The Minimalist Program and Optimality Theory: Derivations and Evaluations

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1. Introduction

Optimality Theory (OT) syntax is often considered to be an alternative to the Minimalist Program outlined in Chomsky (1995).[1] This is by no means a necessary point of view. The very reason why OT syntax and the Minimalist Program are considered to be competitors may be invoked to reconcile the two approaches to syntax: OT deals with outputs, with representations, while the Minimalist Program is mainly concerned with derivations. In the present article, we will put forth reasons to assume that this complementarity should be exploited by combining the two frameworks.

Chomsky (1995) aims at constructing a syntactic system of the highest degree of explanatory adequacy, i.e. he attempts to design the ultimate computational system for human language (C_{HL}). In pursuit of this goal, he proposes an extreme reduction of the descriptive apparatus, leaving many phenomena which received an account in earlier stages of the theory outside the scope of C_{HL} (cf. Chomsky, 1995: 389, fn. 93). However, these phenomena must be accounted for in one way or another, if we want to prevent that a rise in explanatory adequacy goes at the expense of the descriptive adequacy of the system. Chomsky suggests that they should receive an account in the PF wing of the grammar, although he does not put forth a theory that can deal with these matters. We will show that OT syntax can fill this gap. More particularly, we will follow Pesetsky (1998), who argues for an OT system taking LF representations as its Input. The Generator of this OT system creates the relevant Candidate Set by applying the operation DELETE in a random fashion. This Candidate Set is subsequently evaluated with respect to a ranking of violable constraints. This enables Pesetsky to account for several filters proposed in the seventies, such as the Doubly Filled COMP Filter and the *For-to* Filter.

In short, the merger of C_{HL} and OT syntax is advantageous from a Minimalist point of view: the syntactic OT module, taking the place of the aforementioned filters, acts as the interface between C_{HL} and the phonological component. But also OT syntax benefits from such a step: C_{HL} provides the OT system with the generative power it needs. It is of course a truism that a generative grammar needs to generate structure in an explicit manner, even if the generating device is not primarily responsible for the descriptive adequacy of the system as a whole, a consideration which has led many practitioners of OT to ignore the precise nature of the Generator.

This leads us to a model of syntax consisting of a generator, to be identified with Chomsky's C_{HL}, and a filtering device, which operates in the standard OT fashion. In section 2, we will discuss one possible realization of this general idea, and take it as our point of departure. In section 3, we will investigate finite relative clauses in English and (varieties of) Dutch, and show that OT is able to account for the differences between these languages with respect to the Doubly Filled COMP Filter, something that is far beyond the scope of the Minimalist Program as currently understood. Furthermore, some attention will be paid to the anti-*that*-trace effect in English relative clauses. In the conclusion of this section, we will

[1] We would like to thank Jo‹o Costa, Marcel den Dikken, as well as the audiences present at the GLOW Colloquium 1997 (Rabat), the HIL OT Workshop (University of Leiden), the Staff Seminar Grammatica-modellen (University of Tilburg), the ATW op vrijdag Colloquium (University of Amsterdam), and the Taalkundig Colloquium (University of Groningen) for suggestions, comments, and discussion.

argue that there are reasons to modify the model of grammar proposed in section 2. This gives us a system which looks more like a "standard" OT syntax — more specifically, we will suggest that the OT module may choose between derivations, which goes beyond Pesetsky's assumption that the OT module operates on unique LF representations. In section 4, we will argue on the basis of a discussion of the *For-to*-Filter in English infinitival relative clauses that this move is indeed desirable. And finally, in section 5, we will go into the interaction of the two components of syntax we have distinguished, and the division of labor between them.

2 A Model of Grammar

2.1 The computational system

Chomsky (1995) assumes that C_{HL} is uniform across languages. He takes C_{HL} to consist of the three operations SELECT, MERGE and ATTRACT/MOVE. The operation SELECT takes elements from the lexicon (or from a Numeration, if indeed such a notion is indispensable, see section 3.8 and further), the operation MERGE creates structures by assembling these elements, and finally ATTRACT/MOVE transforms the structures formed by MERGE, an operation motivated by the need to eliminate uninterpretable features before the derivation reaches the level of LF.

Chomsky (1995, chapter 3) argues further that these operations are restricted by global conditions such as Shortest and Fewest Steps. We will assume instead that all conditions in C_{HL} are local in nature, which is in line with Chomsky (1995, chapter 4), who interprets the Minimal Link Condition and Last Resort as a defining property of ATTRACT/MOVE. In so far as we need to postulate separate derivational conditions, they should also apply in a strictly local fashion. A good example of such a condition is the one given in (1), which is adapted from Chomsky (1995: 234).

(1) The derivation is cancelled if α has a strong feature, and is in a category headed by β ($\alpha \neq \beta$).

The general idea is that MERGE may introduce strong features into the structure, which are intolerable and must therefore be eliminated by means of checking before the derivation proceeds. Thus, we ensure that the derivation of LF representations proceeds in a strictly cyclic fashion, with the concomitant result that operations like lowering and yo-yo movement are excluded. Whether we end up with a useful (interpretable) LF representation or not is determined by the bare output conditions imposed by the semantic component on the output of C_{HL}.

At this point, we have a computational system that generates LF structures by making use of the idea that certain features are not interpretable at LF. The basic task of C_{HL} is to eliminate these features through the application of the operation ATTRACT/MOVE, an operation which applies in accordance with the Minimal Link Condition and Last Resort, and is locally constrained by (1).

The question now is: how does C_{HL} feed the PF component? According to Chomsky, C_{HL} sends the PF component (relevant parts of) the structure present at an in principle arbitrary point in the derivation, an operation standardly called *Spell-Out*. The appropriate point of Spell-Out is determined by *Procrastinate*, a principle that demands that Spell-Out apply as early in the derivation as possible (i.e. that movement be postponed as much as possible). Chomsky's strong-weak distinction plays a crucial role here, in that Spell-Out must

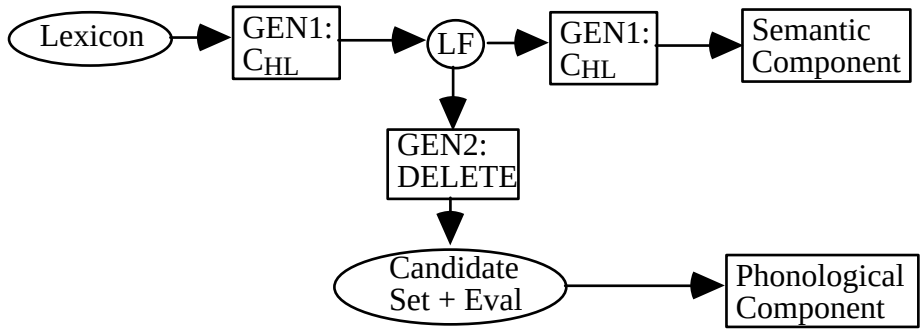
apply as soon as all strong features are eliminated (elimination of weak features being postponed to a later point in the derivation).

The Minimalist Program meets several problems. First, as a result of the search for explanatory adequacy, the descriptive power of C_{HL} is considerably weaker than that of its predecessors, so that a whole range of language-specific phenomena does not receive an adequate explanation. Secondly, parametrization is difficult to capture in domains that do not involve differences in word order. In order to create a descriptively adequate grammar, we must assume that all that cannot be accounted for by C_{HL} must be explained elsewhere in the grammar, according to Chomsky at PF. Below, we will argue that OT can be taken to be responsible for at least some of these aspects of syntax, in other words, that it mediates between C_{HL} and the phonological component.

If OT is indeed a mediator between C_{HL} and the phonological component, we should wonder whether Chomsky's approach to Spell-Out is the best way to proceed, since there is an obvious alternative, according to which LF structures themselves are spelled out. With respect to A'-movement, this alternative is compatible with Hornstein's (1995) conclusion that A'-movement does not apply covertly, i.e. that all instances of A'-movement must take place before Spell-Out. This means that all movements having a semantic impact will already have applied at the moment of Spell-Out, so that it is indeed justified to consider the structure interpreted by the OT module to be an LF representation, in the sense that all positions relevant for semantic interpretation are filled.

These considerations lead to the model of grammar depicted in figure 1, which represents the most conservative view on the merger of Chomsky's C_{HL} and OT syntax, since it leaves both systems intact.

Figure 1



C_{HL} = SELECT, MERGE and ATTRACT/MOVE

2.2 Optimality Theoretic Syntax

2.2.1 Generating structure

As we have already mentioned, an important advantage of the model in figure 1 is the fact that the OT module now has a genuine Generator, i.e. a device that consists of explicit rules. The Generator has received very little explicit attention in the syntactic OT literature (see however Samek-Lodovici, 1996). In general, it is simply assumed that the Evaluator takes representations as its input, without there being much discussion about the way these structures are created. Although the Generator could have various formats, we prefer Chomsky's computational system, because it consists of a limited number of universal operations, so that in principle all language-specific phenomena can be attributed to the

lexicon (feature strength) and the OT Evaluator (Chomsky's PF phenomena); cf. section 5 for further discussion about the role of the lexicon.

2.2.2 The non-universality of the Candidate Set

In the system we are proposing, the Candidate Set is not universal (contra Legendre et al., 1995), only C_{HL} is. C_{HL} takes items from the lexicon, merges them, and applies the operation ATTRACT/MOVE. The latter operation is directly motivated by the properties of the lexical items involved. Thus, the lexical items determine the derivation. Since the lexicon is undoubtedly a place where language-specific, idiosyncratic information is stored, we predict that Candidate Sets are not universal: the lexicon of a language partly determines which derivations are found in a language, and which ones are not, so that some candidates, or some Candidate Sets cannot not produced.

If we were to propose that Candidate Sets are universal, we would for example predict that all languages dispose of the same syntactic categories, which seems to be incorrect. Just because the Candidate Set is generated by C_{HL} out of lexical items with their own properties, it is language-particular. To put it in the most general of terms, Chomsky's C_{HL} allows us to express that also lexical differences between languages (for example with respect to their inventory of syntactic categories) may have a parametrizing influence on the system.

2.2.3 Absolute ungrammaticality

Given the assumption that C_{HL} locally restricts derivations, we predict cases of absolute ungrammaticality, i.e. ungrammatical sentences for which there does not seem to be a grammatical counterpart which blocks it in an OT fashion. For example, it is well known that *wh*-movement cannot apply from a *wh*-island. The examples in (2a&b) are both unacceptable, but still cannot be blocked in an obvious way by the construction in (2c), since this construction cannot be interpreted as a matrix question.

(2) a. *Which book do they remember to whom John gave?
b. *To whom do they remember which book John gave?
c. They remember which book John gave to whom.

Chomsky (1995: 294-295) shows that the degraded status of (2a&b) can be accounted for within C_{HL}. The only LF representation with a matrix question interpretation is given in (3). In the embedded cycle, the [+wh] complementizer attracts the closest *wh*-element, the DP *which book*. Subsequently, in the matrix cycle, the matrix [+wh] complementizer must also attract the closest *wh*-phrase, which is again the DP *which book*, now occupying the specifier of the lower CP. The resulting LF representation in (3) can be argued to be semantically ill-formed, because *which book* must be interpreted both in the main and in the embedded clause, which, by assumption, is not possible (see Chomsky, 1995: 291).

(3) $[_{CP1}$ which book$_i$ do they remember $[_{CP2}$ t_i John gave t_i to whom]]]

Hence, syntactic representations are illegitimate Output structures if the operations necessary to built them are not available in C_{HL}. The illegitimacy of these output structures can lead to the absence of an entire construction in this language when the (lexical) means to construct alternative structures (e.g. null operators that create the possibility of leaving *wh*-

phrases in situ) with similar semantics are absent. See Ackema & Neeleman, Boersma et al., and Kager (all in this volume) for alternative views on absolute ungrammaticality.

The term *absolute ungrammaticality* as it is used here should not be confused with the phenomenon of gradual acceptability judgements. The former concerns the fact that certain linguistic objects are deviant without there being an alternative, optimal object that blocks it. The latter refers to a situation in which some deviant object is judged to be less deviant than others. At this point, we cannot account for the existence of gradual acceptability judgements, which seems to be a general shortcoming of both the Minimalist Program and OT syntax as they are currently formulated (but see Hayes, this volume).[2]

2.3 Conclusion

In this section, we have proposed the model of grammar in figure 1, which we will take as our point of departure in section 3. From the perspective of OT syntax, this model is not entirely satisfactory, since we would like to combine the two Generators. This would give rise to a standard OT system with a Generator that contains both C_{HL} and the operation DELETE. Below, we will see that there are indeed reasons to modify our model in this way.

3. The left periphery of finite relative clauses

In this section, we examine the surface form of relative clauses. More particularly, we will focus on the realization of the elements in the COMP projection, i.e. the complementizer itself and the relative pronoun in its specifier. As suggested in the previous section, our first step will be to assume that C_{HL} creates the LF structure in (4), which functions as the Input for the OT module responsible for what we could call "surface syntax", in accordance with figure 1 (see Kayne, 1994 for an alternative proposal). Also in the previous section, we argued that, although C_{HL} is uniform across languages, it may generate LF structures that are (weakly) language-specific. We will assume, however, that all externally headed relative clauses have the LF representation in (4), until proof of the contrary is given (see section 3.7 and section 4 for discussion).

(4) N [$_{CP}$ (P) pronoun$_i$ [$_{C'}$ that [..... t_i .....]]]

The Input in (4) is interpreted by GEN2, which gives us a Candidate Set that consists of the structures given in (5), as a result of the random application of the operation DELETE. This Candidate Set is evaluated in the standard Optimality Theoretic way, i.e. with respect to a language-particular ranking of (universal) constraints.

(5) a. N [$_{CP}$ (P) pronoun$_i$ [$_{C'}$ that [..... t_i .....]]]
b. N [$_{CP}$ ~~(P) pronoun~~$_i$ [$_{C'}$ that [..... t_i .....]]]
c. N [$_{CP}$ (P) pronoun$_i$ [$_{C'}$ ~~that~~ [..... t_i .....]]]
d. N [$_{CP}$ ~~(P) pronoun~~$_i$ [$_{C'}$ ~~that~~ [..... t_i .....]]]

[2] One might speculate that gradual acceptability judgements are the result of the linguist's ability to consciously ignore some principle otherwise operative in the computational system. The relatively acceptable candidate would then be evaluated as the optimal candidate. We leave this suggestion for future research.

3.1 English

Let us start with a brief discussion of English based on Pesetsky (1998). In English, relative clauses can take the surface forms in (6). Two generalizations leap to the eye. Firstly, English relative clauses are subject to the Doubly Filled COMP Filter — none of the examples in (6) contains both a phonetically realized relative pronoun and an overt complementizer; at least one of the two must be deleted. Secondly, deletion of the relative pronoun is only allowed if it is not the complement of a preposition.

(6) a. the man [$_{CP}$ who$_i$ [$_{C'}$ ~~that~~ [I saw t_i yesterday]]]
a'. the man [$_{CP}$ ~~who~~$_i$ [$_{C'}$ that [I saw t_i yesterday]]]
a". the man [$_{CP}$ ~~who~~$_i$ [$_{C'}$ ~~that~~ [I saw t_i yesterday]]]
b. the book [$_{CP}$ which$_i$ [$_{C'}$ ~~that~~ [I read t_i yesterday]]]
b'. the book [$_{CP}$ ~~which~~$_i$ [$_{C'}$ that [I read t_i yesterday]]]
b". the book [$_{CP}$ ~~which~~$_i$ [$_{C'}$ ~~that~~ [I read t_i yesterday]]]
c. the book [$_{CP}$ [$_{PP}$ about which]$_i$ [$_{C'}$ ~~that~~ [he spoke t_i yesterday]]]

Consequently, an analysis of English relative clauses should answer the three questions in (7):

(7) a. Why does the Doubly Filled COMP Filter hold?
b. Why is deletion of the relative pronoun restricted to those cases that do not involve a PP?
c. Why is it possible to delete both the relative pronoun and the complementizer?

Pesetsky argues that these questions can be answered by reducing the pattern in (6) to the interaction of the following tendencies: (i) meaningful elements must be pronounced, unless they are sufficiently close to an antecedent (e.g. a relative pronoun cannot be deleted, unless it is close to the nominal head of the relative construction), (ii) CPs are introduced by a functional head, such as *that, for* and *to,* or the verb itself (cf. footnote 12), and (iii) meaningless elements are deleted. Pesetsky provides theoretical correlates for these tendencies by introducing the constraints in (8).[3]

(8) a. Recoverability (REC): A syntactic unit with semantic content must be pronounced unless it has a sufficiently local antecedent.
b. Left Edge CP (LE(CP)): CP starts with a lexicalized head from the extended projection of the verb.
c. Telegraph (TEL): Do not pronounce function words.

The constraints in (8) are used to evaluate the members of the generalized Candidate Set given in (5). The particular Candidate Sets for the examples in (6a&b) and (6c) are given in (9) and (10), respectively. The structures marked with an asterisk are excluded in English; all others are acceptable:

[3] The definition of LE (CP) given in (8) is taken from Pesetsky (1995). The definitions of the other two constraints are taken from Pesetsky (to appear). We will revise the definitions of REC and TEL in section 3.4.

(9) a. *****N [$_{CP}$ pronoun$_i$ [$_{C'}$ that [..... t_i .....]]]
b. N [$_{CP}$ ~~pronoun~~$_i$ [$_{C'}$ that [..... t_i .....]]]
c. N [$_{CP}$ pronoun$_i$ [$_{C'}$ ~~that~~ [..... t_i .....]]]
d. N [$_{CP}$ ~~pronoun~~$_i$ [$_{C'}$ ~~that~~ [..... t_i .....]]]

(10) a. *****N [$_{CP}$ P-pronoun$_i$ [$_{C'}$ that [..... t_i .....]]]
b. *N [$_{CP}$ ~~P-pronoun~~$_i$ [$_{C'}$ that [..... t_i .....]]]
c. N [$_{CP}$ P-pronoun$_i$ [$_{C'}$ ~~that~~ [..... t_i .....]]]
d. *N [$_{CP}$ ~~P-pronoun~~$_i$ [$_{C'}$ ~~that~~ [..... t_i .....]]]

Let us now turn to the first question in (7), concerning the Doubly Filled COMP Filter. This question consists of the following two subquestions: (i) Why must the specifier of CP be deleted if the complementizer is overtly realized, and (ii) Why must the complementizer be deleted if the specifier of CP is overtly realized? The first subquestion can be answered by taking recourse to LE(CP), according to which the relative clause must be introduced by a lexicalized head. This can only be attained by means of deleting the relative pronoun, as in (9b), as a result of which the complementizer *that* is the first phonetically realized element in the clause. Before we answer the second subquestion, we will first discuss the two other questions raised in (7).

The question in (7b) can be answered by invoking REC. By assumption, deletion of a relative pronoun is possible since it provides semantic information that is also present on the head noun of the construction. Consequently, if LE(CP) can be satisfied by deleting the relative pronoun, as in (9b), REC will not block this. If the relative pronoun is contained in a PP, however, LE(CP) will force deletion of the complete PP. Since the preposition provides non-redundant semantic information, REC would be violated. Given the unacceptability of (10b), REC seems to obliterate the requirement that a CP start with a functional element. This leads Pesetsky to the conclusion that REC outranks LE(CP) in English:

(11) REC >> LE(CP)

Let us now turn to the third question in (7): why is it possible to delete both the relative pronoun and the complementizer in English? This is where the constraint TEL enters the picture. TEL requires that function words, such as the complementizer *that*, be deleted. This means that two conflicting forces are working on the fate of the complementizer: LE(CP) wants it to be pronounced, whereas TEL favors its deletion. Given the fact that (9b) and (9c) are both acceptable, both constraints seem to be equally important: a violation of LE(CP) is as good or as bad as a violation of TEL. This can be formalized by taking the two constraints to be in a tie.

(12) LE (CP) <> TEL

There are several ways to define a tie. If two constraints C and D are in a tie, this could mean that they are not ranked, i.e., that C and D are interpreted as one complex constraint. Alternatively, if C and D are in a tie, the language has two equally valued rankings available, viz. C >> D *and* D >> C, as in Pesetsky's definition in (13). We will adopt the definition in (13) here, and motivate this choice in section 3.6, by pointing out a situation where the two definitions make different predictions.

(13) The output of a set of *tied* constraints is the union of the output of every possible ranking of those constraints.

There is independent evidence for the ranking in (12) in English, namely the optionality of the complementizer in complements of epistemic verbs, exemplified in (14a). The Dutch complementizer in (14b), on the other hand, is obligatorily pronounced in this context, which is a first illustration of the fact that constraint ranking is a language-specific matter: in Dutch, the ranking is LE(CP) >> TEL.

(14) a. I think (that) Bill and Bob are incompetent.
b. Ik vind *(dat) Bill en Bob incompetent zijn.

The ranking in (12) also provides an answer to the second subquestion of (7a), which is still awaiting an answer. If SpecCP is filled, LE(CP) will necessarily be violated. If both the complementizer and the relative pronoun were pronounced (a doubly filled COMP configuration), it would only aggravate the situation, in that this would imply a violation of TEL on top of the violation of LE(CP). It goes without saying that it is better to avoid this violation by means of deleting the complementizer.

Above, we have established the ranking of the three constraints in (8) for English, which is repeated in (15).

(15) English: REC >> LE(CP) <> TEL

This ranking fully accounts for the paradigm in (6). The evaluation procedure for the Candidate Sets in (9) and (10) is given in tableaux 1 and 2.[4] In accordance with the definition in (13), a fatal violation in a tie in only one direction does not suffice to block a candidate.

Tableau 1: English		REC	LE (CP)	TEL
a. the man who that I saw the book which that I saw			*>	<*
b. the man who ~~that~~ I saw the book which ~~that~~ I saw	☞		*>	
c. the man ~~who~~ that I saw the book ~~which~~ that I saw	☞			<*
d. the man ~~who that~~ I saw the man ~~which that~~ I saw	☞		*>	

Tableau 2: English		REC	LE (CP)	TEL
a. the book about which that I spoke			*	*!
b. the book about which ~~that~~ I spoke	☞		*	
c. the book ~~about which~~ that I spoke		*!		*
d. the book ~~about which that~~ I spoke		*!	*	

[4] For ties, we adopt the following tableaux conventions:
*>: fatal violation if the tie is read from left to right
<*: fatal violation if the tie is read from right to left
*!: fatal violation in both directions
Note that only candidates inducing fatal violations on both readings of a tie lose ((*> *and* <*) or *!).

Although this proposal, which is basically the one given in Pesetsky (1998), accounts for the English data, we are forced to revise it below, because a simple constraint re-ranking will not give us the patterns found in Dutch.

3.2 Standard Dutch

In Dutch, nouns can be distinguished on the basis of the article they select: non-neuter singular nouns take the article *de*, while their neuter counterparts take the article *het*. In the plural, the gender distinction is neutralized; the article *de* is used in all cases. The two groups also take different demonstratives: *de*-nouns can be combined with the demonstratives *deze* and *die*, while *het*-nouns take the demonstratives *dit* and *dat*. This is demonstrated in (16).

(16) a. de man — deze man — die man
the man this man that man
a'. de mannen — deze mannen — die mannen
the men these men those men
b. het boek — dit boek — dat boek
the book this book that book
b'. de boeken — deze boeken — die boeken
the books these books those books

At first sight, the relative pronouns seem to be homophonous with the demonstratives *die* and *dat*. The distribution of the two elements (illustrated in (17)) is again determined by gender and number.

(17) a. de man die ik gisteren zag
the man DIE I yesterday saw
'the man I saw yesterday'
a'. de mannen die ik gisteren zag
the man DIE I yesterday saw
b. het boek dat ik gisteren las
the book DAT I yesterday read
b'. de boeken die ik gisteren las
the books DIE I yesterday read

Relative d-pronouns are not allowed to be embedded in PPs. Instead, relative w-pronouns are used. Here, the nature of the antecedent plays a crucial role. If the antecedent is human, either the relative pronoun *wie* (as [$_{PP}$ over wie] in (18a)), or the relative R-pronoun *waar*, which precedes the preposition, (as [$_{PP}$ waarover] in (18b)) is used. If the antecedent is not human, only the latter option is available (see also footnote 11).

(18) a. de man over wie ik sprak
the man about whom I spoke
b. de man waarover ik sprak
the man what-about I spoke
c. het boek waarover/*over wat ik sprak
the book what-about/about what I spoke

As will be clear from the examples in (17) and (18), Dutch relative pronouns seem to behave like their prepositional counterparts in English: they never delete. Given the

constraints introduced so far, this could only follow from the assumption that the deletion of a relative pronoun violates REC in Dutch. If this is indeed true, we get the evaluations in tableaux 3 and 4 (recall from the discussion of the examples in (14) that LE(CP) outranks TEL in Dutch).

Tableau 3: Standard Dutch	REC	LE(CP)	TEL
a. de man die dat ik zag het boek dat dat ik las		*	*!
b. de man die ~~dat~~ ik zag ☞ het boek dat ~~dat~~ ik las		*	
c. de man ~~die~~ dat ik zag het boek ~~dat~~ dat ik las	*!		*
d. de man ~~die dat~~ ik zag het boek ~~dat dat~~ ik las	*!	*	

Tableau 4: Standard Dutch	REC	LE (CP)	TEL
a. de man waarover/over wie dat ik sprak het boek waarover dat ik sprak		*	*!
b. de man waarover/over wie ~~dat~~ ik sprak ☞ het boek waarover ~~dat~~ ik sprak		*	
c. de man ~~waarover/over wie~~ dat ik sprak het boek ~~waarover~~ dat ik sprak	*!		*
d. de man ~~waarover/over wie dat~~ ik sprak het boek ~~waarover dat~~ ik sprak	*!	*	

Of course, the conclusion that deletion of the relative pronoun violates REC in English but not in Dutch, is far from desirable. In the next section, we will learn that the situation is even more complex than we have just suggested.

3.3 The Aarschot dialect

Both in English and in Standard Dutch, the Doubly Filled COMP Filter seems to be surface-true. This is not the case, however, in the Aarschot dialect, spoken in the Belgian part of Brabant. In this variety of Dutch, a relative clause introduced by a relative pronoun may contain the complementizer *da*. However, this is restricted to those relative clauses that are introduced by the non-neuter relative pronoun *di(e)* or by a prepositional phrase: no examples are attested in which the singular neuter relative pronoun *da* is followed by a complementizer. This is demonstrated in the examples in (19), taken from Pauwels (1958).[5]

[5] The same seems to hold for Middle Dutch (see Verwijs & Verdam, 1889). The situation in the Aarschot dialect is in fact more complicated than suggested in the main text. The dialect disposes of the three relative d-pronouns given in (i).

(i) a. *di* [di]: [feminine] or [- singular]
b. *die* [di∂]: [masculine, + singular]
c. *da* [da]: [neuter, + singular]

(19) Aarschot dialect:
a. de stoelen di (da) kapot zijn
the chairs DI that broken are
b. *'t kind da da valt
the child DA that falls
b'. 't kind da valt
c. 't kind van wie (da) 'k spreek
the child about whom that I talk

The examples in (19) raise two problems. Firstly, the Doubly Filled COMP Filter can be violated in the Aarschot dialect, as shown in (19a&c). It is clear that the three constraints used to explain the English and the Standard Dutch cases cannot be held responsible for any violation of the Doubly Filled COMP Filter. The (a) candidates in tableaux 1-4 are harmonically bound by the (b) candidates on the three constraints we have adopted, since they incur all constraint violations the (b) candidates do next to their violation of TEL (see Boersma et al., this volume). This means that on all rankings, the complementizer will be deleted if preceded by a relative pronoun, since the effect of the only constraint that disfavors complementizer deletion (LE(CP)) is obliterated if the relative pronoun is phonetically realized.

This can only mean that a fourth constraint is in play. We take this constraint to be Grimshaw's (1997) Obligatory Heads, which is defined as in (20).

(20) Obligatory Heads (ObHd): Heads should be filled.

If we assume that, like in Standard Dutch, deletion of the relative pronoun *di(e)* violates REC, the evaluation of the Candidate Sets related to the examples in (19a&c) takes place as in tableau 5, where ObHd and TEL are in a tie.[6]

Tableau 5: The Aarschot dialect		REC	LE(CP)	ObHd	TEL
[$_{CP}$ di(e)/van wie da [$_{IP}$ ...]]	☞		*		<*
[$_{CP}$ di(e)/van wie ~~da~~ [$_{IP}$ ...]]	☞		*	*>	
[$_{CP}$ ~~di(e)/van wie~~ da [$_{IP}$ ...]]		*!			*
[$_{CP}$ ~~di(e)/van wie da~~ [$_{IP}$ ...]]		*!	*	*	

Secondly, the unacceptability of example in (19b) is a problem for the present analysis. Clearly, the more lowly ranked constraints in tableau 5 are not responsible for this. If we assume, however, that deletion of the relative pronoun *da* does not violate REC, the desired result follows. This is illustrated in tableau 6 (the stars in parentheses will be discussed in the next section).[7]

[6] Of course, TEL needs to outrank Obligatory Heads in Standard Dutch and English, where doubly filled COMPs are banned.

[7] Various people have suggested to us that the impossibility of the sequence *da(t) da(t)* might be the result of a constraint that disallows the occurrence of two adjacent phonetically identical elements. Such an expansion of the constraint inventory is not necessary, since *da(t) da(t)* can be ruled out on independent grounds, as we will see in section 3.5.

Tableau 6: The Aarschot dialect	REC	LE(CP)	ObHd	TEL
[CP da da [IP ...]]		*!		*(*)
[CP da ~~da~~ [IP ...]]		*!	*	(*)
[CP ~~da~~ da [IP ...]] ☞				*
[CP ~~da da~~ [IP ...]]		*!	*	

3.4 On Recoverability

The next step is to account for the fact that the pronouns *di(e)* and *da* seem to behave differently with respect to REC. Apparently, relative pronouns having a local antecedent need not be recoverable after deletion. Let us take another look at the definition of Recoverability, given here in a simplified version in (21).[8]

(21) Recoverability: meaningful elements must be pronounced.

The fact that some relative pronouns seem to be recoverable, while others do not, forces us to discuss the notion of *meaningful*. In the Dutch determiner system, three semantic features play a role, viz. [± singular] and [± neuter], and [± definite].[9] In Kester (1996: 94ff.), it is argued on the basis of the distibution of the attributive suffix *-e*, among other things, that [+ singular], [+ neuter], and [- definite] should be considered unmarked in Dutch. In this language, attributively used adjectives appear with this suffix, unless the DP has the aforementioned unmarked features, as illustrated in figure 2.

Figure 2. The inflection of attributively used adjectives

	singular		plural	
	non-neuter	neuter	non-neuter	neuter
definite	de oude man the old man	het oude boek the old book	de oude mannen the old men	de oude boeken the old books
indefinite	een oude man an old man	**een oud boek** an old book	oude mannen old men	oude boeken old books

If only marked features are syntactically present, as we assume here, we may account for the distribution of the attributive suffix by taking it to be licensed by at least one of the pertinent features. Hence, the assumption that only the marked features are assigned to a lexical element (the unmarked features being inferred by default) allows us to define the notion *meaningful element* as in (22).

(22) a. A meaningful element is an element that contains semantic features.
b. Semantic feature: {[-singular], [-neuter], [+definite], ...}

[8] We dropped the unless-clause of Pesetsky's definition in (8a), since it is not relevant in the examples we discuss in this article. Note that Pesetsky's original formulation of Recoverability in (8a) seems to allow for deletion of a PP if it has a sufficiently local antecedent, so that it is wrongly predicted that (ib) should be acceptable besides (ia). The formulation in (21), on the other hand, correctly excludes (ib), as pointed out to us by Jo‹o Costa (p.c.).

(i) a. John cuts the meat with the knife with which he has cut the cheese.
b. *John cuts the meat with the knife he has cut the cheese.

[9] These features all qualify as interpretable formal features in the sense of Chomsky (1995, ch. 4). One might object to the assumption that gender is a semantic feature. Nevertheless, we will assume for the moment that gender is a semantic feature, which is in line with Chomsky (1995, ch. 4), who claims that φ-features are interpretable. See footnote 18 for a remark on uninterpretable features and Recoverability.

In the domain of relative pronouns, only the semantic features related to number and gender seem to be relevant. The relative pronoun *dat* does not contain the marked features [-singular] and [-neuter]; as is illustrated in (23), it can only have a singular, neuter noun as its antecedent. The relative pronoun *die*, on the other hand, is specified for these features; in (24a), it takes a non-neuter (singular) noun as its antecedent, and in (24b) a (neuter) plural one.

(23) a. het boek dat ik las
the book DAT I read
b. *de jongen dat ik zag
the boy DAT I saw
c. *de boeken dat ik las
the books DAT I read

(24) a. de jongen die ik zag
the boy DIE I saw
b. de boeken die ik las
the books DIE I read

Provided that no other features are involved, we may conclude that the relative pronoun *die* is a meaningful element, whereas *dat* is not. This means that only the deletion of *die* violates REC, which is exactly what we want to derive in order to arrive at the evaluations given in tableaux 5 and 6.

Let us now turn to the question of the stars in parentheses in tableau 6. If deletion of *dat* does not violate REC, we should wonder whether its pronunciation violates TEL in (25). If it does, we would end up with a simpler definition of TEL, since we do not have to refer to the (undefined) notion *function word*. This would mean that we have to add the stars in question to tableau 6.

(25) Telegraph (revised): meaningless elements must be deleted.

In sum, the definition of the notion *meaningful element* given in (21) allows us to give a simpler and more accurate definition of both REC and TEL. Below, we will consider the consequences of the proposed reformulations.

3.5 Relative clauses in Dutch revisited

Let us return now to the examples in tableau 3, and begin with relatives involving *die*. Given the definitions in the previous section, the evaluation is as given in tableau 7. Since ObHd is irrelevant here, this evaluation is identical to the one in tableau 3.

Tableau 7: Standard Dutch	REC	LE(CP)	TEL	ObHd
a. de man die dat ik zag		*	*!	
b. de man die ~~dat~~ ik zag ☞		*		*
c. de man ~~die~~ dat ik zag	*!		*	
d. de man ~~die dat~~ ik zag	*!	*		*

However, tableau 3 cannot be taken to represent the evaluation of relative clauses introduced by the neuter relative pronoun *dat*, since we have just argued that the deletion of this pronoun does not violate REC. The correct evaluation is therefore as given in tableau 8, from which it

follows that the element *dat* should be analyzed as a complementizer, and not as a relative pronoun, contrary to what was implied in tableau 3.[10]

Tableau 8: Standard Dutch	REC	LE(CP)	TEL	ObHd
a. het boek dat dat ik las		*!	**	
b. het boek dat ~~dat~~ ik las		*!	*	*
c. het boek ~~dat~~ dat ik las ☞			*	
d. het boek ~~dat dat~~ ik las		*!		*

3.6 Relative clauses in English revisited

Our reformulation of the definition of Recoverability has important implications for the analysis of English relative clauses, because the pronouns *who* and *which* clearly contain semantic features. The former refers to human entities only, whereas the latter must combine with a noun that refers to an artifact. In other words, these pronouns are associated with the semantic features [+human] and [-human], respectively (cf. Chomsky & Lasnik 1977, fn.46).[11] Consequently, deletion of these relative pronouns would violate REC, contrary to what is suggested in tableau 1. Rather, the evaluation proceeds as in tableau 9.

---

[10] In contrast to what we claim for Dutch, the complementizer *dass* 'that' never surfaces in German relative clauses. This is shown in (i) for a relative construction in which the head of the construction is a neuter noun. Notice that *das* and *dass* are homophones, so we cannot draw any firm conclusions from this example: in the dative, however, the relative pronoun surfaces as *dem*.

(i) das Buch das/*dass er gestern gelesen hat
the book DAS/DASS he yesterday read has

This shows that the set of semantic features is not universal: the inventory of semantic features may differ from one language to another, which is illustrated by the fact that English, for example, has no gender distinction at all. Furthermore, the assumption that [+neuter] counts as a semantic feature in German is consistent with the observation that in indefinite, singular, neuter DPs, attributive adjectives are inflected: *ein kleines Buch* 'a small book' (cf. figure 2). Of course, morphological case marking may also be at work here.

[11] The Dutch relative R-pronoun *waar* is not recoverable after deletion either: *w*-pronouns which are extracted from a PP cannot be deleted in Dutch (see (ib,c)). The fact that (iic) is acceptable suggests that we are dealing with the deletable relative pronoun *that*. This is probably related to the fact that regular DPs cannot be extracted from PPs in Dutch (unlike R-pronouns), whereas they can in English. The generalization seems to be that *w(h)*-pronouns are never recoverable after deletion in English and Dutch. This might be due to the fact that these pronouns are marked for the feature [±human].

(i) a. Hij kocht het boek waarover ik sprak. (= (18c))
b. Hij kocht het boek waar ik over sprak.
c. *Hij kocht het boek dat ik over sprak.

(ii) a. He bought the book about which I talked.
b. He bought the book which I talked about.
c. He bought the book (that) I talked about.

That Dutch *w*-pronouns contain the feature [±human] can also be argued on the basis of free relatives, such as (iva,b). A free relative introduced by *wie* 'who' must refer to human beings, while a free relative introduced by *wat* 'what' is used in the other cases.

(iii) a. Wie dit leest, is gek.
who this reads is mad
"whoever reads this is mad"

b. Wat Frits gedaan heeft, is onvergeeflijk.
what Frits done has is unforgivable
"What Frits has done is unforgivable."

Furthermore, the assumption that the relative R-pronoun *waar* is marked for the feature [±human] is supported by the fact that some speakers of Dutch object to using the R-pronoun *waar* if the antecedent is [+human]. Those speakers accept only the example in (18a), and reject the example in (18b).

Tableau 9: English	REC	LE(CP)	TEL	ObHd
a. the man who that I saw the book which that I read		*	*!	
b. the man who ~~that~~ I saw ☞ the book which ~~that~~ I read		*		*
c. the man ~~who~~ that I saw the book ~~which~~ that I read	*!		*	
d. the man ~~who that~~ I saw the book ~~which that~~ I read	*!	*		*

Tableau 9 differs from tableau 1 in that only candidate (b) is acceptable; the candidates (c) and (d) -optimal in tableau 1- are now excluded because they violate REC. This leads us to the question how we can account for the fact that *the man/book (that) I saw* is acceptable in English. Since gender and number do not play any role in the English relative pronoun system, we may assume that English has a relative pronoun which is not marked for gender and number, just like the article *the* (note that in accordance with this claim, English does not exhibit attributive inflection, cf. the discussion of Dutch in section 3.4). As a result of its lack of meaning, the pronunciation of this pronoun implies a violation of TEL, while its deletion is free in the light of REC. The evaluation is given in tableau 10, where we take this relative pronoun to be based on the homophonous demonstrative *that*, just like in the case of the Dutch d-pronouns. In the next section, this assumption will be motivated.

Tableau 10: English	REC	LE(CP)	TEL	ObHd
a. the man/book that that I saw		*>	*<*	
b. the man/book that ~~that~~ I saw		*>	<*	*
c. the man/book ~~that~~ that I saw ☞			<*	
d. the man/book ~~that that~~ I saw ☞		*>		*

Note in passing that tableau 10 illustrates why we adopted the definition in (13), according to which a tie involves two equally valued rankings: the ranking REC >> LE (CP) >> TEL >> ObHd selects option (c) as the optimality candidate, whereas the ranking REC >> TEL >> LE (CP) >> ObHd picks out candidate (d). If we had assumed that Left Edge (CP) and TEL behave as one complex constraint, in accordance with the alternative definition given in section 3.1, we would have ended up with only one optimal candidate, i.e. option (c), as is shown in tableau 10':

Tableau 10': English	REC	LE(CP) & TEL	ObHd
a. the man/book that that I saw		**!*	
b. the man/book that ~~that~~ I saw		**!	*
c. the man/book ~~that~~ that I saw ☞		*	
d. the man/book ~~that that~~ I saw		*	*!

3.7 The anti-*that*-trace effect

In the previous section, we saw that in English the relative pronoun *that* is recoverable after deletion, i.e. that *that* in relative clauses like *the man that I saw yesterday* should be analyzed as a complementizer. This conclusion is problematic in clauses in which the subject is relativized. Consider the examples in (26). Given the discussion in the previous section, we would wrongly expect all three options to be acceptable (cf. tableaux 9 and 10).

(26) a. the man [$_{CP}$ who$_i$ ~~that~~ [$_{IP}$ t_i saw Bill]]
b. the man [$_{CP}$ ~~that~~$_i$ that [$_{IP}$ t_i saw Bill]]
b'. *the man [$_{CP}$ ~~that~~$_i$ ~~that~~ [$_{IP}$ t_i saw Bill]]

Of course, other constraints may be involved in the ungrammaticality of example (26b'). One option would be to introduce a soft version of the Empty Category Principle (Chomsky, 1981). However, the ECP gives the wrong results here — it rules out the grammatical example in (26b), but accepts the ungrammatical example in (26b'), just as it does with the examples in (27) involving *wh*-movement.[12]

(27) a. Who$_i$ do you think [$_{CP}$ t_i ~~that~~ [$_{IP}$ t_i saw Bill]]
b. *Who$_i$ do you think [$_{CP}$ t_i that [$_{IP}$ t_i saw Bill]]

This observation has been around for a long time; Chomsky & Lasnik (1977) expressed it by means of the *unless*-clause in the *That*-trace Filter in (28).

(28) *[$_{S'}$ that [$_{NP}$ e] ...], unless S' or its trace is in the context: [$_{NP}$ NP ___]

Even if we succeed in giving an independent explanation for the *unless*-clause in (28), that is, for the acceptability of example (26b), we will still not have accounted for the ungrammaticality of (26b'). We take this to indicate that we attributed incorrect representations to the acceptable structures in (26). What we would like to propose in order to account for the paradigm is that if the subject is relativized, the CP layer is missing.

In Rizzi (1996), it is proposed that in English main clauses the [+wh] feature is associated with the inflectional head I. Hence, in the case of *wh*-subjects, movement to SpecIP should in principle suffice. In this position, the subject is able to check both the case and the [+wh] feature on I.[13] Movement of the subject into SpecCP and movement of I to C are therefore superfluous, hence blocked. The asymmetry between the examples in (29) follows now: in (29a), the [+wh] feature on I can be checked by the *wh*-phrase in SpecIP; in (29b), on the other hand, the [+wh] feature on I must be moved to C in order to establish a checking relation with the *wh*-phrase in SpecCP.

(29) a. [$_{IP}$ who$_i$ I$_{[+wh]}$ [$_{VP}$ t_i saw Bill]]
b [$_{CP}$ who$_j$ did [$_{IP}$ you t_{did} see t_j]]

Rizzi assumes that in embedded clauses the [+wh] feature is associated with the complementizer. If we slightly revise this, and assume that verbs selecting an embedded

[12] In fact, the English constraint ranking makes the same predictions as the ECP (incorrect in the case of subject relatives) if clause-initial *saw* in (26b') and (27b) satifies LE(CP) (see also Pesetsky, 1994). However, the fact that the verb is preceded by a case-marked trace (a variable) in these examples complicates the issue. If variables count as phonetically realized material, LE(CP) is violated in (26b') and (27b). In the remainder of this article, we will take case-marked traces to be indeed visible to alignment constraints, an assumption that will be motivated in footnote 16 for English and in section 4.4 for Dutch.

[13] Rizzi argues for *wh*-movement of the subject into SpecCP, using additional machinery to avoid *do*-support for English. However, as soon as we allow a position to be both an operator and a case position, the proposal in the main text is fully compatible with Rizzi's assumptions concerning the locus of the [+wh] feature, and in fact simplifies Rizzi's analysis considerably, which leaves us with an analysis not dissimilar from the one proposed by Grimshaw (1997).

question must have a projection of a functional head with a [+wh] feature in their complement, the categorial status of an embedded question can be either CP or IP, depending on whether the *wh*-phrase is the subject of the clause or not (see Dekkers, 1997, for arguments in favor of the possibility of evaluating the IP option as the optimal candidate even in cases where the *wh*-phrase is not the subject of the clause).

If we extend this line of thought to relative clauses, English subject relatives may very well be IPs. Let us assume for the moment that this is correct. When pronouns *who* or *which* are selected from the lexicon, the IP option gives the same surface form as its CP counterpart. However, when the relative pronoun *that* is used, the *that* that is pronounced can no longer be analyzed as a complementizer in the IP scenario. Instead, it should be interpreted as a relative pronoun:

(30) a. the man [$_{IP}$ who$_i$ I [$_{VP}$ t_i saw Bill]]
b. the man [$_{IP}$ that$_i$ I [$_{VP}$ t_i saw Bill]]
b'. *the man [$_{IP}$ ~~that~~$_i$ I [$_{VP}$ t_i saw Bill]]

If we are on the right track, the anti-*that*-trace effect boils down to question why the relative pronoun *that* is deleted if it occupies SpecCP, and why it must be overtly realized if it occupies SpecIP. Now, in the first case the pronoun heads an A'-chain, whereas in the latter case it heads an A-chain. We would like to propose that deletion of the head of an A-chain is prohibited, because A-chains carry a θ-role, and should therefore be considered meaningful elements. In accordance with the definition given in (21), deletion would result in a violation of REC.[14] The hypothesis that *that* has pronominal qualities is not new in the generative literature. In a discussion of English subject relatives, Chomsky remarks that *that* has "quasi-pronominal properties, being preferable with (or for some speakers, limited to) inanimate antecedents" (Chomsky, 1981: 245), an observation that seems fully compatible with the analysis proposed here.

Note that we must still account for the fact that the alternative derivation in (26), where the [+rel] feature is associated with the complementizer, is blocked. Following Dekkers (1995, in prep.) and Deprez (1994), we will argue that this should be reduced to a matter of economy, since the addition of a CP-layer necessarily involves a larger number of movement steps in the case of subjects. This implies that C_{HL} must be considered an OT-like generator generating structures which are subsequently evaluated in the standard (that is: global) Optimality Theoretic way. This would mean that the structures in (26) violate an additional constraint, namely Grimshaw's (1997) STAY:

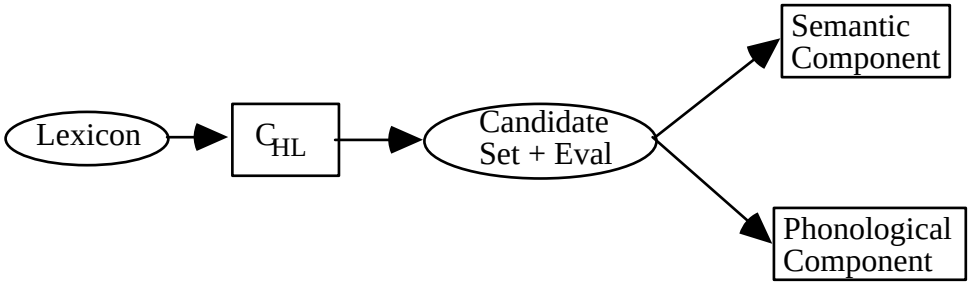
(31) STAY: traces are prohibited.[15]

This means that the Evaluator must be able to compare distinct syntactic structures (IPs and CPs), which is clearly not in accordance the model of grammar we have been assuming sofar (figure 1, section 2.3). This leads us to assume the model in figure 3, where distinct structures *can* be compared.

[14] Cf. Chomsky & Lasnik (1977: section 1.4): "[...] filters of the core grammar are concerned primarily (or solely) with the complementizer system [...]". See however footnote 23 for an alternative explanation based on the EPP.

[15] STAY can be considered the OT counterpart of Procrastinate, since both notions disprefer overt movement (see section 5). Chomsky (1995: 228) suggests that Procrastinate is a global condition, despite the fact that he argues for a local interpretation of the other (economy) conditions (see section 2.1). When we substitute STAY for Procrastinate, global economy conditions will have disappeared from the computational system altogether.

Figure 3



C_{HL} = SELECT, MERGE, ATTRACT/MOVE and DELETE

Figure 3 allows us to assume that the structures in (26) and (30) belong to the same Candidate Set. If we now provisionally assume that sharing the same array of lexical (but not functional elements) is a necessary condition for two structures to be in the same Candidate Set, we get the two evaluations in tableaux 11 and 12.

Tableau 11: English	REC	STAY	LE(CP)	TEL
a. the man [$_{CP}$ who$_i$ that [$_{IP}$ t_i saw Bill]		*!	*	*
b. the man [$_{CP}$ ~~who~~$_i$ that [$_{IP}$ t_i saw Bill]]	*!	*		*
c. the man [$_{CP}$ who$_i$ ~~that~~ [$_{IP}$ t_i saw Bill]]		*!	*	
d. the man [$_{CP}$ ~~who~~$_i$ ~~that~~ [$_{IP}$ t_i saw Bill]]	*!	*	*	
e. the man [$_{IP}$ who saw Bill] ☞			*	
f. the man [$_{IP}$ ~~who~~ saw Bill]	*!			

Tableau 12: English	REC	STAY	LE(CP)	TEL
a. the man [$_{CP}$ that$_i$ that [$_{IP}$ t_i saw Bill]]		*!	*	**
b. the man [$_{CP}$ ~~that~~$_i$ that [$_{IP}$ t_i saw Bill]]		*!		*
c. the man [$_{CP}$ that$_i$ ~~that~~ [$_{IP}$ t_i saw Bill]]		*!	*	*
d. the man [$_{CP}$ ~~that$_i$ that~~ [$_{IP}$ t_i saw Bill]]		*!	*	
e. the man [$_{IP}$ that saw Bill] ☞			*	
f. the man [$_{IP}$ ~~that~~ saw Bill]	*!			

For the sake of completeness, we give the evaluation of embedded subject questions in tableau 13, and that of *wh*-extraction of the subject from the embedded clause in tableau 14. In both cases, the *That*-trace Filter follows.[16] See Dekkers (1995, in prep.) for a more detailed discussion.

[16] Note that in tableau 11, nothing hinges on the ranking of STAY with respect to LE(CP) and TEL. In tableau 12, however, also candidate (b) is optimal if LE(CP) and TEL outrank STAY, with the result that *the man that saw Bill* corresponds to two distinct syntactic structures. In tableau 13, the actual ranking is again immaterial, while in tableau 14 the ranking LE(CP) <>TEL >> STAY incorrectly gives the candidates (a) and (c) as optimal. This ranking does give the right results in tableau 14 if case-marked traces are invisible to LE(CP), but then we expect candidate (d) to be the only optimal form in tableau 12. Hence, we must conclude that case-marked traces are visible to alignment constraints such as LE(CP) (see footnote 12) and that STAY outranks LE(CP) and TEL in English. In Standard Dutch and the Aarschot dialect, on the other hand, LE(CP) outranks STAY, because either C or SpecCP must be filled under all circumstances (see Dekkers, 1995).

Note further that we simplified tableaux 11 and 12 by not taking into account the violations of STAY which are the result of A-movement, assuming that the number of A-movement steps is the same in all cases, and by omitting ObHd, since this constraint is irrelevant here. Remember also that the additional violations of

Tableau 13: English	REC	STAY	LE(CP)	TEL
a. I wonder [$_{CP}$ who$_i$ that [$_{IP}$ t_i saw Bill]]		*!	*	*
b. I wonder [$_{CP}$ who$_i$ ~~that~~ [$_{IP}$ t_i saw Bill]]		*!	*	
c. I wonder [$_{IP}$ who saw Bill] ☞			*	

Tableau 14: English	REC	STAY	LE(CP)	TEL
a. who$_i$ do you think [$_{CP}$ t_i that [$_{IP}$ t_i saw Bill]]		**!		*
b. who$_i$ do you think [$_{CP}$ t_i ~~that~~ [$_{IP}$ t_i saw Bill]]		**!	*	
c. who$_i$ do you think [$_{IP}$ t_i saw Bill] ☞		*	*	

3.8 On Candidate Sets

Our analysis of the anti-*that*-trace effect hinges on the possibility of comparing structures that are built from a distinct set of functional projections. To the extent that functional heads are in the Numeration, we may infer that the Numeration does not play a role in determining the Candidate Set.

However, we associated the two possible pronunciations of subject relatives, *the man who saw Bill* and *the man that saw Bill* with two distinct Candidate Sets, as is shown in tableaux 11 and 12. If indeed the Numeration does not determine Candidate Sets, we should wonder why the aforementioned pronunciations would not be contained in one and the same Candidate Set. In fact, if they were, the result would be exactly as it should be, since the optimal candidate violates only LE(CP) in both tableaux.

Similarly, the combined and individual evaluations of the Candidate Sets in tableaux 9 and 10 give identical results, as is shown in tableau 15. Since LE(CP) and TEL are in a tie, we have to determine the optimal candidates on the rankings REC >> LE(CP) >> TEL >> ObHd *and* REC >> TEL >> LE (CP) >> ObHd: on the former ranking, only candidate 15c' is optimal, while on the latter ranking, 15b and 15d' are optimal.

Tableau 15: English	REC	LE(CP)	TEL	ObHd
a. the man who that I saw the book which that I read		*>	<*	
a'. the man/book that that I saw		*>	*<*	
b. the man who ~~that~~ I saw ☞ the book which ~~that~~ I saw		*>		*
b'. the book/man that ~~that~~ I saw		*>	<*	*
c. the man ~~who~~ that I saw the book ~~which~~ that I read	*!		*	
c'. the man/book ~~that~~ that I saw ☞			<*	
d. the man ~~who that~~ I saw the book ~~which that~~ I read	*!	*		*
d'. the man/book ~~that that~~ I saw ☞		*>		*

TEL in the rows (a) and (c) of tableau 12 follow from our earlier assumption that pronunciation of the relative pronoun *that* leads to a violation of TEL, due to the fact that it does not contain semantic features. We did not add an additional violation of TEL in row (e) of tableau 12, because *that* heads an A-chain in this case (it carries a θ-role); this assumption (which becomes crucial in section 3.8, where we argue that Numerations do not determine the Candidate Set) is consistent with our assumption that deletion of *that* violates Recoverability in this case (see row (f) of tableau 12).

4. The left periphery of infinitival relative clauses
4.1 Introduction

We concluded in the previous section that if functional heads are contained in the Numeration, the subject-object asymmetry attested in English relative clauses constitutes evidence in favor of the claim that Numerations do not determine Candidate Sets, and that this claim is compatible with the analysis presented sofar.

In order to avoid that structures are being blocked by semantically unrelated structures (*Who did you meet?* should not be blocked by the presumably more economical *The Germans lost the war*), we propose to adopt the hypothesis in (32b), instead of the one given in (32a).[17]

(32) a. The members of a Candidate Set are based on identical Numerations.
b. The members of a Candidate Set are truth-functional equivalents.

In this section, we will argue that infinitival relatives constitute further evidence against the relevance of the Numeration, by showing that Candidate Sets may have members that contain distinct lexical items (i.c. *who*/*which* and *that*), which reinforces our choice for (32b). Furthermore, we will see that the fact that we adopted the model of grammar in Figure 3 raises interesting questions with respect to the evaluation of relative clauses involving Pied Piping and Preposition Stranding.

Before we go and examine infinitival relatives, we should mention that these clauses pose specific problems which we will not go into here in any detail. One of these problems is that the complementizer *for*, although deletable in clauses that do not contain a lexical subject, must be overtly realized if a lexical subject is present. We will follow Pesetsky (1998) in assuming that case assignment interferes here. The relevant generalization seems to be the one given in (33).

(33) The infinitival complementizer *for* is pronounced iff it assigns case to a lexical DP.

In this article, we will not attempt to give a principled account for this generalization. We will merely stipulate that case-assigning *for* is subject to REC, while its non-case-assigning counterpart is not.[18]

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[17] There are several alternative ways to prevent a structure from being blocked by a semantically unrelated structure, one of which is by the evaluation of output structures with respect to a rich Input (containing a Numeration as well as semantic information concerning predication, quantifier scope, and information structure). Strictly speaking, *the man I saw* would be able to block *the French president*, but only if the latter structure were drastically unfaithful to the Input. In other words, semantically unrelated structures would never be in direct competition if faithfulness plays a dominant role in candidate evaluation.

Note in passing that it is not evident that the hypothesis in (32a) successfully prevents that *Bob wonders who Hank thinks lost the game* is incorrectly blocked by *Bob thinks Hank wonders who lost the game* (for reasons of economy). We will not go into this problem here, since we reject (32a) on independent grounds.

It must also be noted that abolishing the Numeration has several consequences for the computational system itself, one of which seems to be that we can no longer maintain that Merge is always preferred to Move (Chomsky, 1995). This is discussed at length in Broekhuis & Klooster (2001).

[18] This seems to suggest that only case-assigning *for* is a meaningful element, which could very well be related directly to the case feature it is endowed with. This could ultimately lead to a generalization of our formulation of Recoverability in (21) to all elements that contain formal features at Spell-Out, i.e., interpretable features (which C_{HL} does not delete) as well unchecked uninterpretable features.

Note further that this approach to the *For-to*-Filter is compatible with the fact that in some English dialects, e.g. Ozark English as described by Chomsky & Lasnik (1977), the complementizer *for* can be realized

4.2 *A book to read/a book for John to read*

In this section, we will discuss infinitival relatives of the type *a book to read*. On the assumption that the relative pronoun in English can be either *who*/*which* or *that*, and that the complementizer of the relative clause is *for*, we expect the relevant candidates to be the ones in (34) and (35).

(34) a. a book [$_{CP}$ which$_i$ for [$_{IP}$ to read t_i]]
b. a book [$_{CP}$ which$_i$ ~~for~~ [$_{IP}$ to read t_i]]
c. a book [$_{CP}$ ~~which~~$_i$ for [$_{IP}$ to read t_i]]
d. a book [$_{CP}$ ~~which~~$_i$ ~~for~~ [$_{IP}$ to read t_i]]

(35) a. a book [$_{CP}$ that$_i$ for [$_{IP}$ to read t_i]]
b. a book [$_{CP}$ that$_i$ ~~for~~ [$_{IP}$ to read t_i]]
c. a book [$_{CP}$ ~~that~~$_i$ for [$_{IP}$ to read t_i]]
d. a book [$_{CP}$ ~~that~~$_i$ ~~for~~ [$_{IP}$ to read t_i]]

If we adopt the hypothesis in (32a), the set of options in (34) and the one in (35) correspond to distinct Candidate Sets, each giving rise to at least one optimal candidate. Since deletion of *which* violates REC, the optimal member of the set in (34) should contain at least the pronoun *which*. Given that the pronunciation of this pronoun leads to a violation of LE(CP), the best structure is the one that involves deletion of *for* as this would prevent a violation of TEL. In other words, example (34b) is wrongly predicted to be grammatical, while (35d) is correctly evaluated as the optimal candidate of the set given in (35)).

Hypothesis (32b), on the other hand, does not force us to conclude that at least one example of (34) is acceptable: since the examples in (34) and (35) are now taken to be in the same Candidate Set, the structures in (34) can be blocked by the members of the set in (35). The evaluation of the examples in (34) and (35) is then as given in tableau 16 (the double line separates the two Candidate Sets that should be distinguished according to (32a), ObHd is again irrelevant).[19] Here, candidate 16h is the only optimal one.

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if no overtly realized DP is present: in these dialects ObHd should outrank TEL, or be in a tie with this constraint.

[19] Like Pesetsky, we assume that LE(CP) is satisfied if *to* is the first pronounced element of the clause. We will not consider the structures in which *to* is deleted; according to Pesetsky *to* is responsible for the modal interpretation of infinitival relatives, which entails that its deletion gives rise to a violation of Recoverability. We will not adopt Pesetsky's claim that pronunciation of *to* gives rise to a violation of TEL; given that deletion of *to* gives rise to a violation of Recoverability, this would not be consistent with our definition of Telegraph in (25). Since all candidates contain *to*, this is innocuous.

Tableau 16: English	REC	LE(CP)	TEL
a. a book [$_{CP}$ which$_i$ for [$_{IP}$ to read t_i]]		*>	<*
b. a book [$_{CP}$ which$_i$ ~~for~~ [$_{IP}$ to read t_i]]		*!	
c. a book [$_{CP}$ ~~which~~$_i$ for [$_{IP}$ to read t_i]]	*!		*
d. a book [$_{CP}$ ~~which~~$_i$ ~~for~~ [$_{IP}$ to read t_i]]	*!		
e. a book [$_{CP}$ that$_i$ for [$_{IP}$ to read t_i]]		*>	*<*
f. a book [$_{CP}$ that$_i$ ~~for~~ [$_{IP}$ to read t_i]]		*>	<*
g. a book [$_{CP}$ ~~that~~$_i$ for [$_{IP}$ to read t_i]]			*!
h. a book [$_{CP}$ ~~that~~$_i$ ~~for~~ [$_{IP}$ to read t_i]] ☞			

In the case of infinitival relatives of the type *a book for John to read* a similar problem arises for the hypothesis in (32a). If we disregard structures in which case-assigning *for* is deleted (see the generalization in (33)), we end up with the candidates in (36) and (37). Since, according to (32a), they are in different Candidate Sets, at least one of the two structures in (36) should be grammatical. Given that deletion of *which* violates REC, we wrongly predict (36a) to be acceptable.

(36) a. a book [$_{CP}$ which$_i$ for [$_{IP}$ John to read t_i]]
b. a book [$_{CP}$ ~~which~~$_i$ for [$_{IP}$ John to read t_i]]

(37) a. a book [$_{CP}$ that$_i$ for [$_{IP}$ John to read t_i]]
b. a book [$_{CP}$ ~~that~~$_i$ for [$_{IP}$ John to read t_i]]

If we adopt hypothesis (32b), on the other hand, the examples in (37) may block example (36a). The evaluation of the examples in (36) and (37) is then as given in tableau 17, where only candidate 17d turns out to be optimal: candidate 17b is out on both possible rankings as it violates REC; on the ranking LE(CP) >> TEL, the candidates in 17a and 17c are blocked as they violate LE(CP), wheras 17d satisfies this constraint; on the ranking TEL >> LE(CP), candidate 17c is blocked as it violates TEL twice, whereas 17a and 17d violate it only once, and candidate 17a is blocked as it violates LE(CP) in addition to TEL, whereas 17d satisfies LE(CP).

Tableau 17: English	REC	LE(CP)	TEL
a. a book [$_{CP}$ which$_i$ for [$_{IP}$John to read t_i]]		*!	*
b. a book [$_{CP}$ ~~which~~$_i$ for [$_{IP}$ John to read t_i]]	*!		
c. a book [$_{CP}$ that$_i$ for [$_{IP}$John to read t_i]]		*>	<**
d. a book [$_{CP}$ ~~that~~$_i$ for [$_{IP}$ John to read t_i]] ☞			*

This shows once more that the hypothesis in (32a) cannot be maintained. Our findings are on the other hand in accordance with the hypothesis in (32b), which we will therefore adopt.

4.3 *A topic to work on*/*A topic on which to work*

The fact that we adopted the model of grammar in Figure 3 and more particularly that we assumed the hypothesis in (32b) forces us to claim that relative clauses that involve Preposition Stranding (*a topic to work on*) and ones exhibiting Pied Piping of the preposition (*a topic on which to work*) are contained in one and the same Candidate Set (see footnote 21

for the prediction based on two alternative sets of assumptions). In this section, we will see that this consequence is not without problems, which may indicate either that our present proposal is untenable, at least in as far as we assume that identity of meaning determines which structures are part of the same Candidate Set, or that auxiliary assumptions are needed.

But before we go and examine infinitival constructions, we should test if our assumptions give the correct results for finite clauses. Let us therefore consider the examples in (38), which must come out as the optimal candidates.

(38) a. the topic which I am working on
b. the topic on which I am working
c. the topic that I am working on
d. the topic I am working on

The evaluation is given in tableau 18. Since LE(CP) and TEL are in a tie, we have to consider two alternative rankings: on the ranking REC >> TEL >> LE(CP) >> ObHd, we have four optimal candidates, 18b, 18b', 18f, 18h'; on the alternative ranking REC >> LE(CP) >> TEL >> ObHd, there is only one optimal candidate, 18g'. This means that we are forced to include one candidate in the set of optimal candidates that does not belong there, namely 18b' (the reader may infer that both hypotheses in (32) make the same predictions here).

Tableau 18: English	REC	LE(CP)	TEL	ObHd
a. the topic [$_{CP}$ on which$_i$ that [I am working t_i]]		*>	<*	
a'. the topic [$_{CP}$ on that$_i$ that [I am working t_i]]		*>	<*	
b. the topic [$_{CP}$ on which$_i$ ~~that~~ [I am working t_i]] ☞		*>		*
b'. the topic [$_{CP}$ on that$_i$ ~~that~~ [I am working t_i]] ☞		*>		*
c. the topic [$_{CP}$ ~~on which$_i$~~ that [I am working t_i]]	*!		*	
c'. the topic [$_{CP}$ ~~on that$_i$~~ that [I am working t_i]]	*!		*	
d. the topic [$_{CP}$ ~~on which$_i$ that~~ [I am working t_i]]	*!	*		*
d'. the topic [$_{CP}$ ~~on that$_i$ that~~ [I am working t_i]]	*!	*		*
e. the topic [$_{CP}$ which$_i$ that [I am working on t_i]]		*>	<*	
e'. the topic [$_{CP}$ that$_i$ that [I am working on t_i]]		*>	*<*	
f. the topic [$_{CP}$ which$_i$ ~~that~~ [I am working on t_i]] ☞		*>		*
f'. the topic [$_{CP}$ that$_i$ ~~that~~ [I am working on t_i]]		*>	<*	*
g. the topic [$_{CP}$ ~~which$_i$~~ that [I am working on t_i]]	*!		*	
g'. the topic [$_{CP}$ ~~that$_i$~~ that [I am working on t_i]] ☞			<*	
h. the topic [$_{CP}$ ~~which$_i$ that~~ [I am working on t_i]]	*!	*		*
h'. the topic [$_{CP}$ ~~that$_i$ that~~ [I am working on t_i]] ☞		*>		*

The problem with candidate 18b' is independent of the question whether the candidates that involve Pied Piping are in the same Candidate Set as the candidates that involve Preposition Stranding; if we had considered the candidates in 18a-d separately, the same result would have arisen. Since we do not have a principled explanation for the ungrammaticality of this candidate, we leave this to future research and postulate the *ad hoc* filter in (39). A similar filter is operative in Dutch (cf. the discussion of (18)).[20]

[20] Subdeletion of *that* in this construction would involve deletion in an A-chain. Hence, the impossibility of this follows from our present proposal. There may be a link between the filter in (39) and the issue of Preposition Stranding. In Dutch and English, the filter is active and Preposition Stranding is allowed, while in Standard

(39) a. English: *[$_{CP}$ [$_{PP}$ P that] C [$_{IP}$ ...]]
b. Dutch: *[$_{CP}$ [$_{PP}$ P die/dat] C [$_{IP}$ ...]]

Now that we have discussed finite relative clauses, let us consider the results in infinitival clauses. What we would hope to derive is that the examples in (40) are the optimal candidates.

(40) a. a book on which to work
b. a book to work on

The evaluation of those candidates that do not include the structures that violate the *ad hoc* constraint in (39) is given in tableau 19. We predict only candidate 19h' to surface, which only violates ObHd.[21]

Tableau 19: English	REC	LE(CP)	TEL	ObHd
a. the topic [$_{CP}$ on which$_i$ for [to work t_i]]		*>	<*	
b. the topic [$_{CP}$ on which$_i$ ~~for~~ [to work t_i]]		*!		*
c. the topic [$_{CP}$ ~~on which~~$_i$ for [to work t_i]]	*!		*	
d. the topic [$_{CP}$ ~~on which~~$_i$ ~~for~~ [to work t_i]]	*!			*
e. the topic [$_{CP}$ which$_i$ for [to work on t_i]]		*>	<*	
e'. the topic [$_{CP}$ that$_i$ for [to work on t_i]]		*>	*<*	
f. the topic [$_{CP}$ which$_i$ ~~for~~ [to work on t_i]]		*!		*
f'. the topic [$_{CP}$ that$_i$ ~~for~~ [to work on t_i]]		*>	<*	*
g. the topic [$_{CP}$ ~~which~~$_i$ for [to work on t_i]]	*!		*	
g'. the topic [$_{CP}$ ~~that~~$_i$ for [to work on t_i]]			*!	
h. the topic [$_{CP}$ ~~which~~$_i$ ~~for~~ [to work on t_i]]	*!			*
h'. the topic [$_{CP}$ ~~that~~$_i$ ~~for~~ [to work on t_i]] ☞				*

Although our proposal predicts there to be only one optimal candidate, we believe that this is not a reason to consider it falsified. In the first place, there are several examples that are in accordance with our predictions. Kester (1994) notes for example that Pied Piping gives rise to a marginal result in sentences like the ones given in (41).

(41) a. ??I am looking for a man to whom to give this book.
a' I am looking for a man to give this book to.
b. ??I am looking for a place to which to travel.
b'. I am looking for a place to travel to.
c. ??I am looking for a book to which to refer.
c'. I am looking for a book to refer.

German relative d-pronouns may be the complement of a preposition (the filter is not active) and Preposition Stranding is prohibited. We do not have an explanation for this correlation.

[21] If we had stuck to the grammar in Figure 1 (which entails the hypothesis in (32a)), we would have had the possibility of arguing that Preposition Stranding and Pied Piping correspond to distinct Input structures, as is argued for by Pesetsky (1998). Alternatively, if we had adopted the model in Figure 3 in combination with hypothesis (32a), we would have again been able to argue that *a topic to work on* and *a topic on which to work* are in different Candidate Sets, based on a Numeration containing either *that* (leading to Preposition Stranding) or *which* (resulting in Pied Piping). As the reader may infer, both alternative sets of assumptions lead to the prediction that the structures b, f, g' and h' in tableau 19 are grammatical, which is clearly false.

Furthermore, Craig Thiersch (p.c.) informs us that in colloquial speech Pied Piping never occurs; the possibility of examples such as (40a) is explicitly taught in school (Thiersch attributes this statement to Howard Lasnik). If so, we may claim that the fact that we are not able to derive (40a) is actually a virtue of our proposal, making it superior to accounts that predict it to be grammatical (such as Chomsky & Lasnik's, 1977, Doubly Filled COMP Filter and Pesetsky's, 1998, proposal).

We will conclude by considering infinitival clauses containing an overtly realized subject. In these clauses, there should be only one optimal candidate, namely the one corresponding to the acceptable option given in (42a), its counterpart in (42b) being fully ungrammatical. The evaluation is given in tableau 20. For convenience, we did not include the candidates that go against the generalization in (33) and the filter in (39). The evaluation correctly gives 20d' as the only optimal candidate.

(42) a. a topic for John to work on
b. *a topic on which for John to work

Tableau 20: English	REC	LE(CP)	TEL	ObHd
a. the topic [$_{CP}$ on which$_i$ for [John to work t_i]]		*!	*	
b. the topic [$_{CP}$ ~~on which~~$_i$ for [John to work t_i]]	*!		*	
c. the topic [$_{CP}$ which$_i$ for [John to work on t_i]]		*!	*	
c'. the topic [$_{CP}$ that$_i$ for [John to work on t_i]]		*>	<**	
d. the topic [$_{CP}$ ~~which~~$_i$ for [John to work on t_i]]	*!		*	
d'. the topic [$_{CP}$ ~~that~~$_i$ for [John to work on t_i]] ☞			*	

In conclusion, our proposal comes quite close to being descriptively adequate; especially the fact that we correctly exclude examples such as (42b) is a major improvement over the proposal in Pesetsky (1998). Nevertheless, the generalization in (33) and especially the filters in (39) still call for a principled explanation.

4.4 A note on Dutch

So far, we have only considered English infinitival relative clauses. If we take into account similar examples from Dutch, our proposal *seems* to make the wrong predictions. Consider the grammatical examples in (43).

(43) a. een leuke jongen [om morgen mee uit te gaan]
a nice boy COMP tomorrow with out to go
'a nice boy to go out with'
b. een leuk boek [om morgen te lezen]
a nice book COMP tomorrow to read]
'a nice book to read tomorrow'

The Candidate Sets associated with the examples in (43) should be as given in tableaux 21 and 22; in accordance with Pesetsky we will assume that the pronunciation of *om* violates TEL, as does the pronunciation of the relative pronoun *dat*.

Tableau 21: Standard Dutch	REC	LE(CP)	TEL
a. een leuke jongen die om morgen mee uit te gaan		*	*!
b. een leuke jongen die ~~om~~ morgen mee uit te gaan ☞		*	
c. een leuke jongen ~~die~~ om morgen mee uit te gaan	*!		*
d. een leuke jongen ~~die~~ ~~om~~ morgen mee uit te gaan	*!	*	

Tableau 22: Standard Dutch	REC	LE(CP)	TEL
a. een leuk boek dat om morgen te lezen		*!	**
b. een leuk boek dat ~~om~~ morgen te lezen		*!	*
c. een leuk boek ~~dat~~ om morgen te lezen ☞			*
d. een leuk boek ~~dat~~ ~~om~~ morgen te lezen		*!	

As we can see in these tableaux, we get the correct result if the relative pronoun is *dat*, but not if it is *die*; since deletion of *die* gives rise to a violation of REC, we would wrongly expect it to be overtly realized, and the complementizer *om* should be deleted in order to satisfy TEL. Although this result is disappointing, it should be pointed out that we do arrive at the correct result in the case of infinitival interrogatives, where the Specifier of CP is clearly endowed with semantic features. In (44), it is shown that the *wh*-phrase must always be overtly expressed at the expense of the pronunciation of the complementizer.

(44) a. Ik weet niet [$_{CP}$ wie$_i$ ~~om~~ [$_{IP}$ morgen t_i te bezoeken]]
I know not who tomorrow to visit
'I don't know who to visit tomorrow'
b. Ik weet niet [$_{CP}$ wat$_i$ ~~om~~ [$_{IP}$ morgen t_i te lezen]]
I know not what tomorrow to read
'I don't know what to read tomorrow'

As this is precisely what we would expect on the given constraint ranking, there is reason to doubt that the presupposed analysis of the Dutch examples in (43) is correct; the examples in (43) are not relative clauses in the standard sense. Below, we will give some additional reasons for this conclusion.

Firstly, it should be pointed out that in German, relative clauses of the sort under discussion do not occur at all (Kester, 1994); examples such as (45) are completely unacceptable.[22] If Dutch resembles German in this respect, the examples in (43) must receive a different analysis.

(45) a. *Ich suche ein Buch [um zu lesen]
'I am looking for a book to read'

[22] In examples such as *ein Buch [zum lesen]* and *ein MŠdchen [zum heiraten]*, the bracketed constituent is interpreted as a goal infinitive. Kester (1994) gives two exceptions to the rule that German has no infinitival relative clauses. Firstly, there are examples such as (ia) in which the "relative pronoun" corresponds to the PRO subject, which are problematic anyway as relative pronouns that correspond to arguments generally originate in case-marked positions. Secondly, there are cases such as (ib) in which the antecedent is necessarily a quantifier-like element. We doubt whether cases like these can be seen as ordinary relative clauses.

(i) a. Ich suche einen Mann$_i$ [um PRO$_i$ fŸr mich einzukaufen].
I look-for a man *um* for me to-shop
`I am looking for a man to shop for me.'
b. etwas zu lesen
something to read
'something to read'

b. *Er fand ein MŠdchen [um zu heiraten]
'he found a girl to marry'

Secondly, examples such as the ones given in (46) are generally analyzed as involving *Tough*-movement, i.e. movement of an empty operator into SpecCP (Bennis & Wehrmann, 1987).

(46) a. Die jongen is leuk [$_{CP}$ OP$_i$ om [$_{IP}$ PRO t_i mee uit te gaan]]
that boy is nice COMP with out to go
b. Dat boek is leuk [$_{CP}$ OP$_i$ om [$_{IP}$ PRO t_i te lezen]]
that book is nice COMP to read.

Being a modifier of the adjective, the infinitival clause can be expected to be placed after the noun when the adjective is used attributively. If so, the examples in (43) can be analyzed as cases of *Tough*-movement as well. In other words, SpecCP of the infinitival clause in (43) does not contain a relative pronoun but an empty operator just like in the cases given in (46). This would give rise to the analysis of the examples in (43) in (47).

(47) a. een leuke jongen [$_{CP}$ OP$_i$ om [$_{IP}$ PRO morgen t_i mee uit te gaan]]
b. een leuk boek [$_{CP}$ OP$_i$ om [$_{IP}$ PRO morgen t_i te lezen]]

Thirdly, infinitival clauses can be used in predicative positions. Some examples are given in (48); being open predicates, the infinitival clauses can again be analyzed as involving empty operator movement.

(48) a. Dit kind is [$_{CP}$ OP$_i$ om [$_{IP}$ PRO t_i te zoenen]]
This child is COMP to kiss
b. Dit boek is [$_{CP}$ OP$_i$ om [$_{IP}$ PRO in een adem t_i uit te lezen]]
this book is COMP in one breath out to read

As the infinitival clause can be used in predicative position, there is no *a priori* reason not to assume that they may be used as attributive phrases as well. Consequently, examples such as (49) may receive a similar analysis as the examples in (48).

(49) a. een kind [$_{CP}$ OP$_i$ om [$_{IP}$ PRO t_i te zoenen]]
a child COMP to kiss
b. een boek [$_{CP}$ OP$_i$ om [$_{IP}$ PRO in een adem t_i uit te lezen]]
a boek COMP in one breath out to read

Although examples such as (43) deserve much more discussion, we may conclude that it would be unwise to consider the examples in (43) as decisive counterexamples to our proposal. Hence, we put them aside, while noting that if the clauses in question indeed contain an empty operator in the specifier position, our theory correctly predicts that *om* must be overtly realized. This is shown in tableau 23.

Tableau 23: Standard Dutch	REC	LE(CP)	TEL
a. [$_{CP}$ OP$_i$ om [$_{IP}$ PRO (XP) t_i te V]] ☞			*
b. [$_{CP}$ OP$_i$ ~~om~~ [$_{IP}$ PRO (XP) t_i te V]]		*!	

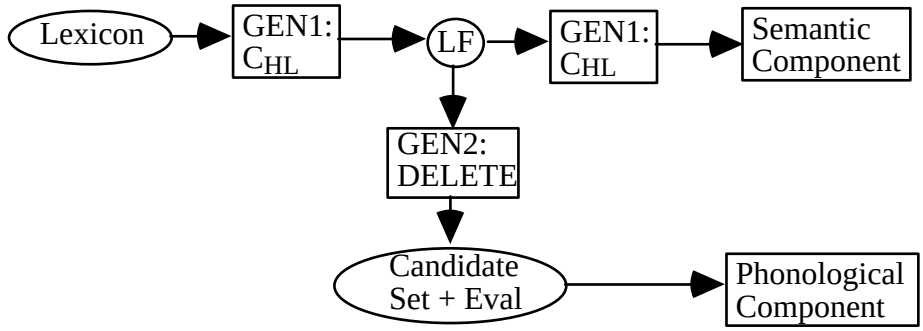
So far, we have only indicated that there may be reasons to treat the examples in (43) on a par with constructions that are generally analyzed as involving empty operator movement. The next step should be to answer the more general question why so-called empty categories are empty, in so far as we want to maintain that these elements are the result of a deletion transformation (see Samek-Lodovici, 1996). We leave this for further research.

Finally, in tableau 23 the element *te* is always preceded by the case-marked trace of the empty operator. In order to account for the fact that the complementizer *om* cannot be deleted if XP is empty, we must assume that the presence of this case-marked trace makes it impossible for the inflectional element *te* to satisfy LE(CP) (see footnotes 12 and 16). This is of course reminiscent of the discussion of *wanna*-contraction, which can be blocked by a case-marked *wh*-trace, but not by an NP-trace or PRO. Apparently, a case-marked trace counts as phonetically realized material.[23]

5. Conclusion

In this article, we studied a phenomenon that is not likely to be analyzed in a satisfactory way in a syntactic system that only disposes of the computational system argued for in Chomsky (1995). In order to meet the requirement of descriptive adequacy, it is necessary to postulate an additional module, which we assumed to have an Optimality Theoretic format. Our point of departure was the model of grammar in figure 1, in which the computational system and the OT module were strictly separated.

Figure 1



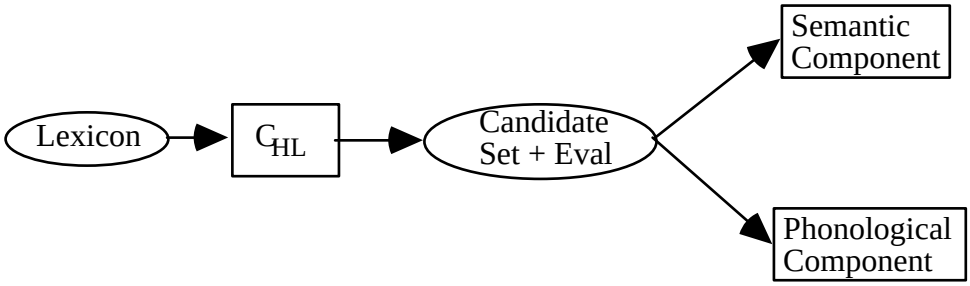
C_{HL} = SELECT, MERGE and ATTRACT/MOVE

In section 3, however, it became clear that it is possible to combine the two generators into a single one, consisting of the operations SELECT, MERGE, ATTRACT/MOVE and DELETE. This resulted in the model in figure 3, which is more or less the model assumed in standard OT

[23] If so, the assumption that the head of an A-chain must be pronounced in English (see the discussion of (30a&b) in section 3.7) may be attributed to an EPP-like constraint, stating that SpecIP must be filled with phonetically visible material. It would follow from this assumption that material which can in principle be deleted under recoverability, such as the relative pronoun *that*, must be pronounced in order to satisfy EPP if it occupies SpecIP. In other words, the subject relative pronoun *that* can only be deleted if it is A'-moved.

approaches to syntax. Finally, in section 4, we showed that the model in figure 3 is superior to the one in figure 1.

Figure 3



C_{HL} = SELECT, MERGE, ATTRACT/MOVE and DELETE

This leaves us with the question whether the lexicon should still be held co-responsible for parametrization, which (putting the inventory of lexical elements aside and given our earlier assumptions) could be fully reduced to constraint ranking if the OT module can be made to handle the parametrization of A-movement.

We assumed in section 2.1, essentially following Chomsky, that after Spell-Out (or LF, in our terminology), C_{HL} is still operative, in the sense that it continues to manipulate structures until they are ready to be interpreted by the semantic component, i.e., until they satisfy the bare output conditions imposed by this semantic component. According to Chomsky, word order parametrization reduces to the question whether movement takes place before or after Spell-Out. In English, for example, subjects must be A-moved into SpecIP overtly, whereas overt Object Shift is blocked, which implies that this type of parametrization has taken place before the OT module is reached.

However, it seems fairly simple to develop an OT account that gives exactly the same results (see Broekhuis 2000; Costa 1996; Dekkers, 1997/1999; Grimshaw 1997). For example, we could postulate a violable constraint CASE which forbids arguments in Case-less positions (at the moment of Spell-Out). The interaction of this constraint with STAY could be held responsible for the choice between overt or covert application of the operation MOVE/ATTRACT. The possibilities are given in (50).[24]

(50) a. CASE >> STAY: obligatory movement
b. STAY >> CASE: no movement
c. CASE <> STAY: optional movement

The situation in English with respect to subject and object movement could now be described as in (51)), in which EPP stands for a constraint that requires a lexically filled specifier of IP: both the subject and the object may remain in situ as far as CASE is concerned, but the subject must move to SpecIP in order to satisfy EPP.

(51) EPP >> STAY >> CASE

[24] We can give shape to covert movement in two ways. Possibly, covert movement takes place after Spell-Out, which would mean that in Figure 3, C_{HL} is still operative between Eval and the Semantic component. Alternatively, covert movement could be seen as movement that strands phonological features, which could apply before Eval. The first option is argued for by Broekhuis (2000), and the latter by Dekkers (1997).

As far as explanatory adequacy is concerned, the proposal outlined above may even be superior to Chomsky's (1995) proposal. It makes use of ranked constraints, which is independently motivated in the sense that we need the OT module to account for those syntactic phenomena that are not explained within C_{HL}, whereas Chomsky makes use of a distinction between strong and weak features, which does not seem to have any independent motivation (see Chomsky, 1996). Importantly, the proposals in (50) and (51) do not imply that we need to introduce constraints for all movement operations, since the application of A'-movement may be motivated by the fact that a given Candidate Set consists of candidates that are truth-functionally equivalent, so that all semantically relevant operations must have applied before the structure is placed in a certain Candidate Set.

Besides important issues like this one, various other questions may arise with respect to the mechanisms or constraints employed by the two modules. Let us take two examples to illustrate this point. Firstly, consider Chomsky's assumption that interrogative complementizers contain an interpretable *wh*-feature. Being interpretable, this feature will survive checking, so that the complementizer will be adorned with a semantic feature at LF. Given our formulation of REC in (21), this means that deletion of this complementizer will wrongly be blocked:

(52) John wondered what (*that/if) Bill had said.

Hence, we are forced to drop Chomsky's assumption and to conclude that the interpretation of the embedded clause as interrogative follows from the fact that it has a *wh*-phrase in an operator position (SpecCP). Since cross-linguistically, functional heads such as C, T and Neg need not be realized overtly, these heads never seem to carry an interpretable feature. If A-movement is accounted for in the way suggested above, this conclusion would of course be desirable as it would enable us to eliminate the notion of feature strength from the syntax entirely.

Secondly, consider the assumption that the OT module contains the constraint REC. This constraint has at least one remarkable property: it is always the most highly ranked and therefore inviolable. If violability is a crucial property of OT constraints, REC seems to be an illicit member of the constraint set. Hence, it is reasonable to assume that recoverability is a condition in the generator. One way to implement this would be to assume that recoverability is a defining part of the operation DELETE requiring that semantic features not be deleted.

The discussion above shows that the model defended in this article can be helpful in evaluating the properties assigned to the computational system and the OT part of syntax. This is especially important for defining the proper format of the computational system, discussions about which have so far been fairly remote from empirical considerations and have mainly been led by intuitive, hence vague, ideas about what is or is not conceptually attractive.[25]

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[25] We refer the reader to Broekhuis (2000) and Dekkers (1997/1999) for further discussion and for solutions to some of the empirical issues remained unsolved in this article.

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