Chapter 5:[1]
Reconstruction Effects Revisited

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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 **??**, 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 $him_1/himself_1]_2$ does $John_1$ like t_2?
d. [Which picture of $him_1/himself_1]_2$ 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

[1]Cf. Fischer, Silke. 2004. *Towards an Optimal Theory of Reflexivization.* Doctoral dissertation, University of Tübingen.

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 was already 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 was discussed extensively why 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.[2]

[2]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

(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 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 **??**)

(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
we told Peter of
sich selbst$_2$/?sich$_2$/*ihm$_2$.]
himself/SE/him
'We told Peter$_2$ about himself$_2$.'

(9) a. Peter$_1$ zeigte mir die Schlange neben sich$_1$/??sich selbst$_1$/
Peter showed me the snake near SE/himself/
*ihm$_1$.
him
'Peter$_1$ showed me the snake near him$_1$.'

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.

b. Ich zeigte [$_{vP=SD}$ t_{ich} Peter$_2$ die Schlange [$_{PP=ThD}$ 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 **??**), 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 **??** and **??** in the previous chapter, which showed that this distribution of beta-features is obligatory in this case).[3] 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)).

[3]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.

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?

(10) *Possible underlying numerations:*

a. $\{y_{[*\beta_1*,\beta_2]/[SELF,SE,pron]},\ x_{[\beta_1]/[SELF,SE,pron]},\ \mathrm{C}_{[*\beta_2*]},\ \ldots\}$

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.[4] Either x turns out to be optimally realized as an R-expression

[4]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 **??**). 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 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 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.[5] So demotion can be considered to take place stepwise:

there would also have to be an optimal output candidate based on the latter numeration.

[5]Note that it is generally reasonable to assume that demotion is costly, because we lose

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 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

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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.

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.[6]

(11) Which claim that John_1 made did he_1 (later) deny?

a. $[_{\text{vP}}$ $[_{\text{NP}}$ t'_x which claim ~~$[_{\text{CP}}$ that t_x made$]$~~$]$ $\text{John}_{[*\beta*]}$ deny $[_{\text{VP}}$ t_{NP} x_β t_{deny} ~~[...]~~$]]$

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.

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* $\textit{himself}_1$ *does* $\textit{John}_1$ *like?*, *vs* (1-a), **Which picture of* $\textit{John}_1$ *does* $\textit{he}_1$/$\textit{heself}_1$/$\textit{himself}_1$ *like?*).

[6]As in the previous chapters, I do not use the DP notation but only NPs for the sake of simplicity.

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 $\text{John}_1]_2$ does he_1 like t_2?
b. *[Which picture of $\text{John}_1]_2$ does John_1 like t_2?
c. [Which picture of him_1/$\text{himself}_1]_2$ does John_1 like t_2?
d. [Which picture of him_1/$\text{himself}_1]_2$ 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 ~~t_x~~$]]$

$T_{1.1}$: NP optimization
(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

	Input: O_1/T_1	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]	∗!	∗		∗		

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).[7]

[7] 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 ~~$[_{\text{PP}}\ t'_x$ of $t_x]$~~$]$ saw $t_{NP}]$
workspace: $\{\text{John}_{[*\beta*]}, \text{C}_{[*wh*]}, \ldots\}$

(20) c. $[_{\text{VP}}\ [_{\text{NP}_{[wh]}}\ \text{t}''_x$ which picture $\sout{[_{\text{PP}}\ \text{t}'_x \text{ of } \text{t}_x]}]\ x_{[\beta]}$ like $\text{t}_{NP}]$
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. $[_{\text{vP}}\ [_{\text{NP}_{[wh]}}\ \text{t}''_x$ which picture $\sout{[_{\text{PP}}\ \text{t}'_x \text{ of } \text{t}_x]}]$ $\text{John}_{[*\beta*]}$ like $[_{\text{VP}}\ \text{t}'_{NP}$ $x_{[\beta]}\ \text{t}_{like}\ \sout{[\text{t}'_{NP}]}]]$

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 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 himself*$_1$ *does John*$_1$ *like?*.[8]

$T_{1.1.1}$: vP optimization
(XP/ThD/CD/SD reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *applies vacuously)*

[8]In the subsequent tableaux, $pron_{dem}$ represents pronominal forms that result from demotion, and $R\text{-}ex_{gen}$ 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.

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$_{dem}$ – $x_{[R-ex]}$			*!	*	*	*

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.$\mathcal{A}_{XD}$ *applies 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 $T_{1.1.2'}$.[9]

(22) [Which picture of him$_1$/himself$_1$]$_2$ does he$_1$ like t$_2$?

a. $[_{\text{vP}}\ [_{\text{NP}_{[wh]}}\ \text{t}''_x$ which picture ~~$[_{\text{PP}}\ \text{t}'_x$ of $\text{t}_x]$~~$]$ $y_{[*\beta_1*,\beta_2]}$ like $[_{\text{VP}}\ \text{t}'_{NP}$ $x_{[\beta_1]}$ t_{like} ~~$[\text{t}_{NP}]$~~$]]$

$T_{1.1.1'}$: 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.$\mathcal{A}_{XP}$
⇒ $O_{111'}$: $y_{[SELF,SE,pr]} - x_{[SELF,SE,pr]}$				**	**
$O_{112'}$: $y_{[SE,pron]} - x_{[SELF,SE,pron]}$			*!	*	*
$O_{113'}$: $y_{[pron]} - x_{[SELF,SE,pron]}$		*!	*		
$O_{114'}$: $y_{[SELF,SE,pron]} - x_{[SE,pron]}$			*!	**	**
$O_{115'}$: $y_{[SE,pron]} - x_{[SE,pron]}$			*!*	*	*
$O_{116'}$: $y_{[pron]} - x_{[SE,pron]}$		*!	**		
$O_{117'}$: $y_{[SELF,SE,pron]} - x_{[pron]}$		*!	*	**	**
$O_{118'}$: $y_{[SE,pron]} - x_{[pron]}$		*!	**	*	*
$O_{119'}$: $y_{[pron]} - x_{[pron]}$		*!*	**		

$T_{1.1.2'}$: vP optimization
(XP/ThD/CD/SD reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *irrelevant for x; for y: XP/ThD reached)*

[9]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.)

Input: $O_{12}/T_{1.1}$	*X-X	F_{SE}	F_{SELF}	$\textsc{Pr}.\mathcal{A}_{ThD}$	$\textsc{Pr}.\mathcal{A}_{XP}$
⇒ $O_{121'}$: $y_{[SELF,SE,pron]} - x_{[SE,pron]}$			*	**	**
$O_{122'}$: $y_{[SE,pron]} - x_{[SE,pron]}$			**!	*	*
$O_{123'}$: $y_{[pron]} - x_{[SE,pron]}$		*!	**		
$O_{124'}$: $y_{[SELF,SE,pron]} - x_{[pron]}$		*!	*	**	**
$O_{125'}$: $y_{[SE,pron]} - x_{[pron]}$		*!	**	*	*
$O_{126'}$: $y_{[pron]} - x_{[pron]}$		*!*	**		

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 $\textsc{Faith}_{pron}$ 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 $\textsc{Faith}_{pron}$, 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. $[_{vP}$ op $x_{[\beta]}$ made $[_{VP}$ t'_{op} t_{made} ~~t_{op}~~$]$

b. $[_{TP}$ op $x_{[\beta]}$ $[_{vP}$ t''_{op} t_x made ~~$[_{VP}$ t'_{op} t_{made} $t_{op}]$~~$]]$

T_2 illustrates the corresponding competition.[10] 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.

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]	*!		*	*			

[10]For reasons of space, I abbreviate the candidates in this and some of the subsequent tablaux.

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.[11] 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 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.[12] 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.$\mathcal{A}_{XD}$ *applies vacuously)*

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[11] 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.

[12] Note, however, that O_{34} does not violate *PRON–R-EX, since it eventually yields the word order R-ex$_1$ $\succ$ pron$_1$.

	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 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 demotion 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.[13]

In a nutshell, this approach works as follows. Again, the derivation is based on the numeration $\{\text{R-ex}_{[*\beta_1*]},\ x_{[\beta_1]/[SELF,SE,pron,R-ex]},\ \ldots\}$. 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.[14]

[13]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.

[14]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))

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 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$_2$
which letter that I Hans sent have has he
laut vorgelesen?
loud read out
'Which letter that I had sent to Hans$_1$ did he$_1$ read out loud?'
b. [Welchen Brief, den ich **ihm**$_1$ geschickt habe,]$_2$ hat **Hans**$_1$ t$_2$
which letter that I him sent have has Hans

laut vorgelesen?
loud read out
'Which letter that I had sent to him_1 did Hans_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.[15,16]

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 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.

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[15]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.

[16]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.

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 vorgelesen?
which letter that I him sent have has Hans loud read out
'Which letter that I had sent to him$_1$ did Hans$_1$ read out loud?'

b. Welchen Brief, den ich **Hans**$_1$ geschickt habe, hat **er**$_1$ laut vorgelesen?
which letter that I Hans sent have has he loud read out
'Which letter that I had sent to Hans$_1$ 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.[17] 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 concerned, 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

[17] 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.

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.[18]

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 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,[19] 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.[20] As discussed above, in the reconstruction examples only *some*

[18]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)).

[19]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))

[20]Note, however, that the operation proposed here might be considered to be an instance of *Impoverishment*. Originally (cf. Bonet (1991) and subsequent work), Impoverishment has been restricted to feature deletion; i.e., "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. However, it has also been proposed in the literature that feature-

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.

(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

changing (instead of feature-deleting) Impoverishment exists as well (cf. Noyer (1998), Müller (2004a)). Hence, *Feature Shift* could be considered to be an instance of feature-changing Impoverishment.

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.[21]

(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 ANAPHORIC 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 ANAPHORIC LINEARIZATION; hence, the two constraints in (36) and (37) must be tied.

(36) ANAPHORIC 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

[21] If x involves the specification *SELF*, *Feature Shift* is ruled out along the same lines.

section 3 (cf. in particular the competition in $T_{2.1}$).[22] Thus, the former constraint *PRON–R-EX can be considered to be translated into the new constraint ANAPHORIC LINEARIZATION, since both favour the final linearization R-$ex_1 \succ pron_1$: ANAPHORIC 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 ANAPHORIC 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 respect to *PRON–R-EX, FAITH$_{pron}$, *DEMOTION), but only in two constraints in the PF linearization approach (ANAPHORIC 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

[22]For the sake of convenience, I repeat the relevant tableau below. (Recall that the constraint *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.$\mathcal{A}_{XD}$ *applies 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$_{dem} - x_{[R]}$			*(!)	*	*	*

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	$pron_1 \succ R\text{-}ex_1$	$R\text{-}ex_1 \succ pron_1$
ANA. LINEARIZATION	↔	*PRON–R-EX	*	√
*FEATURE SHIFT	↔	FAITH$_{pron}$, *DEMOTION	√	*

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$_2$
which letter that I Hans sent have has he
laut vorgelesen?
loud read out
'Which letter that I had sent to Hans$_1$ did he$_1$ read out loud?'

b. [Welchen Brief, den ich ihm$_1$ geschickt habe,]$_2$ hat Hans$_1$ t$_2$
which letter that I him sent have has Hans
laut vorgelesen?
loud read out
'Which letter that I had sent to him$_1$ did Hans$_1$ 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=$\{y_{[*\beta_1*,\beta_2]/[SELF,SE,pron]}$, $x_{[\beta_1]/[SELF,SE,pron]}$, $C_{[*\beta_2*]}$, $\ldots\}$; the other three sentences are based on Num=$\{$R-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$_1$/himself$_1$]$_2$ does he$_1$ like t$_2$?

a. [$_{\text{PP}}$ $x_{[\beta_1]}$ of 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$_3$).

T$_3$: 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* again triggers 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$_{3.1}$).

(45) b. [$_{\text{NP}}$ $x_{[\beta_1]}$ which picture [$_{\text{PP}}$ t$'_x$ of ~~t$_x$~~]]

T$_{3.1}$: NP optimization
(XP/ThD/CD reached – $x_{[\beta_1]}$ unchecked)

Input: O_1/T_3	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 ~~$[_{\text{PP}}\ t'_x$ 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. $[_{\text{vP}}\ [_{\text{NP}_{[wh]}}\ t''_x$ which picture ~~$[_{\text{PP}}\ t'_x$ of $t_x]$~~$]\ y_{[*\beta_1*,\beta_2]}$ like $[_{\text{VP}}\ t'_{NP}$
$x_{[\beta_1]}\ t_{like}$ ~~t_{NP}~~$]]$

As $T_{3.1.1}$ shows, $y_{[SELF,SE,pron]}$ – $x_{[SELF,SE,pron]}$ is predicted to be optimal in the optimization based on the first winner from $T_{3.1}$; in $T_{3.1.2}$, $y_{[SELF,SE,pron]}$ – $x_{[SE,pron]}$ 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.[23]

$T_{3.1.1}$: vP optimization
($x_{[\beta_1]}$ checked, but $y_{[\beta_2]}$ unchecked – XP/ThD of y reached)

Input: $O_{11}/T_{3.1}$	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}: $y_{[pron]} - x_{[pron]}$		*!*	**		

$T_{3.1.2}$: vP optimization
($x_{[\beta_1]}$ checked, but $y_{[\beta_2]}$ unchecked – XP/ThD of y reached)

Input: $O_{12}/T_{3.1}$	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?

[23] At PF, both optimal candidates from $T_{3.1.1/2}$ violate ANAPHORIC 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.

a. $[_{\text{PP}}\ x_{[\beta]}$ of $\text{t}_x]$

The optimizations in T_4 and $T_{4.1}$ basically correspond to the competitions illustrated in T_3 and $T_{3.1}$, 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 $T_{4.1}$

T_4: 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 $[_{\text{PP}}\ \text{t}'_x$ of ~~t_x~~$]]$

$T_{4.1}$: NP optimization
(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

	Input: O_1/T_4	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. $[_{\text{VP}}\ [_{\text{NP}_{[wh]}}\ \text{t}''_x$ which picture ~~$[_{\text{PP}}\ \text{t}'_x$ of $\text{t}_x]$~~$]\ x_{[\beta]}$ like $\text{t}_{NP}]$
workspace: $\{\text{John}_{[*\beta*]}, \text{C}_{[*wh*]}, \ldots\}$

(51) d. $[_{\text{vP}}\ [_{\text{NP}_{[wh]}}\ \text{t}''_x$ which picture ~~$[_{\text{PP}}\ \text{t}'_x$ of $\text{t}_x]$~~$]$ $\text{John}_{[*\beta*]}$ like $[_{\text{VP}}\ \text{t}'_{NP}$ $x_{[\beta]}\ \text{t}_{like}$ ~~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 [β]-feature. Hence, the PRINCIPLE $\mathcal{A}$-constraints apply vacuously in $T_{4.1.1}$ and $T_{4.1.2}$, but the result remains unchanged – the matrices with *SELF* (cf. $T_{4.1.1}$)/*SE* (cf. $T_{4.1.2}$) as most anaphoric specification are optimal.

$T_{4.1.1}$: vP optimization
(XP/ThD/CD/SD/FD/ID reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *applies vacuously)*

	Input: $O_{11}/T_{4.1}$	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]	∗!	∗	∗

$T_{4.1.2}$: vP optimization
(XP/ThD/CD/SD/FD/ID reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *applies vacuously)*

	Input: $O_{12}/T_{4.1}$	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 anaphoric 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 $T_{4.1.1/2}$ 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_5. At this stage, unchecked x not only reaches XP, its θ-domain, and its Case domain (as in $T_{3.1}$ and $T_{4.1}$), 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_5: 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. $T_{5.1}$), 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 ANAPHORIC LINEARIZATION is also fulfiled.)

$T_{5.1}$: vP optimization
($x_{[\beta_1]}$ checked, but $y_{[\beta_2]}$ unchecked – XP/ThD of y reached)

Input: O_3/T_5	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_5); [pron, R-ex] is predicted to be optimal (cf. T_6).

(54) [Which claim that he$_1$ made]$_2$ did John$_1$ (later) deny t$_2$?

a. [$_{NP}$ $x_{[\beta_1]}$ which claim that ~~t_x made~~]

T_6: 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~~] $\text{John}_{[*\beta*]}$ deny $[_{\text{VP}}$ t'_{NP} $x_{[\beta]}$ t_{deny} ~~$[t_{NP}]$~~]]

$T_{6.1}$: vP optimization
($x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *applies vacuously)*

	Input: O_3/T_6	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*.[24]

T_7: PF optimization

	Candidates	ANAPHORIC 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 ANAPHORIC 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 $T_{6.1}$ 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.

[24]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.

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 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 **??** 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)).[25] (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_8). 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_8: 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]	∗!		∗	∗	

[25]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. $T_{8.1}$).

(59) b. $[_{\text{NP}}\ x_{[\beta]}$ welches Bild $[_{\text{PP}}\ \text{t}'_x$ von ~~t_x~~$]]$

$T_{8.1}$: NP optimization
(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

Input: O_1/T_8	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. $[_{\text{VP}}$ Timo$_{[*\beta*]}$ $[_{\text{NP}_{[wh]}}\ x_{[\beta]}$ welches Bild ~~$[_{\text{PP}}\ \text{t}'_x$ von $\text{t}_x]$~~$]$ 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. $[_{\text{VP}}\ [_{\text{NP}_{[wh]}}\ x$ welches Bild ~~$[_{\text{PP}}\ \text{t}'_x$ von $\text{t}_x]$~~$]$ Timo t_{NP} gezeigt$]$

Since x has already checked its $[\beta]$-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 $T_{8.1.1}$ and $T_{8.1.2}$

show.

$T_{8.1.1}$: VP optimization
(XP/ThD/CD reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *applies vacuously)*

	Input: $O_{11}/T_{8.1}$	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]	$*!$		$*$	$*$

$T_{8.1.2}$: VP optimization
(XP/ThD/CD reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *applies vacuously)*

	Input: $O_{12}/T_{8.1}$	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., among others, Barss (1986) and 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 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=$\{\text{Bill}_{[*\beta*]}, x_{[\beta]/[SELF,SE,pron,R-ex]}, \text{John}, \ldots\}$. The derivation then proceeds as follows.[26] 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_9).

(63) a. $[_{\text{PP}}\ x_{[\beta]}$ of $t_x]$

T_9: 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 *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. $T_{9.1}$).

(64) b. $[_{\text{NP}_{[wh]}}\ x_{[\beta]}$ which picture $[_{\text{PP}}\ t'_x$ of $\sout{t_x}]]$

$T_{9.1}$: NP optimization
(XP/ThD/CD reached – $x_{[\beta]}$ unchecked)

	Input: O_1/T_9	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]	$*!$	$*$		$*$		

[26] Derivations of this kind have been discussed before, but I repeat it for the sake of convenience.

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 ~~$[_{\text{PP}}\ \text{t}'_x$ 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. $T_{9.1.1}$ and $T_{9.1.2}$).

(66) d. $[_{\text{vP}}\ [_{\text{NP}_{[wh]}}\ \text{t}''_x$ which picture ~~$[_{\text{PP}}\ \text{t}'_x$ of $\text{t}_x]$~~$]\ \text{Bill}_{[*\beta*]}$ saw $[_{\text{VP}}\ \text{t}'_{NP}$ $x_{[\beta]}\ \text{t}_{saw}$ ~~t_{NP}~~$]]$
workspace: $\{\text{C}_{[*wh*]}, \text{John}, \ldots\}$

$T_{9.1.1}$: vP optimization
(XP/ThD/CD/SD/FD/ID reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *applies vacuously)*

	Input: $O_{11}/T_{9.1}$	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]	*!	*	*

$T_{9.1.2}$: vP optimization
(XP/ThD/CD/SD/FD/ID reached – but: $x_{[\beta]}$ checked; PR.$\mathcal{A}_{XD}$ *applies vacuously)*

	Input: $O_{12}/T_{9.1}$	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 $\{\text{John}_{[*\beta*]}$, $x_{[\beta]/[SELF,SE,pron,R-ex]}$, Bill, $\ldots\}$ 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′. $[_{\text{vP}}\ [_{\text{NP}_{[wh]}}\ \text{t}''_x$ which picture ~~$[_{\text{PP}}\ \text{t}'_x$ of $\text{t}_x]$~~$]\ x_{[\beta]}$ Bill saw $[_{\text{VP}}\ \text{t}'_{NP}$ $\text{t}'''_x\ \text{t}_{saw}$ ~~t_{NP}~~$]]$
workspace: $\{\text{John}_{[*\beta*]}, \text{C}_{[*wh*]}, \ldots\}$

$T_{9.1.1'}$: vP optimization
(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

	Input: $O_{11}/T_{9.1}$	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]	∗!		∗		∗		

$T_{9.1.2'}$: vP optimization
(XP/ThD/CD/SD/FD/ID reached – $x_{[\beta]}$ unchecked)

Input: $O_{12}/T_{9.1}$	F_{pron}	PR.$\mathcal{A}_{ID/FD/SD}$	F_{SE}	PR.$\mathcal{A}_{CD}$	F_{SELF}	PR.$\mathcal{A}_{ThD}$	PR.$\mathcal{A}_{XP}$
$O_{121'}$: [S, pr, R]		**!		**	*	**	**
⇒ $O_{122'}$: [pr, R-ex]		*	*	*	*	*	*
$O_{123'}$: [R-ex]	*!		*		*		

As a result, the matrix [pron, R-ex] is predicted to be optimal in both competitions (cf. $T_{9.1.1'}$ and $T_{9.1.2'}$), 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.[27] 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

[27]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.

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.

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 **??**, and the references cited there.[28] 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.

[28]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".

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 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. $T_{9.1.1}$ and $T_{9.1.2}$ 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. $T_{9.1.1'}$ and $T_{9.1.2'}$). 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.[29]

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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[29] 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
John wonders which pictures of him/him+INTENSIFIER Bill
gesehen hat.
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
Mary wonders which pictures of her/her+INTENSIFIER I
gefunden habe.
found have
'Mary$_1$ wonders which picture of her$_1$/herself$_1$ I have found.'

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