

# Passing the subject

How object clause fronting affects Condition C



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## **Preface**

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## 1 Introduction

An important part in understanding what language is, is knowing which sentences are correct in a specific language and which are not. There are two important factors in judging the correctness of a sentence: the sentence *structure* and the sentence *meaning*. It should be noted that this division into two factors corresponds with an important distinction in linguistics: the distinction between *form* and *content*. Now a sentence with an incorrect structure (the form of the sentence) is said to be an ungrammatical sentence and a sentence with an incorrect meaning (the content of the sentence) is said to be a meaningless sentence. This is illustrated by the examples below:

- (1) a. \*All your base are belong to us.
- b. Ringo thinks he is a genius.
- c. #Colorless green ideas sleep furiously.

(1a) is an ungrammatical sentence: the structure in (1a) is not correct in the English language (an asterisk sign is used to indicate ungrammaticality.) In (1b) there is nothing wrong with the sentence structure, so (1b) is grammatical. The same goes for (1c): it might have a weird meaning, it might even be incomprehensible, but it is grammatical (see Chomsky 1957; a hash sign is used to indicate that an semantically infelicitous sentence).

The field of linguistics that studies sentence structure is the field of syntax, while the field of semantics studies sentence meaning. In this paper sentence meaning is defined as 'the sum of the meanings of the parts of the sentence and the way they are syntactically combined', for matters of convenience. Of course, in a context a sentence can be used to mean something more than just that. The sentence in (2a) can, for example, when uttered by a wife to her husband, mean something like (2b):

- (2) a. There is a dirty towel on the floor.
- b. Pick up that dirty towel, now!

However, when deriving the meaning in (2b) from the utterance in (2a) one should always know the strict meaning of (2a), which is the meaning of (2a) in isolation. This is what semantics does: study the meaning of a sentence in isolation. Therefore, when studying sentences in isolation, one only has to look at the syntax and the semantics of a sentence.

There exists a certain directionality between syntax and semantics, which can be formulated as *form precedes content*, or *syntax precedes semantics*. To put it in simple terms: syntacticians say what sentence structures are correct and semanticist say what those correct sentence structures mean. This means that sentence meaning is of no concern to a syntactician. (3) gives some examples of the linguistic input (sentence structures) and output (grammaticality judgements) in the field of syntax under this notion that form precedes function.

- (3) Examples of the linguistic input and output in the field of syntax under the notion that form precedes content

Input	Output
all your base are belong to us	ungrammatical
Ringo thinks he is a genius	grammatical
colorless green ideas sleep furiously	grammatical

So in the situation in (3), the first input structure is judged as ungrammatical, while the second and third input structures are judged as grammatical.

A problem for the model in (3) is the notion of coreference (see Safir 2004a, 2004b, 2004c for a discussion on the notion.) The notion is illustrated by the examples in (4), which are representations of (1b).

- (4) a. Ringo<sub>i</sub> thinks he<sub>i</sub> is a genius  
 b. Ringo<sub>i</sub> thinks he<sub>j</sub> is a genius

(4a) and (4b) share the same sentence structure and in both (4a) and (4b) Ringo thinks that somebody is a genius. This somebody is represented by the noun phrase (NP) *he*. In (4a) the meaning is expressed that Ringo thinks he himself is a genius (this is signalled in (4a) by the corresponding indices *i* and *i*) and in (4b) the meaning is expressed that Ringo thinks somebody else is a genius (this is signalled in (4b) by the non-corresponding indices *i* and *j*.) Now because in (4a) *Ringo* and *he* refer to the same person, there is coreference between the two NPs. In (4b) there is no such coreference.

The influence of coreference on grammaticality can be seen in the representations in (5).

- (5) a. \*he<sub>i</sub> thinks Ringo<sub>i</sub> is a genius  
 b. he<sub>i</sub> thinks Ringo<sub>j</sub> is a genius

Like the sentences in (4), these sentences share the same structure. Again, the only difference is that in (5a) *he* refers to *Ringo*, while in (5b) it does not. However, (5a) is an incorrect sentence, while (5b) is not. Yet, the incorrectness is not semantic: there is no reason why the words in (5a) could not make a meaningful sentence in that particular order, as (5b) shows. Therefore the incorrectness has to be syntactic. But that would mean that a sentence like (5) could be both grammatical and ungrammatical, depending on the intended meaning. So apparently, meaning does influence grammaticality. Then, the theory that form precedes content cannot hold.

Thus, it seems that syntacticians cannot confine themselves to just the sentence structure. They should also take sentence meaning into account. (6) shows some examples of input and output in the field of syntax under this new notion that content and form interact.

- (6) Examples of the linguistic input and output in the field of syntax under the notion that content and form interact.

input	output
all your base are belong to us	ungrammatical
he <sub>i</sub> thinks Ringo <sub>i</sub> is a genius	ungrammatical
he <sub>i</sub> thinks Ringo <sub>j</sub> is a genius	grammatical
Ringo <sub>i</sub> thinks he <sub>i</sub> is a genius	grammatical
Ringo <sub>i</sub> thinks he <sub>j</sub> is a genius	grammatical
colorless green ideas sleep furiously	grammatical

In (6) the first input sentence is clearly ungrammatical. The second input sentence is ungrammatical because of the coreference. However, the third sentence, the non-coreferential counterpart of the second sentence, is grammatical. The fourth and fifth sentence are also grammatical, despite the coreference in the fourth, and the sixth sentence is grammatical too.

(6) shows that it is important for syntacticians to look how meaning can influence the grammaticality of a sentence. This influence of semantics on syntax is called the syntax-semantics interface. This paper's subject lies at this interface. It deals with a special instance of coreference,

which is coreference between an NP in the main clause of a sentence and an NP in a fronted object clauses. Consider the following Dutch sentences:

- (7) a. Jan<sub>i</sub> negeerde [dat hij<sub>i</sub> op de grond moest zitten]  
John ignored that he on the ground had-to sit  
'John ignored that he had to sit on the floor.'
- b. [dat hij<sub>i</sub> op de grond moest zitten] negeerde Jan<sub>i</sub>  
that he on the ground had-to sit ignored John  
'That he had to sit on the floor John ignored.'
- c. \*hij<sub>i</sub> negeerde [dat Jan<sub>i</sub> op de grond moest zitten]  
he ignored that John on the ground had-to sit  
'He ignored that John had to sit on the floor.'
- d. [dat Jan<sub>i</sub> op de grond moest zitten] negeerde hij<sub>i</sub>  
that John on the ground had-to sit ignored he  
'That John had to sit on the floor he ignored.'

The four sentences in (7) are roughly equivalent with respect to their semantics. In addition, it can be stated that in all four sentences there is coreference between NP *Jan* and NP *hij*. Furthermore, in both (7b) and (7d) the object clause (indicated by the square brackets) is fronted: the object clause is moved to the sentence initial position. In this paper the combination of coreference and object fronting as found in (7b,d) will be referred to as *fronted coreference*.

Of the four sentences in (7), (7a) is the most unmarked one: this is how someone would normally put it if he or she wanted to express the meaning associated with the sentences in (7). (7b) resembles (7a), but now the object clause *dat hij op de grond moest zitten* is fronted. This fronting has no major effect on the grammaticality of the sentence, for (7b) is as grammatical as (7a), although perhaps a little more marked. (7c), on the other hand, is clearly ungrammatical. Apparently this configuration is not possible with coreference. In this case fronting of the object clause does have an influence on grammaticality, because it leads to the grammatical sentence (7d). Clearly, (7d) is grammatical, although perhaps slightly marked, just like (7b).

So why does object clause fronting have an effect on grammaticality in (7c,d), but not in (7a,b)? The observed difference between (7a,b) and (7c,d) will be investigated in this paper. The next section will offer some background information on the subject of coreference.

## 2 Binding Theory: an introduction

The first and most influential account of modelling coreference data is Chomsky's Binding Theory (henceforth BT). Chomsky (1981) noted that there are three factors that play a major role in coreference: the NP category the coreferential NPs belong to, the *minimal domain* regarding the two NPs, and the presence of a relation between the coreferential NPs he called *binding*. All three factors will be explained below.

There are three NP categories that are relevant to coreference. The definition of the categories can be found in (8).

- (8) a. reflexives are reflexive pronouns like *himself, herself, myself, and themselves*  
b. pronominals are personal and possessive pronouns like *he, her, I, their, and yours*  
c. R-expressions are most other NPs like *John, the man, Mr Jones, and the president*

The relevance of these categories can be seen in the examples below:

- (9) a. Ringo<sub>i</sub> adores himself<sub>i</sub>  
 b. \*Ringo<sub>i</sub> adores him<sub>i</sub>  
 c. \*Ringo<sub>i</sub> adores the drummer<sub>i</sub>
- (10) a. \*Ringo<sub>i</sub> thinks [that people should adore himself<sub>i</sub>]  
 b. Ringo<sub>i</sub> thinks [that people should adore him<sub>i</sub>]  
 c. \*Ringo<sub>i</sub> thinks [that people should adore the drummer<sub>i</sub>]
- (11) a. \*Ringo<sub>i</sub>'s fans think [that people should adore himself<sub>i</sub>]  
 b. Ringo<sub>i</sub>'s fans think [that people should adore him<sub>i</sub>]  
 c. Ringo<sub>i</sub>'s fans think [that people should adore the drummer<sub>i</sub>]

In a configuration like (9) a reflexive is possible for coreference with *Ringo* (9a), but not a pronominal (9b) or an R-expression (9c). In a configuration as (10) a pronoun is possible (10b), but not a reflexive (10a) or an R-expression (10c). In a configuration as (11) both a pronoun (11b) and a R-expression (11c) are possible, but a reflexive (11a) is not.

Chomsky argued that the reason coreference shows different behavior in the three configurations in (9) – (11) is that in each of them there is a different *binding* configuration. A simple definition of binding is the following:

- (12) Binding: X binds Y if X c-commands Y and if there is coreference between X and Y

As (12) shows, an important part of binding is a relation called *c-command*:

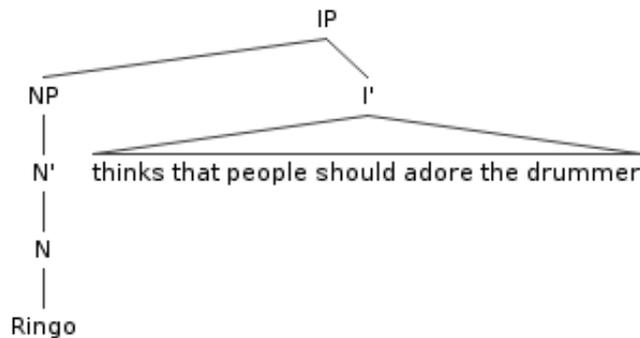
- (13) C-command: X c-commands Y, if Y is inside X's sister

The definition for *sister* is in (13).

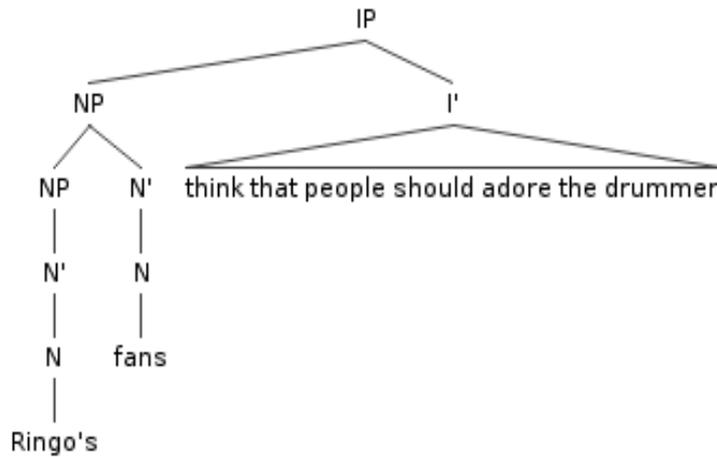
- (14) Sister: X and Y are sisters if they are next to each other in syntactic structure

The three definitions can be illustrated by the syntactic structures in (15) and (16), (15) being the structure belonging to (10c) and (16) being the structure belonging to (11c).

- (15) Syntactic structure of *Ringo thinks that people should adore the drummer*. N: noun; N': noun projection; NP: noun phrase; I': finite verb projection; IP: finite verb phrase.



- (16) Syntactic structure of *Ringo's fans think that people should adore the drummer*. N: noun; N': noun projection; NP: noun phrase; I': finite verb projection; IP: finite verb phrase.



In (15) NP *Ringo* and the finite verb projection (I'), which is *thinks that people should adore the drummer*, are sisters: they are next to each other in the tree structure. In (16) NP *Ringo*, here in genitive form *Ringo's*, is not a sister to I', because they are not next to each other. Instead, the sister of *Ringo* is the NP *fans* and the sister of I' is the complex NP *Ringo's fans*. Consequently, in (15) NP *Ringo* c-commands everything inside the I', while in (16) it is the NP *Ringo's fans* that c-commands everything inside the I'.

Now turning to binding, the difference between (10c) and (11c) becomes clear. In (10c) there is coreference between *Ringo* and *the drummer*, and according to (15) there is also a c-command relation between the two NPs. So because of the definition in (12), there should be binding in (10c). However, (10c) is ungrammatical. In (11c) there is no binding, because *Ringo* does not c-command *the drummer*. (11c) is grammatical. So it seems that a coreferential R-expression like *the drummer* should not be bound:

- (17) R-expression coreference constraint: an R-expression should not be bound

This explains why (10c) and (9c) are ungrammatical.

For pronominals it is not impossible to be bound, as opposed to R-expressions. In (10b) *Ringo* c-commands *him*, and *Ringo* binds *him* also. (10b) is grammatical so it is possible to bind a pronominal. But in (9b) it is not possible to bind the pronominal: (9b) is ungrammatical. So what is the difference between the sentence structure in (10) and the sentence structure in (9)? In (9) both coreferential NPs are arguments of the same predicate (the predicate *adores*.) In (10) *Ringo* belongs to one predicate (the predicate *thinks*) and the bound NP belongs to another (the predicate with verb *adore*). So the difference is that in (9) the two NPs belong to one and the same predicate, where in (10) each NP belongs to a different predicate. Chomsky gave this instance of the notion predicate the term *local domain*:

- (18) Local domain: the predicate a coreferential NP belongs to

(9b) and (10b) show that a bound pronominal like *him* cannot be in the same local domain as the binding NP. This leads to the following constraint on pronominals:

- (19) Pronominal coreference constraint: a pronominal should not be bound in its local domain

Concerning reflexives the situation is rather the opposite. (10b) shows that a reflexive cannot be bound outside its local domain. Furthermore, a reflexives cannot remain unbound: a reflexive always has to be bound by another NP. This is illustrated by (20) below.

- (20) a. \*I adore himself  
 b. I adore him  
 c. I adore the drummer

So, a pronominal like *him* in (20b) or an R-expression like *the drummer* in (20c) can be used without another NP binding it. A reflexive like *himself* in (20a) cannot. The two above observations regarding reflexives are given in (21) below.

- (21) a. A reflexive should not be bound outside its local domain  
 b. A reflexive should be bound

These two observations are usually expressed in the following form:

- (22) Reflexive coreference constraint: a reflexive should be bound inside its local domain

When summing up the previous findings the following can be said. An important distinction in coreference is the distinction between binding and non-binding configurations. Also, within binding configurations there is an important distinction between local binding and non-local binding. The interaction of these three types of binding (local binding, non-local binding, non-binding) with the three NP types (reflexives, pronominals, R-expressions) has its effect on the grammaticality of a sentence as (9) - (11) make clear. An overview of this interaction is shown in (23) below.

- (23) Interactions between binding type and NP type. Grey cells indicate ungrammaticality.

	Local binding	Non-local binding	Non-binding
Reflexive	Ringo <sub>i</sub> adores himself <sub>i</sub>	Ringo <sub>i</sub> thinks that people should adore himself <sub>i</sub>	Ringo's fans <sub>i</sub> think that people should adore himself <sub>i</sub>
Pronominal	Ringo <sub>i</sub> adores him <sub>i</sub>	Ringo <sub>i</sub> thinks that people should adore him <sub>i</sub>	Ringo's fans <sub>i</sub> think that people should adore him <sub>i</sub>
R-expression	Ringo <sub>i</sub> adores the drummer <sub>i</sub>	Ringo <sub>i</sub> thinks that people should adore the drummer <sub>i</sub>	Ringo's fans <sub>i</sub> think that people should adore the drummer <sub>i</sub>

From these findings Chomsky derived a Binding Theory with three conditions. The three conditions are identical to the constraints in (17), (19) and (22):

- (24) Chomsky's Binding Theory  
 a. Condition A: a reflexive is bound in its minimal domain  
 b. Condition B: a pronominal is not bound in its minimal domain  
 c. Condition C: an R-expression is not bound

So the main point of BT is that coreference is only possible when none of the Conditions in (24) are violated. The scope of the Conditions in (24) is shown in (25).

- (25) Scope of Binding Theory's Binding Conditions.

	Local binding	Non-local binding	Non-binding
Reflexive		Condition A	
Pronominal	Condition B		

	Local binding	Non-local binding	Non-binding
R-expression	Condition C		

The figure in (25) expresses the following. Condition A covers non-local binding and non-binding of reflexives. Condition B covers only local binding. Finally, Condition C covers local and non-local binding of R-expressions.

### 3 Object clause fronting and Binding Theory

As can be seen in (23), BT is able to explain many of the data relevant to coreference. There is however a problem with the BT model regarding the fronted coreference data in (7), repeated below.

- (7)
- a. Jan<sub>i</sub> negeerde [dat hij<sub>i</sub> op de grond moest zitten]  
John ignored that he on the ground had-to sit  
'John ignored that he had to sit on the floor.'
  - b. [dat hij<sub>i</sub> op de grond moest zitten] negeerde Jan<sub>i</sub>  
that he on the ground had-to sit ignored John  
'That he had to sit on the floor John ignored.'
  - c. \*hij<sub>i</sub> negeerde [dat Jan<sub>i</sub> op de grond moest zitten]  
he ignored that John on the ground had-to sit  
'He ignored that John had to sit on the floor.'
  - d. [dat Jan<sub>i</sub> op de grond moest zitten] negeerde hij<sub>i</sub>  
that John on the ground had-to sit ignored he  
'That John had to sit on the floor he ignored.'

(7a) resembles (10b) and (7c) resembles (10c), so these two sentences are not the issue. The problem is (7b,d) in which fronted coreference occurs. In order to understand this problem, some basic facts on the fronting of object clauses have to be introduced. The first thing to note is that object clause fronting is an instance of object fronting:

- (26) Object fronting: the object of the sentence is in sentence-first position

So in (27a), where *Ringo* is subject and *himself* is object, there is no object fronting, because the subject is in sentence-first position. But in (27b) - where it also the case that *Ringo* is subject and *himself* is object - there is object fronting, because here the object is in sentence-first position: the object is fronted.

- (27)
- a. Ringo<sub>i</sub> saw himself<sub>i</sub>
  - b. himself<sub>i</sub> Ringo<sub>i</sub> saw

It is generally assumed that an operation like object fronting is not applied immediately at the beginning of the construction process of a sentence. The rationale behind this assumption is that sentences start out in a basic word order with subject and object in their basic positions. This means that (27a) starts out as (27a), because the subject and object are in basic order there, and that (27b) also starts out as (27a), again because of the basic word order in (27a). A simplified representation of the construction process of (27b) would look like (28).

- (28) Construction process of *himself* *Ringo* saw
- a. Ringo saw himself
  - ↓ object fronting
  - b. himself Ringo saw

The sentence starts out as (28a) and because of the object fronting involved it transforms into (28b).

An interesting question now would be where coreference fits into the construction process. This is interesting because of the following. When clauses are fronted, it is possible that one or more of the Binding Conditions in (24) only hold for a certain part of the process: a Binding Condition could only be violated in the phase before fronting, or it could only be violated in the phase after fronting. So the relative ordering of coreference and object fronting in the construction process could affect the grammaticality of sentences with both operations. Therefore, this is a matter that should be looked into. Now, two hypotheses can be construed with respect to the relative ordering of coreference and object fronting:

- (29) a. object fronting precedes coreference  
 b. coreference precedes object fronting

The hypothesis that holds in all situations, makes the best predictions and should be considered the correct hypothesis. The next step is therefore to find out which hypothesis holds in which situation.

Considering (27b), hypothesis (29a) does not hold:

- (30) Construction process of (27b) “*himself<sub>i</sub> Ringo<sub>i</sub> saw*” under hypothesis (29a) that object fronting precedes coreference
- a. Ringo saw himself
  - ↓ object fronting
  - b. himself Ringo saw
  - ↓ coreference
  - c. \**himself<sub>i</sub> Ringo<sub>i</sub> saw*

In (30) it is assumed that coreference takes place after object fronting. That would mean that coreference should be applied to the structure in (30b). In (30b) *Ringo* is c-commanded by *himself* and because there is coreference between the two NPs, *Ringo* should be bound by *himself*. However, Condition C in (24c) states that an R-expression cannot be bound and therefore the resulting structure in (30c) should be ungrammatical. Also, Condition A is violated in (27b) because *himself* is not bound, which leads to the same result: (30c) should be ungrammatical. Yet this is not the correct result: (27b) is a grammatical sentence. Considering this result it seems that hypothesis (29a) is wrong. Hypothesis (29b) looks more promising:

- (31) Construction process of (27b) “*himself<sub>i</sub> Ringo<sub>i</sub> saw*” under hypothesis (29b) that coreference precedes object fronting
- a. Ringo saw himself
  - ↓ coreference
  - b. Ringo<sub>i</sub> saw himself<sub>i</sub>
  - ↓ object fronting
  - c. himself<sub>i</sub> Ringo<sub>i</sub> saw

Under this hypothesis coreference applies to the structure in (31a). In (31a) *Ringo* c-commands *himself* and therefore *Ringo* should bind *himself*. None of the Binding Conditions in (24) is violated, so the structure in (31b) should indeed be possible. And after object fronting the outcome is that the structure in (31c) should be grammatical, which is the correct result.

Now with local binding of pronominals and R-expressions, the situation is different:

- (32) a. \*Jan<sub>i</sub> negeerde hem<sub>i</sub>  
 John ignored him
- b. \*Hem<sub>i</sub> negeerde Jan<sub>i</sub>  
 him ignored John  
 ‘Him John ignored’
- c. \*Hij<sub>i</sub> negeerde Jan<sub>i</sub>  
 he ignored John
- d. \*Jan<sub>i</sub> negeerde hij<sub>i</sub>  
 John ignored he  
 ‘John he ignored’

In (32), (32b) is an instance of (32a) with object fronting, and (32d) is an instance of (32c) with object fronting. (32) shows that local pronominal and R-expression binding is never grammatical. This is very different from local reflexive binding like (28), which is always grammatical. Furthermore, (28) and (32) show that in a local coreference environment object fronting has no effect on grammaticality. Object fronting only affects grammaticality when the coreference is non-local, as in (7) above.

Returning to the topic of the ordering of object fronting and coreference, it seems that both hypothesis (29a) and hypothesis (29b) make correct predictions regarding the local binding of pronominals and R-expressions. (33) deals with (32b) under the hypothesis that object fronting precedes coreference.

- (33) Construction process of (32b) “\*hem<sub>i</sub> negeerde Jan<sub>i</sub>” under hypothesis (29a) that object fronting precedes coreference
- a. Jan negeerde hem  
 ↓ object fronting
- b. hem negeerde Jan  
 ↓ coreference
- c. \*hem<sub>i</sub> negeerde Jan<sub>i</sub>

In (33) coreference applies to the structure with object fronting in (33b). In (33b) there is a violation of Condition C in (24c) because *hem* binds *Jan*, so hypothesis (29b) predicts that (32b) is ungrammatical. (32b) is indeed ungrammatical so (29a) holds. But hypothesis (29b) also holds:

- (34) Construction process of (32b) “\*hem<sub>i</sub> negeerde Jan<sub>i</sub>” under hypothesis (29b) that coreference precedes object fronting
- a. Jan negeerde hem  
 ↓ coreference
- b. \*Jan<sub>i</sub> negeerde hem<sub>i</sub>  
 ↓ object fronting
- c. \*hem<sub>i</sub> negeerde Jan<sub>i</sub>

Under (29b) coreference should be applied to a structure without object fronting such as (34a). In (34a) Condition B is violated because *Jan* binds *hem*. So the prediction is that (32b) is ungrammatical because of this violation and this prediction is also correct.

Both hypotheses are also correct regarding (32d). Under (29a) Condition B is violated:

- (35) Construction process of (32d) “\*Jan<sub>i</sub> negeerde hij<sub>i</sub>” under hypothesis (29a) that object fronting precedes coreference
- a. hij negeerde Jan  
 ↓ object fronting

- b. Jan negeerde hij
- ↓ coreference
- c. \*Jan<sub>i</sub> negeerde hij<sub>i</sub>

In (35) coreference applies to (35b), the structure after object fronting, and in (35b) the violation of Condition B occurs because *Jan* binds *hem*. Because of the violation the prediction is that (32d) is ungrammatical. This is indeed the right prediction so (29a) is correct. But again, hypothesis (29b) is also correct:

- (36) Construction process of (32d) “\*Jan<sub>i</sub> negeerde hij<sub>i</sub>” under hypothesis (29b) that coreference precedes object fronting
  - a. hij negeerde Jan
  - ↓ coreference
  - b. \*hij<sub>i</sub> negeerde Jan<sub>i</sub>
  - ↓ object fronting
  - c. \*Jan<sub>i</sub> negeerde hij<sub>i</sub>

Coreference applies before fronting, so coreference applies to (36a). In (36a), Condition C is violated, because *hij* binds *Jan*, and Condition C states that an R-expression like *Jan* may not be bound at all. This means that under (29b), (32d) should be ungrammatical. This is indeed the case.

So (29a) holds regarding (32b) because of a violation of Condition C and it holds regarding (32d) because of a violation of Condition B. With hypothesis (29b) it is the other way around. It holds regarding (32b) because of a Condition B violation and it holds regarding (32d) because of a Condition C violation. Now both in (32b,d) and in (27b) the fronted object was just a single word. When the object is a whole clause the situation is different, because the binding configuration is rather different. In (7) the objects are such clausal objects. (7b) and (7d) are examples of a sentence with fronting of a whole object clause. Yet, there is a difference between (7b) and (7d) regarding the interaction with hypotheses (29a) and (29b). For (7b) the situation is as follows.

- (37) Construction process of (7b) “[dat hij<sub>i</sub> op de grond moest zitten] negeerde Jan<sub>i</sub>” under hypothesis (29a) that object fronting precedes coreference
  - a. Jan negeerde [dat hij op de grond moest zitten]
  - ↓ object fronting
  - b. [dat hij op de grond moest zitten] negeerde Jan
  - ↓ coreference
  - c. [dat hij<sub>i</sub> op de grond moest zitten] negeerde Jan<sub>i</sub>

In (37) coreference applies to (37b), the situation after object fronting. In (37b), no Binding Conditions in (24) are violated, so it is predicted that (7b) is grammatical. This is correct. But under (29b) the correct prediction is made too:

- (38) Construction process of (7b) “[dat hij<sub>i</sub> op de grond moest zitten] negeerde Jan<sub>i</sub>” under hypothesis (29b) that coreference precedes object fronting
  - a. Jan negeerde [dat hij op de grond moest zitten]
  - ↓ coreference
  - b. Jan<sub>i</sub> negeerde [dat hij<sub>i</sub> op de grond moest zitten]
  - ↓ object fronting
  - c. [dat hij<sub>i</sub> op de grond moest zitten] negeerde Jan<sub>i</sub>

In (38a), which is the structure coreference applies to under (29b), none of the Binding Conditions in (24) is violated. Therefore (7b) should be grammatical, which is indeed the case.

Now with respect to (7d), it seems that hypothesis (29b) does not hold while (29a) does:

- (39) Construction process of (7d) “[dat Jan<sub>i</sub> op de grond moest zitten] negeerde hij<sub>i</sub>” under hypothesis (29a) that object fronting precedes coreference
- a. Hij negeerde [dat Jan op de grond moest zitten]
  - ↓ object fronting
  - b. [dat Jan op de grond moest zitten] negeerde hij
  - ↓ coreference
  - c. [dat Jan<sub>i</sub> op de grond moest zitten] negeerde hij<sub>i</sub>

In (39) coreference is applied to (39b) because of hypothesis (29a). In (39b) *Jan* does not c-command *hij* and therefore there is no binding. Because there is no binding, no Binding Conditions are violated. With no violations the prediction is that (7d) is grammatical. This is a correct prediction. Under (29b) things are different:

- (40) Construction process of (7d) “[dat Jan<sub>i</sub> op de grond moest zitten] negeerde hij<sub>i</sub>” under hypothesis (29b) that coreference precedes object fronting
- a. Hij negeerde [dat Jan op de grond moest zitten]
  - ↓ coreference
  - b. \*Hij<sub>i</sub> negeerde [dat Jan<sub>i</sub> op de grond moest zitten]
  - ↓ object fronting
  - c. \*[dat Jan<sub>i</sub> op de grond moest zitten] negeerde hij<sub>i</sub>

In the structure in (40b) R-expression *Jan* is c-commanded by *hij*. Because there is coreference between *Jan* and *hij*, *Jan* has to be bound by *hij*. However, binding of *Jan* is not permitted, because it violates Condition C in (24c). Therefore (29b) predicts that (7b) is ungrammatical. But surely this is incorrect, because (7d) is a grammatical sentence. This means that (29b) does not hold in this case.

The above findings are summarized in (41). Note that (20a), (7a) and (7c) are included in (41), although they do not have object fronting. They are included to give a complete picture of Binding Condition violations.

- (41) Fronted coreference and violations of Binding Conditions under two hypotheses regarding operation order. Grey squares indicate that an hypothesis wrongly predicts violations of the Binding Conditions.

Sentence	Example number	object fronting precedes coreference			coreference precedes object fronting		
		A	B	C	A	B	C
himself <sub>i</sub> Ringo <sub>i</sub> saw	(27b)	*		*			
*I adore himself <sub>i</sub>	(20a)	*				*	
*hem <sub>i</sub> negeerde Jan <sub>i</sub>	(32b)			*		*	
*Jan <sub>i</sub> negeerde hij <sub>i</sub>	(32d)		*				*
Jan <sub>i</sub> negeerde [dat hij <sub>i</sub> op de grond moest zitten]	(7a)						
[dat hij <sub>i</sub> op de grond moest zitten] negeerde Jan <sub>i</sub>	(7b)						
*hij <sub>i</sub> negeerde [dat Jan <sub>i</sub> op de grond moest zitten]	(7c)			*			*

Sentence	Example number	object fronting precedes coreference	coreference precedes object fronting
[dat Jan <sub>i</sub> op de grond moest zitten] negeerde hij <sub>i</sub>	(7d)		*

As can be seen in (41), neither (29a) nor (29b) can be the correct hypothesis, because neither is always correct in its predictions. Because neither hypothesis is correct, a new hypothesis has to be construed. This will be the topic of the next section.

#### 4 A new hypothesis regarding object fronting and coreference

A probable source of inspiration for a hypothesis that is better than (29a) and (29b) is Reinhart and Reuland's (1993) reflexivity framework. Reinhart and Reuland's framework has been the most influential adjustment of Chomsky's Binding Theory. A major problem of BT are the NP and binding types in (23). In BT the categorization of these types is not independently motivated. Without such independent motivation BT is not really an explanation for coreference data, but just a description of this data. Reinhart and Reuland provide a framework that has independent motivation for both NP type and binding type. Regarding binding types, Reinhart and Reuland argue that the main distinction is between local coreference (which covers local binding) and non-local coreference (which covers non-local binding and non-binding). Central to their motivation for this is the notion of reflexivity. They state that in local coreference the predicate always has a reflexivity meaning, while in non-local coreference there is no such meaning. This is illustrated by some of the examples above. In (27) and (32), which have local coreference, there is indeed a reflexivity meaning to the predicate. In (7), which has non-local coreference, there is no such meaning. Regarding NP types Reinhart and Reuland argue that the main distinction is between reflexives and non-reflexives (which are pronominals and R-expressions). Their motivation for this is that reflexives always need to be bound, while non-reflexives do not.

These findings led Reinhart and Reuland to reformulate BT's Binding Conditions in (24). (42) shows Reinhart and Reuland's Binding Conditions (put in a more convenient form for present purposes).

- (42)
- a. Condition A: a reflexive is bound in its local domain
  - b. Condition B: a non-reflexive is not bound in its local domain
  - c. Condition C: an R-expression is not preferred in non-local binding

Condition A in (42a) resembles BT's Condition A in (24a). However, Reinhart and Reuland's condition B in (42b) is different from BT's Condition B in (24b): (42b) covers both pronominals and R-expressions, where (24b) only covered pronominals. It should be noted that these two Conditions correspond to the main distinctions Reinhart and Reuland made regarding NP types and binding types. As stated above, these are the distinction between local and non-local coreference regarding binding type, and the distinction between reflexives and non-reflexives regarding NP type. Now these two distinctions and Conditions A and B make up the basis of their reflexivity framework:

- (43) Reinhart and Reuland's reflexivity framework with interaction between Binding Conditions A and B and NP and coreference types. Grey cells indicate ungrammaticality.

	Local coreference	Non-local coreference
Reflexive		Condition A
Non-reflexive	Condition B	

Condition A covers non-local reflexive coreference and Condition B covers local non-reflexive coreference. (43) shows this symmetry, which indeed provides an appealing framework

Now Condition C is degraded to a Condition that only covers long-distance R-expression binding. Because of this the Condition is a constraint on the non-local non-reflexive coreference environment from (43). However, Reinhart and Reuland do not consider Condition C a part of the reflexivity framework in (43), which is along the lines of Grodzinsky and Reinhart (1993). As a matter of fact, Condition C has nothing to do with reflexivity at all. Support for this is that the Condition also occurs in languages that have no syntactic regulation of reflexivity. Old English was such a language. In the Old English text *Apollonius of Tyre* (Thorpe 1834) the following constructions occurred:

- (44) a. Apollonius<sub>i</sub> þa út eode & hine<sub>i</sub> scridde  
 Apollonius then out went and him clothed  
 ‘Apollonius then went out and dressed himself’
- b. Ða het se cyngc<sub>i</sub> hine<sub>i</sub> sona gescridan mid wurðfullan scrude  
 Then had the king him soon clothed with worth-full clothes  
 ‘The king then had him clothed immediately with honorable clothing’

In (44a) the pronoun *hine* is used as a reflexive, and in (44b) the pronoun is used as a non-reflexive (a pronominal). This implies that a pronoun like *hine* could be either reflexive or non-reflexive in Old English. In other words, in Old English reflexivity was not regulated by syntactic means, but is instead left open to interpretation by means of the context. Because of this Condition A and Condition B do not apply to Old English, and (43) is not applicable either.

But Old English did have a Condition C. In (44a), *hine* could not have been replaced by an expression like *þone man* (‘the man’), because of the coreference. Yet in (44b), where there is no coreference between the two NPs, it would have been possible to replace *hine* with *þone man*:

- (45) a. \*Apollonius<sub>i</sub> þa út eode & þone man<sub>i</sub> scridde  
 Apollonius then out went and the-ACC man clothed  
 ‘Apollonius then went out and dressed the man’
- b. Ða het se cyngc<sub>i</sub> þone man<sub>i</sub> sona gescridan mid wurðfullan scrude  
 Then had the king the-ACC man soon clothed with worth-full clothes  
 ‘The king then had the man clothed immediately with honorable clothing’

So the data in (44) and (45) show that Condition C applies to Old English, but Conditions A and B do not. This suggests that Condition C works in a framework that is independent from the reflexivity framework of Conditions A and B. Because Grodzinsky and Reinhart refer to non-binding coreference as *covaluation*, this second framework can be regarded as Grodzinsky and Reinhart’s *covaluation framework*:

- (46) Grodzinsky and Reinhart's covaluation framework with interaction between Binding Condition C and NP and coreference types. Grey cells indicate ungrammaticality.

	Non-local binding	Non-binding
Pronoun		
R-expression	Condition C	

Now this distribution of Binding Conditions over two frameworks provides a solution to the problem posed by the failure of hypotheses (29a) and (29b). This solution is based on the following. If the reflexivity framework and the covaluation framework are two separate things, then reflexivity coreference and covaluation coreference could also be separate things. This means there are three operations relevant to sentences with object fronting and coreference: reflexivity coreference, covaluation coreference and object fronting. With three operations there are six possible orderings in which the operations may appear. Of these six orderings, the ordering in (47) is the most promising.

- (47) reflexivity coreference precedes object fronting and object fronting precedes covaluation coreference

The ordering in (47) corresponds with the observation derived from (7) and (32), that object fronting has an effect on covaluation coreference but no effect on reflexivity coreference. This implies two things, as (47) shows. The first is that object fronting should occur after reflexivity coreference, so object fronting can have no influence on sentences with local coreference. The second is that object fronting should occur before covaluation coreference, so object fronting can have its influence on sentences with non-local coreference.

The hypothesis in (47) holds for all the sentences in (41) as can be seen in (48).

- (48) Fronted coreference and violations of the reflexivity framework's and covaluation framework's Binding Conditions under hypothesis (47) that reflexivity coreference precedes object fronting and object fronting precedes covaluation coreference

Sentence	Example number	Reflexivity		Covaluation
		A	B	C
himself <sub>i</sub> Ringo <sub>i</sub> saw	(27b)			
*I adore himself <sub>i</sub>	(20a)	*		
*hem <sub>i</sub> negeerde Jan <sub>i</sub>	(32b)		*	
*Jan <sub>i</sub> negeerde hij <sub>i</sub>	(32d)		*	
Jan <sub>i</sub> negeerde [dat hij <sub>i</sub> op de grond moest zitten]	(7a)			
[dat hij <sub>i</sub> op de grond moest zitten] negeerde Jan <sub>i</sub>	(7b)			
*hij <sub>i</sub> negeerde [dat Jan <sub>i</sub> op de grond moest zitten]	(7c)			*
[dat Jan <sub>i</sub> op de grond moest zitten] negeerde hij <sub>i</sub>	(7d)			

For the sentences in (48) without an clausal object the situation is as follows. In (27b) there are no violation of Conditions A or B because those conditions apply to *Ringo saw himself*, the

instantiation of (27b) before object fronting. Neither is there a violation of Condition C in (27b): this Condition does apply to *himself* *Ringo saw*, the instantiation after object fronting, but it does not apply to local coreference. A violation of Condition A does occur in (20a). In (20a) *himself* is not bound by another NP, and therefore Condition A is violated. A violation of Condition B occurs in (32b). The Condition applies to *Jan negeerde hem*, the instantiation of (32b) before fronting, in which there is a clear violation of the Condition. The situation for (32d) is similar: in *hij negeerde Jan*, the instantiation of (32d) before fronting, there is also a violation of Condition B, as stated in (42b).

Regarding sentences that do have a clausal object, the situation is rather different. The reason for this is that in sentences with a clausal object Condition C can be violated. Condition C only applies to non-local coreference and in sentences with a clausal object there can be non-local coreference. In (7a) there is no such violation of Condition C, so (7a) should be grammatical. The same goes for (7b): there is no violation of Condition C. *Jan* is not c-commanded by *hij*, so *Jan* is not bound by anything, and Condition C is not violated. A violation of Condition C does occur in (7c). In (7c) *Jan* is most certainly c-commanded by *hij*, and therefore Condition C is violated. This violation does not occur in (7d), at least not in the instantiation after object fronting. In *hij negeerde dat Jan op de grond moest zitten*, the instantiation of (7d) before object fronting, Condition C would be violated. However, because it is an instantiation before object fronting, Condition C does not apply to it, so the Condition cannot be violated. This is why (7d) is grammatical, while (7c) is not.

## 5 Conclusion

In this paper the problem that fronted coreference poses to Binding Theory has been dealt with. It has been argued that a distinction can be made between reflexivity coreference and covaluation coreference. This distinction follows from the data on fronted coreference, which show that in the construction process of a sentence reflexivity coreference takes place before object fronting, while covaluation coreference takes place after object fronting. Independent evidence for the distinction can be found in the coreference dynamics of languages without syntactic reflexive marking, when viewed in the light of Reinhart and Reuland 1993 and Grodzinsky and Reinhart 1993.

For future research it would be interesting to apply the above distinction to operations that are similar to object fronting, e.g. wh-movement (Lebeaux 1991, Heycock 1995, Grohmann 2000), left dislocation (Grohmann 2000) and raising (Zwart 2002). Another interesting research topic is the influence that semantics can have on Condition C violations (van Hoek 1997, Safir 2004b, 2004c). Understanding this influence will be essential for a complete understanding of Condition C.

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