Pronominalisation, reflexivity and the partial pronunciation of traces: Binding goes OT

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1 Introduction

Standard Binding Theory (SBT) is often taken to task on two points. One is that it conflates phenomena which do not form a natural class (Pollard & Sag 1992, Reinhart & Reuland 1993). For example, consider the sentences in (1):

(1) a. I like myself
b. I think that the picture of myself is too small
c. apart from myself, there were no other ornithologists in the room

SBT considers (1a) and (1b) to fall within the realms of binding relations and thus constructs its notions, especially that of *governing category*, accordingly. (1c) is thought to be of a different nature and hence is ignored. However, there is evidence that (1b) and (1c) form a natural class and it is (1a) that constitutes different phenomena. For example, the reflexive pronoun alternates with the personal pronoun in the last two examples in (1), but not the first:

(2) a.*I like me
b. I think that the picture of me is too small
c. apart from me, there were no other ornithologists in the room

Taking (1a) and (1b) to form a natural class, SBT has developed a system of considerable complexity in the attempt to account for the data in a uniform manner.[1] However, it is clearly the case that a much simpler and more general theory results if we assume that examples such as (1a) and (1b) fall into different classes of phenomena.

[1] Indeed, the sole motivation for the notions *accessibility* and *SUBJECT*, two of the most problematic notions in SBT, comes from data such as (1b).

The second criticism often levelled at SBT concerns its use of referential indices, which are notoriously inadequate as devices for the basis of referential interpretation (Lasnik 1981, Higginbotham 1983, Lasnik and Uriagereka 1988). One set of problems concerns the interpretation of non-coindexed elements. Binding theory tends to assume fairly simple principles of index interpretation, something like: interpret coindexation as coreference and non-coindexation as disjoint reference. However, as Evans (1980) has shown, the interpretation of non-coindexation cannot be as simple as this, as sometimes we get "accidental coreference" between elements which must, by the binding conditions, be non-coindexed. Consider the example in (3):

(3) even John hates John

Clearly, the two instances of *John* in (3) must have different indices, otherwise we would get a condition C violation and the sentence would be ungrammatical before it was ever given an interpretation. But then, given that the two NPs can be interpreted as coreferential, we must assume that in the semantics the indices can be accidentally be interpreted as coreferential: $John_i$ happens to refer to the same entity as $John_j$ does. But if this is possible, we need to account for why accidental coreference is not more widespread, i.e., why (4) cannot normally be interpreted with the NPs as coreferential:

(4) John_i hates him_j

The danger is, of course, that if we develop a complex theory concerning the interpretation of indices, this will make the binding theory itself redundant: we might just as well formulate a complex theory concerning the referential interpretation of NPs and eliminate the indices.

A second problem with indices concerns the interpretation of overlapping reference. While indices provide a grammatical equivalent to coreference (i.e., coindexation) and disjoint reference (non-coindexation), there is no obvious indexation corresponding to overlapping reference. This makes accounting for the following sorts of differences rather difficult:

(5) a. we_i elected me_j
b.*we_i voted for me_j

The grammaticality of (5a) is to be expected given the binding conditions, as the pronominal is non-coindexed with the subject of the clause. However, by the same considerations, the ungrammaticality of (5b) is totally unexpected. Clearly, the difference between these examples falls out from the difference between the predicates *elect* and *vote for.* However, the point is that it is not obvious how indices can be utilised to show the relevant distinctions.

In this paper, I want to reconsider binding phenomena in light of the Optimality Theory framework originally devised in Newson 1996. It will be shown that a radically different view of the nature of pronouns enabled in this framework avoids the uncomfortable problems which face SBT. In forming this theory, I will heavily rely on the already radically different views (from the perspective of SBT at least) of Reinhart & Reuland (1993) and Pesetsky (forthcoming).

The paper is organised as follows. In the next section, I will review the relevant aspects of Reinhart and Reuland's and Pesetsky's theories, as well as introducing the OT framework that I will adopt. In section **3,** the basic theory will be outlined, demonstrating how with a very small number of general constraints the basic binding facts can be made to follow. In section **4,** I will discuss the role of c-command in binding phenomena and argue that this notion can be entirely ejected from the grammar if we adopt the theory outlined in section two. In section **5,** I turn to a specific criticism of the kind of approach taken here discussed in Reinhart & Reuland (1993), that binding phenomena often extends beyond a lexical predicate and its arguments. I will demonstrate that not only is this criticism misdirected, but a reconsideration of the data from which the criticisms arise leads to a desirable simplification of the theory. Section **6** considers the problem of accidental coreference and suggests a principle of the interpretative component which prevents the coreference of any two input elements. Finally section **7** turns to the logophoric usage of reflexive pronouns and the outlines of a syntactic theory of logophoricity are sketched.

2 Setting the Scene

This section introduces the theories that I will be borrowing from. Space prevents me from providing a full review of these theories and therefore I will restrict myself only to those issues which are of direct relevance to the present paper.

2.1 Reinhart & Reuland (1993)

Reinhart & Reuland (1993 — henceforth Reinhart and Reuland) propose the following two conditions of the binding theory:

(6) **Condition A**
a reflexive-marked predicate must be reflexive

(7) **Condition B**
a reflexive predicate must be reflexive-marked

While these conditions do not directly mention pronouns, they have the effect of restricting pronoun usage through the notion of reflexive-marking (r-marking). A reflexive predicate is one for which (at least) two of its arguments are coindexed and a predicate is r-marked if one of its arguments is a "self"-anaphor:[2] i.e., an anaphoric pronoun which is morphologically complex containing a morpheme equivalent to *self* in English reflexives, for example. Thus a pronominal will not be able to be used with a reflexive predicate as it will not r-mark the predicate and an r-marking reflexive cannot be used when its predicate is not reflexive.

One important consequence of this theory is that it predicts that binding phenomena, in which we get complementary distribution between anaphors and pronominal (i.e., that governed by conditions A and B), is restricted to argument contexts. This follows simply because the binding theory is a theory of the use of reflexive predicates and their arguments. If a pronoun is not in an argument position, conditions A and B will be inapplicable. This appears to be along the right lines as, as Reinhart and Reuland point out, the complementary distribution of pronominals and anaphors is found in argument positions and we find overlapping distribution in cases where the pronouns are not in argument positions:

(8) a. Joe_i likes $^*\text{him}_i$/himself_i
b. Joe_i's pictures of $^*\text{him}_i$/himself_i

(9) a. apart from me/myself, ...
b. Amy_i said that the Queen invited [Joe and her_i/herself_i] ...

Reinhart and Reuland claim that in cases such as (9) we get the logophoric usage of reflexive pronouns which is altogether different from the r-marking usage of reflexives. The point is, however, that in cases such as (9) the binding conditions have nothing to say as the co-indexed elements are not arguments of a predicate and hence there is no r-marking involved.

However, this simple picture is complicated by the fact that we find some cases which seem to involve a reflexive sitting in an argument position,

[2] Reinhart and Reuland also allow what they call *intrinsic* r-marking, which is marked on the head of the predicate either morphologically or by lexical specification, as in reflexive verbs such as *shave* or *wash*.

yet it does not r-mark the predicate and there are some instances where the reflexive appears to be r-marking a predicate which it is not an argument of:

(10) a. pictures of me/myself would look good on the wall
 b. he_i saw a snake near him_i/$himself_i$
(11) a. Joe_i believes *him_i/$himself_i$ to be smart
 b. Amy_i heard *her_i/$herself_i$ sing

In the cases in (10), the pronouns appear to be arguments of a nominal and a prepositional predicate but, given that there is no complementary distribution between pronominals and anaphors, it appears that conditions A and B are not in operation. The ECM cases in (11) demonstrate the opposite problem. Here there is complementary distribution between pronominals and anaphors, suggesting that the binding conditions are operant. Yet the pronouns are not arguments of the ECM predicate, which appears to be what requires r-marking.[3]

Reinhart and Reuland's response to these cases is to complicate the notion of a predicate. They claim that examples such as (10) and (11) demonstrate that condition A does not operate with the notion *lexical predicate,* but rather something they refer to as a *syntactic predicate.* A syntactic predicate is one that contains all the arguments that its head is *syntactically* related to and a subject. Given that the predicates in (10) lack subjects, these examples do not involve syntactic predicates. Moreover, the ECM verbs in (11) are reflexive because the exceptionally Case marked subject is syntactically related to the ECM verb (via Case marking) and hence counts as one of its syntactic arguments. Thus as these ECM verbs have two syntactic arguments coindexed, they are therefore reflexive and require r-marking.

Reinhart and Reuland argue that condition A and condition B differ in that the latter applies at some level of semantic representation. This assumption is, in part, made to account for data of the type mentioned in (5), repeated here as (12):

(12) a. we_i elected me_i
 b.*we_i voted for me_i

Reinhart and Reuland claim that the difference between (12a) and (12b) is that the first has a collective reading whereas the second has a distributive

[3] Note also that there is an instance of the first problem in these examples too. The reflexive pronoun is an argument of the lower predicate, yet this predicate is not reflexive.

reading. This might be represented at the relevant semantic level in the following way:

(13) a. we$_i$ elected me$_j$
b. we=I, $x^1, \ldots, x^n$: I$_i$ voted for me$_i$ & x^1_j voted for me$_i$, ..., & x^n_k voted for me$_i$

In the collective reading of (12a), there is just a single event with differently indexed arguments. Thus the predicate is not reflexive. However, in the distributive reading of (12b), there are a many "voting for" events as there are participants. As one of these involves a coreferential subject and object, we have a reflexive predicate which is not r-marked in violation of condition B.[4]

Turning to the problem, mentioned in footnote 3, that in ECM cases a reflexive exceptionally Case marked subject does not r-mark the predicate which it is semantically related to, Reinhart and Reuland address this through reference to the process of complex predicate formation in Dutch:

(14) ... dat [$_{IP}$ Max$_i$ [$_{IP}$ zichzelf$_i$ Lucie t$_j$] [$_V$ hoorde critiseren$_j$]
that Max himself Lucie heard criticise
'... that Max heard himself criticise Lucie'

In these kinds of ECM constructions, the lower predicate moves to form a complex with the ECM verb. Reinhart and Reuland suppose that this is a universal feature of ECM constructions, with such movement taking place at LF in some languages (e.g., English). They propose that this process results in the reflexive pronoun subject no longer being seen as an argument of the raised predicate and therefore that the reflexive does not r-mark the raised predicate.[5]

Another issue of relevance to the present paper concerns Reinhart and Reuland's treatment of hierarchy effects in binding. Note that the

[4] Note that *we voted for myself* is also ungrammatical, but this time the explanation is because the syntactic predicate, for which condition A is relevant, is not reflexive given that its syntactic arguments are not coindexed.

[5] I consider this analysis fairly questionable on the grounds that movement does not usually alter argument structure, or if it does, it serves to extend the set of arguments a predicate is associated with rather than to reduce it. It is clear, however, that Reinhart and Reuland are forced into this position through their adopting condition A, which ensures that a reflexive pronoun in an argument position must r-mark the relevant predicate. We will see later how, if we drop this condition, a much simpler theory evolves.

theory we have reviewed so far does not distinguish between the following structures:

(15) a. Joe likes himself
b.*himself likes Joe

In both examples in (15) the predicate is reflexive and is r-marked, as the theory requires. Yet only (15a) is grammatical. Reinhart and Reuland claim that the binding theory does not distinguish between these cases, but that independent conditions do. They propose to extend the notion *chain* to include the antecedent–anaphor relationship such that the head of the anaphor-chain is the antecedent and the foot is the anaphor. There are many things in common between an anaphor-chain and a movement-chain, but until now these have been handled otherwise as it was taken that chains should be restricted to single arguments (i.e., to cases of movement). Thus a chain bearing more than one theta role was automatically excluded. If this restriction is relaxed, however, then the well known similarities between movement and anaphor binding can be accounted for through restrictions that the grammar places on chains. One such restriction, the Chain condition, can be used to account for the difference between (15a) and (15b). This is stated thus:

(16) A maximal A-chain $(\alpha_1, \ldots, \alpha_n)$ contains exactly one link—α_1—that is both +R and Case-marked

The feature +R is that of referential independence and is born only by elements that are capable of taking their own reference (i.e., by pronominals and r-expressions, but not reflexives). The chain condition stated in (16) stipulates that the head of the chain must be +R and hence (15b) is excluded.[6]

Note, as of yet, no mention has been made of the notion c-command, which is a central part of the SBT account of binding phenomena. Reinhart and Reuland very nearly eliminate this notion from their theory of binding. Very nearly, but not quite. Standard facts which have been assumed to necessitate inclusion of c-command into the definition of the binding relationship, such as in (17), are handled quite differently in Reinhart and Reuland's theory:

[6] As far as I can see, that the head of the chain must be +R does not follow from anything that Reinhart and Reuland propose other than the chain condition itself. Thus the account is rather stipulative and not particularly insightful. We will offer an account in which this observation follows from the definition of "head of the chain" itself.

(17) a. Joe likes himself
b.*Joe's mother likes himself

As Reinhart and Reuland's theory of binding is a theory of the licensing of reflexive predicates, it is not surprising that arguments of different predicates do not enter into "binding" relations. In (17b), for example, the ungrammaticality is explained by the fact that the r-marked predicate is not reflexive because none of its arguments are coindexed, not because there is an incorrect relationship holding between the reflexive pronoun and its antecedent. However, despite this move towards the simplification of the grammar, the notion c-command sneaks back into the theory via the notion chain,[7] which is then operant in accounting for hierarchy effects. One can't help but feel a little disappointed by this, as clearly if the notion could be entirely eliminated from the grammar, a more restricted and explanatory theory would result.

It is worth pointing out at this point that Reinhart and Reuland, like SBT, also make use of the notion of referential indices. While they do address many of the issues which are raised as problems for SBT with regard to the use of referential indices as discussed above, it strikes me that the notion is still problematic. For example, consider the following data:

(18) a. Joe_i believes himself_i to be the best candidate
b.*we_i believe myself_j to be the best candidate
c. we_i believe me_j to be the best candidate
d. we_i believe each $\text{other}_{i/j}$ to be the best candidate

Reinhart and Reuland have an account for (18a–c). The ECM verb takes the exceptionally Case marked subject as a syntactic argument. Thus, in (18a), this predicate is syntactically reflexive and hence requires r-marking. However, because none of the arguments are coindexed in (18b), the use of the reflexive pronoun violates condition A. In (18c) the predicate is not reflexive syntactically, as none of its arguments are coindexed, or semantically as the exceptionally Case marked subject is not a semantic

[7] Reinhart and Reuland define a(n A-) chain as: "any sequence of coindexation that is headed by an A-position and satisfies antecedent government; that is each coindexed link, except for the head, is c-commanded ... by another link ..." (1993 : 693).

argument of the verb. Thus condition B is satisfied here.[8] But now consider (18d). There are two possibilities here, either the reciprocal does not trigger r-marking (or another similar notion for reciprocity), in which case the matrix subject and the reciprocal must be counter indexed so that the predicate is not reflexive. Or the reciprocal does r-mark the predicate, in which case the reciprocal is coindexed with its antecedent. But none of these options provides a very satisfactory way of representing the meaning of the construction. If we take the first option, we have no account as to what links the reflexive to its antecedent at any level of representation and if we take the second option we have no account of how the arguments become disjoint in reference (as they must in Reinhart and Reuland's theory as the ECM verb does not head a reflexive semantic predicate) at the level of semantic representation. No doubt the answer to this puzzle lies in the investigation of the meaning of reciprocals. However, it seems to me that indices are a poor device for interpreting the complex semantic relationships that exist in these cases.

To summarise, the main advance of Reinhart and Reuland's theory, in comparison to SBT, is that in recasting the theory as a theory of the use of reflexive predicates, a much simpler theory results which is more accurate in identifying true cases of "binding" phenomena. Another positive point concern the extension of the notion chain to the antecedent–anaphor relation which allows further simplification of the binding theory and at the same time provides a way of relating binding and movement phenomena. One drawback of their work is that in maintaining condition A they are forced to accept a complex and problematic notion of "predicate" in order to prevent the appearance of an r-marked predicate every time a self-reflexive is

[8] Actually, the situation is not quite so straightforward. Note that the assumption is that the lower predicate raises to form a complex predicate at LF. We have seen that Reinhart and Reuland assume that this process disassociates the arguments from the raised predicate, at least syntactically, for the purposes of principle A. However, it is not at all obvious that the same game can be played in the semantics as semantically the arguments are still associated with their predicates. But, if a complex predicate is formed by this movement, then all the arguments are arguments of this complex predicate and hence this predicate is reflexive at the level of semantic representation. It seems then that we can adopt one of two problematic stances. Either we claim that the arguments are associated with the predicate for one set of semantic reasons such as interpretation, but not for another such as defining a reflexive semantic predicate. Or we claim that no complex predicate is formed at the semantic level of representation. The first is stipulative and odd at best and the second robs us of any account as to why a complex predicate should be formed in the first place.

used. The other main drawbacks concern the fact that the theory is still dependent on notions such as referential indices and c-command.

2.2 Pesetsky (forthcoming)

Pesetsky's work does not directly concern binding theory, but it may have consequences for a treatment of binding phenomena. It is couched in terms of Optimality Theory (OT), though the point of view he adopts is significantly different from the one I will be adopting. However, these differences are not particularly interesting from the point of view of the current paper and so I will concentrate here only on the aspects of Pesetsky's theory that I will borrow from.

For Pesetsky, OT has its main role in syntax in the mapping of LF structures to PF structures.[9] Thus, the main issue for OT to decide on is how to "pronounce" LFs. The initial step in the development of Pesetsky's approach is the observation that if one adopts a copy theory of movement (as most recently suggested in Chomsky 1995), then what we have is essentially one element (or various copies of it) occupying more than one syntactic position in the LF representation. Given this view, an issue to do with pronunciation arises: when an element occupies more than one syntactic position at a time, where do we pronounce it? For an element in two different positions, there are four logically possible answers to this question, illustrated in (19):

(19) a. element ... element
b. element ... ~~element~~[10]
c. ~~element~~ ... element
d. ~~element~~ ... ~~element~~

(19b) is clearly the case that is assumed for overt movement: the trace is unpronounced. It is at least a possibility that (19c) is the case of covert movement, where the trace is pronounced, but the head of the chain is silent. (19d) is a possible representation of complete deletion (after movement), such as we find in some relative clauses:

[9] In this assumption Pesetsky differs radically from the standard point of view that LF and PF representations derive from a point which is neither one nor the other: S-structure in GB and Spell out in Minimalism. Pesetsky's position is similar to that of Bródy (1996) in that both assume that an LF representation (LLF in Bródy's terms) directly feed PF.

[10] The strikethrough denotes non-pronunciation of the element.

(20) the man ~~who~~ Joe likes ~~who~~

(19a) may well exist in languages which have "resumptive" wh-elements in wh-questions, such as discussed in Koopman (1983).

Note, under this view, a trace is not an empty category which is inserted by the movement transformation, but simply any non-head element of the chain formed by an element occupying more than one position.[11] Traces may or may not be silent.

The next issue to tackle is why, in cases of overt movement, is the element pronounced at the head but not the foot of the chain? In answer to this, Pesetsky proposes the following constraint:

(21) **Silent Trace (SILENT-T)**
do not pronounce traces

Suppose that (21) is presented with the set of options given in (19). Then clearly it will prefer (19b) and (19d) over (19a) and (19c). If there is a reason why complete deletion is ruled out, (21) provides an account of why overt movement looks as it does. Of course, complete deletion of all elements in a chain would make it very difficult to recover the content of the structure if applied without restriction and hence we can assume a principle of Recoverability to be in operation.

Pesetsky does not develop these ideas into a full blown theory of movement (and neither will I). However he attempts to provide some support for these views through the investigation of resumptive pronoun behaviour. Typically we find resumptive pronouns in the position that we would normally expect to find traces. Their use in English seems to be further restricted to cases which would otherwise be ungrammatical if the resumptive did not replace the trace, such as Island contexts:

(22) a. the man who Joe saw Amy and him
b.*the man who Joe saw Amy and ~~who~~
(23) a. the man who that Joe didn't like him upset Amy
b.*the man who that Joe didn't like ~~who~~ upset Amy

Other languages allow a less restricted use of resumptives, and some even call for obligatory usage in certain contexts (Broihier 1995).

From the point of view of a copy theory of movement, the appearance of resumptive pronouns may seem strange: the pronoun replaces the original element after it is copied to another position. However, in Pesetsky's

[11] We shall tighten up this definition of a trace later in the paper.

"pronunciation" terms, there is a very natural way to view resumptives. If an overt NP is a full pronunciation of an element and a trace is the non-pronunciation of an element, then it seems that a pronoun is a partial pronunciation of the element. Of course, what a pronoun voices is a set of grammatical features, while a full NP voices semantic content as well as grammatical features. To elaborate on Pesetsky's theory, with the theory I will introduce in the next section in mind, we might say that any element is made up of two types of features: grammatical (ϕ-features) and content features. It seems that if we give voice to the content features, we automatically voice the ϕ-features, but voicing the ϕ-features does not necessarily entail voicing the content features. Thus, we may view the ϕ-features as the skeleton of any element on which the content features are hung. We may strip the element bare, leaving behind only the skeletal frame, but we cannot have content features without the skeletal ϕ-features. The conclusion of these speculations is that the bare minimum pronunciation of an element is a pronoun (i.e., voicing only the skeletal frame of the ϕ-features).[12] If we pronounce any less we have silence and if we pronounce any more we have the fully pronounced element.

Let us demonstrate how Pesetsky proposes to handle resumptive pronouns as it will be instructive for what is to follow. As stated above, Pesetsky does not intend to develop a full blown theory of movement and so he is satisfied with a constraint such as the following:

(24) **Island Constraints (ISLANDS)**
$*\alpha \ldots [_{\text{Island}} \ldots \cancel{\beta} \ldots]$, where β is the trace of α

What this constraint (or family of constraints) does is to block the non-pronunciation of a trace if it is associated with an element off the Island containing the trace. Clearly, in a full blown theory of movement, one would hope for something a little more explanatory. But whatever constraint or constraints this involves, these can easily be substituted for (24) and hence no harm is done by adopting this simplistic position. What is important is the interaction between SILENT-T, given previously in (21), and whatever blocks an unpronounced trace in the Island contexts.

In non-Island contexts, the Island constraints will be inapplicable and hence SILENT-T will be free to apply, selecting as optimal the candidate with an unpronounced trace:

[12] We will address the issue of how pronouns end up with other non-skeletal features such as reference in the next section.

(25) a.*the man who Joe likes who
b.*the man who Joe likes him
c. the man who Joe likes ~~who~~

(26)

		ISLANDS	SILENT-T
	(25a)		**!
	(25b)		*!
☞	(25c)		

For simplicity, we assume that a full pronunciation of a trace incurs two penalties, whilst its partial pronunciation incurs only one. The actual details are not important, though, as long as full pronunciation is penalised more heavily than the use of a pronoun. As we see in (26), however, the optimal candidate is the one where the trace is completely unpronounced. Now consider a case involving an Island:

(27) a.*the man who Joe saw Amy and who
b. the man who Joe saw Amy and him
c.*the man who Joe saw Amy and ~~who~~

(28)

		ISLANDS	SILENT-T
	(27a)		**!
☞	(27b)		*
	(27c)	*!	

Assuming that the Island constraints are ranked higher than SILENT-T, as (27c) violates this higher ranked constraint it is "killed off" immediately. This means that SILENT-T must then be violated as (27c) is the only candidate that satisfies it. However, the example also illustrates an important aspect of OT. Given that SILENT-T must be violated, it is not the case that it plays no role in determining the optimal candidate. In OT, violated constraints still have potential effect. Hence SILENT-T will select the candidate which violates it minimally, which in this case in (27b).

At this point, we can offer some comments on the similarities between Reinhart and Reuland's theory of reflexive predicates and Pesetsky's theory of the pronunciation of chains. While the theories focus on different linguistic phenomena, there is a point where they briefly make contact. This is that they both extend the notion of a chain in roughly the same direction. In both theories, a chain is considered to be a sequence of related elements which may or may not be overt at either end. Moreover, both consider the possibility of having a pronoun in the "trace" position, though from a traditional standpoint, the kinds of pronouns that each theory is concerned with are of a rather different nature. However, I see no necessity to maintain the traditional view and it is quite plausible that resumptive and non-resumptive pronouns form a natural class and conform to much the same set of principles. With these ideas in place, I think it starts to become plausible that a reasonable theory of binding phenomena can be conceived of making use of Pesetsky's notion of the partial pronunciation of traces and embedding this in a framework similar to that proposed by Reinhart and Reuland. I will develop these ideas in section three. But before this I will outline some of the background assumptions I make concerning the general structure of the grammar.

2.3 Particulars of the OT system

In this section, I introduce the relevant assumptions I make about the OT system. This is largely based on the theory of phrase structure developed in Newson (1996). We start with a consideration of the nature of the input and then move on to consider aspects of the structural theory.

2.3.1 The nature of the input

Much of the syntactic work done in the framework of OT assumes that the input to the system consists of a set of lexical elements along with certain information about how these should be related in terms of argument structure, topic/focus structure and scope relations (Grimshaw 1995, Legendre et al. 1995, forthcoming). What this amounts to is the claim that the input contains all the semantically relevant information concerning how the eventually selected optimal structure should be interpreted. Speas (1996) argues that this point of view adds an unwanted redundancy in that such semantic information is stated twice over: once in the input and once in the interpreted structure (presumably an LF).[13] Pesetsky, as we have seen, takes a different view. He assumes that the input is an LF and therefore there is no such redundancy in his account. I think there is a way to bring

[13] From the perspective of Legendre et al. (forthcoming) it may be that stating this information twice over is necessary as the "intended" or "target" relations stated in the input may not be realised as such in the interpretation of the output. In this system then, there is no redundancy as the two sorts of information are of different natures. I will present a different view in this paper which also eliminates this redundancy.

Pesetsky's approach and the standard one a little closer in such a way as to maintain Pesetsky's elimination this redundancy. Let us suppose, along with Pesetsky, that the input is an LF. However, let us also suppose that what an LF is, is closer to the standard view of what an input is. From this perspective an LF is a set of lexical elements along with statements concerning their semantic relationships. Importantly, from this view, LFs are not syntactic structures.[14]

Now, there are some obvious objections to this point of view, which differs radically from that which has been developed since the very beginnings of generative linguistics. The most obvious objection is: how can LF not be a syntactic structure when it is obvious that syntactic relations affect semantic interpretation? However, once one steps back from the set of beliefs that have been held constant for well over 30 years, it is not so obvious as to what affects what. For example, it is held that an element X can bear such and such a semantic relationship to another element Y (say, X has scope over Y) only if X and Y are in the relevant structural relationship (say, X c-commands Y). However, it is just as plausible to assume that X and Y stand in a certain syntactic configuration only if they stand in such and such a semantic relationship. The former view is that syntax *determines* semantics, while the second is that semantics *determines* syntax. I see no reason to favour any one of these views at present and hence either of them is equally likely. Therefore, there is no logical or empirical reason to believe that LFs must be syntactically structured.[15] In what follows, we will adopt the point of view that inputs are syntactically unstructured LFs. This will enable quite a radical view of what coreference amounts to without the use of indices.

[14] By the claim that LFs are not syntactic structures I mean that they are not of the nature that is usually supposed, i.e., something that is representable in terms of a tree diagram. This does not entail that they do not contain any structural information at all. As we shall see, I will take an LF to contain information about predicates' argument structures, which is something represented in each predicate's lexical entry. This is structurally organised in terms of the notion *argument prominence.* This notion then serves to determine the syntactic relationships that are present in syntactic structures. My thanks to the anonymous reviewer of this paper for pointing out the structural properties of LFs so conceived.

[15] Note that my perspective does not go quite as far as that adopted by the Generative Semanticists as I am not claiming that the input to the system is a meaning. An input is a set of lexical elements and statements concerning how they are related. Presumably, this information will have to be "interpreted" by the semantic component as any LF must. The claim is simply that LFs are not syntactic structures.

2.3.2 Structures

Let us proceed with this idea, then, to see where it leads. For the sake of simplicity, I will concentrate solely on the thematic relations stated in the input, and put to one side information about topic/focus structure and scope relations. Thus, an input to a simple sentence such as (29a) will be as in (29b):

(29) a. Amy likes Joe
b. $\{\text{likes}_{[2,1]}, 2{=}\text{Amy}, 1{=}\text{Joe}\}$

An important aspect of the input demonstrated in (29b) is that the argument structure of the predicate is given in terms of a prominence hierarchy of arguments. This notion is based on the work of Grimshaw (1990), who claims that argument prominence is determined by the complex interaction between a thematic hierarchy and an aspectual hierarchy.[16] I will assume Grimshaw's theory, with one modification: if there is a conflict between the thematic and the aspectual hierarchy, then the aspectual hierarchy wins and the most prominent argument will be the aspectually most prominent one.[17] In inputs, the prominence of an argument is indicated by the number in the argument structure: the bigger the number, the more prominent the argument.

The notion of argument prominence plays a role in determining syntactic structure in the following way. To capture the fact that arguments tend to be closely associated with their predicates, we assume a constraint,

[16] The thematic hierarchy that Grimshaw assumes is a fairly standard one:
i. agent > experiencer > obliques > theme
The aspectual hierarchy is determined by the predicate's event structure. Basically, aspectually more prominent arguments are those which are associated with prior events in the event structure.

[17] I do not disagree with Grimshaw on the important point that the notion *external argument* will not be defined in the case of a conflict between the two hierarchies. However, I do believe that there is a general prominence hierarchy determined in such cases, with the aspectual hierarchy the dominant determiner. The point is that in Grimshaw's theory, when no external argument is defined, there is no prominence relationship defined. Thus there is nothing to determine which argument becomes the subject. Yet it is in precisely these cases where the aspectually more prominent and thematically less prominent argument is made subject. It seems reasonable, even in the absence of a well-defined external argument, that argument prominence determines which argument is to be made subject. Thus I will continue to assume that argument prominence is defined even in cases of conflict between thematic and aspectual hierarchies.

ASSIGN, that forces the saturation of argument structure in syntactic structure as quickly as possible. Thus, arguments must be included in a syntactic structure as close as possible to their related predicate. Moreover, ASSIGN is violated more by unsaturated prominent arguments. In the context of a binary branching tree (forced by another constraint BIN),[18] this system will force the more prominent arguments to be included into syntactic structures before the less prominent ones. We can call this the Prominence First Hypothesis.

One consequence of the Prominence First Hypothesis is that *ceteris paribus,* the most prominent argument, i.e., the one associated with the subject position, should be the closest argument to the verb. Clearly, this is not the case. I assume that this is the result of further constraint interaction. In particular, a constraint forces there to be a subject. Following Williams (1980) we can assume that this is something to do with the requirement that the VP be interpreted in a subject-predicate relationship (the relevant constraint therefore is probably FULL INTERPRETATION, FI).[19] Neelemann (1996) suggests that the way a structure is interpreted as a predicate is for it to contain a gap. I assume that this gap is formed through underparsing an element of the verb's argument structure.[20] Not only will this

[18] Note, in configurational languages, BIN is ranked higher than ASSIGN. However, in non-configurational languages, such as Hungarian, ASSIGN is ranked higher. This has the effect that while the VP in configurational languages is hierarchically organised, the VP in Hungarian will be flat (see É. Kiss 1994). However, as the violations of BIN are forced by conformity to ASSIGN in Hungarian, in contexts where ASSIGN has no role (i.e., in non-thematic structure), BIN will have effect. Hence, other aspects of Hungarian structure will conform to binary branching, i.e., be configurational.

[19] FULL INTERPRETATION, in this system, must be taken to be a purely grammatical constraint as meaning is interpreted from the input, not the structure that the system picks out as optimal. This is important for what immediately follows where it is suggested that part of the verb's argument structure may be underparsed. This process can have no effect on the interpretation associated with the input: the underparsed argument will still be interpreted as a semantic argument of the verb.

[20] Note that I make the standard assumption about underparsing that it does not involve the complete deletion of input material. We may suppose that underparsing makes input material invisible to certain parts of the grammar, but given that nothing is actually deleted underparsed information may still be accessible for other parts of the grammar. Specifically, I assume that while the underparsing of an element of a predicate's argument structure makes this element invisible to ASSIGN, it remains visible (as a gap) for the purposes of FI.

create the required “gap”, but it will also free up one of the arguments in the input to act as subject. The question remains as to which element of the argument structure is to be underparsed. This is answered by ASSIGN which will militate for the underparsing of the most prominent argument, which will therefore not be the cause of a violation of this constraint. To demonstrate how this works, consider the following simple example:

(30) {likes$_{[2,1]}$, 2=Amy, 1=Joe}

(31) a. likes$_{[2,1]}$ Amy Joe
  b. Amy [likes$_{[\langle 2\rangle,1]}$ Joe]
  c. Joe [likes$_{[2,\langle 1\rangle]}$ Amy]

(32)

		FI	ASSIGN[21]
	(31a)	*!	2+1+1
☞	(31b)		1
	(31c)		2!

In (31), the underparsing of elements of the predicate’s argument structure is indicated by the standard angled brackets. In the first case, no element is underparsed and hence both arguments appear in the VP. As the VP cannot be interpreted, we get a fatal violation of FI. The second two examples contain an underparsed element and hence FI is satisfied. However (31b) is less of a violation of ASSIGN as here the most prominent argument is underparsed.[22]

The Prominence First Hypothesis correctly predicts the order of NP arguments in double object constructions, with the goal argument being added to the structure before the less prominent theme. However, PP arguments seem to be counterexamples to the hypothesis, as is demonstrated with the dative construction:

(33) a. Joe gave Amy$_{\text{goal}}$ a book$_{\text{theme}}$
  b. Joe gave a book$_{\text{theme}}$ to Amy$_{\text{goal}}$

However, PP arguments are very peculiar. Often, the thematic relationship holds between the predicate and the NP inside the PP and not with the

[21] The numbers indicating the degree of violation of assign are calculated from the numbers which represent an argument’s prominence in the following way. When a predicate enters a structure, none of its argument structure is saturated and hence all (non-underparsed) argument values are added together. Then, at the next level of projection, assuming binary branching, one argument will be saturated, and all remaining values will be added to the previous calculation. This continues until all the arguments are saturated.

[22] Of course, the faithfulness constraints, which are ranked between FI and ASSIGN, will prevent the over use of argument structure underparsing. There are a number of other issues which I have left out of this discussion for reasons of space. For a fuller treatment of structural issues in this framework, see Newson 1996, 1997.

PP itself, as demonstrated by the fact that we get such alternations as the double object/dative constructions. Pesetsky (1995) terms the relationship between the verb and the argument in the PP *mediated selection,* with the preposition acting as mediator between the verb and the NP that it selects. From our perspective, the fact that we get alternations such as demonstrated in (33) indicates that either both structures are the optimal outputs associated with one input, or that the two are not in competition, being associated with different inputs. There are reasons to believe that we should curb the assumption of optional outputs (Grimshaw 1995, Tesar & Smolensky 1993), and so we are predisposed to assuming that these structures are associated with different inputs—the obvious difference being the occurrence of the preposition in the dative construction. Suppose then that the inputs for (33a) and (33b) are (34a) and (34b) respectively:

(34) a. $\{\text{give}_{[3,2,1]}$, 3=Joe, 2=Amy, 1=book$\}$
b. $\{\text{give}_{[3,2,1]}$, 3=Joe, 2=Amy, 1=book, $\text{to}_{[4]}\}$

(34a) is straightforward, with the agent argument being underparsed to fulfil the role of subject and the other arguments entering the structure on a prominent first basis. (34b) has the additional problem that there is one more argument position than arguments to fill them. However, given this input, there must be an optimal structure for it and obviously the claim is that the dative structure is the winning candidate. What happens here is that the relevant argument of the verb is "robbed" and given to the preposition, presumably to satisfy FI. The PP thus formed is not an argument of the verb and hence is inserted as an adjunct, which accounts for why the PP follows the theme argument.[23]

There are clearly many issues that arise out of this analysis which I cannot hope to do justice to in the present paper. The interested reader is directed toward Newson 1996 and 1997 for further discussion. However, what we have presented will suffice. We are now in a position to return to the main theme of the paper: binding phenomena, which we turn to immediately.

[23] It must be pointed out that underparsing of argument structure is purely a syntactic process and in no way affects the semantic interpretation. This follows from the fact that it is the input which interpreted semantically, being an LF, and thus no matter what goes on in the syntax, semantic relations will remain unaffected. This accounts for the nature of mediated selection as the element which surfaces as the argument of the preposition is for all intents and purposes an argument of the verb semantically.

3 An outline of the theory

Consider the range of structures which call for the use of a pronoun:

(35) a. Amy saw *herself*
b. Joe thinks Amy saw *him*
c. Amy saw *him*
d. no one but *myself* wanted to go to the Black Sabbath concert
e. the man who John saw Mary and *him* in the shop ...

The first three examples are handled in SBT by conditions A and B, which state that an anaphor must be bound in its governing category and that a pronominal must be free in its governing category, respectively. The last two examples stand outside the binding theory, with (35d) giving an example of the logophoric usage of a reflexive and (35e) a resumptive usage of a pronoun.

Suppose, however, that these pronouns are all instances of the pronunciation of some input element which is not the pronoun itself. The immediate question is what is the input for such examples? Making use of Pestesky's suggestion that a chain is simply the occurrence of a single element in a number of structural positions and combining this with Reinhart and Reuland's proposal that antecedent–pronoun sequences form chains, then the input for (35a) and (35b) might involve the statement that one element occupies a number of different argument positions. I suggest that the following captures this adequately:

(36) a. $\{\text{see}_{[2,1]}, 2\&1{=}\text{Amy}\}$
b. $\{\text{think}_{[4,3]}, 3{=}\text{see}_{[2,1]}, 2{=}\text{Amy}, 4\&1{=}\text{Joe}\}$[24]

Clearly, this extends the notion *chain* even beyond that proposed by Reinhart and Reuland, as for them only (36a) involves a chain. Given that the required locality relationship between the personal pronoun and its antecedent is missing in (36b) (see footnote 7), this relationship would not qualify as a chain in Reinhart and Reuland's theory. However, under the view that a chain is the multiple appearance of a single element in a

[24] For the time being I will not attach any significance to the different numbers given to the argument structures of different predicates. While these numbers signify prominence relations between the arguments of each predicate, they do not necessarily do so between arguments of different predicates. We will return to this issue in the next section where we will argue that there is a prominence relationship between arguments of different predicates, but that this is better founded than simply assigning larger or smaller numbers to them in the input.

structure and that a pronoun is an under-pronunciation of one of those appearances, I see no reason to exclude the situation in (35b) from the notion of a chain. One might object that this view fails to observe important conditions on chains and if we were to allow the object formed by the antecedent–pronoun sequence in (35b) to be a well defined chain then we would loose the ability to capture the kinds of restrictions we see holding in movement chains. This would be true if there were no way to distinguish between the chains involved, however there are many differences. One of the major differences between movement and pronoun chains, to which we will be referring, is the fact that pronoun chains have more than one link in θ-positions, while movement chains have only one link in a θ-position. I will not attempt a theory of the limitation placed on the distance between links in a movement chain in the present paper, but it is clear that such a theory is not made impossible by any of the assumptions made here. We will return to the discussion of the difference between pronoun- and movement-chains a little later.

One advantage that can be claimed for this approach is that it quite straightforwardly accounts for coreference phenomena without the use of referential indices. As we are assuming that inputs are LFs and as such are the elements that are interpreted by the semantic component, the relevant coreference facts are assured in inputs such as (36) as it is the same element that occupies both relevant positions. As an element is coreferential with itself, there is little more to add to the theory to get the basic facts to follow.[25] Recall that we are assuming that a pronoun is merely the pronunciation of a set of ϕ-features and that content features are not expressed by a pronoun. It is clear that pronouns "inherit" their referential features from their antecedents, as they are a partial pronunciation of these elements. Given that it is the input that in interpreted, not the

[25] However, it must be said that not everything follows from this assumption. For example, the problem of accounting for the difference between (i) and (ii) is left unsolved:

i.*we voted for me

ii. we elected me

Yet, it is clear that these examples do not involve chain formation in the sense we have assumed and as such fall outside the scope of the theory we are developing. It will transpire later that the relevant input elements for the pronouns in (i) and (ii) are discourse markers and the relationships between the possible referential interpretations of these is clearly a purely semantic issue, perhaps dealt with along the lines suggested in Reinhart and Reuland. But surely this is not anything that a theory of syntax, or more specifically a theory of how to pronounce given LFs, should be concerned with.

surface structure, we can see that pronouns as such do not have referential properties, but the referential interpretation comes from the underlying input element.

Further note that the notion c-command does not enter our notion of a chain. This seems to me to be the right move to make given that Reinhart and Reuland have almost eliminated the notion from their theory of binding, only to have it sneak back in via their notion of a chain. If we can eliminate c-command from the definition of chains then we can eliminate it entirely from binding theory and a simpler theory will result. I leave it to further research to discover whether the notion c-command can be eliminated from the grammar as a whole. If the current approach to binding is on the right track, the indications are quite hopeful that it can.

Returning to the other examples in (35), note that only (35e) involves a chain, the properties of which will not concern us in this paper. We may assume a theory similar to that of Pesetsky's to handle the appearance of resumptive pronouns. This leaves (35c) and (35d) to be discussed. As there is no element in the structure that the pronouns in these cases can be seen to be partial pronunciations of, we will have to assume that the input element which gets pronounced as a pronoun is not itself a fully specified NP. Clearly, the full features of this element are recoverable only from the discourse and as such all that sits in the input is some pointer to some element in the discourse. Let us refer to this "pointer" as a *discourse marker* and let us further assume that this element is in the input. The idea is that discourse markers are not themselves specified for content, but may be for grammatical features (which themselves may be recoverable from the discourse). If this is so, then a pronoun is exactly the right way to pronounce them as pronouns voice only grammatical features and not semantic content. Thus, a first suggestion for the possible inputs for these structures might be:

(37) a. $\{\text{see}_{[2,1]}$, 2=Amy, 1=DM$\}$
b. $\{$"apart from"$_{[1]}$, 1=logophoric DM, ...$\}$

I will return to these issues after discussing further aspects of pronoun usage from this perspective.

The next question that needs to be addressed is: Why do we use the particular pronoun that we do in each of the cases in (35)? I will propose a general answer to this here and then discuss some apparently problematic cases for the approach developed.

3.1 Personal pronouns

A personal pronoun is used when the same argument is associated with two argument positions as in the following examples:

(38) a. Joe thinks Amy saw *him*
b. $\{\text{think}_{[4,3]}$, 3=see$_{[2,1]}$, 2=Amy, 4&1=Joe$\}$

Under the view that the personal pronoun is the minimum possible pronunciation of an NP, obviously what we want to say here is that there is some constraint preventing the full pronunciation of the NP *and* that there is some constraint that is preventing the non-pronunciation of the NP. We already have a constraint that prevents the pronunciation of NPs in this kind of context: SILENT-T. This constraint, then, accounts for typical condition C effects (i.e., an r-expression cannot be bound):

(39) *Joe thinks Amy saw Joe

In (39) we have a chain that is fully pronounced at both ends and thus it contains a pronounced trace, in violation of SILENT-T. In an OT system, (38a) is more optimal than (39) given that the former contains only a partially pronounced trace.

This view has a number of advantages over that of SBT. One is that it does away with the need for condition C, which has long been considered a problematic part of binding theory. Another is that it provides an account for certain phenomena that were puzzling from an SBT perspective. For example, even when no c-command relationship and therefore no binding is involved, it is still preferable to use a pronoun rather than two coreferential r-expressions:

(40) a.*Joe's mother likes Joe
b. Joe's mother like him

These observations follow straightforwardly from the present theory as the two occurrences of *Joe* in (40a) constitute a chain and hence we have the full pronunciation of a trace, in violation of SILENT-T.[26] Incidentally, this also supports the claim that c-command is not a basic property of chains: if there were no chain formed in (40a), we would not be able to account for its ungrammaticality in terms of the over pronunciation of traces.

[26] We return to the issue of which element of the chain is to be considered the trace in such cases in section four. There it will be argued that both elements are traces as this particular chain lacks a head.

The claim is that pronominalisation phenomena is exactly the same as movement phenomena in terms of conformity to SILENT-T. The difference between movement and pronominalisation lies in the nature of their inputs. With pronominalisation it is expressly stated in the input that an element must occupy two argument positions, whereas with movement, given that this constitutes movement from a thematic position (=actual argument position of a given predicate) to a non-thematic position, the reasons for an argument occupying two positions have nothing to do with the input, but are grammatically motivated. Thus, an input for a case of wh-movement as in (41a) might look like (41b):

(41) a. who does Joe like ~~who~~
b. {like$_{[2,1]}$, 2=Joe, 1=who}

Clearly, the input in (41b) does not state that any element must occupy more than one syntactic position. The fact that the wh-element actually does occupy more than one position will follow from its own lexical properties and constraints on what constitutes a well defined structure (something like "an operator must take its scope"). In essence then, a pronoun chain is something which corresponds to information directly encoded in the input, while a movement chain has no direct input motivation but exists in order to satisfy some constraint.

However, this cannot be the end of the story as, if pronominalisation and movement phenomena are similar in that they are governed by SILENT-T, we might expect pronouns to be unpronounced. In other words, we need to account for why (38a) is more optimal than (42):

(42) Joe thinks Amy saw ~~Joe~~

Now, given the input distinction between movement and pronominalisation, we can immediately see that the constraint that forces the pronoun to be present in pronominalisation cases must be something to do with the fact that the chain formed by the input element appearing in more than one position must be interpreted as two arguments, whereas a chain formed by movement is interpreted as one. The intuition being that there is a preference for the same number of pronounced elements as arguments, though these may not be full pronunciations.

Suppose, then, that we propose a constraint:

(43) **Overt Chain (OVERT-C)**
$*\alpha \ldots \cancel{\alpha}$, where each occurrence of α bears a θ-role

In plain English, OVERT-C is a constraint on the non-pronunciation of traces in chains which bear more than one θ-role.

To see how this works, consider the two constraints OVERT-C and SILENT-T together. If OVERT-C is the higher ranked constraint, then we get the results we need for English:

(44) a. Joe thinks Amy saw him
b. Joe thinks Amy saw Joe
c. Joe thinks Amy saw ~~Joe~~

(45)

		OVERT-C	SILENT-T
☞	(44a)		*
	(44b)		**!
	(44c)	*!	

Of course, given the way OT works, we predict that these two constraints might be otherwise ranked in other languages, in which case (44c) would be the optimal structure. As far as I know, there are no languages which have no pronouns and represent pronominalisation in the same way as movement: i.e., with an unpronounced trace.[27] There are a number of ways that we might address this problem. One would be to assume that the ranking between these constraints is fixed universally. This would not be the first time that a fixed ranking has been suggested and so perhaps it is not so unusual. Another possibility would be to assume that from a functional perspective pronouns are too useful not to have, especially when the alternative is no pronunciation. From this perspective we would claim that a language without pronouns falls within the class of humanly possible languages, but it would be such an awkward language that it is never realised. I will leave this matter open.

In summary, the claim that antecedent-pronoun sequences form chains which are subject to some of the restrictions applicable to movement chains allows us to capture some of the binding data straight off. In particular condition C violations are automatically out as over-pronunciations of chains. The use of pronouns in these instances then follows from a constraint which differentiates movement chains from pronoun chains on the basis of their inputs. What remains is to distinguish between the cases where a personal pronoun and a reflexive pronoun are used.

[27] There are cases of binding in which it is possible to have no overt element expressed in the place where a pronoun might otherwise be found:
i. Joe shaved ~~Joe~~
However, to my knowledge there are no languages which only have this device for expressing chains.

3.2 Reflexives

So far, I have claimed that the pronoun will be used in contexts like (38) as it is the least that can be pronounced without there being total silence. But what about the reflexive pronoun?

(46) *Joe thinks Amy saw himself

Clearly, the use of the reflexive is non-optimal here. This may be due to another constraint, the equivalent to binding condition A, which governs the use of reflexive pronouns and in particular prevents them from appearing in contexts such as (46). However, I believe that we already have an account of the ungrammaticality of (46) without proposing any more constraints. Suppose we assume that reflexives are a pronunciation of more than just the bare minimum. We will return later to the question of what else they pronounce, but for now we can take the fact that reflexive pronouns are always morphologically complex, often incorporating some form of the personal pronoun (Yang 1983), as indication that this is true.

If it is true that reflexives are more "contentful" than personal pronouns, then the use of the reflexive will also be out as a greater violation of SILENT-T than the pronoun gives rise to. Thus, including (46) in table (45) we get:

(47)

		OVERT-C	SILENT-T
☞	(44a)		$*$
	(44b)	$*!$	
	(44c)		$**!$
	(46)	$**!$	

I will be satisfied with representing the violation of SILENT-T by the reflexive as "$**$", without distinguishing this from that for the fully pronounced NP in (44c). In fact, we will never have to decide between these cases as no matter which way the constraints are ranked, there will always be a more optimal candidate than both of these. The important point for the present discussion is that (46) represents more of a violation of SILENT-T than does (44a), and hence the latter is more optimal.

The interesting thing about this approach is that we can achieve the effects of condition A of the binding theory without having any such condition, the resulting grammar being simpler in this respect. Also note that the present proposal is an improvement over that of Reinhart and Reuland, who also propose a condition equivalent to condition A (i.e., that a reflexive pronoun r-marks its predicate). Reinhart and Reuland's condition A is the cause of much complexity in their system. Because they assume that every time a reflexive pronoun is used in an argument position it r-marks its predicate, they are forced to redefine the notion of predicate in those cases where a reflexive does not seem to be used for r-marking purposes and yet appears in the argument position of a lexical predicate, such as in ECM contexts and in NPs without a subject. If we do not assume condition A, then we are not forced to accept that every time a reflexive is used it enters into an r-marking relationship with any predicate. Therefore, assuming the current proposal, in the contexts which are problematic for Reinhart and Reuland, a simple notion of the predicate corresponding to "lexical predicate" can be maintained. Basically, a reflexive pronoun will be used only if it is the optimal pronunciation of the input element. Otherwise the use of reflexive pronouns will be barred.

Turning now to the actual use of reflexives, we see in (35a) and (36a), repeated as (48), that a reflexive is used when the same argument is associated with two different argument positions of the same predicate. (49) gives the other contenders for the title "optimal structure", each of which obviously looses out to (48a).

(48) a. Amy saw *herself*
b. $\{\text{see}_{[2,1]},\ 2\&1{=}\text{Amy}\}$

(49) a.*Amy saw Amy
b.*Amy saw ~~Amy~~
c.*Amy saw her

The fact that (49a) is ungrammatical indicates that SILENT-T is still in operation in this example and the fact that (49b) is out shows that so is OVERT-C. Thus, these constraints will make sure that the trace is pronounced as a pronoun. But why the reflexive here and not the personal pronoun? The simplest answer to this question is to assume that Reinhart and Reuland's notion *r-marking* is in play. I have said that reflexive pronouns are expressions of something more than the bare minimum. Suppose that the extra morpheme that they contain is the reflex of an extra feature which is responsible for r-marking. It seems then that a constraint which does the job of Reinhart and Reuland's condition B is needed. Thus, I shall assume (50):

(50) **R-MARKING**
$*\alpha$, where α is a reflexive predicate that is not r-marked

To complete (50) we need a definition of a *reflexive predicate.* I suggest that a reflexive predicate is one for which two or more of its argument positions are occupied by the same element. This offers a substantial improvement over the definition of a reflexive predicate offered by Reinhart and Reuland. Recall that their definition of a reflexive predicate crucially made use of the notion of coindexation. This gives rise the problem that, in principle, it does not have to be one of the coindexed arguments that r-marks the reflexive predicate, thus allowing ungrammatical cases such as:

(51) *Joe revealed him to myself

In (51), the predicate is reflexive because it contains two coindexed elements, *Joe* and *him.* The predicate is also r-marked by *myself.* However, it is clear that r-marking must be done by one of the arguments that is involved in making the predicate reflexive. To overcome this problem, Reinhart and Reuland relativise the notions reflexive predicate and r-marking to a given indexing. But such complications are totally avoided in the present theory, according to which the use of pronouns is simply the most optimal way of pronouncing certain input material. (51) is not ungrammatical because the wrong element r-marks the predicate, but because there is a more optimal way of pronouncing it, which happens to be (52):

(52) Joe revealed himself to me

(52) is more optimal than (51) because the argument *me/myself* is a pronunciation of a discourse marker in the input and pronouncing this as a reflexive adds an extra feature which is totally unnecessary to the interpretation of that element. Thus (51) violates the faithfulness conditions in a way that (52) does not.[28]

[28] To make this argument work we will have to elaborate the theory of categories given at the beginning of the paper. Recall that I am assuming that a category is made of a skeletal structure of grammatical features on which is built the content features. Suppose that the feature responsible for r-marking forms a layer between the skeletal structure and the content. Then all full categories contain this feature. A personal pronoun is the pronunciation of the skeletal structure of the category, a reflexive pronoun is the pronunciation of this plus the r-marking feature and a full NP is the pronunciation of all the features. On these assumptions, the pronunciation of a full NP as a reflexive violates faithfulness in that it underparses the content features, whereas the pronunciation of a discourse marker as a reflexive violates faithfulness in that it overparses this feature, which is not present in the input. We then assume that underparsing is more optimal than overparsing. This is independently motivated by considerations presented in section **7**.

Finally, consider the question of the ranking of R-MARKING. In English, clearly this constraint is ranked above SILENT-T, otherwise this would force the use of the personal pronoun, even in reflexive contexts. However, as R-MARKING does not conflict with OVERT-C, there is no need to assume a ranking relevant for these two constraints. This is all represented in table (53):

(53)

		R-MARKING	OVERT-C	SILENT-T
☞	(48a)			∗∗
	(49a)	∗!		∗∗
	(49b)	∗!	∗	
	(49c)	∗!		∗

Once again note that there exists the possibility of re-ranking the constraints in another language with the result that (48a) would not be optimal, but (49c) would:

(54)

		OVERT-C	SILENT-T	R-MARKING
	(48a)		∗∗!	
	(49a)		∗∗!	∗
	(49b)	∗!		∗
☞	(49c)		∗	∗

If such a language existed, it would not have reflexive pronouns, but would use personal pronouns even in reflexive contexts. Lo and behold, such languages do exist. For example, many Creole languages do not have reflexive pronouns and use personal pronouns in their stead (Iatridou 1988). This is a good example of the way in which an OT grammar determines properties of the lexicon, rather than having the lexicon determining the grammar. A simple ranking of two constraints determines that a language either has or does not have reflexives. It would be very odd if the appearance of reflexives in the lexicon were to determine that reflexive predicates need r-marking as a grammatical principle, or that the absence of reflexive pronouns were to determine that reflexive predicates can do without it.

To conclude this section, at least for the basic part of pronominalisation phenomena, we can capture the data with just three simple constraints, with only one of them needed solely for binding purposes. Thus, binding theory reduces to just one constraint, the equivalent of condition B, which has always been viewed as the least problematic of the binding conditions. As far as the ranking of these constraints is concerned, two do not conflict and hence ranking is not an issue and two seem to be universally fixed in their respective ranking. Thus there would appear to be only two permutations possible producing two types of language, both of which are attested. The theory is also simpler than its predecessors in that it does not make use of indices and, so far, makes no mention of c-command. In the next section we will consider the hierarchy effects that have normally been held to motivate the use of c-command in binding theory. We will show that following the theory outlined in this section, we can eliminate this notion from binding considerations entirely.

4 Hierarchy Effects

So far I have presented an account of when certain pronouns will appear which claims that pronouns are used to pronounce traces. Note that this gives us a straightforward account of the ungrammaticality of (55):

(55) *himself saw Joe

Although R-MARKING is respected here, SILENT-T is violated in a big way and hence (55) is sub-optimal. Thus, it seems that the hierarchical effects that standard binding theory captured through the notion of c-command, fall out from our theory without mention of this notion.

However, further consideration of the matter reveals that our theory depends on how we define the notions *chain, head of chain* and *trace.* It may be that the notion c-command creeps back in to the theory through these definitions, as it does in Reinhart and Reuland's account.

Consider first the most straightforward case where there is just one predicate:

(56) a.*Joe saw Joe
b.*Joe saw ~~Joe~~
c.*Joe saw him
d. Joe saw himself

(57) a.*~~Joe~~ saw Joe
b.*him saw Joe
c.*himself saw Joe

The examples in (56) will be dealt with as we have stated above: in each of the ungrammatical examples, the trace is either over- or under-pronounced. The cases in (57) are all ungrammatical as the trace is over-pronounced. But this analysis crucially relies on defining a trace as the lower element of the chain. Recall that above we defined a trace as any element in a chain that is not the head. But what defines what the head of a chain is? Obviously this is crucial, as it is from this that everything else follows. I would like to propose that the head of the chain will be the most prominent argument in the chain. Thus all but the most prominent element in a chain will be defined as traces and thus be subject to the constraints that we have proposed. As it is the most prominent argument that is made subject and given that the subject is inserted into a higher position than the object, the c-command effect is thus epiphenomenal rather than a central concept in determining binding relations.

Let us check this theory with respect to other data. It has been pointed out that if c-command is central to determining binding relations, then the following data suggest that structures are organised on a rightwards-downwards basis (Larson 1988, Pesetsky 1995):

(58) a. Joe showed Amy herself (in the mirror)
b.*Joe showed herself Amy

(59) a. Joe introduced Amy to herself
b.*Joe introduced herself to Amy

Clearly, the indication is that the leftward argument c-commands the rightward one. However, under the present assumptions, this is not the correct conclusion. If argument prominence determines the head of the chain and all subsequent elements in the chain must be "quieter" than the head, then there is no reason to conclude from (58) or (59) that one argument c-commands the other.[29] Consider (58). Here both the internal arguments are equivalent on the aspectual hierarchy. However, the goal argument is more thematically prominent than the theme and hence the goal is the more prominent argument in the chain. By our definition, then, the goal will be the head of the chain and the theme will be a trace. This is exactly what we find as it is the goal that is fully pronounced. Now consider (59). It would at first appear that the present theory makes exactly the wrong prediction as this time it is the theme that appears to be the head of the chain, being fully pronounced. However, as the goal appears inside a prepositional phrase, its status as an argument of the verb is mediated. Recall

[29] This has the positive consequence that we can maintain a "rightwards-upwards" structure, in accordance with much the structural evidence which led Pesetsky (1995) to the somewhat bizarre conclusion that each expression is associated with both a rightwards-downwards *and* a rightwards-upwards structure. As argued in Newson 1996, we can maintain a rightwards-upwards syntactic structure and let rightwards-downwards phenomena, such as binding hierarchy effects, be read off argument structure.

that the theory of phrase structure I assume takes mediated selection to be the "robbing" of an argument of the verb to give to the preposition. In these terms, the goal argument in (59) is no longer an argument of the verb, but is included in an adjunct. Thus, the theme is the most prominent argument as adjuncts are not arguments at all. The prediction is that if a chain is formed between an argument of a predicate and a non-argument related to the predicate, then the argument will be the more prominent and hence it will be defined as the head of the chain. This prediction is borne out by the data.[30]

We must now consider more complicated examples which concern chains formed across arguments related to different predicates. At first we might think that the notion argument prominence will have nothing to say about these cases, given that this notion is defined over the arguments of a single predicate. Indeed for most purposes we do not need the notion to extend over to arguments of different predicates. For example, in determining the order of inclusion of arguments into a structure we need only consider the arguments of individual predicates. The fact that one predicate may head a structure which is the argument of another will be enough to determine the relative orders of the arguments of both predicates without determining the relative prominence of these arguments themselves.

However, just because there is no need to state prominence relationships between arguments of different predicates for some purposes, does not mean that it should not be done for other purposes. Obviously, if we were to state such prominence relations, it would not be incompatible with the assumed structural analysis as such relationships have no relevance for the business of putting arguments into structures.

Let us then define the relative prominence of arguments of different predicates in the following way:

(60) given predicates P and Q, where Q is associated with an argument position of P, then the arguments of P are more prominent than the arguments of Q.

[30] Note that what must be meant by "argument structure" here is that which is represented in the syntactic structure, rather than that which is present in the input. Clearly, underparsing a part of the augment structure of a predicate does not affect the actual argument structure at all: the underparsed element is still interpreted as the argument of the predicate. This is perfectly consistent as a chain is also a syntactic object and hence we might expect it to be defined in terms of syntactic rather than semantic notions.

Under this notion of the prominence relationship between arguments, we once again capture the c-command effects of binding, without actual reference to such a structural relationship: the arguments of the higher predicate will be more prominent and hence the structurally higher argument positions will be defined as the heads of chains that they enter into with lower argument positions.

There is a problem, however, arising from data such as the following:

(61) a. John's mother likes him
     b. that John would have to join the army appalled him

In these examples, it would seem that the head of the chain is the element inside the subject and the trace is an argument of the predicate. (60) predicts that it should be the other way round: the arguments of the superordinate predicate should be more prominent than those of the subordinate predicate associated with the subject position. While we might be able to get out of this difficulty in (61a) through the suggestion that the possessor role is not a thematic one and hence that the genitive element is not in an argument position of the noun, making (60) inapplicable, the same strategy cannot be used to account for (61b), where *John* clearly is an argument of *join.*

It is noteworthy that these problems concern elements in subject position and that in this regard, there is an asymmetry between subject and complement positions. It is also interesting to note that along side the examples in (61) we have those such as (62):

(62) a. his mother likes John
     b. that he would have to join the army appalled John

What these example demonstrate is that in such cases neither element in the chain seems to be defined as the head and hence either end can be pronounced as a pronominal. Clearly, the same is not true of predicates associated with complement positions:

(63) a. Joe thinks that Amy saw him
     b.*he thinks that Amy saw Joe

Thus, it seems that for some reason subjects are special.

What I would like to suggest is going on here is that the subject is not counted as a normal argument of a predicate and as such, the definition of argument prominence in (60) is inapplicable. We must be careful here, though, as it would be unwise to claim that subjects in general do not count as arguments of predicates at all as then we should loose our account of examples like (63), where *Joe,* as the subject of *think,* is more prominent than the arguments of the lower predicate *saw.*

I believe that the theory of phrase structure I am adopting makes the distinction we want. This theory has two properties that offer a possible account of the phenomena we are concerned with here. First, the subject is an underparsed element, "robbed" from the predicate and therefore, from a grammatical point of view, is no longer an argument of the predicate. Secondly, the subject then re-enters into a syntactic relationship with the projection of the predicate, but this is of a different nature to the predicate–argument relationship. What I propose is that the subject–predication relationship makes the element siting in subject position the most prominent "argument" of the predicate, but that this relationship only holds of the subject itself and not its own arguments. The definition of argument prominence in (60) is transitive such that if the arguments of predicate P are more prominent than those of predicate Q and the argument of predicate Q are more prominent than those of predicate R, then the arguments of predicate P are more prominent than those of R. However, while the subject is more prominent than the other arguments of a predicate (and is therefore more prominent than arguments of any lower predicate), the arguments of the subject itself do not enter into a prominence relationship with these arguments at all. This is simply achieved by the following:

(64) the subject which enters into a predication relationship with the projection of a predicate P will be the most prominent argument of P.

As (64) does not mention the arguments of the subject, a prominence relationship between these and other arguments will not be established and hence any chain formed by requiring an input element to appear both inside the subject and in one of the argument positions of the predicate that the subject is related to, will effectively be headless. If this is so, then both ends of the chain might plausibly be counted as traces — a trace being defined as a non-head element in a chain. As such, SILENT-T and OVERT-C will be applicable to both ends of the chain and hence a pronoun can appear at either. Clearly, the faithfulness constraints will ensure that both ends of the chain will not be pronounced as a pronoun as then the non-pronounced input features would be unrecoverable from the structure.

To summarise what we have said in this section, we have claimed that we can do away with the c-command condition on "binding" relations, replacing this essentially with an extended notion of argument prominence. In general, the arguments of superordinate predicates will be more prominent than those of subordinate ones. However, this is true only of subordinate predicates in complement position, not of those in subject position. While the subject itself will be the most prominent argument of a predicate, arguments within the subject do not enter into a prominence relation with the arguments of the superordinate predicate. To capture the hierarchy effects of binding, then, all we need do is define the head of the chain as the most prominent argument and define traces as non-head links in a chain. The constraints we have proposed will affect the pronunciation of traces and hence the overt element will c-command the pronoun in the correct contexts.

5 The problem of the syntactic predicate

Reinhart and Reuland have one big argument against theories which try to account for binding phenomena in terms of the argument structure of predicates, of which the present analysis is one. This is that sometimes we find reflexivisation occurring across the arguments of more than one predicate and other times we find no reflexive marking of a predicate which has a reflexive pronoun as one of its arguments. These are the cases discussed in section **2.1** concerning ECM constructions and nominal and prepositional predicates without subjects:

(65) a. Amy believes [herself to be polite]
  b. Joe considers [himself strong]

(66) a. [pictures of himself] often embarrass John
  b. Mary saw a snake [near herself][31]

The examples in (65) offer two challenges to those theories that attempt to account for anaphora in terms of argument structure. First the arguments involved are clearly arguments of different predicates and second the reflexive pronoun is an argument of the subordinate predicate which is not itself reflexive. We have already discussed the second problem, stating that it dissolves if we do away with Reinhart and Reuland's condition A, as we have proposed. As there is no requirement that a reflexive pronoun

[31] Reinhart and Reuland discuss the difference between locative PPs, which appear to contain independent predicate prepositions, and other PPs where the preposition clearly mediates for the verb and one of its arguments. If this distinction is valid, as seems so, then we cannot treat locative prepositions in the same way as we analysed other PP complements, discussed earlier. In particular the preposition must be taken as a full predicate in its own right and thus (66b) offers an instance of a non-reflexivising reflexive as the preposition is not a reflexive predicate.

must enter into an r-marking relationship with its predicate, then there is no problem of the use of a reflexive anywhere. Of course, the use of the reflexive must be optimal, and in a number of cases using a reflexive will be an over-pronunciation and therefore will be sub-optimal. In these particular cases, however, the use of the reflexive is sanctioned by the need to r-mark some other element distinct from the lower predicate. The examples in (66) similarly display cases where a reflexive is used without entering into an r-marking relationship with its governing predicate (i.e., the predicate is not reflexive), and similarly we can claim that the problem dissolves under our assumptions. However, the problem is slightly different here as we still need to account for the use of the reflexive in these cases, as opposed to the personal pronoun. Once we have an analysis of why ECM predicates seem to require r-marking when the exceptionally Case marked subject forms a chain with one of the ECM predicate's arguments, then we have an account of why the reflexive pronoun is used in (65). But this will have nothing to say about the use of the reflexive in (66). In fact, the use of the reflexive in (66) is of a very different nature to that in (65), as we have previously pointed out.

In (66) we get the logophoric usage of the reflexive which differs greatly from the r-marking use of this pronoun. We will return to the facts concerning logophoricity in section **7.** This then leaves us with one issue to attend to: why do ECM predicates appear to be reflexive when they are not?

One possible approach would be to revise our definition of a reflexive predicate, along the lines of Reinhart and Reuland, so that the ECM verb is seen as reflexive when a single argument is associated with its subject and the subject of its clausal complement. But this seems ad hoc and doesn't really get to the heart of the matter: why should a "syntactic" predicate be r-marked when it is not semantically reflexive?

A second possibility would be to abandon the assumption that the subject of the ECM clause is not an argument of the ECM predicate. For example, we could assume a similar approach to that which Lasnik (1993) takes in his Minimalist account of ECM structures. Lasnik assumes that ECM structures involve the Minimalist equivalent of "raising to object", in that the accusative subject moves to the specifier of the AGR-o of the ECM verb. There its accusative Case is checked and for all intents and purposes (apart from thematic ones) the ECM subject is the object of the ECM predicate. However, this proposal is not that dissimilar to Reinhart and Reuland's in that it is still based on the distinction between a "syntactic predicate/argument" and a semantic one: the movement of the ECM subject makes it an object of the ECM predicate only syntactically. We still need an answer to why the ECM predicate needs to be r-marked when it is not semantically reflexive.

A third possibility, again based on a suggestion by Reinhart and Reuland, is that ECM cases involve complex predicates: the ECM predicate and the predicate heading its clausal argument come together at some level of representation and form a single complex predicate. Under this assumption, the so formed complex predicate is reflexive as two of its combined argument positions are occupied by the same element. However, once again, there are reasons to doubt that this is what is going on in ECM constructions. One argument against this analysis comes from Reinhart and Reuland's own data. They note that Dutch differs from English in this situation as in Dutch we can get the use of a non-reflexive anaphor (i.e., a non-r-marking pronoun):

(67) Henk hoorde [zich zingen]
H. heard pron. sing
'Henk heard himself sing'

If a complex predicate were formed in this case, then presumably, the reflexive-marking pronoun would have to be used as a reflexive predicate would be the result. The fact that the reflexive-marking pronoun can be used here is a further problem:

(68) Henk hoorde [zichzelf zingen]

The only conclusion we can draw from this under the assumptions we are making here is that complex predication formation in Dutch is an option, where as in English it is obligatory. Yet, the predicates in (67) and (68) receive exactly the same interpretation, despite one being a complex predicate and the other not and, moreover, the only difference between English and Dutch in these respects is that Dutch has a non-r-marking anaphor which English does not. Thus, the difference between a language having compulsory complex predication formation or not depends on whether it has non-r-marking anaphors or not. This seems odd at best.

Another reason to reject the complex predicate approach is the fact that the ECM predicate appears to be reflexive only when the subject of the complement clause is coreferential with the subject of the ECM predicate. When the object of the complement clause is coreferential with this subject a normal pronominal is used:

(69) Amy believes Joe to like her/*herself

If there were a complex predicate formed in this case then if any of its arguments were coreferential it should be reflexive. Clearly, this is not true.

It would seem that whichever way we look at the situation, if we assume that the ECM predicate is r-marked we run into the same problem: our account is at best ad hoc. This might lead us to deny that reflexive marking is involved in ECM cases. But this would make ECM structures similar to those which make use of the logophoric reflexives, and this is not borne out by the evidence: logophoricity is indicated by the possible use of a personal pronoun, the use of an antecedentless reflexive (usually first or second person) or a reflexive with a non-c-commanding antecedent. None of these is true of ECM structures:

(70) a. *Joe believed him to be well behaved
b. *Joe believes myself to love him
c. *Joe's mother believes himself to love her

There is an alternative, however, which makes use of the notion r-marking, but denies that it is the predicate that is involved. The details of this account are still to be fully worked out, but let me offer an outline. We start by comparing ECM and control structures:

(71) a. Joe believes himself to be good
b. Joe tried to be good

It has been noted by Stowell (1982) that one difference between the non-finite clauses in control and ECM structures is that in the case of control, the non-finite clause has a tense interpretation which is independent of the governing tense. Essentially, the tense of a control non-finite clause is "future unrealised". This is not true of ECM cases where the tense of the non-finite clause is entirely dependent on the governing tense:

(72) a. Joe believes/believed Amy to have done the homework
b. Joe believes/believed Amy to be doing the homework

In (72a) the perfectiveness of the embedded clause is seen as relative to the tense of the matrix clause: if Joe believes that Amy has done her homework now, then the homework was completed at some time before now, but if Joe believed this yesterday, then the homework would have been finished at some point before yesterday (in the set of belief states held by Joe, at least). The same is true of the progressive in (72b). Thus, with ECM constructions we have a completely anaphoric tense.

We need some way of representing this in the OT system being built here. Presumably, tense (or a tense operator) is part of the input. We will simply assume here that tense is like an argument which is associated with the relevant position of a predicate's argument structure. Thus, a reasonable input for (73a) would be (73b):

(73) a. Ilona smiled
b. {$\text{smile}_{[\text{T},1]}$, T=past, 1=Ilona}

In the case of ECM constructions, it seems to be an input condition that a single tense operator occupies the T position of two predicates and thus, in our terms, forms a chain.[32] Consider (74):

(74) a. Joe believes [Ilona to be smiling]
b. {$\text{believe}_{[\text{T}^1,3,2]}$, 3=Joe, 2=be $\text{smiling}_{[\text{T}^2,1]}$, 1=Ilona, T^1&T^2=pres}

Recall that we are assuming that the subject of the predicate is robbed from it to satisfy the purpose of predication. The subject thus enters into a relationship with the element of predication. It is clear from recent work on the syntax of functional elements that for one set of reasons we want to see functional structure as the projection of functional elements, but for another set of reasons we might also want functional structure to be projected from the thematic element which heads the ultimate complement of the functional element (see Grimshaw 1991, Abney 1986). It seems that functional structures are headed by both the functional element and its ultimate lexical complement, a situation which is problematic under a standard X-bar treatment of structure, but which may well be possible under an OT treatment. Thus, given that the subject is predicated of something that includes the tense operator and the VP, what the subject enters into a relationship with is a projection of both the tense operator and the predicate. Above, we claimed that the subject is redefined as the most prominent argument of the head of the element of predication that it

[32] Interestingly enough, the T in the lower clause is not given full pronunciation, but is pronounced as *to*. This accords with the view of this as trace in a pronominalisation chain, as it is neither fully pronounced nor completely silent. It might be possible to extend this analysis further to the case of the non-anaphoric tense in control infinitivals. Again, this element is not a fully pronounced tense, but it does not form part of a chain. In a sense it is like the use of an unbound pronoun, which we have claimed to be the pronunciation of a discourse marker. Suppose, then, that in control structures we have the tense equivalent to a discourse marker in the input. To pronounce this as a full tense would be an over-pronunciation, but leaving it silent would be unfaithful to the input. When looked at like this, it appears that the infinitival marker behaves exactly like a pronoun.

enters into a subject-predicate relationship with. It follows, then, that the subject is defined as an argument of the tense element as well as the lexical predicate. Seen in this light, in cases such as (75), we have one argument that occupies two argument positions of one tense operator:

(75) a. {believe$_{[T^1,3,2]}$, 2=be good$_{[T^2,1]}$, 3&1=Joe, T^1&T^2=pres}
b. Joe pres believes [Joe pres be good]

Here *Joe* is subject of a single tense operator in both clauses and hence we have one argument occupying two argument positions of one tense operator. In other words, we have a reflexive tense operator which, we may assume, will require r-marking. Hence the reflexive pronoun will be the optimal pronunciation of the trace of *Joe* in the lower clause.

To conclude then, a reflexive pronoun is required in ECM constructions, not because the predicate is reflexive, but because ECM constructions require anaphoric tense, a situation which we have characterised as a single tense operator occupying the relevant position of the argument structure of two predicates. Hence the subjects of the two clauses are arguments of the same tense operator. It is thus the tense that is reflexive and this is what necessitates the reflexive pronoun to r-mark it. Therefore, a personal pronoun will be an under-pronunciation of the trace in the chain formed when both subject positions are occupied by the same element and hence this will be non-optimal. The optimal pronunciation will consequently be the reflexive pronoun.

This account is much more minimal than previous accounts of reflexivisation in ECM contexts in that it requires no other devices other than those which are needed for other purposes. In SBT, the notion *governor* was introduced as relevant for defining the governing category of a pronoun subject of the complement of an ECM verb and in Reinhart and Reuland's reflexivity approach the notion of a syntactic predicate is introduced for the same purpose. The present account relies on the independently established facts that in ECM cases there is anaphoric tense and that the subject is defined as an argument of the head of the predication. Thus, this analysis adds nothing to the set of grammatical devices other than what is needed independently and therefore may be preferred to other approaches on grounds of minimality.

6 The problem of accidental coreference

The account we have detailed so far handles coreference phenomena without the use of indices, which is a positive move given the problematic nature of these devices. However, it might be objected that this account raises problems of its own. One such problem concerns accidental coreference.

Recall that we are assuming that the input element which gives rise to the use of an obviative pronoun is a discourse marker:

(76) a. Joe saw him
b. $\{\text{see}_{[2,1]}$, 2=Joe, 1=DM$\}$

This discourse marker will receive an interpretation in the semantic component depending on the discourse conditions. But, what prevents the semantic component from accidentally interpreting the discourse marker as coreferential with *Joe*? Clearly, (76a) cannot be given this interpretation, and hence we must assume some principle of interpretation that rules this possibility out. The danger is, of course, that this principle of interpretation redundantly does the same job that we have been trying to do in the syntax. However, this is not necessarily so and we need to investigate further to discover the true nature of this principle of interpretation.

It is interesting to note that the situation in which a discourse marker is "accidentally" given the same reference as another element does occur in cases of focus:

(77) everybody hates him, even HE/JOHN hates him

It is perfectly possible in such examples to interpret the pronoun (or, more precisely, the underlying discourse marker) as coreferential with the focused subject.[33] Obviously, this has got something to do with the nature of focus phenomena. But the point is that, in this restricted case, accidental coreference is possible. This at least indicates that whatever the principle of interpretation that prevents accidental coreference is, it has properties that differ from anything we have been considering so far and hence we are not forced to accept the conclusion that just because such a principle exists, that there is necessarily redundancy in the grammar.

To try to determine further what the nature of the interpretative principle is, consider the following case:

(78) Joe thinks Amy saw him

[33] Note that we wouldn't want to say that in this example there is one element occupying both the subject and object position as if this were the case then the predicate would be reflexive and hence in need of r-marking. The fact that the object is pronounced as a pronoun indicates that this is not the partial pronunciation of a full NP, but the full pronunciation of a discourse element.

With the obviative reading of the pronoun, we have assumed that it is related to a discourse marker in the input, and with the proximate reading we have assumed that the input states that *Joe* is associated with two argument positions, as represented in (79):

(79) a. $\{\text{think}_{[4,3]}$, 4=Joe, 3=$\text{see}_{[2,1]}$, 2=Amy, 1=DM$\}$
b. $\{\text{think}_{[4,3]}$, 3=$\text{see}_{[2,1]}$, 2=Amy, 4&1=Joe$\}$

However, an interesting question arises. Can the obviative reading of (78) be reached from input (79a) with the accidental coreference interpretation between the discourse marker and *Joe*? Suppose the answer is yes. Then the principle that disallows the accidental coreference interpretation in (76a) has virtually the same effect as condition B of the binding theory. It must say that a discourse marker cannot be interpreted as coreferential with any argument of its own predicate, though it may be coreferential with an argument of another predicate. However, suppose that the only way to achieve the proximate reading for (78) is through the input (79b). If this is true then the interpretation principle is much simpler. It says that a discourse marker cannot be interpreted as coreferential with any other element in the sentence (excepting focused elements). This principle clearly does not restate anything we have mentioned in our account of binding phenomena and hence there is no redundancy here.

In fact, this may simply be an instance of an even more general principle which states that no element can be accidentally interpreted as coreferential with any other element in the sentence. Such a principle is needed to rule out accidental coreference in cases such as the following:

(80) John likes John/that man/Bill

Clearly, in such cases, the subject and object arguments are represented as different elements in the input. Yet if accidental coreference were a possibility, what would stop it from applying in these cases? That this is exactly the same principle at work as with the case of the discourse marker is indicated by the fact that even here, this principle can be overridden in the context of focus:

(81) everyone hates John, even JOHN hates John

It must be a basic interpretative principle that no two input elements are interpreted as coreferential. The only way to achieve coreference, therefore, is through the placing of a single element (which of course is coreferential with itself) in more than one position in a structure. If this line of reasoning can be sustained, then there is clearly no reduplication in the semantics of the binding principles that we have proposed in the syntax.

7 Logophors

It is time we returned to a question left unattended in section **5,** that of how come reflexive pronouns can be used in cases where no r-marking appears to be needed? We get such usage of reflexives in those cases which Reinhart and Reuland deemed to lack a syntactic predicate, either because the pronoun stands in a non-argument position or because the pronoun is an argument of a lexical predicate that lacks a subject, something which fails to be a syntactic predicate by definition:

(82) a. Amy said that the Queen invited Joe and herself to tea
b. Joe thought that the picture of himself was too small
c. Amy put the box behind herself

However, it is easy to see that in these cases we do not get the use of the r-marking reflexive, but the logophoric use of the reflexive instead. This is shown by the fact that in each case the reflexive is not in complementary distribution with the pronoun and that it can have a non-c-commanding antecedent or even no antecedent at all:

(83) a. Amy said that the Queen invited Joe and her to tea
b. Joe thought that the picture of him was too small
c. Amy put the box behind her

(84) a. that the Queen had invited Joe and herself to tea surprised Amy
b. the picture of themselves looked good on Amy and Joe's wall
c. that the box was placed in front of herself was no surprise to Amy

(85) a. no one but myself wanted to leave the party early
b. [pictures of oneself] are often disappointing
c. there was a snake [near myself]

Thus, what is needed is an account of the use of logophoric pronouns rather than of the extended use of r-marking reflexives. Importantly, given that we are not assuming a condition A equivalent, the problem here is not that the reflexive r-marks something that it should not, as it is in Reinhart and Reuland's theory, but simply why the reflexive is not ruled out as an over pronunciation of the input element that it is associated with. There are two issues to address: what are the syntactic facts of logophoricity?; what is the nature of the input that gives rise to the use of logophoric pronouns?

Determining the syntactic facts of logophoricity is far from straightforward. We have seen that in languages such as English, the use of logophoric reflexives is restricted to non-argument positions. However, in languages which have a separate logophoric pronoun, these can appear in argument positions within the clausal complements of certain verbs, as in the following Ewe example:

(86) kofi be yè-dzo
Kofi say log-leave
'Kofi said that he (Kofi) left' (Sells 1987 : 448)

It is not entirely obvious, though, whether the two types of languages differ greatly in this respect. As indicated by the English translation in (86), in this case a personal pronoun is used. This can either be taken to indicate that English does not allow logophoric elements in this position, or that it does allow them here, only they get pronounced as a personal pronoun. If we assume that English-type languages do not allow logophoric elements in these contexts, then this will have to be accounted for in terms of a constraint on the interpretative component. This would not be entirely happy, however, as we would have to assume that the Ewe-type languages lack this constraint. It is reasonable to assume that languages do not differ with respect to their interpretative components and hence we might conclude that English does allow logophoric elements in these contexts.[34] The question is, therefore, why does the logophoric element surface here as a pronoun, while in other contexts it surfaces as a reflexive?

Turning to the second issue, concerning the nature of the input element that surfaces as a logophoric pronoun, in cases where there is no antecedent, it is clear that the logophor is like an obviative pronoun and thus must be related to some discourse marker. Moreover, this discourse

[34] There is a second possible account for the difference between the two languages which I will not fully explore, but cannot rule out entirely either. Languages which have independent logophoric pronouns restrict the use of these to contexts governed by certain verbs, those which Sells (1987) refers to as *logocentric*. It may be that it is the lexical facts of these verbs which differs between languages such that languages such as Ewe mark certain verbs as logocentric while those such as English do not. However, this view fails to say anything about the appearance of logophors in non-argument contexts, where their appearance is certainly not determined by the presence of a logocentric verb. Thus I will continue to assume that English is not totally distinct from Ewe in the relevant respects and assume that there are other ways to characterise the differences. However, it cannot be denied that certain verbs are marked as logocentric while others are not. The question is whether languages differ in this respect or not.

marker differs minimally from that associated with the obviative pronoun in that it is interpreted logophorically. We will assume that this is due to an extra feature "log" of this discourse marker. The question then arises as to whether all instances of logophoric pronouns are to be associated with the logophoric discourse marker in the input, or whether those with antecedents are to be analysed as involving chains, like other proximate pronouns. It is difficult to think how the feature of logophoricity can be introduced into a chain, given our conception of this object as a full NP occupying more than one structural position. Furthermore, there is a certain amount of support for the claim that all logophoric pronouns are to be associated with an input discourse marker. Sells (1987) reports that it is a common feature of logophoric pronouns that they may take antecedents which have smaller extensions than that denoted by the logophor, though the interpretation of the logophor is still restricted by the antecedent:

(87) kofi kpɔ be yèwo-do go
Kofi see comp log-pl-come out
'Kofi saw that they (including Kofi) had come out'

It is clear that we cannot assume that the logophoric pronoun is the partial pronunciation of *Kofi* in this case, yet the interpretation of the pronoun is still dependent on this element. This indicates that the coreference of logophors is something to do with the interpretative component, rather than being a reflex of chain formation.

However, if this is true, then cases where logophors have antecedents constitute general violations of the principle of interpretation discussed in the previous section in that the logophoric discourse marker can and often must be interpreted a coreferential with other elements in the same input. Thus, logophoric contexts are like focus contexts in this respect as both allow for the systematic violation of this principle of interpretation. I have nothing to offer as to why this should be so. However, interestingly, it does demonstrate that the interpretative component seems to operate along OT lines with constraints being violable under certain conditions. Clearly, to offer a proper account of what going on here would entail the development of a theory of interpretation, which lies well beyond the scope of this paper.

To summarise the discussion so far, we have argued that logophoric pronouns are associated with special discourse markers in the input, even when they have a syntactic antecedent. In English-type languages which lack an independent logophoric pronoun, the reflexive is used to express logophoricity in non-argument positions, while the personal pronoun expresses all cases of discourse determined reference in argument positions.

The questions that need to be addressed, then, are: why is the reflexive pronoun used to express logophoricity in languages which have no independent logophoric pronoun?; why can the reflexive not be used to express logophoricity in argument positions? and why is the personal pronoun the choice pronunciation of the logophoric input element in argument positions?

The first of these questions is perhaps the easiest. Assuming that a language has no independent logophoric pronoun, it still must faithfully represent input elements in the output. Given that personal pronouns pronounce the bare minimum of grammatical features, it is obvious that such pronoun would be an under-pronunciation of the logophoric discourse marker which contains an extra feature. On the other hand, a full NP would obviously be on over-pronunciation of the logophoric discourse marker, which like other discourse markers lacks all content features. There is only one kind of pronunciation left: the reflexive pronoun. This expresses more than just the basic grammatical features of an NP as it contains the r-marking feature. However, it does not contain the content features or full NPs. Let us suppose that in the absence of a pronoun which fully pronounces the logophoric discourse marker, it is more optimal to pronounce *something* that to be unfaithful to the input by under-pronouncing. This might be a consequence of the interaction of the constraints RECOVERABILITY and FAITHFULNESS. If RECOVERABILITY is ranked higher than FAITHFULNESS, which is a reasonable assumption as RECOVERABILITY seems to be universally highly ranked, then the logophoric feature on the input discourse marker should have to be *marked* in the output, even if it cannot be pronounced. The only way we have of marking an extra feature on a discourse marker is through a reflexive as a personal pronoun will not distinguish between a logophoric and a non-logophoric discourse marker. Therefore, it seems that the reflexive pronoun is the optimal pronunciation of the logophoric element in the absence of a specific pronoun to express this.[35] This much is predicted from the theory so far developed.

[35] I would like to be able to derive the fact that English lacks a separate logophoric pronoun from the grammar, rather than using this fact to account for the use of the reflexive here. Unfortunately, at this moment, I can think of no non-ad-hoc way of doing this. However, this situation is not as problematic in this case as it would be in others we have considered. Thus, the absence of a logophoric pronoun in English does not entail the absence or presence of any grammatical principles, but rather a utilisation of universal principles in a way which differs from languages which have logophoric pronouns. It therefore seems that linguistic phenomena are not solely lexically nor solely grammatically determined, but are the product of complex interaction between grammatical and lexical properties. This does not seem to be an unreasonable conclusion.

The other questions are not so easy and require more theoretical architecture than we have developed so far. Consider first the question of why the logophoric use of the reflexive pronoun is restricted to non-argument positions. One view of what is going on here is that in argument positions, the reflexive pronoun is used to r-mark reflexive predicates and this serves to "block" the appearance of logophoric reflexives in these positions. This is supported by the fact that languages which have independent logophoric pronouns do allow these in argument positions. It is not surprising that the r-marking use of a reflexive should be more appropriate in the relevant contexts (i.e., in argument positions) than the logophoric use of these pronouns, given that a reflexive pronoun is the pronunciation of the ϕ-features plus an additional r-marking feature. Reflexive pronouns do not contain the logophoric feature, they are just used to pronounce a discourse marker with this feature in the absence of a pronoun specially designed for this purpose. In other words, what seems to be happening is that a more appropriate use of the reflexive pronoun in argument positions, i.e., to r-mark a reflexive predicate, blocks a less appropriate use of the reflexive, which is to pronounce the logophoric discourse marker. We can state this constraint thus:

(88) **APPROPRIATENESS**
*[X pronoun Y] if there exists an identical structure [X pronoun Y] in which the pronoun is used in a way more appropriate with its features.

This constraint, then, accounts for why a reflexive pronoun is not used to pronounce a logophoric discourse marker in argument positions. In non-argument positions the constraint will be inapplicable as the reflexive can never be used to r-mark a reflexive predicate in such cases. Moreover, the constraint also handles the following cases:

(89) a. Joe thought that the picture of himself was too small
b. Joe thought that Amy's picture of herself was too small
c.*Joe thought that Amy's picture of himself was too small

In (89a) we have the logophoric use of the reflexive, as demonstrated above. Here this is possible because the predicate which the pronoun is an argument of could not possibly be reflexive as it has no other argument. Thus, appropriateness is inapplicable here. In (89b) we have the r-marking use of the reflexive, in accordance with the account developed in previous sections. (89c) is ruled out as a pronunciation of the input in (90) because, as (89b) demonstrates, in this context there is a use of the reflexive pronoun which is more appropriate with its features:

(90) {think$_{[5,4]}$, 5=Joe, 4=small$_{[3]}$, 3=picture$_{[2,1]}$, 2=Amy, 1=DM$^{\text{log}}$}

Finally, we turn to the issue of why, when a reflexive is not the optimal pronunciation of a logophoric discourse marker, the personal pronoun is used instead. Clearly, what we want to say is that the use of the reflexive to express logophoricity in such cases is prevented by APPROPRIATENESS. The use of the pronominal clearly does not violate APPROPRIATENESS, but it does violate RECOVERABLITY, as discussed above. Thus, when the option of using a reflexive pronoun to voice more than the ϕ-features is ruled out, the system will allow the logophoric feature to go unrealised in the output. This indicates that APPROPRIATENESS is ranked higher than RECOVERABILITY as demonstrated in the following table:

(91)

	{..., pred$_{[\ldots,x]}$, x=DM$^{\text{log},\ldots}$}	APPROPRIATENESS	RECOVERABILITY
	... reflexive ...	*!	
☞	... pronoun ...		*

This analysis produces the appropriate results and does not extend the system we have so far proposed excessively, given that RECOVERABILITY is needed independently. Thus we capture all of the relevant observations with the one constraint in (88) plus the assumption that this outranks RECOVERABILITY. Of course, as with all the other cases we have considered, it is possible that these constraints might be differently ranked, in which case we would expect to find languages which express logophoricity using a reflexive pronoun even in argument positions. This does not seem to be a too outlandish possibility, though at the moment I am unable to confirm the existence of such languages. One relevant observation, however, which at least demonstrates that such a languages would be possible is that we can find reflexive logophors in argument positions in English, when the logophor is focused (what Reinhart and Reuland refer to focus logophors):

(92) the letter was addressed only to myself

Apart from demonstrating once again that focus phenomena interact in interesting ways with the system of constraints that have been proposed in this paper, data such as this show that it is not impossible to get reflexive logophors in argument positions. We might therefore expect there to be languages which use the reflexive to voice logophoricity in argument positions even in non-focus contexts.

8 Conclusion

In this paper I have attempted to demonstrate that an OT approach to syntactic phenomena can yield interesting and profitable results. Without assuming general optimality mechanisms the treatment of pronouns as partial pronunciations of input material would not have been possible. Thus, in so far as the analyses presented in this paper have any value, they demonstrate that OT has the ability to shed light on the nature of linguistic phenomena and does not just offer a reworking of old ideas using new terminology. Moreover, the theory of binding proposed here may be argued to be an improvement over its predecessors. Its main features are that it does away with the notions of referential indices and c-command and proceeds on the basis of only one actual binding constraint, which is the equivalent of condition B. While there has been much discussion in the literature concerning the problematic nature of condition C, condition A has been considered much less problematic. However, the fact that we get reflexive pronouns used in non-reflexive contexts is obviously a problem for any theory that embraces a principle restricting reflexives to reflexive contexts. The present approach, which casts aside these two problematic conditions, is therefore a much needed improvement.

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