. the previous section). If *Peter* is now coreferent with x or not is not encoded in features but depends on whether *Peter* happens to refer to the same person as "[β]". If it does, we get sentence (136-a) (*Peter*$_1$*'s sister adores him*$_1$), otherwise the following sentence is derived.

(139) Peter$_1$'s sister adores him$_2$.

As to example (136-b), it behaves analogously to (136-a) with *Peter* and x in exchanged positions.

However, the previous examples have also alluded to a first restriction that must be assumed for the distribution of [$*\beta*$]-features. As discussed in section 5.12., discourse binding always implies that the pronominal form is predicted to be the optimal realization. Thus it can be concluded that if the option of discourse binding were generally available, i.e., if [$*\beta*$] could always be associated with matrix C, we would predict that pronominal binding would be a universal option in all binding contexts. Since this prediction is obviously not borne out (cf., for example, *John*$_1$ *likes himself*$_1$*/*him*$_1$), the occurence of $\text{C}_{[*\beta*]}$ must be restricted. How could such a restriction look like? Recall that in the analysis of (136-a) and (136-b), the insertion of $\text{C}_{[*\beta*]}$ in the numeration was the only possibility to yield a convergent derivation. So let us therefore assume that the following principle holds.

(140) *Restriction on the distribution of [$*\beta*$]-features:*

$C_{[*\beta*]}$ is a last resort option; it is only licit if the association of [$*\beta*$] with a lexical item of the numeration (including underspecified x) does not yield a convergent derivation.

What about sentence (137) (*John*$_1$ *wonders whether he*$_1$ *should shave himself*$_1$/**him*$_1$)? In principle, we could think of the following six underlying numerations if we take into account all potentially possible distributions of the beta-features.[55]

(141) *Possible distribution of beta-features:*

a. $\text{Num}_1 = \{\text{John}_{[*\beta*]},\ x_{[\beta]},\ y_{[\beta]},\ \ldots\}$
b. $\text{Num}_2 = \{\text{John}_{[*\beta*]},\ x_{[\beta,*\beta*]},\ y_{[\beta]},\ \ldots\}$
c. $\text{Num}_3 = \{\text{John}_{[*\beta*]},\ x_{[\beta]},\ y_{[\beta,*\beta*]},\ \ldots\}$
d. $\text{Num}_4 = \{\text{John}_{[*\beta*,*\beta*]},\ x_{[\beta]},\ y_{[\beta]},\ \ldots\}$
e. $\text{Num}_5 = \{\text{John}_{[*\beta*]},\ x_{[\beta]},\ y_{[\beta]},\ C_{[*\beta*]}, \ldots\}$
f. $\text{Num}_6 = \{\text{John},\ x_{[\beta]},\ y_{[\beta]},\ C_{[*\beta*,*\beta*]}\ \ldots\}$

The first numeration, $\text{Num}_1 = \{\text{John}_{[*\beta*]}, x_{[\beta]}, y_{[\beta]}, \ldots\}$, can be ruled out immediately, since it only involves one [$*\beta*$]- but two [β]-features. Hence, one [β]-feature will remain unchecked, and Num_1 must therefore be excluded. (In fact, one of the items with a [β]-feature would not even reach a position in which it could in principle check features against *John*, because there is no need to drag along both x and y to satisfy *Phrase Balance*.)

As to $\text{Num}_2 = \{\text{John}_{[*\beta*]}, x_{[\beta,*\beta*]}, y_{[\beta]}, \ldots\}$, it does not only facilitate a convergent derivation, it also yields the expected results with regard to the predicted realization forms: y is checked by x in its θ-domain, hence y will have to be realized as anaphor,

[55]In the following, I assume that the second coindexed element (linearly speaking) starts out as x and the third one as y.

and x is checked by *John* later in the derivation when its realization matrix has already been reduced to [pron] – hence, it is realized as pronoun.[56]

(142) a. *Checking 1:*

$[_{vP}\ x_{[\beta,*\beta*]}$ shave $[_{VP}\ y_{[\beta]}\ \mathrm{t}_{shave}\ \cancel{\mathrm{t}_y}]]$

b. *Checking 2:*

$[_{vP}$ John$_{[*\beta*]}$ wonders $[_{VP}\ x_{[\beta]}\ \mathrm{t}_{wonders}\ [\cancel{_{CP}\ \mathrm{t}''_x \text{ whether } [_{TP}\ \mathrm{t}'_x \text{ should } [_{vP}\ \mathrm{t}_x \text{ shave } [_{VP}\ y\ \mathrm{t}_{shave}\ \mathrm{t}_y]]]]}]]$

As far as Num$_3$=\{John$_{[*\beta*]}$, $x_{[\beta]}$, $y_{[\beta,*\beta*]}$ ...\} is concerned, there are two possibilities. If the resulting derivation proceeds as indicated in (143), it crashes. Here it is assumed that y remains in edgeV, and x moves on to satisfy *Phrase Balance* and eventually check its [β]-feature against *John*. As a result, the features of y remain unchecked (since self-checking is excluded; cf. footnote 56).

(143) *Non-convergent derivation:*

a. $[_{vP}\ x_{[\beta]}$ shave $[_{VP}\ y_{[\beta,*\beta*]}\ \mathrm{t}_{shave}\ \cancel{\mathrm{t}_y}]]$; workspace: \{John$_{[*\beta*]}$, ...\}

b. $[_{vP}$ John$_{[*\beta*]}$ wonders $[_{VP}\ x_{[\beta]}\ \mathrm{t}_{wonders}\ [\cancel{_{CP}\ \mathrm{t}''_x \text{ whether } [_{TP}\ \mathrm{t}'_x \text{ should } [_{vP}\ \mathrm{t}_x \text{ shave } [_{VP}\ y_{[\beta,*\beta*]}\ \mathrm{t}_{shave}\ \mathrm{t}_y]]]]}]]$

However, based on Num$_3$ there might be an alternative derivation; if y does not stay in edgeV but moves on to Specv (for instance, because *Phrase Balance* triggers movement to satisfy the needs of another feature [*F*]), x gets the opportunity to check its [β]-feature in an appropriate configuration: under c-command against y's [*β*]-feature (cf. (144-a) and (144-b)). Afterwards, *Phrase Balance* would force y to move on till it reaches the specifier of the matrix VP, where it could eventually check features with *John* (cf. (144-c)).

[56] Note that the feature distribution $x_{[\beta,*\beta*]}$ does not facilitate "self-checking" – this is excluded since feature checking requires a c-command relation and the notion of c-command is not reflexive.

(144) *Unwanted derivation:*

a. $[_{\text{vP}}\ x_{[\beta]}$ shave $[_{\text{VP}}\ y_{[\beta,*\beta*,F]}\ \text{t}_{shave}\ \cancel{\text{t}_y}]]$; workspace: $\{\text{John}_{[*\beta*]}, \text{X}_{[*F*]}, \ldots\}$

b. *Checking 1:*

$[_{\text{vP}}\ y_{[\beta,*\beta*,F]}\ x_{[\beta]}$ shave $[_{\text{VP}}\ \text{t}'_y\ \text{t}_{shave}\ \cancel{\text{t}_y}]]$

c. *Checking 2:*

$[_{\text{vP}}$ John$_{[*\beta*]}$ wonders $[_{\text{VP}}\ y_{[\beta]}\ \text{t}_{wonders}$ $\cancel{[_{\text{CP}}\ \text{t}''''_y \text{ whether } [_{\text{TP}}\ \text{t}'''_y \text{ should } [_{\text{vP}}\ \text{t}''_y\ x \text{ shave } [_{\text{VP}}\ \text{t}'_y\ \text{t}_{shave}\ \text{t}_y]]]]}]]$

Hence, Num$_3$ might yield a convergent derivation – however, it does not yield the correct result. Since in this case x is checked in its base position, it has to be realized as anaphor; and since y is checked when its matrix has been reduced to [pron], we would expect a pronoun in the object position, contrary to the facts. As a result, this derivation has to be excluded. In fact, what seems to go wrong in (144) is that the probe for x is base-generated below the latter and moves across the goal to get into this feature checking configuration. Therefore it must be assumed that the following restriction holds, which finally excludes Num$_3$ as a possible underlying numeration.

(145) [$*$F$*$] must not move across [F].

And what about Num$_4$=$\{\text{John}_{[*\beta*,*\beta*]}, x_{[\beta]}, y_{[\beta]}, \ldots\}$? *A priori*, it does not violate any restrictions and yields a convergent derivation. However, it would predict that y has to be realized as a pronoun (since it would be checked when its matrix would have been reduced to [pron]) – and this option must be ruled out. So what might be wrong with the following derivation?

(146) *Unwanted derivation:*

$[_{\text{vP}}$ John$_{[*\beta*,*\beta*]}$ wonders $[_{\text{VP}}\ y_{[\beta]}\ x_{[\beta]}\ \text{t}_{wonders}$ $\cancel{[_{\text{CP}}\ \text{t}''''_y\ \text{t}''_x \text{ whether } [_{\text{TP}}\ \text{t}'''_y\ \text{t}'_x \text{ should } [_{\text{vP}}\ \text{t}''_y\ \text{t}_x \text{ shave } [_{\text{VP}}\ \text{t}'_y\ \text{t}_{shave}\ \text{t}_y]]]]}]]$

What we want to enforce is that y is already checked in its θ-domain, which is only possible if it is checked by x. More generally, if we have more than two coindexed elements in a sentence and the first one (L_1) c-commands all the others, the second one (L_2) all but the first one, the third one (L_3) all but the first and the second one etc., we want to make sure that the beta-features are distributed as follows: $\{L_{1[*\beta*]}, L_{2[*\beta*,\beta]}, L_{3[*\beta*,\beta]}, \ldots Ln_{[\beta]}\}$. This is achieved if we assume that the following restriction holds. According to this rule, the derivation in (145) is already ruled out when the embedded vP is completed.[57]

(147) *Restriction on the cooccurrence of [β]-features:*
Two coreferent (i.e. identical) unchecked [β]-feature must not cooccur in the same accessible domain.

As far as Num_5 ($\{John_{[*\beta*]}, x_{[\beta]}, y_{[\beta]}, C_{[*\beta*]}, \ldots\}$) and Num_6 ($\{John, x_{[\beta]}, y_{[\beta]}, C_{[*\beta*,*\beta*]} \ldots\}$) are concerned, they are also ruled out, because they violate (140) – Num_2 already yields a convergent derivation without resorting to discourse binding.

Let us now turn to example (138), repeated in (148).

(148) $John_1$ (only) shaves $himself_1$/*him_1 in his_1 bathroom.

Since the sentence involves again three coreferent items, there are in principle again the six potential numerations from (141). The first numeration, $Num_1=\{John_{[*\beta*]}, x_{[\beta]}, y_{[\beta]}, \ldots\}$ can be excluded along the same lines as before, and we can generally state that each unchecked feature needs a different corresponding starred feature.

The second possibility, $Num_2=\{John_{[*\beta*]}, x_{[\beta,*\beta*]}, y_{[\beta]}, \ldots\}$, can also be ruled out immediately. Since x can check its [β]-feature against *John* when it is in SpecV (cf.

[57]Note that this principle does not affect configurations as in (i-a); since in this case the [β]-features are not coreferent, they can cooccur in edgev.

(i) $Sarah_1$ knows that Max_2 thinks she_1 adores him_2.

a. $[_{vP}\ y_{[\beta_2]}\ x_{[\beta_1]}$ adores $[_{VP}\ t'_y\ t_{adores}\ \cancel{t_y}]]$; workspace: $\{Sarah_{[*\beta_1*]}, Max_{[*\beta_2*]}, \ldots\}$

(149)), it would not have to move any further and would thus never c-command y (which is contained in a vP-adjunct). Hence, it cannot act as a probe for the latter.

(149) $[_{\mathrm{vP}}$ John$_{[*\beta*]}$ shaves $[_{\mathrm{VP}}\ x_{[\beta]}\ \mathrm{t}_{shaves}\ \cancel{\mathrm{t}_x}]]$

And what about Num$_3$=$\{$John$_{[*\beta*]}$, $x_{[\beta]}$, $y_{[\beta,*\beta*]}$, $\ldots\}$, where the second $[*\beta*]$-feature is associated with y? In this case, the derivation proceeds as follows: *Phrase Balance* triggers movement of x to the edge of VP. When little vP is built up *John* enters the derivation *before* the PP adjunct is also inserted in Specv. Hence, the first opportunity for x to check its feature involves feature checking with *John* – and not with y.[58] However, this implies that y cannot get rid of its beta-features anymore, and the derivation crashes.

(150) $[_{\mathrm{vP}}\ y_{[\beta,*\beta*]}\ [_{\mathrm{v'}}\ [_{\mathrm{v'}}$ John$_{[*\beta*]}$ shaves $[_{\mathrm{VP}}\ x_{[\beta]}\ \mathrm{t}_{shaves}\ \cancel{\mathrm{t}_x}]]\ [_{\mathrm{PP}}\ \mathrm{t}'_y$ in ~~[NP t$_y$ bathroom]~~]]]

The fourth possibility is Num$_4$=$\{$John$_{[*\beta*,*\beta*]}$, $x_{[\beta]}$, $y_{[\beta]}$, $\ldots\}$. This attempt is more promising; since both x and y are c-commanded by *John* at some stage in the derivation and there are two $[*\beta*]$-features which trigger movement of the two bound elements to the current accessible domain, the derivation does not crash.[59] Moreover, x is already bound in its θ-domain, hence it is correctly predicted that it must be realized as anaphor, whereas y is only bound when its matrix has been reduced to [pron]. Hence, this numeration yields the correct result. And since Num$_4$ yields a convergent derivation, Num$_5$ ($\{$John$_{[*\beta*]}$, $x_{[\beta]}$, $y_{[\beta]}$, C$_{[*\beta*]}$,$\ldots\}$) and Num$_6$ ($\{$John, $x_{[\beta]}$, $y_{[\beta]}$, C$_{[*\beta*,*\beta*]}$ $\ldots\}$) are immediatedly ruled out by (140).

(151) a. *Checking 1:*

$[_{\mathrm{vP}}$ John$_{[*\beta*,*\beta*]}$ shave $[_{\mathrm{VP}}\ x_{[\beta]}\ \mathrm{t}_{shaves}\ \cancel{\mathrm{t}_x}]]$

---

[58]Generally, feature checking takes place as soon as possible, i.e., it cannot be delayed.

[59]Note that (145) is respected throughout the derivation; cf. (151).

b. *Checking 2:*

$[_{\mathrm{TP}}$ John$_{[*\beta*]}$ T $[_{\mathrm{vP}}\ y_{[\beta]}\ [_{\mathrm{vP}}\ \mathrm{t}_{John}$ shaves $[\cancel{_{\mathrm{VP}}\ x\ \mathrm{t}_{shaves}\ \mathrm{t}_x}]]\ [_{\mathrm{PP}}\ \cancel{\mathrm{t}_y\ \mathrm{in}}$ $\cancel{[_{\mathrm{NP}}\ \mathrm{t}_y\ \mathrm{bathroom}]}]]]$

The findings of this section can thus be summarized as follows. First, we saw that the three types of sentences under discussion can be derived within the current theory, namely on the basis of the numerations indicated in (152-a)-(152-c).[60]

(152) a. *Two coreferent elements involved – no c-command relation:*

Peter$_1$'s sister adores him$_1$/*himself$_1$.

Num=$\{$C$_{[*\beta*]}$, $x_{[\beta]}$, Peter, ...$\}$

b. *Three coreferent elements involved – three c-command relations:*

John$_1$ wonders whether he$_1$ should shave himself$_1$/*him$_1$.

Num=$\{$John$_{[*\beta*]}$, $x_{[\beta,*\beta*]}$, $y_{[\beta]}$, ...$\}$

c. *Three coreferent elements involved – two c-command relations:*

John$_1$ only shaves himself$_1$/*him$_1$ in his$_1$ bathroom.

Num=$\{$John$_{[*\beta*,*\beta*]}$, $x_{[\beta]}$, $y_{[\beta]}$, ...$\}$

However, although it is of course crucial to have a derivation that makes correct predictions, it is also important to rule out alternative derivations that might yield unwanted results. Since in a derivational model look-ahead with respect to syntactic structures must be excluded, we cannot *a priori* associate beta-features only with elements that will later establish a c-command relation – this would involve knowledge of syntactic structures that we cannot know at the stage when the features are dis-

[60]Note that the analysis of (152-b) also extends to sentences of the following type – the only difference being that in this case the first binding relation is an instance of discourse binding:

(i) He$_1$ likes himself$_1$.

Num=$\{$C$_{[*\beta*]}$, $x_{[\beta,*\beta*]}$, $y_{[\beta]}$, ...$\}$

tributed. Hence, we must in principle permit that beta-features might be associated with all kinds of pairs of coreferent elements, even it they will never occur in a c-command relationship. The task is then to rule out independently those derivations that would formally converge but make wrong empirical predictions. And, as has been shown in the discussion above, this can be achieved if we assume that the three restrictions from (140), (145), and (147), repeated in (153-a), (153-b), and (153-c), respectively, hold.[61]

(153) a. *Restriction 1*

$C_{[*\beta*]}$ is a last resort option; it is only licit if the association of $[*\beta*]$ with a lexical item of the numeration (including an unspecified x) does not yield a convergent derivation.

b. *Restriction 2*

$[*\beta*]$ must not move across $[\beta]$.

c. *Restriction 3*

Two coreferent (i.e. identical) unchecked $[\beta]$-feature must not cooccur in the same accessible domain.

[61]Recall moreover that the c-command requirement does not have to be stipulated specifically for binding relations; instead, it follows from the general operation of *Feature Checking* (cf. (26) in section 4.2.).

Chapter 5

Reconstruction Effects Revisited

1. The Core Data

Let us now come back to those data that served as initial motivation for a derivational approach in chapter 3 – the reconstruction examples illustrated in (1) and (2). Sentences like these are generally constructed as follows. In the course of the derivation, the phrase containing the bound element (x) is moved to a position preceding its antecedent. As a first consequence, this means that the binding relation must be evaluated before x leaves the c-command domain of its binder.

However, as discussed in chapter 3, section 8., there is a second particuliarity that must be accounted for: the contrast between (1-a) and (2-a). As (2-a) shows, it is sometimes possible that x is realized as an R-expression in these constructions, although it is bound earlier in the derivation. Hence, it seems to be the case that the movement operation in examples like (2-a) can obviate Principle C effects.

(1) a. *[Which picture of John_1]$_2$ does he_1 like t_2?
b. *[Which picture of John_1]$_2$ does John_1 like t_2?
c. [Which picture of him_1/$\mathrm{himself}_1$]$_2$ does John_1 like t_2?
d. [Which picture of him_1/$\mathrm{himself}_1$]$_2$ does he_1 like t_2?

(2) a. [Which claim that John_1 made]$_2$ did he_1 later deny t_2?

b. *[Which claim that John_1 made$]_2$ did John_1 later deny t_2?

c. [Which claim that he_1 made$]_2$ did John_1 later deny t_2?

d. [Which claim that he_1 made$]_2$ did he_1 later deny t_2?

However, as (1-a) indicates, this is not possible in general, and in chapter 3, it has been suggested that it is connected with the depth of embedding as to whether these constructions are grammatical or not. The conclusion drawn earlier has been that R-expressions that are bound within their subject domain (= traditional binding domain) at some stage must be ruled out, even if this occurs only at one point in the derivation, whereas R-expressions that are bound outside their subject domain but are then moved out of the c-command domain of their antecedent are licit.

In chapter 3, this has already been implemented in an optimality-theoretic approach; but the analysis developed there is not compatible with the present approach to binding for several reasons. First, it relies on the traditional binding principles, and second, it is based on the assumption that the realization of the bound element is determined from the beginning. (Recall that in the chapter 3 approach a strict version of the *Strict Cycle Condition* is adopted and this is the logical consequence.) Hence, it is not possible to optimize its realization form in the course of the derivation, and as a result, not different forms of x compete, but different realizations of the potential antecedent (i.e., coreferent *vs* non-coreferent forms). This means that the bound element's form as such remains stable, while the interpretation might change due to optimization procedures; in the present approach, by contrast, the meaning is given and the optimal form to express this meaning is determined in the course of the derivation.

In chapter 2, it has been discussed extensively that the traditional binding principles are not sufficient. In the context of reconstruction, this is confirmed once more if we consider the following German examples.

(3) a. *Welches Bild von Timo$_1$ mag er$_1$ am liebsten?
which picture of Timo likes he best
'Which picture of him$_1$/himself$_1$ does Timo$_1$ like best?'

b. Welches Bild von sich$_1$ mag Timo$_1$ am liebsten?
which picture of Timo likes he best
'Which picture of him$_1$/himself$_1$ does Timo$_1$ like best?'

(4) a. ?Welches Bild von Timo$_1$ hast du ihm$_1$ gezeigt?
[which picture of Timo]$_{acc}$ have you him$_{dat}$ shown
'Which picture of him$_1$ have you shown to Timo$_1$?'

b. Welches Bild von ihm$_1$ hast du Timo$_1$ gezeigt?
[which picture of him]$_{acc}$ have you Timo$_{dat}$ shown
'Which picture of him$_1$ have you shown to Timo$_1$?'

(5) a. ?Welcher Klassenkameradin von Timo$_1$ hast du ihn$_1$ als
[which classmate-fem of Timo]$_{dat}$ have you him$_{acc}$ as
Nachhilfelehrer empfohlen?
private tutor recommended
'To which classmate of his$_1$ did you recommend Timo$_1$ as private tutor?'

b. Welcher Klassenkameradin von ihm$_1$ hast du Timo$_1$ als
[which classmate-fem of him]$_{dat}$ have you Timo$_{acc}$ as
Nachhilfelehrer empfohlen?
private tutor recommended
'To which classmate of his$_1$ did you recommend Timo$_1$ as private tutor?'

What is interesting here is the contrast between (3-a) and (4-a)/(5-a). Although the bound element is embedded equally deeply in all three *wh*-phrases and all *wh*-phrases function as arguments, (4-a) and (5-a) are better than (3-a). Depending on the underlying structure that is assumed for double object constructions, it might not be surprising that (5-a) is not ruled out by Principle C; if the indirect object

(IO) is base-generated in a higher position than the direct object (DO) (cf. (6-a)), it is possible that the indirect object never occurs in the c-command domain of the direct object, and hence a Principle C configuration does not arise throughout the derivation.

(6) *Underlying structure for (5-a):*

a. *possibility 1:* [$_{\text{CP}}$ *wh*-IO t$_{IO}$ DO]

b. *possibility 2:* [$_{\text{CP}}$ *wh*-IO t$'_{IO}$ DO t$_{IO}$]

However, in the case of example (4-a), the *wh*-phrase is definitely c-commanded by the other object at some point in the derivation.[1]

(7) *Underlying structure for (4-a):*

a. *possibility 1:* [$_{\text{CP}}$ *wh*-DO IO t$_{DO}$]

b. *possibility 2:* [$_{\text{CP}}$ *wh*-DO IO t$_{DO}$ t$_{IO}$]

Thus we can conclude that the contrast between (3-a) and (4-a) is unexpected according to both the argument-adjunct approach and the theory developed in chapter 3, since in both examples arguments are involved and binding takes place within the subject domain. However, the contrast is not that surprising if we take into account the "domain-sensitive" theory refined in the previous chapter. As already mentioned in chapter 2, languages may exhibit subject-object asymmetries of the following type: The realization of bound elements as pronouns (instead of anaphors) might already

[1]The structures in (6) and (7) suggest that the unmarked surface word order for German double object constructions is such that the indirect object precedes the direct object; however, they leave it open as to whether the objects are base-generated in this way (as (6-a) and (7-a) suggest) or whether this order is derived by some movement operation (as indicated in (6-b) and (7-b)). Note, however, that the argumentation as such is not affected if one prefers to assume that the indirect object follows the direct one in the unmarked case.

occur in much more local binding relations if the antecedent is an object (instead of a subject). For German, it has been observed that objects can bind anaphors only if the binding relation is established within the θ-domain (cf. (8-b)); if it is less local and occurs, for instance, in the subject domain, x must be realized as pronoun (cf. (9-b)). (The following examples are repeated from chapter 2, section 9.)

(8) a. Peter$_1$ erzählte uns von sich$_1$/sich selbst$_1$/*ihm$_1$.
Peter told us of SE/himself/him
'Peter$_1$ told us about himself$_1$.'

b. Wir erzählten [$_{\text{vP=ThD=SD}}$ t$_{wir}$ Peter$_2$ von sich selbst$_2$/?sich$_2$/*ihm$_2$.]
we told Peter of himself/SE/him
'We told Peter$_2$ about himself$_2$.'

(9) a. Peter$_1$ zeigte mir die Schlange neben sich$_1$/??sich selbst$_1$/ *ihm$_1$.
Peter showed me the snake near SE/himself/ him
'Peter$_1$ showed me the snake near him$_1$.'

b. Ich zeigte [$_{\text{vP=SD}}$ t$_{ich}$ Peter$_2$ die Schlange [$_{\text{PP=ThD}}$ neben
I showed Peter the snake near
ihm$_2$/??sich$_2$/*sich selbst$_2$.]]
him/SE/himself
'I showed Peter$_2$ the snake near him$_2$.'

If we reconsider the examples in (3-a) (**Welches Bild von Timo$_1$ mag er$_1$ am liebsten?*) and (4-a) (*?Welches Bild von Timo$_1$ hast du ihm$_1$ gezeigt?*), it seems to be exactly this subject-object asymmetry which is responsible for the contrast: Although x is embedded in the same way, its antecedent is a subject in the former and an object in the latter case.

Hence, these examples suggest that the domain-sensitive theory is on the right track; however, it remains to be seen how exactly the reconstruction data can be derived. In the next section, the problematic aspects of these data will first be expounded, before we then turn to possible solutions and detailed analyses of the data in the remaining chapter.

2. Theoretical Considerations

Let us start at the beginning, which is the numeration in a derivational model. As discussed before (cf. chapter 4, section 5.10.), there are in principle two possibilities. First, the antecedent might not be an R-expression; this means that it is encoded as y in the numeration with the realization matrix [SELF, SE, pron]. Consequently, the bound element, x, cannot contain an R-expression in its realization matrix either, and it contains exactly the same specifications: [SELF, SE, pron]. Moreover, x is equipped with a [β]-feature and y with a [β]- and a [$*\beta*$]-feature, and the second [$*\beta*$]-feature is associated with C (cf. the sections 5.12. and 5.13. in the previous chapter, which showed that this distribution of beta-features is obligatory in this case).[2] Obviously, this numeration is the starting point for the sentences in (1-d) (*Which picture of him*$_1$/*himself*$_1$ *does he*$_1$ *like?*) and (2-d) (*Which claim that he*$_1$ *made did he*$_1$ *later deny?*) (cf. (10-a)).

Alternatively, the antecedent might be encoded in the numeration as R-expression, which means that x is equipped with the realization matrix [SELF, SE, pron, R-ex] (cf. (10-b)). From this numeration, the examples (1-c) (*Which picture of him*$_1$/*himself*$_1$ *does John*$_1$ *like?*) and (2-c) (*Which claim that he*$_1$ *made did John*$_1$ *later deny?*) can be derived. The questions that remain to be answered are: What is the underlying numeration for (2-a) (*Which claim that John*$_1$ *made did he*$_1$ *later deny?*)? And why is it not possible to derive (1-a) (**Which picture of John*$_1$ *does he*$_1$ *like?*) in the same way?

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[2]For the sake of clarity, I will use different indices to distinguish between the beta-features associated with x and those associated with y, although they are in principle identical.

(10) *Possible underlying numerations:*

a. $\{y_{[*\beta_1*,\beta_2]/[SELF,SE,pron]},\ x_{[\beta_1]/[SELF,SE,pron]},\ C_{[*\beta_2*]},\ \ldots\}$

b. $\{\text{R-ex}_{[*\beta_1*]},\ x_{[\beta_1]/[SELF,SE,pron,R-ex]},\ \ldots\}$

At first sight, it is not surprising that (1-a) is ungrammatical. Since the binder is realized as a pronoun (*he*), we expect x not to have an R-expression in its realization matrix at all, and hence it seems to be trivial that x cannot be realized as *John*. However, then what about (2-a)? Here the preconditions are the same, and still it is possible to realize x as R-expression. This is unexpected against the background of chapter 4, according to which this sentence should not be derivable. Hence, the grammaticality of example (2-a) forces us to extend the theory of the previous chapter. Let us therefore start with a closer investigation of this sentence.

If we stick to the assumption that x can be realized as R-expression only if its binder is an R-expression, the grammaticality of (2-a) leaves only two possibilities.[3] Either x turns out to be optimally realized as an R-expression and the realization form of the binder is 'demoted' for some reason such that it surfaces as pronoun, although it is encoded as R-expression in the numeration. Alternatively, (2-a) could

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[3]Since (2-a) definitely contains an R-expression, it can be assumed that it is based on the numeration in (10-b).

In general, it is assumed that bound elements are always encoded as $x_{[\beta]}$ in the numeration, and their realization matrix can only contain an R-expression if this is a copy of the designated binder. This means that numerations of the type {R-ex (= binder); R-ex (= bound element)} or {y (= binder); R-ex (= bound element)} are excluded (cf. also chapter 4, section 5.10.). Note that apart from the fact that these numerations would undermine the general idea of how bound elements are derived in the course of the derivation, we would moreover lose the account of the generalization that pronouns can never bind R-expressions, and it would be completely unclear what could then rule out (1-a) since there would also have to be an optimal output candidate based on the latter numeration.

be considered to be the result of an optimal linearization derived at PF, which is based on a different outcome in the syntactic component, according to which the antecedent is an R-expression and x is predicted to be optimally realized as pronoun. In the following, I will explore these two possibilities.

3. The Demotion Approach

Let us first take a closer look at the demotion approach. It starts with the numeration $\{$R-ex$_{[*\beta_1*]}$, $x_{[\beta_1]/[SELF,SE,pron,R-ex]}$, $\ldots\}$, and in the end, the antecedent is realized as a pronoun and x as R-expression. At first sight, this approach therefore violates the *Inclusiveness Condition*, since a pronominal form is introduced in the course of the derivation which seems to spring up from nowhere (after all, the antecedent was encoded as R-expression in the numeration) – and this kind of violation is exactly what we have tried to avoid before by introducing the realization matrix in the other cases.

One way out of this dilemma might be to assume that the demoted forms are not inserted in the course of the derivation, but that each R-expression is equipped with a "demotion potential", similar to x's realization matrix. On this assumption, the R-expression would be encoded as R-ex$_{[pron,SE,SELF]}$ in the numeration, and in the case of demotion, the *Inclusiveness Condition* would not have to be violated. But although at first sight, this demotion potential and the realization matrix look very similar, they would have to function differently. While the most anaphoric form is the preferred specification in x's realization matrix, the first choice if the R-expression is demoted is obviously the pronominal form. In fact, demotion to an anaphoric form can generally be excluded if it is assumed that there is a constraint that prohibits demotion, and while demotion to the pronominal form violates this constraint only once, it is violated twice if the R-expression is demoted to the first anaphoric form.[4] So demotion can be considered to take place stepwise: the first step yields a pronominal form, the second step a simple anaphoric form, and the third step a complex anaphoric form. But the demotion approach faces some more problems.

For instance, we lose the straightforward explanation as to why the universal generalization holds that R-expressions cannot be bound by pronouns. If a binding pronoun can in principle be a demoted R-expression, we can no longer exclude that x's realization matrix contains the copy of an R-expression, even if its antecedent surfaces as pronoun. Hence, the candidate *pron*$_{demoted}$ – *R-ex* as such exists (whereas *pron* – *R-ex* is not a possible candidate at all if we exclude demotion), and it must be ruled out as potential winner in another way. For example, it might be harmonically bounded by the candidate *R-ex* – *R-ex*, because demotion is costly, and the latter candidate does not involve demotion while the bound element has the same realization form.

A more severe problem concerns the additional constraints that we would need in such an approach. Since, according to the demotion approach, the sentences (2-a) (*Which claim that John*$_1$ *made did he*$_1$ *later deny?*) and (2-c) (*Which claim that he*$_1$ *made did John*$_1$ *later deny?*) emerge from the same numeration (= {R-ex$_{[*\beta_1*]}$, $x_{[\beta_1]/[SELF,SE,pron,R-ex]}$, ...}), they would have to be winners of the same competition. However, in (2-a), x's optimal realization matrix is [R-ex], while in (2-c), it is [pron, R-ex]. Hence, only the former sentence violates FAITH$_{pron}$, the highest-ranked relevant FAITH-constraint of the respective subhierarchy. Consequently, (2-c) must

[4]Note that it is generally reasonable to assume that demotion is costly, because we lose semantic information if the antecedent is not realized as R-expression, as indicated in the numeration, but only as pronoun. The constraint that prohibits demotion (cf. (16) in the subsequent section) can therefore be classified as MAX-constraint, which means that it punishes loss of information.

With x it is different. Due to the fact that x has an antecedent in the sentence/discourse, its meaning is always fully recoverable, independent of its realization form.

violate an equally highly ranked constraint such that both sentences can turn out to be optimal. Unfortunately, this additional constraint cannot be the principle alluded to before, namely that demotion is costly, since it must be violated by (2-c), which does not involve demotion at all (in contrast to (2-a), which therefore violates a further constraint).

If we consider the two sentences, the only aspect where (2-c) comes off worse than (2-a) concerns the linear order of pronoun and R-expression. On the assumption that it is preferable if R-expressions linearly precede coindexed pronouns, (2-a) is better in this respect. However, it is not easy to integrate such a constraint into the syntactic component. Consider (11-a), which represents the point in the derivation when x checks its [β]-feature with its antecedent.[5]

(11) Which claim that John_1 made did he_1 (later) deny?

a. $[_{\text{vP}}\ [_{\text{NP}}\ \text{t}'_x$ which claim $\cancel{[_{\text{CP}}\ \text{that}\ \text{t}_x\ \text{made}]}]$ $\text{John}_{[*\beta*]}$ deny $[_{\text{VP}}\ \text{t}_{NP}\ x_\beta$ $\text{t}_{deny}\ \cancel{[\ldots]}]]$

At this stage, x does not precede the antecedent but is positioned in the next lower specifier position (= SpecV). And although a trace of x linearly precedes the antecedent, because it is contained in the *wh*-phrase in the highest specifier position, it is only determined at PF in which position x is spelt out. Hence, it would require a great deal of look-ahead if we wanted to apply a constraint like the following at this stage with the result that it is violated by the matrix [pron, R-ex] (– because at PF x would then be realized as pronoun, and since it would be spelt out in the *wh*-phrase, it would finally linearly precede the coindexed R-expression).

(12) *PRON–R-EX (*p-R):

Pronouns must not linearly precede coindexed R-expressions.

[5] As in the previous chapters, I do not use the DP notation but only NPs for the sake of simplicity.

Moreover, the constraint cannot even be formulated in a more general way, for instance such that there would be a general ban on forms preceding coindexed less anaphoric forms, because in the case of anaphors, it is unproblematic that they linearly precede their antecedents (cf. (1-c), *Which picture of himself*$_1$ *does John*$_1$ *like?*, *vs* (1-a), **Which picture of John*$_1$ *does he*$_1$*/heself*$_1$*/himself*$_1$ *like?*).

3.1. Analysis

But although the approach suffers from all these drawbacks, let me briefly illustrate – for the sake of concreteness – how the sentences in (1) and (2), repeated in (13) and (14), could in principle be derived.

(13) a. *[Which picture of John$_1$]$_2$ does he$_1$ like t$_2$?
b. *[Which picture of John$_1$]$_2$ does John$_1$ like t$_2$?
c. [Which picture of him$_1$/himself$_1$]$_2$ does John$_1$ like t$_2$?
d. [Which picture of him$_1$/himself$_1$]$_2$ does he$_1$ like t$_2$?

(14) a. [Which claim that John$_1$ made]$_2$ did he$_1$ later deny t$_2$?
b. *[Which claim that John$_1$ made]$_2$ did John$_1$ later deny t$_2$?
c. [Which claim that he$_1$ made]$_2$ did John$_1$ later deny t$_2$?
d. [Which claim that he$_1$ made]$_2$ did he$_1$ later deny t$_2$?

Assume that apart from (12), the following two constraints hold, and that they are ordered as indicated in (17). (The relevance of the constraint in (15) is illustrated in T$_{2.1}$.) Since all three constraints make reference to properties of the antecedent, they can apply vacuously before the antecedent is merged into the derivation.

(15) *X-X: Binder and bindee must not have the same realization form.

(16) *DEMOTION (*DEM): Avoid demotion.

(17) *X-X $\gg$ *PRON–R-EX $\circ$ FAITH$_{pron}$ $\gg$ *DEM

Let us first consider the derivation of (13-c). (18-a) illustrates the point in the derivation when PP optimization takes place. At this stage, the antecedent has not yet entered the derivation, and since I assume that the Case-marking of x does not only involve the preposition but also N, only PRINCIPLE $\mathcal{A}_{XP}$ applies non-vacuously when PP is optimized. Hence, O_1 turns out to be optimal, as T_1 illustrates.

(18) [Which picture of him_1/$\text{himself}_1]_2$ does he_1/John_1 like t_2?

a. $[_{\text{PP}}\ x_{[\beta]}$ of $t_x]$

T_1: PP optimization

(XP reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{pron}	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{XP}$
⇒	O_1: [SELF, SE, pron, R-ex]				$***$
	O_2: [SE, pron, R-ex]			$*!$	$**$
	O_3: [pron, R-ex]		$*!$	$*$	$*$
	O_4: [R-ex]	$*!$	$*$	$*$	

When the NP is built, *Phrase Balance* triggers movement to the edge of the phrase. At this stage, x's θ- and Case domain are reached, and when the phrase is optimized, both [SELF, SE, pron, R-ex] and [SE, pron, R-ex] are predicted to be optimal (cf. $T_{1.1}$).

(19) b. $[_{\text{NP}}\ x_{[\beta]}$ which picture $[_{\text{PP}}\ t'_x$ of $\cancel{t_x}]]$

$T_{1.1}$: NP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Input: O_1/T_1	F_{pron}	F_{SE}	$\text{PR.}\mathcal{A}_{CD}$	F_{SELF}	$\text{PR.}\mathcal{A}_{ThD}$	$\text{PR.}\mathcal{A}_{XP}$
⇒ O_{11}: [SELF, SE, pron, R]			$***(!)$		$***$	$***$
⇒ O_{12}: [SE, pron, R-ex]			$**$	$*(!)$	$**$	$**$
O_{13}: [pron, R-ex]		$*!$	$*$	$*$	$*$	$*$
O_{14}: [R-ex]	$*!$	$*$		$*$		

As long as no bigger domain relevant for binding is reached, these two matrices remain optimal. So let us skip VP optimization and turn to vP optimization illustrated in $T_{1.1.1}/T_{1.1.2}$. Note, however, that at the VP level *Phrase Balance* does not only trigger movement of x but also of the whole *wh*-phrase (= NP).[6]

(20) c. $[_{\text{VP}}\ [_{\text{NP}_{[wh]}}\ t''_x$ which picture $\cancel{[_{\text{PP}}\ t'_x \text{ of } t_x]}]\ x_{[\beta]}$ like $t_{NP}]$
Num.=$\{\text{John}_{[*\beta*]}, \text{C}_{[*wh*]}, \ldots\}$

When vP is reached, the antecedent finally enters the derivation, hence, there is no need for x to move any further, since it can now establish a checking configuration.

(21) d. $[_{\text{vP}}\ [_{\text{NP}_{[wh]}}\ t''_x$ which picture $\cancel{[_{\text{PP}}\ t'_x \text{ of } t_x]}]$ $\text{John}_{[*\beta*]}$ like $[_{\text{VP}}\ t'_{NP}\ x_{[\beta]}$ $t_{like}\ \cancel{[t'_{NP}]}]]$

Thus, the PRINCIPLE $\mathcal{A}$-constraints apply vacuously, but now the three constraints *PRON–R-EX, *DEMOTION, and *X-X come into play. *X-X is violated by the

[6]Note that it is not possible to leave x within the *wh*-phrase; since the specifier of a specifier is not an edge position, x could not satisfy *Phrase Balance* in this position:

(i) *$[_{\text{VP}}\ [_{\text{NP}_{[wh]}}\ x_{[\beta]}$ which picture $\cancel{[_{\text{PP}}\ t'_x \text{ of } t_x]}]$ saw $t_{NP}]$
workspace: $\{\text{John}_{[*\beta*]}, \text{C}_{[*wh*]}, \ldots\}$

candidates O_{116} and O_{117}, since they predict the same type of realization form for both binder and bindee. *DEMOTION is violated by all candidates that involve a demoted antecedent (the possibility that demotion yields an anaphoric form is ignored because these candidates would all be harmonically bounded by the respective candidates involving demotion to the pronominal form). *PRON–R-EX is only violated by candidate O_{115}, since this configuration would finally lead to a linearization where the R-expression would be preceded by a coindexed pronoun. However, there is one candidate in this competition which does not violate any constraint, namely O_{111}, and hence it is predicted to be optimal. So this derivation finally yields the sentence *Which picture of himself₁ does John₁ like?*.[7]

$T_{1.1.1}$: vP optimization

(XP/ThD/CD/SD reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *apply vacuously)*

Input: $O_{11}/T_{1.1}$	*X-X	*p-R	F_{pron}	*DEM	F_{SE}	F_{SELF}
⇒ O_{111}: R-ex$_{gen}$ – $x_{[SELF,SE,pron,R]}$						
O_{112}: pron$_{dem}$ – $x_{[SELF,SE,pron,R]}$				*!		
O_{113}: R-ex$_{gen}$ – $x_{[SE,pron,R]}$						*!
O_{114}: pron$_{dem}$ – $x_{[SE,pron,R]}$				*!		*
O_{115}: R-ex$_{gen}$ – $x_{[pron,R]}$		*!			*	*
O_{116}: pron$_{dem}$ – $x_{[pron,R]}$	*!			*	*	*
O_{117}: R-ex$_{gen}$ – $x_{[R-ex]}$	*!		*		*	*
O_{118}: pron$_{dem}$ – $x_{[R-ex]}$			*!	*	*	*

[7]In the subsequent tableaux, *pron$_{dem}$* represents pronominal forms that result from demotion, and *R-ex$_{gen}$* refers to "genuine" R-expressions, i.e., R-expressions that do not result from a reduced realization matrix but are encoded as such in the numeration.

However, the competition in $T_{1.1}$ yields two optimal outputs, hence there is an alternative derivation based on the O_{12}=[SE, pron, R-ex]. When vP is optimized, this derivation predicts the pair R-ex$_{gen}$ – $x_{[SE,pron,R-ex]}$ to be optimal; and since English lacks a simple anaphoric form, it finally yields the sentence *Which picture of him$_1$ does John$_1$ like?*. Hence, (13-c) has been derived successfully.

$T_{1.1.2}$: vP optimization

(XP/ThD/CD/SD reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *apply vacuously)*

Input: $O_{12}/T_{1.1}$	*X-X	*p-R	F_{pron}	*DEM	F_{SE}	F_{SELF}
⇒ O_{121}: R-ex$_{gen}$ – $x_{[SE,pron,R]}$						*
O_{122}: pron$_{dem}$ – $x_{[SE,pron,R]}$				*!		*
O_{123}: R-ex$_{gen}$ – $x_{[pron,R]}$		*!			*	*
O_{124}: pron$_{dem}$ – $x_{[pron,R]}$	*!			*	*	*
O_{125}: R-ex$_{gen}$ – $x_{[R-ex]}$	*!		*		*	*
O_{126}: pron$_{dem}$ – $x_{[R-ex]}$			*!	*	*	*

Let us now turn to sentence (13-d) (repeated in (22)). Here, no R-expression is involved, hence, x's realization matrix cannot contain a copy either and the antecedent is also encoded as unspecified y which is equipped with a realization matrix. Consequently, the constraints *DEMOTION, *PRON–R-EX, and FAITH$_{pron}$ will not play a role in the derivation and are therefore ignored in the subsequent tableaux. Moreover, since y is not yet specified at the time when x checks its [β]-feature, *X-X cannot be violated at this point in the derivation either. Hence, the competition is in this case determined by the PRINCIPLE $\mathcal{A}$-constraints that come into play before checking takes place and the two FAITH-constraints FAITH$_{SE}$ and FAITH$_{SELF}$; cf.

the illustrations in $T_{1.1.1'}$ and $T_{1.1.2'}$.[8]

(22) [Which picture of him_1/himself_1]$_2$ does he_1 like t_2?

a. $[_{vP}\ [_{NP_{[wh]}}\ t''_x$ which picture $\cancel{[_{PP}\ t'_x \text{ of } t_x]}]\ y_{[*\beta_1*,\beta_2]}$ like $[_{VP}\ t'_{NP}\ x_{[\beta_1]}$ $t_{like}\ \cancel{[t_{NP}]}]]$

$T_{1.1.1'}$: vP optimization (with binder = y)
(XP/ThD/CD/SD reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *irrelevant for x;*
for y: XP/ThD reached)

Input: $O_{11}/T_{1.1}$	*X-X	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
⇒ $O_{111'}$: $y_{[SELF,SE,pr]} - x_{[SELF,SE,pr]}$				**	**
$O_{112'}$: $y_{[SE,pron]} - x_{[SELF,SE,pron]}$			*!	*	*
$O_{113'}$: $y_{[pron]} - x_{[SELF,SE,pron]}$		*!	*		
$O_{114'}$: $y_{[SELF,SE,pron]} - x_{[SE,pron]}$			*!	**	**
$O_{115'}$: $y_{[SE,pron]} - x_{[SE,pron]}$			*!*	*	*
$O_{116'}$: $y_{[pron]} - x_{[SE,pron]}$		*!	**		
$O_{117'}$: $y_{[SELF,SE,pron]} - x_{[pron]}$		*!	*	**	**
$O_{118'}$: $y_{[SE,pron]} - x_{[pron]}$		*!	**	*	*
$O_{119'}$: $y_{[pron]} - x_{[pron]}$		*!*	**		

[8]The previous optimization steps do not completely correspond to the illustrations in T_1 and $T_{1.1}$, but since the winners would be the same, I simply refer to these two tableaux. (In fact, in the PP and NP optimization for sentence (13-d)/(22), the fourth candidate, [R-ex], and the specification *R-ex* in the other matrices would be missing; as a result, there would be one violation less for each candidate with respect to the PR.$\mathcal{A}$-constraints.)

$T_{1.1.2'}$: vP optimization

(XP/ThD/CD/SD reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ irrelevant for x; for y: XP/ThD reached)

Input: $O_{12}/T_{1.1}$	*X-X	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
⇒ $O_{121'}$: $y_{[SELF,SE,pron]} - x_{[SE,pron]}$			*	**	**
$O_{122'}$: $y_{[SE,pron]} - x_{[SE,pron]}$			**!	*	*
$O_{123'}$: $y_{[pron]} - x_{[SE,pron]}$		*!	**		
$O_{124'}$: $y_{[SELF,SE,pron]} - x_{[pron]}$		*!	*	**	**
$O_{125'}$: $y_{[SE,pron]} - x_{[pron]}$		*!	**	*	*
$O_{126'}$: $y_{[pron]} - x_{[pron]}$		*!*	**		

As the previous two tableaux show, it is again correctly predicted that the optimal form for x is the SELF anaphor or the SE anaphor (i.e., the pronominal form in English). As far as y is concerned, it will not be bound before the root is reached, hence, it reaches all the domains relevant for binding before, and thus the matrix will be reduced further in the course of the derivation until only the specification [pron] is left. As a result, we get (13-d).

To sum up, $T_{1.1.1'}/T_{1.1.2'}$ provide an account of sentence (13-d), where no R-expression is involved, and $T_{1.1.1}/T_{1.1.2}$ not only illustrate how (13-c) can be derived but also show why (13-a) and (13-b) are illicit: (13-a) (**Which picture of John$_1$ does he$_1$ like?*) corresponds to O_{118} in $T_{1.1.1}$ and O_{126} in $T_{1.1.2}$, and both candidates are ruled out because they violate the relatively highly ranked FAITH$_{pron}$ such that they come off worse than the matrices with the anaphoric specifications. (13-b) (**Which picture of John$_1$ does John$_1$ like?*) (= O_{117} in $T_{1.1.1}$ and O_{125} in $T_{1.1.2}$) also violates FAITH$_{pron}$, but moreover, it violates *X-X, which is even higher ranked (as will be shown in the following analyses); hence, it must also be ruled out.

Let us now turn to the second set of sentences, which were repeated in (14). The main difference between these "claim"-examples and the "picture"-examples discussed before is that here x already reaches its subject, finite, and indicative domain much earlier, namely before the antecedent enters the derivation. As a result, x's realization matrix is already reduced to [pron] before the antecedent and x establish a checking relation. This means that the matrices with anaphoric specifications will already have been ruled out irreversibly at that stage, and the optimal realization of x cannot be an anaphoric form.

In the previous examples (the "picture"-sentences), the anaphoric elements remained in the competition and came off better than [R-ex] in the end (cf. $T_{1.1.1/1.1.2}/T_{1.1.1'/1.1.2'}$). By contrast, in the "claim"-examples, only [pron, R-ex] competes with [R-ex] when the binding relation is established, and hence the latter can possibly win (cf. $T_{2.2}/T_{2.2'}$).

Let us now consider the first example, (14-c), repeated in (23). The first domain relevant for binding is reached when the vP of the relative clause is completed (cf. (23-a)). At this stage, x's θ-domain is reached, but in the corresponding competition the full matrix [SELF, SE, pron, R-ex] remains optimal and no specification is deleted. The next optimization process is more interesting; when TP is completed, the accessible domain not only contains an indicative verb but also x's Case-marker T, which means that TP corresponds to x's θ-, Case, subject, finite, and indicative domain (cf. (23-b)).

(23) [Which claim that he_1 made]$_2$ did John_1 (later) deny t_2?

a. $[_{\text{vP}}\ \text{op}\ x_{[\beta]}\ \text{made}\ [_{\text{VP}}\ t'_{op}\ t_{made}\ \cancel{t_{op}}]$

b. $[_{\text{TP}}\ \text{op}\ x_{[\beta]}\ [_{\text{vP}}\ t''_{op}\ t_x\ \text{made}\ \cancel{[_{\text{VP}}\ t'_{op}\ t_{made}\ t_{op}]}]$

T_2 illustrates the corresponding competition.[9] Since the high-ranked constraints PRINCIPLE $\mathcal{A}_{ID}$, PRINCIPLE $\mathcal{A}_{FD}$, and PRINCIPLE $\mathcal{A}_{SD}$ are involved, O_3 wins against O_1 and O_2.

[9]For reasons of space, I abbreviate the candidates in this and some of the subsequent tablaux.

T_2: vP optimization

(XP/ThD/CD AND SD/FD/ID reached – $x_{[\beta]}$ unchecked)

Candidates	F_{pron}	PR.$\mathcal{A}_{ID/FD/SD}$	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{CD}$	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
O_1: [S, S, pr, R]		**!*			* * *	* * *	* * *
O_2: [S, pr, R]		**!		*	**	**	**
⇒ O_3: [pr, R-ex]		*	*	*	*	*	*
O_4: [R-ex]	*!		*	*			

NP and VP optimization, the subsequent competitions, do not change the result; as long as the antecedent is not merged into the derivation, only the FAITH- and the PRINCIPLE $\mathcal{A}$-constraints are involved in the competitions, and they cannot reduce the matrix any further.[10] But let us see what happens when the binder enters the derivation.

(24) c. finally:

[$_{vP}$ [$_{NP}$ t''''_x which claim ~~[$_{CP}$ t'''_x that [$_{TP}$ ...]]~~] $John_{[*\beta*]}$ deny [$_{VP}$ t'_{NP} $x_{[\beta]}$ t_{deny} ~~[t_{NP}]~~]]

If the binder is an R-expression, as in the case of example (14-c) (*Which claim that he$_1$ made did John$_1$ later deny?*), four candidates compete, depending on whether the R-expression is demoted or not and whether the matrix is reduced further or not (cf. $T_{2.1}$). Sentence (14-c) is based on O_{31}, so this must be an optimal output candidate. As the other candidates, it violates FAITH$_{SE}$ and FAITH$_{SELF}$; but in addition, it violates the constraint *PRON–R-EX, since it would result in a linearization where a pronominal form would precede a coindexed R-expression (although this is not yet the case at the current stage of the derivation). This violation is crucial, because

[10]All PR.$\mathcal{A}$-constraints, which would favour a reduction of the matrix, are outranked by FAITH$_{pron}$, which is violated by O_4, the only remaining competing candidate.

this derivation must not only yield sentence (14-c), but also sentence (14-a) (*Which claim that John*$_1$ *made did he*$_1$ *later deny?*), as argued in the previous section. And the latter sentence is based on candidate O_{34}, which not only violates FAITH$_{SE}$ and FAITH$_{SELF}$, but also FAITH$_{pron}$ and *DEMOTION.[11] So if it is assumed that the latter constraints are not higher ranked than *PRON–R-EX and at least one of them is tied with *PRON–R-EX, both O_{31} and O_{34} come off equally well. What is left to show is how the remaining two candidates can be ruled out; and this can be easily done if the constraint *X-X is ranked above the tie mentioned before.

$T_{2.1}$: vP optimization (with binder = R-ex)
($x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *apply vacuously)*

	Input: O_3/T_2	*X-X	*p-R	F$_{pron}$	*DEM	F$_{SE}$	F$_{SELF}$
⇒	O_{31}: R-ex$_{gen}$ – $x_{[pron,R]}$		*(!)			*	*
	O_{32}: pron$_{dem}$– $x_{[pron,R]}$	*!			*	*	*
	O_{33}: R-ex$_{gen}$ – $x_{[R]}$	*!		*		*	*
⇒	O_{34}: pron$_{dem}$ – $x_{[R]}$			*(!)	*	*	*

At this point the question might arise as to why *X-X does not rule out (14-d) (*Which claim that he*$_1$ *made did he*$_1$ *later deny?*). However, if the antecedent is not encoded as R-expression in the numeration, it is an unspecified y equipped with a realization matrix, and its optimal realization has not yet been determined when x checks its [β]-feature against it (cf. $T_{2.1'}$). Hence, *X-X applies vacuously when the optimal realization matrix of x is determined (– trivially, it is [pron], since a further reduction is not possible in this case). At this stage, y's matrix remains fully specified, but since it will not be bound before the root of the sentence is completed, it will also be reduced to [pron] in the course of the derivation, and in the end we

[11] Note, however, that O_{34} does not violate *PRON–R-EX, since it eventually yields the word order R-ex$_1$ $\succ$ pron$_1$.

therefore get sentence (14-d).

$T_{2.1'}$: vP optimization (with binder = y)

($x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *irrelevant for x – for y: XP/ThD reached)*

Input: O_3/T_2	*X-X	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
⇒ O_1: $y_{[SELF,SE,pron]} - x_{[pron]}$		*	*	**	**
O_2: $y_{[SE,pron]} - x_{[pron]}$		*	**!	*	*
O_3: $y_{[pron]} - x_{[pron]}$		**!	**		

To sum up, all "claim"-sentences have now been derived as follows: $T_{2.1'}$ illustrates the derivation of (14-d) (*Which claim that he$_1$ made did he$_1$ later deny?*), and $T_{2.1}$ yields (14-c) (*Which claim that he$_1$ made did John$_1$ later deny?*) and (14-a) (*Which claim that John$_1$ made did he$_1$ later deny?*), whereas (14-b) (*Which claim that John$_1$ made did John$_1$ later deny?*) is ruled out because it violates the high-ranked constraint *X-X. So if we compare again sentence (14-a) with sentence (13-a) (**Which picture of John$_1$ does he$_1$ like?*), the tableaux $T_{2.1}$ *vs* $T_{1.1.1}/T_{1.1.2}$ reveal that the latter example is not possible because the underlying candidate (O_{118} in $T_{1.1.1}/O_{126}$ in $T_{1.1.2}$) is outranked by the anaphoric candidates; so the tie between *PRON–R-EX and FAITH$_{pron}$, which gives rise to optionality in $T_{2.1}$, does not play a role in $T_{1.1.1}/T_{1.1.2}$.

3.2. Summary

All in all, it can be concluded that the demotion approach can in principle account for the reconstruction data. However, the discussion above also showed that it suffers from several drawbacks.

First, we lose the inherent explanation that it is generally impossible that a pronoun binds an R-expression, even in languages in which R-expressions may be bound by other R-expressions. In order to avoid a violation of the *Inclusiveness Condition*, it is moreover necessary to introduce a demotion matrix which is associated with each R-expression, and since it differs from the realization matrix that bound elements are equipped with, this must be considered an additional theoretical stipulation. However, the most severe objection to the deomotion approach concerns the additional constraints that have to be introduced in order for the derivation to succeed – in particular the constraint *PRON–R-EX looks very much like an *ad hoc* invention which requires quite a lot of look-ahead capacities since the final linearization is evaluated before it has been constructed and the corresponding items are concretely selected. Hence, it does not seem to fit into a derivational account at all. Similarly, *X-X looks very much like a representational constraint; however, in contrast to *PRON–R-EX, it is at least sufficient to know the material in the accessible domain in order to evaluate the constraint.

So if all these additional stipulations (and in particular non-derivational constraints) are necessary to integrate this specific construction into the present approach, the question arises as to whether it is the right way to derive sentences like (14-a) (*Which claim that John*$_1$ *made did he*$_1$ *later deny?*) like this – in the syntactic component with the R-expression as optimal realization of x and a demoted antecedent (pronominal realization instead of R-expression). After all, it might be preferable to consider this kind of data as a "special case" which requires a completely different approach that might not even be part of narrow syntax. So let us take a closer look at an alternative approach which treats these data as PF phenomena.

4. Optimal Linearization at PF

For the sake of convenience, let me repeat once more the core data:

(25)
a. *[Which picture of John$_1$]$_2$ does he$_1$ like t$_2$?
b. *[Which picture of John$_1$]$_2$ does John$_1$ like t$_2$?
c. [Which picture of him$_1$/himself$_1$]$_2$ does John$_1$ like t$_2$?
d. [Which picture of him$_1$/himself$_1$]$_2$ does he$_1$ like t$_2$?

(26) a. [Which claim that John$_1$ made]$_2$ did he$_1$ later deny t$_2$?
b. *[Which claim that John$_1$ made]$_2$ did John$_1$ later deny t$_2$?
c. [Which claim that he$_1$ made]$_2$ did John$_1$ later deny t$_2$?
d. [Which claim that he$_1$ made]$_2$ did he$_1$ later deny t$_2$?

As alluded to before, an alternative approach would be to assume that sentences like (26-a) are the result of an optimal linearization derived at PF, which is based on a different outcome in the syntactic component.[12]

In a nutshell, this approach works as follows. Again, the derivation is based on the numeration $\{$R-ex$_{[*\beta_1*]}$, $x_{[\beta_1]/[SELF,SE,pron,R-ex]}$, $\ldots\}$. In the course of the syntactic derivation, [pron, R-ex] is predicted to be x's optimal realization matrix and its binder keeps the form of an R-expression, as encoded in the numeration. At PF, when it is determined in which position x is spelt out, it turns out that the bound element linearly precedes its antecedent, and on the assumption that it is in principle preferable if R-expressions are uttered before coreferent pronouns (which seems to coincide with our intuition), the two forms can optionally be interchanged.[13]

Before we turn to the discussion of how this exchange can be technically implemented, let us investigate more thoroughly when this kind of reconstruction is licit. Let us therefore start with the following question: If (26-a) and (26-c) are based on

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[12]That reconstruction data might be treated best as PF phenomena has already been proposed before. However, the PF-movement approaches developed by Aoun & Benmamoun (1998) and Sauerland & Elbourne (2002), for instance, only deal with Scope Reconstruction.

[13]That the linear order of antecedent and bound element has an impact on binding relations has also been suggested by Featherston & Sternefeld (2003), who propose the (violable) *Binding Direction Rule*:

(i) *Binding Direction Rule*
A binder must linearly precede its bound element. (Featherston & Sternefeld (2003:39))

the same syntactic derivation and differ only insofar as (26-a) involves an additional optional exchange at PF, why is it not possible to derive (25-a) in a similar way from (25-c) (the latter examples are repeated in (27))?

(27) a. *[Which picture of **John**$_1$]$_2$ does **he**$_1$ like t$_2$?
b. [Which picture of **him**$_1$/**himself**$_1$]$_2$ does **John**$_1$ like t$_2$?

A first tentative answer could be that a genuine change of bound element and antecedent in (27-b) would not really yield (27-a), but rather something like the sentences in (28). However, they are illicit because the antecedent must occur in the Nominative, which differs phonologically from the given form in (28-a) and does not exist at all in the anaphoric case in (28-b).

(28) a. *[Which picture of John$_1$]$_2$ does him$_1$ like t$_2$?
b. *[Which picture of John$_1$]$_2$ does himself$_1$ like t$_2$?

In (26-a), on the other hand, the two forms are phonologically identical to the forms in (26-c) (repeated in (29-a) and (29-b), respectively).

(29) a. [Which claim that **John**$_1$ made]$_2$ did **he**$_1$ later deny t$_2$?
b. [Which claim that **he**$_1$ made]$_2$ did **John**$_1$ later deny t$_2$?

However, the exchange at PF does not really hinge on the identity of the phonological form, as the following German example shows.

(30) a. [Welchen Brief, den ich **Hans**$_1$ geschickt habe,]$_2$ hat **er**$_1$ t$_2$ laut
which letter that I John sent have has he loud
vorgelesen?
read out
'Which letter that I had sent to John$_1$ did he$_1$ read out loud?'

b. [Welchen Brief, den ich **ihm**$_1$ geschickt habe,]$_2$ hat **Hans**$_1$ t$_2$ laut
which letter that I him sent have has John loud
vorgelesen?
read out
'Which letter that I had sent to him$_1$ did John$_1$ read out loud?'

Hence, the ungrammaticality of (25-a) (= (27-a)) must be explained differently. In fact, it seems to be the case that the bound element can only be realized as R-expression if the alternative grammatical possibility involves a pronominal realization and no anaphoric form. That is, an exchange of the realization form is excluded if anaphors are involved. This assumption is supported by the observation that an exchange with anaphoric elements is even ruled out if the antecedent is not in a Nominative Case position but in a Case position for which anaphoric forms would in principle be available.

(31) a. [Welches Bild von **sich**$_1$] gefällt **Timo**$_1$ am besten?
which picture of SE pleases Timo$_{dat}$ best
'Which picture of him$_1$/himself$_1$ does Timo$_1$ like best?'

b. *[Welches Bild von **Timo**$_1$] gefällt **sich**$_1$ am besten?
which picture of Timo pleases SE$_{dat}$ best
'Which picture of him$_1$/himself$_1$ does Timo$_1$ like best?'

c. Timo$_1$ gefällt sich$_1$.
Timo pleases SE$_{dat}$
'Timo$_1$ pleases himself$_1$.'

As the German example in (31-c) illustrates, the SE anaphor *sich* can be used in the Dative. But although the target position of *sich* would be a Dative argument position and the forms would even be phonologically identical, it is not possible to exchange the bound anaphor and its antecedent, an R-expression, in sentences like (31-a) (as illustrated in (31-b)).

So it must be concluded that it is not the identity of the phonological form that rules out an exchange at PF, but that it is simply an illicit operation for anaphors.[14,15]

However, it still remains to be seen why (25-a) (= (27-a)) cannot be derived from the version of (25-c) (= (27-b)) which involves the pronominal form. Here we have to remember the derivation of this form; the crucial thing about it is that it is not based on the optimal matrix [pron, R-ex], but rather on the matrix [SE, pron, R-ex], and since English lacks simple anaphors, the most specific available form is chosen, which is the pronoun. Thus we can account for the lack of exchange in (25-c) if we assume that it would have to occur before MAB eventually determines the optimal realization so that it is the optimal realization matrix that is considered rather than the concrete form. This is what we have to assume anyway in view of the fact that the pronominal exchange does not necessarily presuppose identity in phonological form. Hence, these reconstruction data provide further evidence for the assumption

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[14] Note moreover that sentence (31-b) does not improve if the R-expression is replaced with a pronoun.

(i) *[Welches Bild von ihm$_1$] gefällt sich$_1$ am besten?
which picture of him pleases SE$_{dat}$ at best
'Which picture of him$_1$/himself$_1$ does he$_1$ like best?'

Thus we can conclude that the exchange of R-expression and pronoun is not alone facilitated by the fact that these forms are adjacent on the anaphoricity hierarchy; otherwise we would expect (i) to be grammatical as well, since pronouns and (simple) anaphors are also adjacent (just like pronouns and R-expressions). It rather seems to be the case that anaphors are generally excluded from this kind of operation.

[15] Intuitively speaking, the hearer might have difficulties with the reconstruction of the syntactic structure if the anaphor occupies a position that has never been c-commanded by the coindexed item throughout the derivation.

that an English pronoun is not only the corresponding realization for the matrix [pron, R-ex], but also the form that is chosen if the optimal matrix is [SE, pron, R-ex].

To sum up, everything amounts to the following scenario: If $x_{[pron,R-ex]}$ linearly precedes its antecedent (= an R-expression) at PF, they can optionally exchange positions, and afterwards Late Insertion (guided by the MAB principle) takes place and assigns x its phonological form. Optionality arises because the exchange is both costly and desired because it yields a better linearization.

4.1. Technical Implementation

What remains to be seen is how this process can be technically integrated into the model. Hence, the following issues need to be addressed: What exactly is exchanged? What are the licensing conditions for this operation? And what exactly does the rule look like?

As to the first question, it has been observed before that it is crucial that the exchange occurs before Late Insertion takes place, because not the lexical items as such change positions but their realization specification. This is a logical conclusion given the fact that the exchange might affect different Case positions (cf. (30): *Welchen Brief, den ich ihm*$_1$ *(=Dat) geschickt habe hat Hans*$_1$ *(=Nom) laut vorgelesen? vs Welchen Brief, den ich Hans*$_1$ *(=Dat) geschickt habe, hat er*$_1$ *(=Nom) laut vorgelesen?*). Apparently, it is possible that a Dative pronoun occurs in the Nominative Case after the exchange has taken place; this suggests that the crucial exchange operation does not affect the complete set of features, but only the specifications concerning the form of x and its binder.

On this assumption, the Case features remain in their original position, and thus the exchanged forms take on the Case associated with their new positions. For the sake of concreteness, consider the situation in (30) (repeated in (32)).

(32) a. Welchen Brief, den ich **ihm**$_1$ geschickt habe, hat **Hans**$_1$ laut
which letter that I him sent have has John loud
vorgelesen?
read out
'Which letter that I had sent to him$_1$ did John$_1$ read out loud?'

b. Welchen Brief, den ich **Hans**$_1$ geschickt habe, hat **er**$_1$ laut
which letter that I John sent have has he loud
vorgelesen?
read out
'Which letter that I had sent to John$_1$ did he$_1$ read out loud?'

Let us start with sentence (32-a). At PF, before Late Insertion takes place, the bound element is encoded as a bundle of features including, *inter alia*, the realization matrix [pron, HANS] and a Dative Case feature.[16] Since the binder has been encoded as R-expression from the beginning in this example, the respective set of features does not contain a realization matrix but simply the form HANS plus all the other features like Case (here Nominative Case), ϕ-features etc. (cf. (33-a)).

Until this stage, the derivation of example (32-b) is identical; but before Vocabulary Insertion takes place, an operation is triggered that derives (33-b) from (33-a). Informally speaking, it can be called an exchange of the realization specification (we will turn to this aspect immediately) – in any case, the illustration in (33) shows clearly that the other features are not affected, which has the effect that in its new position [pron, HANS] is no longer marked for Dative Case but for Nominative Case, whereas HANS is now associated with Dative Case. As far as the ϕ-features are con-

[16]I use capital letters for the (copy of the) R-expression to indicate that it is still an abstract form, because Late Insertion has not yet taken place; the "real" vocabulary item will have to be modified according to the other associated features.

cerned, they are not affected by the operation either, but since x and its antecedent refer to the same entity, they are identical anyway.

(33) a. *bound element:*
{**[pron, HANS]**, Dative, 3rd person, singular, masculine, ...}
binder:
{**HANS**, Nominative, 3rd person, singular, masculine, ...}
b. *bound element:*
{**HANS**, Dative, 3rd person, singular, masculine, ...}
binder:
{**[pron, HANS]**, Nominative, 3rd person, singular, masculine, ...}

What has been assumed so far is that not the complete bundles of features change their positions, but only the part where the realization form is encoded. However, if we compare again (33-a) and (33-b), it can be seen that this operation can be restricted further: It need not be the case that the complete specifications, [pron, HANS] and HANS, exchange their positions, it suffices if some part of x's realization matrix is shifted to the antecedent's feature bundle – i.e., if we take (33-a) as a starting point, (33-b) can simply be derived by taking the specification *pron* and attaching it to the form HANS.[17]

At first sight, this operation might resemble the process called *Lowering* in the literature on Distributed Morphology (DM) (cf., for example, Embick & Noyer (2001)). However, on closer inspection, it becomes clear that we are not dealing with an instance of *Lowering* here.

In general, Embick & Noyer (2001) distinguish between two types of mergers in

[17]Note that this operation does not leave a trace or copy of the shifted specification in its base position – i.e., after the shift, the specification *pron* has been deleted from the bound element's realization matrix (cf. (33-b)).

morphology: *Lowering* and *Local Dislocation*. While the latter occurs after Vocabulary Insertion and can only affect linearly adjacent items, *Lowering* occurs prior to Late Insertion and makes reference to the hierarchical structure of the derivation. Since the operation we are dealing with must occur before Vocabulary Insertion and is not strictly local, it cannot be considered to be a type of *Local Dislocation*. But what about *Lowering*?

The goal of *Lowering* is to "unite syntactic terminals that are phonologically spelled together but not joined in overt syntax" (Embick & Noyer (2001:561)). Briefly, this operation can lower a head to the head of its complement,[18] which accounts, for instance, for the fact as to why tense is realized on the verb in English, although verbs do not move to T in overt syntax.

This does not really look like the operation we are dealing with either, although it also takes place before Vocabulary Insertion and lowers some elements.[19] As discussed above, in the reconstruction examples only *some* feature specifications are shifted and not a complete head, the locality conditions are less strict, and the hierarchical structure does not play a role. In fact, the only thing which seems to count in our case is the linear order of two coreferent items. The operation which applies in our examples can hence be defined as follows.

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[18]According to Embick & Noyer (2001), the target of *Lowering* is in fact the closest morphosyntactic word (MWd) of the complement; MWd:= the highest segment of an X° not contained in another X° (cf. Embick & Noyer (2001:574; 589))

[19]Note that the operation proposed here cannot be considered to be an instance of *Impoverishment* either. *Impoverishment* means that "within a certain context, features at a node are deleted – and the context may be features of a different node in the tree" (cf. Marantz (2003:9)). But although the feature *pron* in x's realization matrix could be said to be blocked by the feature *R-ex* in the specification of the antecedent, the blocked feature is not deleted completely but emerges in another position, namely in the feature set of the blocking element.

(34) *Feature Shift:*

a. If α and β are coreferent and α linearly precedes β at PF ($\alpha \succ \beta$), the most anaphoric element of α's realization matrix may be *shifted* to β's realization specification if (i) it respects the requirement that matrices be not extended and (ii) this yields a licit specification.

b. *Licit specifications* are either R-expressions or realization matrices of the form $[e_n, \ldots, e_1]$ ($n \geq 1$), where e_i ($n \geq i \geq 1$) are specifications $\in$ {SELF, SE, pron, R-ex}, and e_j and e_{j-1} ($n \geq j > 1$) are adjacent on the anaphoricity hierarchy.

Following this definition, the only environment in which *Feature Shift* can take place is the one illustrated in (35-a), where x has the optimal matrix [pron, R-ex] and its antecedent is encoded as R-expression from the beginning. Hence, the target of *Feature Shift* is not a matrix, and (34-a)-(i) is respected. Furthermore, if the feature *pron* combines with *R-ex*, it yields a licit specification for the antecedent (cf. (34-a)-(ii) and (34-b)), which can now be considered to be a new realization matrix.

However, if an anaphoric specification is involved, *Feature Shift* cannot apply successfully. If x is specified by the matrix [SE, pron] since the binder is not an R-expression but represented by the realization matrix [pron], *Feature Shift* is not possible because the antecedent is already equipped with a matrix, which would have to be extended in violation of (34-a)-(i). This case is illustrated in (35-b). If, as in (35-c) and (35-d), x has the matrix [SE, pron, R-ex] and its antecedent is not encoded as a matrix but as an R-expression, *Feature Shift* would not extend a given matrix. However, the shift of *SE* alone (cf. (35-c)) would yield the specification [SE, R-ex], which is illicit since the forms are not adjacent on the anaphoricity hierarchy; and the simultaneous shift of the two specifications *SE* and *pron*, as illustrated in (35-d), is not compatible with the definition either, because only the *most* anaphoric specification can be shifted.[20]

(35) a. [pron, R-ex] $\succ$ R-ex $\xrightarrow{\textit{Feature Shift}}$ [R-ex] $\succ$ [pron, R-ex]

b. [SE, pron] $\succ$ [pron] $\xrightarrow{\textit{*Feature Shift}}$ [pron] $\succ$ [SE, pron]

c. [SE, pron, R-ex] $\succ$ R-ex $\xrightarrow{\textit{*Feature Shift}}$ [pron, R-ex] $\succ$ [SE, R-ex]

d. [SE, pron, R-ex] $\succ$ R-ex $\xrightarrow{\textit{*Feature Shift}}$ [R-ex] $\succ$ [SE, pron, R-ex]

As alluded to before, *Feature Shift* can be considered to be functionally motivated, because it yields a better linearization. But since each additional operation is against the idea of economy, *Feature Shift* does not apply obligatorily, and hence optionality arises.

These considerations can also be implemented in Optimality Theory. For example, it could be assumed that a principle like OPTIMAL LINEARIZATION (cf. (36)) holds, which triggers *Feature Shift*. However, since this process is optional, *Feature Shift* must be considered to be as costly as the violation of OPTIMAL LINEARIZATION; hence, the two constraints in (36) and (37) must be tied.

(36) OPTIMAL LINEARIZATION:
If α and β are coreferent and α linearly precedes β at PF ($\alpha \succ \beta$), β must not be less anaphoric than α.

(37) *FEATURE SHIFT: Avoid Feature Shift.

This implementation in optimality-theoretic terms facilitates a direct comparison between this PF approach and the demotion approach outlined in section 3. (cf. in particular the competition in $T_{2.1}$).[21] Thus, the former constraint *PRON–R-EX can

[20] If x involves the specification *SELF*, *Feature Shift* is ruled out along the same lines.

[21] For the sake of convenience, I repeat the relevant tableau below. (Recall that the constraint

be considered to be translated into the new constraint OPTIMAL LINEARIZATION, since both favour the final linearization R-ex$_1 \succ$ pron$_1$: OPTIMAL LINEARIZATION favours a PF exchange, and *PRON–R-EX prefers the candidate with a demoted antecedent and a bindee that has a maximally reduced realization matrix (= [R-ex]). Hence, they forward sentences like *Which claim that John$_1$ made did he$_1$ later deny?* ((26-a)), which correspond to candidate O$_{34}$ in T$_{2.1}$. However, while OPTIMAL LINEARIZATION applies at PF, *PRON–R-EX must be evaluated earlier in the syntactic derivation and therefore it has a problematic status in a local derivational syntactic approach.

The alternative candidate with the PF linearization pron$_1 \succ$ R-ex$_1$ (cf. (26-c), *Which claim that he$_1$ made did John$_1$ later deny?*/O$_{31}$ in T$_{2.1}$) violates these two constraints, but it is favoured by the constraint *FEATURE SHIFT in the PF approach and by the two constraints FAITH$_{pron}$ and *DEMOTION in the demotion approach; hence, these constraints have the same effect and can be considered to be counterparts in the two approaches.

The reason as to why the two candidates (pron$_1 \succ$ R-ex$_1$ and R-ex$_1 \succ$ pron$_1$) differ with respect to three constraints in the demotion approach (namely with re-

*PRON–R-EX (=*p-R) refers to the final word order at PF, which might not yet be reflected by the candidates at the present stage of the derivation.)

T$_{2.1}$: vP optimization (with binder = R-ex)
($x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *apply vacuously)*

	Input: O$_3$/T$_2$	*X-X	*p-R	F$_{pron}$	*DEM	F$_{SE}$	F$_{SELF}$
⇒	O$_{31}$: R-ex$_{gen}$ – $x_{[pron,R]}$		*(!)			*	*
	O$_{32}$: pron$_{dem}$– $x_{[pron,R]}$	*!			*	*	*
	O$_{33}$: R-ex$_{gen}$ – $x_{[R]}$	*!		*		*	*
⇒	O$_{34}$: pron$_{dem}$ – $x_{[R]}$			*(!)	*	*	*

spect to *PRON–R-EX, FAITH$_{pron}$, *DEMOTION), but only in two constraints in the PF linearization approach (OPTIMAL LINEARIZATION and *FEATURE SHIFT) has something to do with the nature of *Feature Shift*: This operation changes simultaneously the specifications of antecedent and bindee; hence, *FEATURE SHIFT also refers to both items at the same time, i.e., it requires both that the bindee keeps its *pron* specification and that the antecedent's specification (= *R-ex*) is not extended. In the demotion approach, by contrast, these two requirements are encoded in two separate constraints. FAITH$_{pron}$ refers to the bindee and prevents a further reduction of the matrix [pron, R-ex], whereas *DEMOTION refers to the antecedent and ensures that it remains an R-expression and is not changed into a pronominal form by demotion. However, since FAITH$_{pron}$ is higher ranked than *DEMOTION, the FAITH-constraint plays a more important role in practice, and its tie with *PRON–R-EX finally yields optionality in the demotion approach (cf. again $T_{2.1}$).

The following table briefly summarizes the comparison between PF linearization and demotion approach. On the lefthandside, the corresponding constraints are represented, and on the righthandside, it is illustrated which PF order is favoured by the respective constraints.

PF Linearization		Demotion Approach	$\text{pron}_1 \succ \text{R-ex}_1$	$\text{R-ex}_1 \succ \text{pron}_1$
OPT. LINEARIZATION	$\leftrightarrow$	*PRON–R-EX	*	$\surd$
*FEATURE SHIFT	$\leftrightarrow$	FAITH$_{pron}$, *DEMOTION	$\surd$	*

4.2. Analysis

Against this background, let us now examine the derivation of the data introduced in the previous sections. For the sake of convenience, all examples are repeated in (38)-(43).

(38) a. *[Which picture of $John_1]_2$ does he_1 like t_2?

b. *[Which picture of $John_1]_2$ does $John_1$ like t_2?

c. [Which picture of him_1/$himself_1]_2$ does $John_1$ like t_2?

d. [Which picture of him_1/$himself_1]_2$ does he_1 like t_2?

(39) a. [Which claim that $John_1$ $made]_2$ did he_1 later deny t_2?

b. *[Which claim that $John_1$ $made]_2$ did $John_1$ later deny t_2?

c. [Which claim that he_1 $made]_2$ did $John_1$ later deny t_2?

d. [Which claim that he_1 $made]_2$ did he_1 later deny t_2?

(40) a. *Welches Bild von $Timo_1$ mag er_1 am liebsten?

which picture of Timo likes he best
'Which picture of him_1/$himself_1$ does $Timo_1$ like best?'

b. Welches Bild von $sich_1$ mag $Timo_1$ am liebsten?

which picture of Timo likes he best
'Which picture of him_1/$himself_1$ does $Timo_1$ like best?'

(41) a. ?Welches Bild von $Timo_1$ hast du ihm_1 gezeigt?

which picture of Timo have you him shown
'Which picture of him_1 have you shown to $Timo_1$?'

b. Welches Bild von ihm_1 hast du $Timo_1$ gezeigt?

which picture of him have you Timo shown
'Which picture of him_1 have you shown to $Timo_1$?'

(42) a. [Welchen Brief, den ich $Hans_1$ geschickt $habe,]_2$ hat er_1 t_2 laut

which letter that I John sent have has he loud

vorgelesen?

read out
'Which letter that I had sent to $John_1$ did he_1 read out loud?'

b. [Welchen Brief, den ich ihm_1 geschickt $habe,]_2$ hat $Hans_1$ t_2 laut

which letter that I him sent have has John loud vorgelesen?

read out
'Which letter that I had sent to him_1 did John_1 read out loud?'

(43) a. [Welches Bild von sich_1] gefällt Timo_1 am besten?
which picture of SE pleases Timo_{dat} best
'Which picture of him_1/himself_1 does Timo_1 like best?'

b. *[Welches Bild von Timo_1] gefällt sich_1 am besten?
which picture of Timo pleases SE_{dat} best
'Which picture of him_1/himself_1 does Timo_1 like best?'

However, it will be sufficient to provide a detailed analysis of the sentences in (38) and (39), because they constitute the core cases from which most of the other examples can be derived. (40-a) and (40-b) pattern exactly like (38-a) and (38-c), but they have been added because (40-a) contrasts sharply with (41-a), where the binder is an object. The pair of sentences in (42) is accounted for in the same way as (39-a)/(39-c), and (43) finally patterns like (38).

So let us begin with the sentences in (38). As far as the numerations are concerned, only (38-d) starts with the Num=$\{y_{[*\beta_1*,\beta_2]/[SELF,SE,pron]}$, $x_{[\beta_1]/[SELF,SE,pron]}$, $\text{C}_{[*\beta_2*]}$, $\ldots\}$; the other three sentences are based on Num=$\{$R-$\text{ex}_{[*\beta_1*]}$, $x_{[\beta_1]/[SELF,SE,pron,R-ex]}$, $\ldots\}$. Thus, the derivation of (38-d) proceeds as follows:

(44) [Which picture of him_1/$\text{himself}_1]_2$ does he_1 like t_2?

a. $[_{\text{PP}}\ x_{[\beta_1]}$ of $\text{t}_x]$

Since it is assumed that x is Case-marked by the embedding NP and not by PP, only PRINCIPLE $\mathcal{A}_{XP}$ applies non-vacuously when PP is optimized, and O_1 wins in the first competition (cf. T_{32}).

T_{32}: PP optimization

(XP reached – $x_{[\beta_1]}$ unchecked)

Candidates	F_{pron}	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{XP}$
⇒ O_1: [SELF, SE, pron]				**
O_2: [SE, pron]			*!	*
O_3: [pron]		*!	*	

When the NP is built, *Phrase Balance* triggers again movement of x to its edge, and when it is completed it fulfils the definitions of the θ- and the Case domain; hence, three PRINCIPLE $\mathcal{A}$-constraints apply non-vacuously in the following optimization, and both [SELF, SE, pron] and [SE, pron] are predicted to be optimal (cf. $T_{32.1}$).

(45) b. $[_{\text{NP}}\ x_{[\beta_1]}$ which picture $[_{\text{PP}}\ t'_x$ of $\cancel{t_x}]]$

$T_{32.1}$: NP optimization

(XP/ThD/CD reached – $x_{[\beta_1]}$ unchecked)

Input: O_1/T_{32}	F_{pron}	F_{SE}	PR.$\mathcal{A}_{CD}$	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
⇒ O_{11}: [SELF, SE, pron]			**(!)		**	**
⇒ O_{12}: [SE, pron]			*	*(!)	*	*
O_{13}: [pron]		*!		*		

As long as no further XD is reached, these two matrices remain optimal, thus we can neglect VP optimization. However, the derivation as such is illustrated in (46), since it involves now *two* instances of movement triggered by *Phrase Balance*: first, x is moved out of the NP to the edge of VP, and then the remnant NP itself moves to edgeV.

(46) c. $[_{\text{VP}}\ [_{\text{NP}_{[wh]}}\ t''_x$ which picture $\cancel{[_{\text{PP}}\ t'_x \text{ of } t_x}]]\ x_{[\beta_1]}$ like $t_{NP}]$
workspace: $\{y_{[*\beta_1*,\beta_2]}, C_{[*wh*,*\beta_2*]}, \ldots\}$

In the next phrase, the binder, y, is merged into the derivation, hence x need not move any further but stays in SpecV. However, *Phrase Balance* triggers once more movement of the *wh*-phrase to the edge of vP. Moreover, even if x can check its [β]-feature at this stage, another unchecked [β]-feature is now part of the current derivation – [β_2], associated with y, which means that the PRINCIPLE $\mathcal{A}$-constraints still apply non-vacuously when vP is optimized.

(47) d. [$_{vP}$ [$_{NP_{[wh]}}$ t''_x which picture [$\cancel{_{PP}\ t'_x\ \text{of}\ t_x}$]] $y_{[*\beta_1*,\beta_2]}$ like [$_{VP}$ t'_{NP} $x_{[\beta_1]}$ t_{like} $\cancel{t_{NP}}$]]

As $T_{32.1.1}$ shows, $y_{[SELF,SE,pron]} - x_{[SELF,SE,pron]}$ is predicted to be optimal in the optimization based on the first winner from $T_{32.1}$; in $T_{32.1.2}$, $y_{[SELF,SE,pron]} - x_{[SE,pron]}$ wins the competition. As a result, it is predicted that x should be realized as complex anaphor in the former case; according to the second competition, the optimal realization of x is the pronoun, since this form is the available form in English that matches the specification [SE, pron] best. As to y, the antecedent, its optimal matrix is not yet determined at this stage, since it is still free. When TP is completed, its matrix is further reduced to [pron], since its Case, subject, finite and indicative domain is reached; thus, it is eventually realized as pronoun as well.

Hence, this derivation correctly predicts sentence (38-d) to be grammatical.[22]

[22]At PF, both optimal candidates from $T_{32.1.1/2}$ violate OPTIMAL LINEARIZATION; but since *Feature Shift* is ruled out in this configuration (cf. (35-b)), there are no candidates that satisfy this constraint; hence, no PF exchange takes place.

$T_{32.1.1}$: vP optimization

($x_{[\beta_1]}$ checked, but $y_{[\beta_2]}$ unchecked – XP/ThD of y reached)

Input: $O_{11}/T_{32.1}$	F_{pron}	F_{SE}	F_{SELF}	$PR.\mathcal{A}_{ThD}$	$PR.\mathcal{A}_{XP}$
⇒ O_{111}: $y_{[SELF,SE,pr]} - x_{[SELF,SE,pr]}$				**	**
O_{112}: $y_{[SE,pron]} - x_{[SELF,SE,pron]}$			*!	*	*
O_{113}: $y_{[pron]} - x_{[SELF,SE,pron]}$		*!	*		
O_{114}: $y_{[SELF,SE,pron]} - x_{[SE,pron]}$			*!	**	**
O_{115}: $y_{[SE,pron]} - x_{[SE,pron]}$			*!*	*	*
O_{116}: $y_{[pron]} - x_{[SE,pron]}$		*!	**		
O_{117}: $y_{[SELF,SE,pron]} - x_{[pron]}$		*!	*	**	**
O_{118}: $y_{[SE,pron]} - x_{[pron]}$		*!	**	*	*
O_{119}: $y_{[pron]} - x_{[pron]}$		*!*	**		

$T_{32.1.2}$: vP optimization

($x_{[\beta_1]}$ checked, but $y_{[\beta_2]}$ unchecked – XP/ThD of y reached)

Input: $O_{12}/T_{32.1}$	F_{pron}	F_{SE}	F_{SELF}	$PR.\mathcal{A}_{ThD}$	$PR.\mathcal{A}_{XP}$
⇒ O_{121}: $y_{[SELF,SE,pron]} - x_{[SE,pron]}$			*	**	**
O_{122}: $y_{[SE,pron]} - x_{[SE,pron]}$			**!	*	*
O_{123}: $y_{[pron]} - x_{[SE,pron]}$		*!	**		
O_{124}: $y_{[SELF,SE,pron]} - x_{[pron]}$		*!	*	**	**
O_{125}: $y_{[SE,pron]} - x_{[pron]}$		*!	**	*	*
O_{126}: $y_{[pron]} - x_{[pron]}$		*!*	**		

Let us now consider those cases in which the antecedent is encoded as R-expression in the numeration, which means that the realization matrix of the bound element contains a copy of it. ((48) corresponds to (38-c).)

(48) [Which picture of him_1/$\text{himself}_1]_2$ does John_1 like t_2?

a. $[_{\text{PP}}\ x_{[\beta]}$ of $t_x]$

The optimizations in T_{33} and $T_{33.1}$ basically correspond to the competitions illustrated in T_{32} and $T_{32.1}$, the only difference being that this time the matrices are enriched with the specification *R-ex*, which means that a fourth candidate, [R-ex], competes. However, the outcome remains the same – the first two candidates are predicted to be optimal in $T_{33.1}$

T_{33}: PP optimization

(XP reached – $x_{[\beta]}$ unchecked)

Candidates	F_{pron}	F_{SE}	F_{SELF}	$\text{Pr}.\mathcal{A}_{XP}$
⇒ O_1: [SELF, SE, pron, R-ex]				∗∗∗
O_2: [SE, pron, R-ex]			∗!	∗∗
O_3: [pron, R-ex]		∗!	∗	∗
O_4: [R-ex]	∗!	∗	∗	

(49) b. $[_{\text{NP}}\ x_{[\beta]}$ which picture $[_{\text{PP}}\ t'_x$ of $\cancel{t_x}]]$

$T_{33.1}$: NP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Input: O_1/T_{33}	F_{pron}	F_{SE}	$\text{Pr}.\mathcal{A}_{CD}$	F_{SELF}	$\text{Pr}.\mathcal{A}_{ThD}$	$\text{Pr}.\mathcal{A}_{XP}$
⇒ O_{11}: [SELF, SE, pron, R]			∗∗∗(!)		∗∗∗	∗∗∗
⇒ O_{12}: [SE, pron, R-ex]			∗∗	∗(!)	∗∗	∗∗
O_{13}: [pron, R-ex]		∗!	∗	∗	∗	∗
O_{14}: [R-ex]	∗!	∗		∗		

(50) c. $[_{\mathrm{VP}}\ [_{\mathrm{NP}_{[wh]}}\ \mathrm{t}''_x$ which picture $\cancel{[_{\mathrm{PP}}\ \mathrm{t}'_x \text{ of } \mathrm{t}_x]}]\ x_{[\beta]}$ like $\mathrm{t}_{NP}]$
workspace: $\{\mathrm{John}_{[*\beta*]}, \mathrm{C}_{[*wh*]}, \dots\}$

(51) d. $[_{\mathrm{vP}}\ [_{\mathrm{NP}_{[wh]}}\ \mathrm{t}''_x$ which picture $\cancel{[_{\mathrm{PP}}\ \mathrm{t}'_x \text{ of } \mathrm{t}_x]}]$ $\mathrm{John}_{[*\beta*]}$ like $[_{\mathrm{VP}}\ \mathrm{t}'_{NP}\ x_{[\beta]}$ $\mathrm{t}_{like}\ \cancel{\mathrm{t}_{NP}}]]$

When the antecedent finally enters the derivation, the situation slightly differs from the previous analysis, because the binder is already specified and does not bear an additional unchecked $[\beta]$-feature. Hence, the PRINCIPLE $\mathcal{A}$-constraints apply vacuously in $\mathrm{T}_{33.1.1}$ and $\mathrm{T}_{33.1.2}$, but the result remains unchanged – the matrices with *SELF* (cf. $\mathrm{T}_{33.1.1}$)/*SE* (cf. $\mathrm{T}_{33.1.2}$) as most anaphoric specification are optimal.

$T_{33.1.1}$: vP optimization
(XP/ThD/CD/SD/FD/ID reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $\mathrm{O}_{11}/\mathrm{T}_{33.1}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{111}: [SELF, SE, pron, R-ex]			
	O_{112}: [SE, pron, R-ex]			*!
	O_{113}: [pron, R-ex]		*!	*
	O_{114}: [R-ex]	*!	*	*

$T_{33.1.2}$: vP optimization
(XP/ThD/CD/SD/FD/ID reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $\mathrm{O}_{21}/\mathrm{T}_{33.1}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{121}: [SE, pron, R-ex]			*
	O_{122}: [pron, R-ex]		*!	*
	O_{123}: [R-ex]	*!	*	*

This information is then mapped to PF: [SELF, SE, pron, R-ex] or [SE, pron, R-ex] is the optimal realization matrix of x, which means that x should be preferably realized as complex or simple anaphor. However, if this is the case, we know according to

(35-c)/(35-d) that optimal linearization is blocked, because *Feature Shift* is excluded in this configuration. Thus, (38-a) (**Which picture of John*$_1$ *does he*$_1$ *like?*) cannot be derived, whereas (38-c) (*Which picture of him*$_1$*/himself*$_1$ *does John*$_1$ *like?*) is the result of the previous analysis: when x is finally assigned its phonological form, it is realized as *himself* (according to the matrix [SELF, SE, pron, R-ex]), or as *him*, since this is the English form that fits the matrix [SE, pron] best.

As far as (38-b) (**Which picture of John*$_1$ *does John*$_1$ *like?*) is concerned, it must be excluded, because the matrix [R-ex] does not win in $T_{33.1.1/2}$ when the final optimal matrix is determined, and thus MAB will never select the R-expression as optimal realization for x. Hence, (38-c) can be considered to block (38-b).

Let us now turn to the sentences in (39). Again, the fourth sentence is the only one which is based on the numeration Num=$\{y_{[*\beta_1*,\beta_2]/[SELF,SE,pron]}$, $x_{[\beta_1]/[SELF,SE,pron]}$, $C_{[*\beta_2*]}, \ldots\}$; (39-a), (39-b), and (39-c) are based on Num=$\{$R-ex$_{[*\beta_1*]}$, $x_{[\beta_1]/[SELF,SE,pron,R-ex]}, \ldots\}$. (39-d) is repeated in (52), and the first relevant optimization is illustrated in T_{34}. At this stage, unchecked x not only reaches XP, its θ-domain, and its Case domain (as in $T_{32.1}$ and $T_{33.1}$), but also its subject, finite, and indicative domain.

(52) [Which claim that he$_1$ made]$_2$ did he$_1$ (later) deny t$_2$?

a. [$_{NP}$ $x_{[\beta_1]}$ which claim that ~~t_x made~~]

As a result, all PRINCIPLE $\mathcal{A}$-constraints apply non-vacuously, and in contrast to the previous derivations concerning the sentences in (38), not the matrices with the anaphoric specificatios win, but [pron], which means that an anaphoric realization of x is already excluded at this stage.

T_{34}: NP optimization

(XP/ThD/CD AND SD/FD/ID reached – $x_{[\beta_1]}$ unchecked)

Candidates	F_{pron}	PR.$\mathcal{A}_{ID/FD/SD}$	F_{SE}	PR.$\mathcal{A}_{CD}$	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
O_1: [S, S, pr]		*!*		**		**	**
O_2: [S, pr]		*!		*	*	*	*
⇒ O_3: [pron]			*		*		

(53) illustrates the step, when the antecedent is finally merged into the derivation. At this point, x is checked, but since the binder y bears an unchecked [β]-feature, the PRINCIPLE $\mathcal{A}$-constraints still apply non-vacuously.

(53) b. [$_{vP}$ [$_{NP_{[wh]}}$ t'_x which claim ~~that t_x made~~] $y_{[*\beta_1*,\beta_2]}$ deny [$_{VP}$ t'_{NP} $x_{[\beta_1]}$ t_{deny} ~~[t_{NP}]~~]]
workspace: $\{C_{[*wh*,*\beta_2*]}, \ldots\}$

The outcome of the competition is that $y_{[SELF,SE,pron]} - x_{[pron]}$ is predicted to be optimal (cf. $T_{34.1}$), which means that the bound element will eventually be realized as pronoun. As far as the antecedent is concerned, its optimal realization cannot yet be determined at this point in the derivation. However, when TP is optimized, y's matrix is reduced to [pron], which means that it will also have to be realized as pronoun.

Hence, (39-d) is derived. (Note that OPTIMAL LINEARIZATION is also fulfiled.)

$T_{34.1}$: vP optimization

($x_{[\beta_1]}$ checked, but $y_{[\beta_2]}$ unchecked – XP/ThD of y reached)

Input: O_3/T_{34}	F_{pron}	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
⇒ O_{31}: $y_{[SELF,SE,pron]} - x_{[pron]}$		*	*	**	**
O_{32}: $y_{[SE,pron]} - x_{[pron]}$		*	**!	*	*
O_{33}: $y_{[pron]} - x_{[pron]}$		**!	**		

If we start with the numeration where the binder is encoded as R-expression, the NP optimization is not really different from the previous analysis (cf. T_{34}); [pron, R-ex] is predicted to be optimal (cf. T_{35}).

(54) [Which claim that he$_1$ made]$_2$ did John$_1$ (later) deny t$_2$?

a. [$_{\text{NP}}$ $x_{[\beta_1]}$ which claim that ~~t_x made~~]

T_{35}: NP optimization

(XP/ThD/CD AND SD/FD/ID reached – $x_{[\beta]}$ unchecked)

Candidates	F_{pron}	PR.$\mathcal{A}_{ID/FD/SD}$	F_{SE}	PR.$\mathcal{A}_{CD}$	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
O$_1$: [S, S, pr, R]		**!*		* * *		* * *	* * *
O$_2$: [S, pr, R]		**!		**	*	**	**
⇒ O$_3$: [pr, R-ex]		*	*	*	*	*	*
O$_4$: [R-ex]	*!		*		*		

When the binder enters the derivation and x checks its [β]-feature, no unchecked [β]-feature is left, and thus the PRINCIPLE $\mathcal{A}$-constraints do not play a role when vP is optimized. As a result, [pron, R-ex] remains optimal.

(55) c. [$_{\text{vP}}$ [$_{\text{NP}}$ t$'_x$ which claim ~~that t_x made~~] John$_{[*\beta*]}$ deny [$_{\text{VP}}$ t$'_{NP}$ $x_{[\beta]}$ t$_{deny}$ ~~[t$_{NP}$]~~]]

$T_{35.1}$: vP optimization

($x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ apply vacuously)

Input: O$_3$/T$_{35}$	F_{pron}	F_{SE}	F_{SELF}
⇒ O$_{31}$: [pron, R-ex]		*	*
O$_{32}$: [R-ex]	*!	*	*

Again, this information is mapped to PF, and since *Feature Shift* can now apply to this configuration, there are two potential PF candidates; O$_1$= [pron, R-ex] – R-ex, and O_2= [R-ex] – [pron, R-ex], which results from *Feature Shift*.[23]

T_{36}: PF optimization

Candidates	OPTIMAL LINEARIZATION	*FEATURE SHIFT
⇒ O_1: [pron, R-ex] – R-ex	∗(!)	
⇒ O_2: [R-ex] – [pron, R-ex]		∗(!)

The first candidate, which does not involve *Feature Shift*, respects *FEATURE SHIFT, but it violates OPTIMAL LINEARIZATION; the second candidate satisfies the latter constraint, but it violates *FEATURE SHIFT. Hence, both candidates turn out to be optimal, and thus we get both sentence (39-c) (*Which claim that he$_1$ made did John$_1$ later deny?*) and sentence (39-a) (*Which claim that John$_1$ made did he$_1$ later deny?*).

However, sentence (39-b) (**Which claim that John$_1$ made did John$_1$ later deny?*) is completely ruled out, since it is again blocked by the (c)-sentence: As $T_{35.1}$ shows, [pron, R-ex] beats [R-ex] in the crucial competition, namely when the input for PF is determined, and hence it is impossible that MAB ever selects the R-expression as optimal realization for x.

To sum up, it basically depends on whether the optimal realization for x is a 'true' pronoun (i.e., a pronoun based on the optimal matrix [pron, R-ex]) or an anaphoric form. In the former case, *Feature Shift* is possible, which means that the forms are interchangeable; in the latter case it is not. Against this background, all the examples introduced in the previous section can be analysed in the same way as the examples in (38) and (39). And along the same lines, we can now also capture the subject-object symmetry alluded to in the introduction: Although it is not possible to derive sentence (56-a), because the underlying derivation involves an anaphor as

[23]Here, I pursue the assumption that *Feature Shift* is encoded in optimality-theoretic terms. However, as mentioned before, this need not necessarily be the case.

optimal realization of the bound element (cf. (56-b)), the sentence is much better if the antecedent is an object (cf. (56-c)). From the current point of view, this is exactly what we expect given the fact that the underlying derivation allows x to be realized as pronoun (cf. (56-d)). Hence, *Feature Shift* can apply, and (56-c) can be derived via PF exchange.

(56) a. *Welches Bild von Timo$_1$ mag er$_1$ (am liebsten)?
which picture of Timo likes he (best)
'Which picture of him$_1$/himself$_1$ does Timo$_1$ like (best)?'

b. Welches Bild von sich$_1$/*ihm$_1$ mag Timo$_1$?
which picture of SE/him likes Timo
'Which picture of him$_1$/himself$_1$ does Timo$_1$ like?'

c. ?Welches Bild von Timo$_1$ hast du ihm$_1$ gezeigt?
which picture of Timo have you him shown
'Which picture of him$_1$ have you shown to Timo$_1$?'

d. Welches Bild von ihm$_1$ hast du Timo$_1$ gezeigt?
which picture of him have you Timo shown
'Which picture of him$_1$ have you shown to Timo$_1$?'

The contrast between (56-a) and (56-c) thus follows from the general subject-object asymmetry in German that we have already discussed in chapter 2, section 9. As observed before, object-bound elements in German surface as anaphors only if the binding relation is established within the θ-domain; if binding is less local (as in (56-c)), x must be realized as pronoun. This is derived with the help of the following constraint, repeated from chapter 2:

(57) *Reflexivity in VP (*Refl.$_{VP}$):
If the first XP in which α is bound is a VP, α must be minimally anaphoric.

So let us now turn to the derivation of example (56-c) (repeated in (58)).[24] (58-a) illustrates the point in the derivation when PP is completed (note that *Phrase Balance* triggers again movement of x to the edge of the current phrase).

(58) ?Welches Bild von Timo$_1$ hast du ihm$_1$ gezeigt?

a. $[_{\text{PP}}\ x_{[\beta]}$ of $\text{t}_x]$

Since $x_{[\beta]}$ remains unchecked, *REFLEXIVITY IN VP applies vacuously when PP optimization takes place (cf. T$_{37}$). As to the PRINCIPLE $\mathcal{A}$-constraints, only the low-ranked PRINCIPLE $\mathcal{A}_{XP}$ applies non-vacuously, hence the FAITH-constraints determine the outcome of the competition and yield O$_1$ as optimal candidate.

T$_{37}$: PP optimization
(XP reached – $x_{[\beta]}$ unchecked)

Candidates	F_{pron}	*Refl.$_{VP}$	F_{SE}	F_{SELF}	PR.$\mathcal{A}_{XP}$
⇒ O$_1$: [SELF, SE, pron, R-ex]					$***$
O$_2$: [SE, pron, R-ex]				$*!$	$**$
O$_3$: [pron, R-ex]			$*!$	$*$	$*$
O$_4$: [R-ex]	$*!$		$*$	$*$	

[24]For the sake of simplicity, I will assume the following underlying structure for double object constructions:

(i) $[_{\text{vP}}$ subject $[_{\text{VP}}$ indirect object $[_{\text{V}'}$ direct object V]] v]

Note, however, that it would not make a difference if direct objects were base-generated above indirect objects; the only thing that is crucial is that the picture-NP containing x is completed before the binding relation is established. As a result, binding takes place outside the smallest XP that qualifies as θ- and Case domain.

When NP is completed, x is still free; hence, *REFLEXIVITY IN VP still does not play a role. But since NP qualifies as θ- and Case domain, the three constraints PRINCIPLE $\mathcal{A}_{XP}$, PRINCIPLE $\mathcal{A}_{ThD}$, and PRINCIPLE $\mathcal{A}_{CD}$ apply non-vacuously. As a result, both [SELF, SE, pron, R-ex] and [SE, pron, R-ex] are predicted to be optimal (cf. $T_{37.1}$).

(59) b. $[_{\mathrm{NP}}\ x_{[\beta]}$ welches Bild $[_{\mathrm{PP}}\ \mathrm{t}'_x$ von $\cancel{\mathrm{t}_x}]]$

$T_{37.1}$: NP optimization
(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Input: O_1/T_{37}	F_{pron}	*Refl.$_{VP}$	F_{SE}	PR.$\mathcal{A}_{CD}$	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
⇒ O_{11}: [S, SE, pr, R]				***(!)		***	***
⇒ O_{12}: [SE, pr, R]				**	*(!)	**	**
O_{13}: [pron, R-ex]			*!	*	*	*	*
O_{14}: [R-ex]	*!		*		*		

On the assumption that direct objects are base-generated as complements of V (cf. the previous footnote), the NP that has been built in the previous steps is now merged with V. Next, the indirect object *Timo* is merged into the specifier position of VP, which means that the antecedent finally enters the derivation and $[\beta]$ can be checked.

(60) c. $[_{\mathrm{VP}}$ Timo$_{[*\beta*]}$ $[_{\mathrm{NP}_{[wh]}}\ x_{[\beta]}$ welches Bild $\cancel{[_{\mathrm{PP}}\ \mathrm{t}'_x \text{ von } \mathrm{t}_x]}]$ gezeigt$]$

However, VP has not been completed yet – in order to be balanced, the picture-NP (which bears a *wh*-feature) must move to the edge of VP, since the remaining numeration contains the feature [*wh*]. At this stage, VP optimization takes place.

(61) d. $[_{\mathrm{VP}}\ [_{\mathrm{NP}_{[wh]}}\ x$ welches Bild $\cancel{[_{\mathrm{PP}}\ \mathrm{t}'_x \text{ von } \mathrm{t}_x]}]$ Timo t_{NP} gezeigt$]$

Since x has already checked its [β]-feature, the PRINCIPLE $\mathcal{A}$-constraints apply vacuously. However, *REFLEXIVITY IN VP comes into play now and must ensure that the matrix [pron, R-ex] wins. This is achieved if the latter constraint is ranked above FAITH$_{SE}$ and below FAITH$_{pron}$, as $T_{31.1.1}$ and $T_{37.1.2}$ show.

$T_{37.1.1}$: VP optimization

(XP/ThD/CD reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *apply vacuously*

	Input: $O_{11}/T_{37.1}$	F_{pron}	*Refl.$_{VP}$	F_{SE}	F_{SELF}
	O_{111}: [SELF, SE, pron, R-ex]		**!*		
	O_{112}: [SE, pron, R-ex]		**!		*
⇒	O_{113}: [pron, R-ex]		*	*	*
	O_{114}: [R-ex]	*!		*	*

$T_{37.1.2}$: VP optimization

(XP/ThD/CD reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{12}/T_{37.1}$	F_{pron}	*Refl.$_{VP}$	F_{SE}	F_{SELF}
	O_{121}: [SE, pron, R-ex]		**!		*
⇒	O_{122}: [pron, R-ex]		*	*	*
	O_{123}: [R-ex]	*!		*	*

At PF, x might now be assigned a pronominal form (via MAB), which would yield sentence (56-d) (*Welches Bild von ihm$_1$ hast du Timo$_1$ gezeigt?*). Alternatively, since the antecedent is an R-expression and the optimal matrix is [pron, R-ex], *Feature Shift* can apply – and as a result, we would get sentence (56-c)=(58) (*?Welches Bild von Timo$_1$ hast du ihm$_1$ gezeigt?*).

4.3. Loose Ends

What has been excluded from the discussion so far are examples like the following (cf., for example, Epstein *et al.* (1998:48)), in which *himself* can either refer to the embedded subject *Bill* or to *John*, the subject of the matrix clause.

(62) John_1 wondered [which picture of $\text{himself}_{1,2}]_3$ Bill_2 saw t_3.

This is unexpected under the present approach, as the following considerations reveal. In the numeration, it must be encoded which subject NP serves as antecedent for the bound element by assigning it the respective [$*\beta*$]-feature. The realization of the bound element itself is not yet determined at all but rather must be computed in the course of the syntactic derivation. For instance, if we take *Bill* as designated antecedent, the numeration corresponds to Num=$\{\text{Bill}_{[*\beta*]}$, $x_{[\beta]/[SELF,SE,pron,R-ex]}$, John, $\ldots\}$. The derivation then proceeds as follows.[25] The first optimization takes place when PP is completed. At this stage, a maximal phrase has been reached and x is still free; hence, [SELF, SE, pron, R-ex] is predicted to be optimal (cf. T_{38}).

(63) a. $[_{\text{PP}}\ x_{[\beta]}$ of $t_x]$

T_{38}: PP optimization
(XP reached – $x_{[\beta]}$ unchecked)

	Candidates	F_{pron}	F_{SE}	F_{SELF}	$\text{PR}.\mathcal{A}_{XP}$
⇒	O_1: [SELF, SE, pron, R-ex]				$***$
	O_2: [SE, pron, R-ex]			$*!$	$**$
	O_3: [pron, R-ex]		$*!$	$*$	$*$
	O_4: [R-ex]	$*!$	$*$	$*$	

When the *wh*-phrase is completed (cf. (64)), x's θ- and Case domain are reached, but x is still free; hence, NP optimization yields two optimal outputs, [SELF, SE, pron, R-ex] and [SE, pron, R-ex] (cf. $T_{38.1}$).

[25]Derivations of this kind have been discussed before, but I repeat it for the sake of convenience.

(64) b. $[_{\text{NP}_{[wh]}}\ x_{[\beta]}$ which picture $[_{\text{PP}}\ \text{t}'_x$ of $\cancel{\text{t}_x}]]$

$T_{38.1}$: NP optimization

(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Input: O_1/T_{38}	F_{pron}	F_{SE}	PR.$\mathcal{A}_{CD}$	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
⇒ O_{11}: [SELF, SE, pron, R]			$***(!)$		$***$	$***$
⇒ O_{12}: [SE, pron, R-ex]			$**$	$*(!)$	$**$	$**$
O_{13}: [pron, R-ex]		$*!$	$*$	$*$	$*$	$*$
O_{14}: [R-ex]	$*!$	$*$		$*$		

Next, the whole *wh*-phrase is merged with *saw* and VP is built up. Before VP optimization occurs, *Phrase Balance* triggers first movement of x out of the object NP to the edge of VP and then forces the remnant NP to move to a specifier position as well (cf. (65)).

(65) c. $[_{\text{VP}}\ [_{\text{NP}_{[wh]}}\ \text{t}''_x$ which picture $\cancel{[_{\text{PP}}\ \text{t}'_x \text{ of } \text{t}_x]}]\ x_{[\beta]}$ saw $\text{t}_{NP}]$
workspace: $\{\text{Bill}_{[*\beta*]}, \text{C}_{[*wh*]}, \text{John}, \ldots\}$

VP is now completed and optimization takes place; since x is still free and no further domain relevant for binding is reached, the results remain unchanged. However, when the next phrase is built, x's antecedent enters the derivation. Thus, the PRINCIPLE $\mathcal{A}$-constraints apply vacuously when vP is optimized, and as a result, the matrices [SELF, SE, pron, R-ex] and [SE, pron, R-ex] are predicted to be optimal (cf. $T_{38.1.1}$ and $T_{38.1.2}$).

(66) d. $[_{\text{vP}}\ [_{\text{NP}_{[wh]}}\ \text{t}''_x$ which picture $\cancel{[_{\text{PP}}\ \text{t}'_x \text{ of } \text{t}_x]}]\ \text{Bill}_{[*\beta*]}$ saw $[_{\text{VP}}\ \text{t}'_{NP}\ x_{[\beta]}\ \text{t}_{saw}$ $\cancel{\text{t}_{NP}}]]$
workspace: $\{\text{C}_{[*wh*]}, \text{John}, \ldots\}$

$T_{38.1.1}$: vP optimization

(XP/ThD/CD/SD/FD/ID reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{11}/T_{38.1}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{111}: [SELF, SE, pron, R-ex]			
	O_{112}: [SE, pron, R-ex]			*!
	O_{113}: [pron, R-ex]		*!	*
	O_{114}: [R-ex]	*!	*	*

$T_{38.1.2}$: vP optimization

(XP/ThD/CD/SD/FD/ID reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *apply vacuously)*

	Input: $O_{21}/T_{38.1}$	F_{pron}	F_{SE}	F_{SELF}
⇒	O_{121}: [SE, pron, R-ex]			*
	O_{122}: [pron, R-ex]		*!	*
	O_{123}: [R-ex]	*!	*	*

Hence, it is correctly predicted that sentence (62) (*John wondered which picture of himself Bill saw*) can be used to express a binding relation between *Bill* and *himself*. But what about the alternative interpretation?

If we base the derivation on the numeration {John$_{[*\beta*]}$, $x_{[\beta]/[SELF,SE,pron,R-ex]}$, Bill, ...} and thus force coreference between the matrix subject and the bound element, the results of PP, NP, and VP optimization are not affected. However, when vP is completed, the antecedent is not yet merged into the derivation. Thus, *Phrase Balance* also triggers movement of x to the edge of vP, and since x's subject, finite and indicative domain are reached, three further PRINCIPLE $\mathcal{A}$-constraints apply non-vacuously when vP is optimized.

(67) d′. [$_{\text{vP}}$ [$_{\text{NP}_{[wh]}}$ t″$_x$ which picture ~~[$_{\text{PP}}$ t′$_x$ of t$_x$]~~] $x_{[\beta]}$ Bill saw [$_{\text{VP}}$ t′$_{NP}$ t‴$_x$ t$_{saw}$ ~~t$_{NP}$~~]]

workspace: {John$_{[*\beta*]}$, C$_{[*wh*]}$, ...}

T$_{38.1.1'}$: vP optimization

(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

Input: $O_{11}/T_{38.1}$	F_{pron}	PR.$\mathcal{A}_{ID/FD/SD}$	F_{SE}	PR.$\mathcal{A}_{CD}$	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
$O_{111'}$: [S, S, pr, R]		**!*		***		***	***
$O_{112'}$: [S, pr, R]		**!		**	*	**	**
⇒ $O_{113'}$: [pr, R-ex]		*	*	*	*	*	*
$O_{114'}$: [R-ex]	*!		*		*		

T$_{38.1.2'}$: vP optimization

(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

Input: $O_{21}/T_{38.1}$	F_{pron}	PR.$\mathcal{A}_{ID/FD/SD}$	F_{SE}	PR.$\mathcal{A}_{CD}$	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
$O_{211'}$: [S, pr, R]		**!		**	*	**	**
⇒ $O_{212'}$: [pr, R-ex]		*	*	*	*	*	*
$O_{213'}$: [R-ex]	*!		*		*		

As a result, the matrix [pron, R-ex] is predicted to be optimal in both competitions (cf. $T_{38.1.1'}$ and $T_{38.1.2'}$), which means that x is eventually realized as pronoun. However, this is not what we find in sentence (62), where x is realized as *himself* and can still be bound by the matrix subject *John* (*John*$_1$ *wondered which picture of himself*$_1$ *Bill saw*). (Note, however, that the pronominal form would also be licit.)

In principle, there are two possibilities how this result can be achieved under the current theory. First, it could be assumed that for some reason the anaphoric form is chosen although the optimal matrix is [pron, R-ex]. However, this would mean that the realization form bears a feature (namely *SELF*) which has already been deleted from the matrix in the course of the syntactic derivation.[26] Hence, the form would not be compatible with the optimal matrix anymore, and therefore this possibility does not seem to be promising.

If an anaphoric form cannot be chosen for the optimal matrix [pron, R-ex], it might instead be the case that *himself* in the example above is not an anaphor at all but a certain type of pronoun. On this assumption, it would satisfy the requirements of the matrix; however, it remains to be explained why a pronoun should surface as *himself*. At first sight, this possibility might not seem to be very attractive either, but there are a couple of observations that support this approach.

As mentioned before (cf. chapter 2), the English form *himself* is not only found in contexts in which it is relatively locally bound; it also occurs in sentences like (68-a), where the binding relation is not very local, in sentences like (68-b), where the coreferent NP does not even c-command *himself*, or in examples like (68-c), in which the antecedent of *himself* does not even belong to the same sentence.

(68)
a. John_1 thinks that it is unlikely that pictures of himself_1 will be found.
b. John_1's campaign said that the nude pictures of himself_1 were fabricated.
c. John_1 is proud as a peacock. Pictures of himself_1 are on display in the gallery.

[26]Note that this case is different from the situation in English where a pronominal form is chosen for the optimal matrix [SE, pron, R-ex], although the realization does not absolutely match the desired specification in this case either. However, in the latter case, the chosen realization form is less anaphoric than the most anaphoric specification in the matrix, and the feature *pron*, which characterizes pronominals, is still contained in the matrix.

All these examples involve contexts in which pronouns are perfectly fine but where anaphors are generally not licit. Thus, it seems reasonable to suppose that these instances of *himself* are no anaphors at all but intensified pronouns, which happen to have the same form as English anaphors (= pronoun+SELF); cf. also chapter 2, section 11., and the references cited there.[27] This assumption is furthermore supported by crosslinguistic evidence – in languages like German, where intensified pronouns differ in form from complex anaphors, anaphoric forms are generally excluded and only pronominals are licit in these contexts (cf. (69-b)-(71-b)).

(69) a. Jim$_1$ thinks that it is unlikely that pictures of him$_1$/himself$_1$ will be found.
b. Jim$_1$ denkt, dass es unwahrscheinlich ist, dass Bilder von ihm$_1$/*sich$_1$/ *sich selbst$_1$ gefunden werden.

(70) a. Jim$_1$'s secretary declared that the nude pictures of him$_1$/himself$_1$ were fabricated.
b. Jims$_1$ Sekretärin beteuerte, dass die Nacktfotos von ihm$_1$/*sich$_1$/*sich selbst$_1$ gefälscht seien.

(71) a. Jim$_1$ is proud as a peacock. Pictures of him$_1$/himself$_1$ are on display in a gallery.
b. Jim$_1$ ist stolz wie ein Pfau. Bilder von ihm$_1$/*sich$_1$/*sich selbst$_1$ werden in einer Gallerie ausgestellt.

This is not only true for the three previous examples, but also for sentence (62) (repeated in (72-a)), as (72-b$_1$) and (72-b$_2$) show. ((73) and (74) are examples of the

[27]The examples in (68) are taken from Hornstein (2001:155; fn.12), who also points out that these non-local or unbound reflexives are pronoun-like and suggests that they are "emphatic pronouns or logophors".

same sort which have been disambiguated.)

(72) a. John_1 wondered which picture of $\text{himself}_{1,2}$ Bill_2 saw.

b_1. John_1 fragt sich, welche Bilder von ihm_1/*sich_1/*sich selbst_1 Bill gesehen hat.

b_2. John fragt sich, welche Bilder von *ihm_2/sich_2/sich selbst_2 Bill_2 gesehen hat.

(73) a. I wonder which pictures of her_1/herself_1 Mary_1 has found.

b. Ich frage mich, welche Bilder von *ihr_1/sich_1/sich selbst_1 Maria_1 gefunden hat.

(74) a. Mary_1 wonders which picture of her_1/herself_1 I have found.

b. Maria_1 fragt sich, welche Bilder von ihr_1/*sich_1/*sich selbst_1 ich gefunden habe.

To sum up, the ambiguity in sentences like (62) (= (72-a): *John*$_1$ *wondered which picture of himself*$_{1,2}$ *Bill*$_2$ *saw*) might be accounted for as follows: If the embedded subject (*Bill*) serves as antecedent for the bound element, the theory predicts that the matrices [SELF, SE, pron, R-ex] or [SE, pron, R-ex] are optimal (cf. $\text{T}_{38.1.1}$ and $\text{T}_{38.1.2}$ respectively), which means that the realizations *himself* and *him* are licit in English (– the latter since English lacks a SE anaphor). By contrast, if the matrix subject (*John*) functions as binder, the optimal matrix is [pron, R-ex] (cf. $\text{T}_{38.1.1'}$ and $\text{T}_{38.1.2'}$). Hence, a pronominal form must be chosen, and since English intensified pronouns have the same form as SELF anaphors, *himself* can again occur in this context (apart from the pronominal form *him*).

Thus, the ambiguity only arises because English lacks on the one hand a SE anaphor and has on the other hand the same realization form for intensified pronouns and SELF anaphors. In languages like German, where this is not the case, we do not find this ambiguity: If the binder is the embedded subject, x is realized as SELF or SE anaphor (the latter form being available), and if the binder corresponds to the matrix subject, x is realized as (intensified) pronoun.[28]

Summary (for masculine forms in the Accusative:

antecedent =	matrix subject	embedded subject
theory predicts:	pron./ intensified pron.	SE ana./ SELF ana.
realization in English:	him/ himself	him/ himself
realization in German:	ihn/ ihn selbst	sich/ sich selbst

To conclude, this approach might be on the right track, although the licensing requirements of intensification remain to be clarified (cf. the previous footnote) and its exact role requires some further discussion.

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[28]However, I have the impression that in German the intensified pronoun is not really as good as the normal pronoun:

(i) a. John$_1$ fragt sich, welche Bilder von ihm$_1$/?ihm selbst$_1$ Bill gesehen hat.
John wonders which pictures of him/him+INTENSIFIER Bill seen has
'John$_1$ wonders which pictures of him$_1$/himself$_1$ Bill saw.'

b. Maria$_1$ fragt sich, welche Bilder von ihr$_1$/?ihr selbst$_1$ ich gefunden habe.
Mary wonders which pictures of her/her+INTENSIFIER I found have
'Mary$_1$ wonders which picture of her$_1$/herself$_1$ I have found.'

Conclusion

Based on the observation that the standard approaches to binding suffer from empirical inadequacies and have difficulties to account for crosslinguistic variation, I have set out to develop an alternative binding theory which captures these shortcomings. My first assumption was that the principles that regulate the distribution of anaphors, pronouns, and R-expressions must be violable, because in this way exceptions to otherwise clear tendencies can be captured straightforwardly. Hence, the analysis I have put forward has been developed within Optimality Theory.

Furthermore, I have assumed that a local derivational framework should be adopted for both conceptual and empirical reasons. At this point, the question has been brought up as to whether it is possible to capture binding in a local derivational theory, since it does not seem to be a strictly local phenomenon. However, I have shown that this is in principle possible if a minimal violation of the *Strict Cycle Condition* at PF is taken into account.

Admittedly, I have neglected additional factors that might also play a role in binding and reconstruction contexts (like logophoricity or additional semantic constraints), and the exact role of post-syntactic realization might also require some further discussion – but I hope to have shown that the theory developed here constitutes a uniform, restrictive system which makes good empirical predictions and is at the same time still flexible enough to permit further refinements along the same lines. Hence, these issues (as well as an extension to further language types) might be subject to future research.

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