# OT Semantics and Control

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**Abstract**: Control, the interpretation of the implicit subject of a non-finite clause, seems to depend on interaction between syntactic, semantic, and pragmatic principles. This suggests that an OT framework, which is based on the idea of constraint interaction, should be particularly suited to handle the problem. The present paper integrates configurational, lexical, and pragmatic factors in an OT analysis of control in Swedish. This approach enables the analysis to cover a broader range of control phenomena than can be accounted for from a more uniformly syntactic or semantic perspective.

Since the study of control concerns syntax and semantics both, it may provide interesting insights concerning the relation between the two perspectives. Unlike most contemporary theories of grammar, the OT architecture easily lends itself to treating production and interpretation separately. This makes control, as a matter of interpretation, a separate issue from the distribution of controllable elements. By distinguishing these processes – and thereby their inputs – with respect to control, some interesting consequences for OT syntax and OT semantics in general may be revealed. In this paper, it is shown that a fully inflected input to OT syntax is not very well suited to treat the distribution of non-finite clauses (and, consequently, control phenomena). It is also proposed that syntactic structure should not be regarded as part of the input to OT semantics.

## 1. Introduction

Generally, syntax is supposed to deal with the *generation* of grammatical sentences, and their interpretation belongs to the domain of semantics. However, there are certain issues of interpretation that seem to concern syntacticians at least as much as they do semanticists, in that they are treated as theoretically central within virtually every syntactic framework. Scope relations and the interpretation of implicit elements have been high on the agenda for well above 30 years and still continue to be controversial issues in syntactic theory.

Thus control, the co-reference relation between the implicit subject of a non-finite clause and its antecedent, has probably been treated more extensively within syntax than within semantics, despite being a matter of interpretation. Since the actual phenomena at hand seem to be governed through interaction between syntactic, semantic, and pragmatic factors, control is a relevant problem from either perspective. Consequently, we have failed to find a single principle that smoothly explains all the data, and so the problem remains.

This points in the direction of Optimality Theory (henceforth OT). The OT framework is based on the idea of interactions between conflicting factors, which

is exactly what seems to be the case here. Scholars argue whether complement control is best explained through syntactic or (lexical) semantic principles, and whether adjunct control primarily depends on syntax or on pragmatics (see below). From an OT perspective, it is not a matter of either or, but rather a question of how all these factors interact.

The present approach (a development from Lyngfelt 1999) is founded in the syntactic tradition, but the outcome is probably better characterized as a specimen of semantics. The relation between the two perspectives with respect to OT will be discussed in section 4. For a more purely syntactic OT analysis of control, see Speas (1997).

The analysis is based on a survey of control constructions in the Swedish PAROLE corpus. It consists of 25 million running words and is tagged for morphosyntactic information. Except for a few sentences, all examples in this paper are taken from PAROLE.


## 2. A survey of standard control issues, based on Swedish

Many kinds of linguistic relations have been called *control* in the literature, but in the standard view the controlled element is the implicit subject of a non-finite clause, usually labelled (big) PRO.[2] It differs from (small) *pro* and other implicit elements, in that it cannot be replaced by an explicit constituent.


(1)　　a. Han bad henne att PRO komma
　　　　　'He asked her to PRO come'

　　　b. * Han bad　　henne att hon komma
　　　　　*he　　asked her　　to　she　come*

　　　c. Han bad henne att hon skulle komma
　　　　　'He asked her that she would come'


As shown in (1), we cannot make the implicit PRO referent in (a) explicit just by inserting a subject in the infinitival phrase, as seen in (b). Instead we have to turn the infinitival phrase into a full subordinate clause, as in (c), adding not just a subject but also e.g. a finite verb. In contrast, the difference between implicit *pro* and an explicit pronoun does not necessarily have to be more than just that, as shown in (2).[3]


(2)　　a. *pro* Kom tillbaka igår
　　　　　'*pro* Came back yesterday'

　　　b. Jag kom tillbaka igår
　　　　　'I came back yesterday'

When it comes to establishing the other half of the control relation, the *controller* of PRO, one generally expects it to be a c-commanding[4] NP (though there are lots of exceptions to this). However, complements, adjuncts, and subjects behave somewhat differently with respect to the choice of controller. In complement control, the main issue concerns subject vs. object control, illustrated in (3a) and (3b), respectively:

(3)  a. Hon$_i$ övertalade honom$_j$ att PRO$_j$ komma.
      'She$_i$ persuaded him$_j$ to PRO$_j$ come'

   b. Hon$_i$ lovade honom$_j$ att PRO$_i$ komma.
      'She$_i$ promised him$_j$ to PRO$_i$ come'

(4)  Han planerade att PRO komma
    'He planned on PRO coming'[5]

In most di-transitive sentences we get object control, i.e. PRO is co-referent with the indirect object, as in (3a). However, some few verbs, notably *lova* ('promise'), instead generate subject control, as in (3b). In monotransitive sentences like (4), subject control is the norm. Some relate the general tendency to syntactic proximity (the Minimal Distance Principle (MDP) of Rosenbaum 1967) and note *promise* as a lexical exception; others ascribe all complement control to lexical semantics (e.g. Pollard & Sag 1994); and still others invoke pragmatics (e.g. Comrie 1985).

   For adjuncts, the normal case is subject control, as in (5a), though there are also some cases of object control, as in (5b).

(5)  a. Kan jag$_i$ nå lyckan genom att PRO$_i$ bli buddist?
      'Can I attain happiness by PRO becoming a Buddhist?'

   b. Han$_i$ bjöd hem dem$_j$ för att PRO$_j$ bese underverket.
      'He$_i$ invited them$_j$ home to PRO$_j$ behold the miracle'

Both types adhere to c-command and MDP. The challenge to this generalization is so-called logophoric control (cf. Williams 1992), in which the control relation is established on pragmatic rather than syntactic grounds:

(6)  a. För att PRO underlätta läsningen bör det på ett tidigt stadium framgå vad texten eller meningen handlar om.
      'To PRO help reading, it should be clear early on what the text or sentence is all about'
   b. Dokumentet skrivs ut genom att PRO välja Print i menyn.
      'The document gets printed by PRO choosing Print in the menu'

In some of these cases, there is disagreement on grammaticality; and adjunct control is a controversial topic in normative grammar. Consider, for example, the following piece of advice:

(7)  When dangling, watch your participles (Espy 1980:155)

Notice, however, that the disagreement primarily concerns the distribution of PRO – not its interpretation, i.e. control. All Swedes agree on what a sentence like (6b) means, though some speakers think it should be expressed differently.

Due to the possibility of pragmatic interference, adjunct control is often considered outside the domain of grammar or underspecified by it. This view is common within generative grammar (especially in the tradition of Chomsky 1981, 1995), and can be found in OT as well (see e.g. Speas 1997). It also applies to control in infinitival subject clauses:

(8)     Att PRO angripa det sociala och religiösa hyckleriet blev livsviktigt.
        'To PRO attack the social and religious hypocrisy became essential.'

Accordingly, the main part of the linguistic debate on control has concerned complements, especially the *promise/persuade* issue (cf. (3a–b) above). It is considered core grammar, and there is overall agreement on the data, but not on how to best explain them. This narrowing of the scope of investigation is in fact one of the reasons for the disagreement. There are models (e.g. Pollard & Sag 1994) that give a convincing and elegant account of complement control but cannot be applied to non-finite adjunct or subject clauses; therefore they naturally conflict with broad approaches to PRO in general (e.g. Landau 1999).


## 3. Introduction to OT

OT is based on the idea of interaction between violable constraints. These constraints are presumably part of universal grammar, and differences between languages are considered to be due to different rankings of the same constraints. Thus the grammars of individual languages are effectively equivalent to constraint rankings.

In OT, violating a constraint does not necessarily render a sentence ungrammatical, since this violation may lead to the satisfaction of another, possibly higher ranked constraint. For a given input, a number of candidate outputs compete for grammaticality; and the winner – the optimal output – is the candidate that best satisfies the highest ranking constraint on which the candidates differ. All non-optimal candidates are ungrammatical.

As an illustration, from the domain of OT syntax, consider the following simplified account of expletive subjects vs. so-called *pro*-drop.

(9)     a. It rains (English)
        b. Il pleut (French)
        c. *pro* Piove (Italian)
        d. *pro* Llueve (Spanish)
        e. Det regnar (Swedish)

As shown in (9), English, French, and Swedish use expletive subjects, while Italian and Spanish do not. One might say that the subject is encoded morphologically on the verb instead, but that does not seem to be enough. English and French verbs also agree with the subject, but expletive subjects are required nonetheless.

Instead, the data in (9) may be accounted for by interaction between the following two constraints (definitions from Grimshaw 1997):

SUBJECT:    Clauses have subjects[6]
FULLINT:    Full Interpretation. Lexical conceptual structure is parsed.

The first of these constraints require the subject position of a sentence to be filled, and is thus violated by *pro*-drop. The second, FULLINT, requires output elements to correspond to some input meaning, and penalizes e.g. expletives. If SUBJECT ranks higher than FULLINT, we would expect the subject position to be filled – even when there is no subject referent in the input. This is the case in e.g. French, as shown in Tableau 1.

*Tableau 1.    SUBJ >> FULLINT –> expletive subjects in French*

| 'It rains' | SUBJ | FULLINT |
|---|---|---|
| Pleut | *! | |
| ☞    Il pleut | | * |

\* = constraint violation, ! = violation is fatal, ☞ = the optimal candidate, shaded fields are irrelevant to the selection of the optimal candidate

The expletive *il* satisfies SUBJECT at the cost of violating FULLINT. Since SUBJECT is higher ranked in French (as in English and Swedish), candidate b is optimal. In Italian (and Spanish), on the other hand, SUBJECT is ranked below FULLINT. Accordingly, we find no expletives there, as shown in Tableau 2:

*Tableau 2.    FULLINT >> SUBJ –> no expletive subjects in Italian*

| 'It rains' | FULLINT | SUBJ |
|---|---|---|
| ☞    Piove | | * |
| EXPL piove | *! | |

Of course the above account is overly simplified. Note for example that in Swedish, which normally uses expletive subjects, *pro*-drop is still possible in certain circumstances, as shown in example (2a) above. Thus, there seems to be more factors at play here. For a more nuanced treatment of *pro*-drop in Italian,

see Grimshaw & Samek-Lodovici (1998). See also Grimshaw (1997) who applies SUBJECT and FULLINT to the analysis of *do*-support in English.

Note that being outranked does not render a constraint irrelevant. "Constraints are never switched off" (Vikner 1999:34). Although FULLINT is ranked below SUBJECT in Swedish, it still matters, as shown in Tableau 3. Candidate c is suboptimal, i.e. ungrammatical with respect to the input, since the referential subject *han* ('he') contains more unparsed information than the expletive *det* does, and therefore forces a graver violation of FULLINT.

*Tableau 3.      SUBJ >> FULLINT –> expletive subjects in Swedish*

| 'It rains' | SUBJ | FULLINT |
|---|---|---|
| Regnar | *! | |
| ☞ Det regnar | | * |
| Han regnar | | **! |

SUBJECT and FULLINT represent two fundamentally different kinds of constraints. SUBJECT is a **markedness** constraint and has to do with structure preferred within the grammar itself. FULLINT is a **faithfulness** constraint, which means that it requires the output to correspond to the input. A crucial difference between the two types is that the latter depends on assumptions about the input, while the former does not.

The optimization process (determining the optimal/grammatical output for a given input), is usually modelled in four stages: INPUT –> GEN –> EVAL –> OUTPUT. The GEN function generates the candidates, which are then evaluated with respect to the constraint ranking in EVAL (also called CON), after which the winning candidate emerges as output.

All properties of GEN are taken to be universal, which means that only candidates that satisfy them will be generated (and no other outputs are possible in *any* language). For example, assuming that binary branching is part of GEN (cf. Grimshaw 1997), only binary syntactic structures are allowed and no flat trees may be generated. If, on the other hand, binary branching follows from a certain constraint ranking, other structures are possible under a different ranking (i.e. in another language) or in contexts where other constraints are relevant (cf. Sells 2000). Thus, GEN is effectively a theory of the limits of natural language, while EVAL primarily accounts for language variation.

Most work in OT focuses on EVAL, trying to explain cross-linguistic variation through differences in constraint rankings. This line of study is more surface oriented, since it is all about the actual outputs. The main purpose is to establish constraint rankings that make correct predictions about grammaticality for various languages. In other words, most OT practitioners are more interested in picking out the right winners than in delimiting the set of losers.
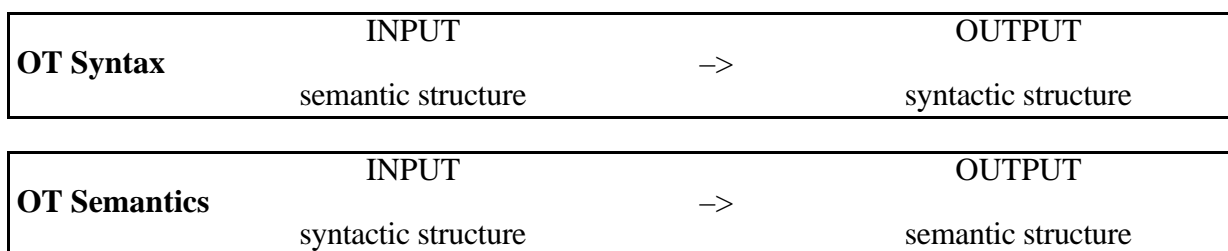
## 4. The relation between syntax and semantics in OT

Before we get into the actual analysis of control in OT, let us consider its relation to the distinction between syntax and semantics, especially as regards the input. I believe that my initial claim in this paper, that syntax normally deals with the generation of grammatical sentences and semantics with their interpretation, is quite uncontroversial. However, in practice, we usually treat grammaticality issues regardless of communicative direction, since the sender and the addressee presumably use the same grammar. Applied to control, this standard practice means that PRO is identified as the implicit subject of a non-finite clause (or, in different terminology, as occupying a null case position) and then certain types of constructions are associated with certain control relations.

Thus, we effectively view the set of grammatical sentences in a given language as an inventory of form-meaning pairs, as opposed to treating production and interpretation (of the same set of sentences) separately. Deriving these sentences from underlying forms or some abstract construal of the input does not constitute a departure from this inventory perspective, not until the input is related to the perspective of the sender or that of the addressee.[7]

It seems to me that the OT architecture makes this neutral position (with respect to communicative direction) harder to maintain. The object of OT syntax is to determine the optimal, i.e. grammatical, expression of a given meaning, while OT semantics concerns the optimal interpretation of a given expression. Using the terminology of Hendriks & de Hoop (1999:10), this may be construed as in Figure 1.

*Figure 1. Syntax and semantics in OT, basic version*

| | INPUT | | OUTPUT |
|---|---|---|---|
| **OT Syntax** | | –> | |
| | semantic structure | | syntactic structure |

| | INPUT | | OUTPUT |
|---|---|---|---|
| **OT Semantics** | | –> | |
| | syntactic structure | | semantic structure |

(cf. Hendriks & de Hoop 1999)

In both boxes of Figure 1, the grammar (both GEN and EVAL) is indicated by a simple arrow. In both boxes, it may be explicated the same way: First, a number of candidates are generated from the input; then the candidates are evaluated with respect to the constraint ranking, and the optimal candidate emerges as output. However, in OT syntax, the candidates are expressions; in semantics they are interpretations. Therefore, the arrows indicate different kinds of optimization

processes. In the terminology of Wilson (1999)[8], these may be called **expressive** and **interpretive** optimization, respectively.

Further, for reasons that will be explained later in this section, I think the nature of the inputs and outputs needs to be considered very carefully. Therefore I do not wish to commit myself to the neat reversed pair of semantic vs. syntactic structure of Figure 1 just yet. Instead, as a temporary base for the following discussion, I will use Figure 2 (in which the parts within brackets will subsequently be modified).

*Figure 2. Syntax and semantics in OT, extended version*

| | INPUT | expressive | OUTPUT |
|---|---|---|---|
| **OT Syntax** | given meaning (semantic structure) | –> optimization | optimal expression (syntactic structure) |

| | INPUT | interpretive | OUTPUT |
|---|---|---|---|
| **OT Semantics** | given expression (syntactic structure) | –> optimization | optimal interpretation (semantic structure) |

(cf. Hendriks & De Hoop 1999, Wilson 1999)

Construed as in Figure 1 or 2, Optimality Theory looks more process oriented than most contemporary theories of grammar. This kind of model, though necessarily an idealization, shows a striking resemblance to pre-theoretical notions of actual language processing. Syntax seems to take the perspective of the sender and semantics that of the addressee.

Therefore, one must bear in mind that the optimization process is a theoretical construct, which concerns a more abstract level than real-time language processing. The goal of OT, just like that of other linguistic theories, is to explain similarities and differences between human languages. In an optimization process, the competing candidates are typologically possible alternatives, not alternative responses to a communicative situation.

Nevertheless, the process oriented construal of the OT architecture differs from the standard inventory approach in that production and interpretation are treated separately.[9] This perspective highlights interesting aspects of the relation between syntax and semantics, since – unlike the inventory perspective – the two domains have different inputs.

In the case of PRO, the implicit subject of a non-finite clause, an OT model like the one in Figure 1 or 2 places the distribution of PRO in the realm of syntax, while its interpretation falls within the domain of semantics. In both cases, the optimization perspective raises the issue of what the input and the alternative candidates are.

Starting with the **syntax** part, the distribution of PRO differs even between closely related languages like Swedish and English, as illustrated in (10):

(10) a. Efter att PRO ha    ätit    en god  frukost    åkte  han direkt   till jobbet
        *after  to* PRO *have eaten a   good breakfast went he   directly to the-work*
        'After PRO having had a good breakfast he went straight to work'

     b. * Innan  att PRO åka till  jobbet      åt   han en god  frukost.
        *before to* PRO *go    to  the-work  ate he   a   good breakfast*
        'Before PRO going to work he had a good breakfast'

     c. Innan   han åkte till jobbet      åt   han en god   frukost.
        *before he  went to the-work  ate he   a   good breakfast*
        'Before he went to work he had a good breakfast'

For some kinds of temporal adverbials, both Swedish and English allow a non-finite clause structure, as in (10a) – but for others, only English does. The Swedish version of (10b) is ungrammatical; and the only way to express the corresponding meaning in Swedish would be to use a full subordinate clause, as in (10c). In English, both the finite and the non-finite variant are grammatical, as shown by the English versions of (10b-c).

As mentioned in section 2, the difference between the two constructions is not merely a choice between an explicit pronoun and implicit PRO, but also concerns e.g. finiteness. Also note that the variation does not seem to be distributed randomly, since English in general is more hospitable to non-finite clauses than Swedish is (Lyngfelt 2000)[10]. This implies that the variation is not just arbitrary but depends on a difference in constraint ranking.

Since there is cross-linguistic variation here, we cannot simply assume a non-finite clause structure as input. The choice between an infinitival phrase and a full subordinate clause has to be handled by the expressive optimization. More specifically, it is determined in EVAL, where the finite and the non-finite clause are competing candidate outputs from the same input.

The first issue, then, is to determine what this input is. In Speas' (1997) OT analysis of control, finiteness is given by the input. Consequently she – as indeed most accounts of the distribution of PRO – treats the issue merely as a choice between PRO and a pronoun. Speas also includes Pro[11] in the input, which makes the pronoun variant an unfaithful competitor. For the input '*Mary hopes* Pro *will see Bill*', her analysis picks out "Mary hopes she will  see Bill" as the optimal output; and for '*Mary hopes* Pro *to see Bill*', it nominates "Mary hopes *Pro* to see Bill" (Speas 1997:190).

Note that the finite and non-finite structures never compete in Speas' analysis. Therefore, it cannot handle cases like (10b-c), where essentially the same meaning is typically expressed by a non-finite clause in English but requires a finite clause in Swedish. Consequently, her model is poorly equipped to account for the distribution of PRO. To be able to do that, one *has* to assume that the finite and non-finite structures compete, i.e. that they are both potential outputs from the same input.

Speas' analysis also generates a lot of unfaithful winners. For example, "Mary hopes she will see Bill" is judged unfaithful to its input because it lacks a Pro. However, this does not look like an issue of faithfulness to me. It is not like e.g. case marking, which may be analyzed as a competition between a faithfulness constraint requiring case to be expressed and a structural constraint penalizing morphological complexity. In the present case, however, Speas assumes an input form (Pro) which is different from the output form (a pronoun). Why would it be more faithful to express the sentence with an implicit PRO than with a pronoun? I cannot see any convincing reason to assume '*Mary hopes* Pro *will see Bill*' as input for the above sentence.

It should be noted, however, that Speas' (1997) purpose is *not* to account for cases like (10). Instead, she shows that an OT approach is compatible with GB and Minimalism. By basing her model on a fairly standard GB analysis of control (Manzini 1983), she illustrates how results obtained within that framework can easily be incorporated in OT – and gain from the change. The drawbacks I have noted are due to the Minimalist heritage, specifically to the use of a fully inflected input. By including form of expression in the input, she is forced to rely on faithfulness. By this I mean that she has to assume one form to be more consistent with the input and, accordingly, its alternative to be structurally more favorable.

A model of OT syntax that I believe is better suited to handle the distribution of non-finite clauses is the tradition of Grimshaw (1997), where the input is defined as:

> The *input* for a verbal extended projection is a lexical head plus its argument structure and an assignment of lexical heads to its arguments, plus a specification of the associated tense and aspect. (Grimwhaw 1997:375f, italics in the original)

In this view, the input basically consists of the meaning of the sentence, and its form is determined through constraint interaction. There is thus no need to resort to faithfulness. What such an analysis would actually look like will not be explored in the present paper, which is devoted to the *interpretation* of PRO. In fact, I believe that we need more empirical data about the distribution of non-finite clauses, before the expressive side of PRO may be successfully analyzed (cf. Lyngfelt 2000).

Turning to **semantics**, we find cases like (11), which is ambiguous with respect to the controller of PRO. Who is supposed to do the studying?

(11) /.../ innan  jag måste köra   iväg   honom för att PRO tentamensläsa.
      *before I    must  drive away him     for  to* PRO *exam-study*
      'before I have to make him leave to PRO study for the exam'

The usual way to handle this kind of ambiguity is to conclude that the two readings have different phrase structures (see section 5 below). For syntax, and for the inventory perspective, this implies that they correspond to different inputs,

but from the viewpoint of OT semantics I cannot see that they do. If we view the interpretive optimization as a path from a given expression to its optimal interpretation, all the reader/listener gets as input is a string of words – plus context. Determining the syntactic structure is part of the interpretation.

In this view, contrary to what is usually assumed in syntax, the different readings of (11) have the same input – unless we find some distinguishing factors in the context or intonation of the utterance. Therefore the two interpretations are candidates in the same competition, and if the sentence truly is ambiguous we have two winners – a situation corresponding to that of optionality in OT syntax.[12]

If we take a look at Figure 2 (or Figure 1) again, it looks like the output of syntax and the input of semantics constitute an interface between the two optimizations, but that does not quite fit with what I have just been saying. The output of OT syntax includes syntactic structure, but the input for OT semantics does not. According to this, the lower box in Figure 1–2 is wrong, since the syntactic structure indicated at the input simply is not there. Alternative structures are generated and evaluated as different candidate interpretations during the interpretive optimization. This view of OT semantics may be represented as in Figure 3.

*Figure 3. Syntax and semantics in OT, revised version*

| | INPUT | expressive | OUTPUT |
|---|---|---|---|
| **OT Syntax** | given meaning (semantic structure) | –> optimization | optimal expression (syntactic and semantic structure) |

| | INPUT | interpretive | OUTPUT |
|---|---|---|---|
| **OT Semantics** | given expression | –> optimization | optimal interpretation (syntactic and semantic structure) |

One may wish to adjust Figure 3 further. For example, since the context (notably topic) matters for syntax and semantics both, it is really always part of the input and could have been entered in both boxes of Figure 3. I chose not to do that, since the illustration looks complex enough as it is. Instead, context will be marked as part of the input in the OT tableaux – once the constraints dealing with context are taken into account (i.e. section 8 and onwards).

Further, one might argue that semantic structure should not be considered part of the *output* for OT syntax, since it is not a product of the expressive optimization. My motivation for not deleting it is that the output *contains* both semantic and syntactic structure, although one of them was there from the start; but the difference does not really matter for the present proposal. What is crucial

is that the input for OT semantics includes neither syntactic nor semantic structure.

Since the control analysis in the following sections covers interpretation only, it belongs to the domain of OT semantics. The approach thus corresponds to the lower box in Figure 3. Note that, since syntactic structure is not taken to be present in the input, then neither is PRO, technically.

But it *is* present in the output. Even pre-theoretically, our ability to interpret implicit elements means that something we do not see or hear – i.e. do not receive as input – is nevertheless construed as part of the interpretation. The element we interpret as the implicit subject argument of a non-finite clause is referred to here as PRO for convenience.

In technical terms, we include PRO in the interpretation because candidates without it would violate the the θ-criterion:

> Each argument bears one and only one θ-role, and each θ-role is assigned to one and only one argument (Chomsky 1981:36)

Whenever the non-finite verb assigns a θ-role to its external argument, and the input includes no such argument, we generate candidates that do by adding PRO. Whether it corresponds to a syntactic constituent, or just represents some semantic features of the predication, does not really matter for the present proposal – which is restricted to the viewpoint of OT semantics. What *does* matter is that PRO contributes to a coherent interpretation of the sentence by filling a θ-role.

In relation to this, note that verbs that do not assign θ-roles cannot be used in control constructions, as shown in (12).

(12)  \* Det är roligt att PRO snöa.
       'It is fun to PRO snow'

The θ-criterion has been adopted to OT by Grimshaw (1997:387), who assumes it to be inviolable. It *would* be violated by non-finite clauses without PRO (given that the verb requires a θ-role to be filled). Assuming that the θ-criterion is inviolable and thus part of GEN, no such interpretations will be generated – and assuming it is not, they will normally be ruled out in EVAL.

For the purposes of the present paper, candidates without PRO will not be considered. To support readability, PRO will be represented in all examples, although it is not really considered part of the input.

Finally, a comment on the terminology: In some respects, I find the term **interpretive OT** preferable to *OT semantics*. It says more clearly on what grounds the concept is defined, and it is less laden with other uses. For example, in the next section I will have reason to distinguish *semantic* constraints – as those having to do with meaning – from syntactic and pragmatic ones, which depend on other factors. Another benefit with *interpretive* is that it can easily be

combined with other restrictions; one may, e.g., want to distinguish 'interpretive OT syntax' from 'interpretive OT phonology' (cf. Boersma 1999), where the terms *syntax* and *phonology* represent different linguistic levels.

On the other hand, *OT semantics* is probably more informative to linguists in general. I will use both terms, preferring the more precise *interpretive OT* for theory internal uses, and *OT semantics* in a broader context.


## 5. The constraints

In this section, the constraints of the present analysis will be introduced and their relative ranking in Swedish established. At the same time they are applied to some typical control issues. In the subsequent sections, three kinds of control phenomena will be examined more closely, namely indirect control, control shift, and adjunct control.

Note that all the constraints assumed in this paper are quite general principles, relevant far beyond the realm of control. I will not, however, explore their range of applicability in this paper, but concentrate on how they apply to control. Consequently, the constraints will be defined only so far as to yield the right predictions about control, and specific assumptions regarding their more general properties will be avoided. At the cost of this vagueness in the definitions, the analysis is kept compatible with most models of OT syntax, e.g. Grimshaw (1997) and Bresnan (1998). Hopefully, this solution also diminishes the risk for incorrect predictions regarding issues outside the scope of investigation, for example anaphora. "Constraint ranking is language-specific, not construction-specific." (Vikner 1999:17)

The constraints will be introduced a few at a time. Whenever the definition of a constraint is meant to cover only its effects on control, deliberately avoiding claims about its general properties, this will be indicated by "here" in the beginning of the definition.

Let us first consider the configurational factors. As mentioned in section 4 above, the ambiguity of (11) may be attributed to differences in phrase structure, as shown in Figure 4.

(11)  /.../ innan  jag$_i$ måste köra  iväg  honom$_j$ för att PRO$_{i/j}$ tentamensläsa.
         *before I    must  drive away him     for  to* PRO     *exam-study*
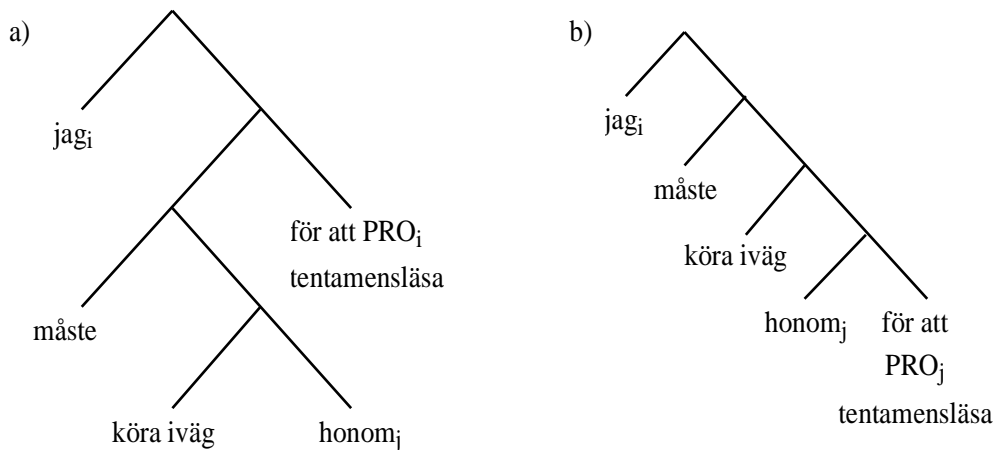      'before I have to make him leave to PRO study for the exam'

*Figure 4. Two interpretations of the phrase structure in (11)*

In the interpretation corresponding to the (a) tree in Figure 4, there is only one c-commanding NP, which is thus the controller. In the (b) version, however, there are two. In accordance with the Minimal Distance Principle of Rosenbaum (1967) we pick the closest NP *honom* ('him') as controller. This may be captured in OT terms by the interaction of the following two violable constraints:

C-COM     C-command. Here: the controller of PRO must c-command it.
MDP       Minimal Distance Principle. Here, roughly: don't cross NP nodes.

Note that the standard conception of MDP – that the controller should be the closest c-commanding NP – is inconsistent with the OT framework, since the notion 'closest' implies a comparison. Constraints apply directly to each candidate and do not compare different candidates; that evaluation is handled by the grammar as a whole (Wilson 1999:23f). Instead, the present construal of MDP incurs a violation for each step in the structure, and the candidate with the fewest violations wins (all other things being equal).

Exactly what constitutes a 'step' depends on how one chooses to represent syntactic structure. One might well note a penalty for each intervening node, but the closest candidate will always incur the fewest violations. For simplicity I choose to count only intervening NP nodes, since only NP's are viable controllers for semantic reasons (see below).

Also note that MDP is taken to presuppose c-command, which is thus the more basic requirement of the two. In terms of constraint ranking, this means that C-COM always outranks MDP. Therefore, MDP only matters when more than one candidate satisfies C-COM. When it does not apply (as is presumably the case for all non c-commanding controllers) it is satisfied vacuously.

Finally, it should be stressed that structural constraints like C-COM and MDP are perfectly consistent with the definition of interpretive OT in Figure 3 above.

Although phrase structure is not considered part of the input, constraints apply to candidate outputs, not inputs.

The effects of these two constraints with respect to (11) may be represented as in Tableau 4 below. The main candidates are listed below, where I-II correspond to the (a) tree of Figure 4 and III-IV to the (b) tree.

*Tableau 4. Ambiguous subject/object control*

| Input: (11) | | C-COM | MDP |
|---|---|---|---|
| ☞ | I | | |
| | II | *! | |
| | III | | *! |
| ☞ | IV | | |

innan  jag måste köra  iväg   honom för att PRO tentamensläsa.
'before I have to make him leave to PRO study for the exam'

I     innan [jag [[måste [köra  iväg honom]] [för att PRO$_{jag}$ tentamensläsa]]]
II    innan [jag [[måste [köra  iväg honom]] [för att PRO$_{honom}$ tentamensläsa]]]
III   innan [jag [måste [köra  iväg [honom [för att PRO$_{jag}$ tentamensläsa]]]]]
IV    innan [jag [måste [köra  iväg [honom [för att PRO$_{honom}$ tentamensläsa]]]]]


As shown in Tableau 4, the constraints assumed nominate two winning candidates, corresponding to two different phrase structures. This is what we would expect for an ambiguous sentence. The issue of whether (11) would remain ambiguous if context is taken into account will be left aside for the moment (cf. section 9 below). So will the theoretical problem of ambiguity, which is equivalent to that of optionality on OT syntax (cf. Müller 1999). For the moment, it is enough to introduce the constraints.

Both MDP and C-COM presuppose the existence of a controlling antecedent. This basic requirement on control may seem trivial, and it would have been if not for the fact that it can be violated. This is the case in sentences with so-called arbitrary control.

(13)  Det    pågår   mycket forskning runt om i  världen    för att PRO kunna
      *there goes-on much   research   around in the-world for to PRO be-able-to*

      ersätta  dem  med  till exempel blandoxider    av övergångsmetaller
      *replace them with for example mixed-oxides of transitory-metals*

      'There is much research going on around the world to PRO replace them with, e.g.,
      mixed oxides of transitory metals'


In (13), there are syntactically viable controllers present, like the expletive subject *det* and the extraposed subject *forskning* ('research'), but neither is semantically appropriate. Therefore we have to look elsewhere or do without a controller. In

other words, semantic appropriateness is more important than presence. This is crucial, since the only motivation for violating a constraint is to satisfy a higher ranking constraint.

These factors may be captured by the constraints ANTECEDENT and SELECT:

ANT      Here: PRO requires a controlling antecedent.
SELECT   A head selects only semantically appropriate arguments.

The facts of arbitrary control tells us that SELECT **dominates** (i.e. is ranked higher than) ANT, a relation usually represented as SELECT >> ANT. This means that arbitrary control is not really arbitrary, since the controller has to be semantically appropriate, that is, it has to satisfy SELECT. And this constraint is higher ranked than ANT, otherwise we would have picked *forskning* ('research') as the controller in (13). This may be represented as in Tableau 5.

*Tableau 5. SELECT >> ANTECEDENT:*

| Input: (13) | SELECT | ANT | C-COM | MDP |
|---|---|---|---|---|
| PRO$_{forskn.}$kunna | *! | | | |
| PRO$_{det}$ kunna | *! | | | * |
| ☞   PRO$_{arb.}$ kunna | | * | * | |

The controller required by ANT does not necessarily have to be expressed in the sentence. It may well be, for example, an implicit agent in the matrix clause or a referent mentioned in a preceding sentence, as long as it is somehow available in the context. (What it actually means for an antecedent to be present in the context will be explored further in sections 6 and 8.) The antecedent also needs a nominal character – to be a referential NP or the implicit equivalent of one – but that seems to be a semantic requirement following from SELECT rather than ANT. The crucial aspect of the ANTECEDENT constraint is that it penalizes arbitrary control.

SELECT is a local valency requirement that syntactic arguments bear semantic features appropriate for the thematic roles associated with the verbal head. For example, intentional verbs require animate agents as subjects. Applied to control, SELECT restricts what can be an external argument (i.e. PRO) of the non-finite predicate. Non-NPs will always be ruled out by SELECT; additional restrictions depend on lexical properties of the verb.

The four constraints introduced so far are sufficient to handle most types of control constructions. But they do not cover the famous *promise/persuade* issue from example (3):

(3)    a. Hon$_i$ övertalade honom$_j$ att PRO$_j$ komma.

'She$_i$ persuaded him$_j$ to PRO$_j$ come'

   b. Hon$_i$ lovade honom$_j$ att PRO$_i$ komma.
     'She$_i$ promised him$_j$ to PRO$_i$ come'

In most ditransitive sentences, PRO in an infinitival complement is controlled by the indirect object, as in (3a). However, in sentences with *promise* (or equivalent verbs in other languages) we get subject control, as in (3b), even though it means a violation of MDP. Since SELECT, ANT and C-COM are all satisfied by both subject and object, the control relation in (3b) must be motivated by some other constraint.

    To account for this I will adopt an idea from Comrie (1985) (cf. Pollard & Sag 1994). He relates the control relations of e.g. *persuade* and *promise* to the illocutionary force of the corresponding speech acts. An act of persuasion is meant to influence the addressee, and the verb *persuade* is similarly directed towards the object. On the other hand, a promise is a commitment made by the speaker, and the verb *promise* is directed towards the subject.

    Applying this to control, Comrie suggests that the choice between subject and object control is due to the orientation of the matrix predicate. *Persuade* is oriented towards the object for object control, and *promise* is oriented towards the subject for subject control. I will refer to this idea as the constraint ORIENTATION.[13]

ORIENT    Here: In complement clauses, PRO is interpreted according to the orientation of the matrix predicate.

The notion of ORIENTATION will be explored further in section 7, and a more precise definition will be proposed. For the present purposes, however, the preliminary version above will serve. Just bear in mind that it only concerns complement control, since it follows from properties of the matrix verb. The effects of ORIENT on (3a) and (3b) are represented in Tableax 6 and 7, respectively.

*Tableau 6. Object control with "övertala" (persuade')*

| Input: (3a) | ORIENT | SELECT | ANT | C-COM | MDP |
|---|---|---|---|---|---|
| PRO$_{subj}$ komma | *! | | | | * |
| ☞  PRO$_{obj}$ komma | | | | | |

*Tableau 7. Subject control with "lova" ('promise')*

| Input: (3b) | ORIENT | SELECT | ANT | C-COM | MDP |
|---|---|---|---|---|---|
| ☞    PRO$_{subj}$ komma | | | | | * |
| PRO$_{obj}$ komma | *! | | | | |

My placing ORIENT leftmost in the Tableaux 6–7 indicates that it outranks even SELECT. This is also the case, as shown in (14) and Tableau (8).

(14) Roger$_i$ tvingade bollen$_j$ att PRO$_j$ sparka Olle.
     'Roger forced the ball to PRO kick Olle.'

*Tableau 8. ORIENT >> SELECT*

| Input: (8) | ORIENT | SELECT | ANT | C-COM | MDP |
|---|---|---|---|---|---|
| PRO$_{roger}$ sparka | *! | | | | * |
| ☞    PRO$_{bollen}$ sparka | | * | | | |
| PRO$_{olle}$ sparka | *! | | | * | |

Even though balls cannot kick things, we interpret *bollen* ('the ball') as the controller of PRO in (14). This interpretation is weird, but it is grammatical. Therefore ORIENT dominates SELECT.

These two constraints are almost the mirror images of each other. Both are semantic constraints, related to valency, but they affect PRO from opposite directions. SELECT is a local constraint on arguments, and therefore specifies what may be interpreted as a subject argument of the non-finite verb. ORIENT, on the other hand, springs from the matrix predicate and concerns the relation between the matrix and the complement clause.

Next, we need a constraint that prevents PRO from being identical with another argument of the same verb. For example, the matrix subject *Tobbe* in (15) cannot control PRO since it also functions as a complement of *lita på* ('trust').[14] Such an interpretation is ruled out by the so-called Principle B (Chomsky 1981, adopted to OT semantics by Hendriks & de Hoop 1999).

(15) Tobbe$_i$ är inte att PRO lita   på t$_i$
     *Tobbe$_i$ is  not to* PRO *trust on* t$_i$
     'Tobbe is not to be trusted'

PRIN B     If two arguments of the same semantic relation are not marked as being identical, interpret them as being distinct. (Hendriks & de Hoop 1999:10)[15]

The hedge in the above definition of PRINCIPLE B allows for reflexives, which of course may be coreferent with their subjects (including PRO). Also note that the imaginable interpretation of (15) in which *Tobbe* controls PRO and the final complement receives no interpretation at all is disallowed by the -criterion.

As for the ranking of PRIN B, it at least outranks ANT, since arbitrary control is preferable to violating PRIN B. I have not, however, been able to determine its status relative to SELECT or ORIENT. A sentence in which Prin B crucially conflicts with any of these constraints is beyond my imagination. For convenience, I will represent it on a par with SELECT in the tableaux below.

Accordingly, the interpretation of (15) may be represented as in Tableau 9:

*Tableau 9. PRIN B >> ANT*

| Input: (15) | ORIENT | SELECT | PRIN B | ANT | C-COM | MDP |
|---|---|---|---|---|---|---|
| PRO<sub>Tobbe</sub> lita på | | | *! | | | |
| ☞ PRO<sub>arb</sub> lita på | | | | * | * | |

As in the case of (11) above, this analysis might be slightly different once the context is considered. Nevertheless, we may safely conclude that without regard to context, arbitrary control is the optimal interpretation of (15).

To complete the picture, a constraint dealing with the pragmatic factors involved in logophoric control (see example (6) above) is needed. This constraint will simply be called LOG (logophoricity). However, it turns out not to be so important as first might seem. Most cases of logophoric control can basically be covered by the constraints already introduced, especially through the interaction between SELECT and ANT, and the few remaining cases are restricted to sentence-initial adjuncts.

Therefore, LOG seems to reside at the bottom of the list, at least ranked below C-COM (the relation between LOG and MDP cannot be determined). It will be introduced and discussed in section 8, and I will disregard it until then. There are also other constraints on language that may be relevant for control, but as long as they do not turn out to be crucially relevant I see no need to assume any more constraints than I already have.

As indicated above, the following ranking seems to obtain for Swedish (with reservations for PRIN B possibly being higher ranked). A comma between two adjacent constraints implies that their relative ranking has not yet been established:

ORIENT >> SELECT, PRIN B >> ANT >> C-COM >> MDP, LOG

As far as I can tell, the same ranking applies to English, Danish, and Norwegian. There are plenty of distributional differences, but where non-finite clauses do

appear they are interpreted the same way in these languages. The reader is welcome to verify this by comparing the Swedish examples in this paper with their English translations.

The fact that I have found no signs of re-ranking is interesting, since it implies that the grammars of interpretation are more uniform across languages than those of syntax. It is also a problem, since checking whether there are languages that verify the predictions made by different rankings is probably the best test to verify the validity of individual constraints (cf. Börjars 1999:108). It is possible that the study of control relations in other languages may reveal other control patterns, thus offering the possibility of such a test. If they do not, but the predictions made by the ranking assumed here holds true, that may serve to confirm the ranking as a whole.

I would not, however, got so far as to propose a fixed ranking for these constraints, not even as a hypothesis. Many more languages – and of different types – have to be studied before such a claim can be made.


## 6. Indirect control

Except in subjects and some adverbials, control is usually taken to be a direct relation between PRO and its controlling antecedent. As a typical, unproblematic example, take (16):

(16)  Men min far$_i$    vägrade  blankt att PRO$_i$ ta    av  sig   kartongen.
       *but  my father refused  flatly  to* PRO  *take off* SELF *the-cardboard-box*
       'But my father flatly refused to take off the cardboard box'

In (16), PRO is coreferent with the subject *min far* ('my father'). This relation is simple and obvious and seems to be the only control relation there can be in a simple mono-transitive sentence. However, as shown in (17), predicative complements behave differently:

(17)  a. Att PRO1$_i$ leva är att PRO2$_i$ arbeta
         'To PRO1 live is to PRO2 work'

      b. Avsikten är  att PRO bygga en sjöduglig båt
         'The intention is to PRO build a sea-worthy boat'

In predicative complements, like those in (17), direct control through c-command is ruled out by SELECT, since neither of the subjects is viable as a controller. In (a), the subject is itself an infinitival clause, and only NP's may control PRO. In (b), the subject *avsikten* ('the intention') is disallowed as controller of PRO, since the verb *bygga* ('build') requires an animate agent as subject. This is not just a coincidence, but follows from the way copula verbs relate their arguments to each other.

Nevertheless, there is still an obligatory control relation between PRO and the subject. The controller of PRO is not the subject itself but the *controller* of the subject. In (17a) the subject includes a PRO of its own, and whoever controls PRO1 must also control PRO2. In (17b) the controller is the holder of the intention (*avsikten*) – the one who intends something is the one who is going to build the boat. I will refer to this relation as **indirect control**.

The interesting fact about indirect control is that it seems to be obligatory. We cannot simply pick whichever antecedent is most appropriate in the present context, as may be the case in adverbials (cf. section 8). The controller of the predicative clause *has* to be the controller of the subject.

Put in OT terms, we do not just look for any antecedent that satisfies SELECT. The copula predicates its complement of its subject, which means that it assigns an orientation towards it. Therefore, every controller candidate except the subject violates ORIENT. This fits with the actual facts iff we assume the implicit controller to be part of the subject. For interpretational purposes, I believe it is. Since the copula verbs express a kind of identity between their arguments here, it seems implausible that only one of the arguments has clausal properties. If the predicative complement contains a predication, presumably so does the subject – even if it lacks clausal form, as the subject in (17b).

According to this view, obligatory indirect control as in (17b) may be represented as in Tableau 10.

*Tableau 10. Indirect control of PRO in a predicative complement*

| Input: (17b) | ORIENT | SELECT | PRIN B | ANT | C-COM | MDP |
|---|---|---|---|---|---|---|
| PRO<sub>avsikt</sub> bygga | | *! | | | | |
| PRO<sub>båt</sub> bygga | *! | * | * | | * | |
| PRO<sub>arb.</sub> bygga | *! | | | * | * | |
| ☞ PRO<sub>indir.</sub> bygga | | | | | * | |

As shown in Tableau 10, the full subject NP *avsikten* ('the intention') violates SELECT, as does the object of the complement clause *båt* ('boat'). The latter also violates ORIENT and PRIN B. Arbitrary control satisfies SELECT (and PRIN B), but violates both ANT and ORIENT. As the indirect controller is assumed to be part of the subject – as the agent of the predication implied by the deverbal noun – it satisfies ORIENT and only violates C-COMMAND. It is therefore correctly nominated the optimal controller.

Note, however, that although arbitrary control of the predicative complement violates ORIENT, it may still apply indirectly, as in (17a). The indirect control pattern makes PRO2 coreferent with PRO1. Since PRO1 is assigned through arbitrary control, as expected in a non-finite subject clause, so is PRO2. What matters is that PRO2 cannot receive arbitrary control independently of PRO1.

Indirect control also applies to adnominals, of which there are three main kinds in Swedish, exemplified in (18). Whether all of them are to be considered cases of indirect control, or only those who depend on ORIENT (types b and c below), will not be discussed here. For present purposes, it matters only that all three types are covered by the constraint ranking proposed.

(18)  a. <u>Relative</u>
Han$_i$ har ju      inget arbete att PRO$_i$ stiga upp till
*he   has you-know no   work   to PRO get   up   to*
'He has no work to get up to, you know'

b. <u>Identifying</u>
för att  PRO$_i$ undgå det  skandalösa   ödet att PRO$_i$ bli      ogift          mor
*for to PRO  avoid  the scandalous  fate to PRO  become unmarried mother*
'to avoid the scandalous fate of becoming an unmarried mother'

c. <u>Valency-based</u>
kunde vara tillräcklig  orsak att  PRO utebli       från  arbetet
*could  be   sufficient cause to  PRO stay-away from the-work*
'could be a sufficient reason not to appear at work'

Relative infinitives (18a) work just like regular (finite) relative clauses. In the identifying construction (18b), the head noun and the adnominal infinitive have the same reference, and the adnominal specifies the meaning of the head. In the valency-based construction (18c), the infinitival clause is an argument of its head.

The distinction between types (b) and (c) may require some further explication, since it is not always obvious and not always relevant (cf. Teleman, Andersson & Hellberg 1999, vol. 3:122–25). In (19), for example, it pretty much amounts to the same thing whether someone has the right *to* be neutral (type c) or neutrality *is* his right (type b).

(19)  Tredje man$_i$ har sin rätt att PRO$_i$ vara neutral.
'The third party has a right to PRO be neutral'

On the other hand, the difference can often be crucial for interpretation, as in (20). With respect to control patterns, the distinction between identifying and valency-based adnominals seems very much relevant, since (20a) corresponds to regular complement control whereas (20b) behaves more like a predicative complement.

(20)  a. Vad  kan hon$_i$ ha    för motiv att PRO$_i$ uttala    sig    så?
      *what can she  have for motive to* PRO  *express herself so/like-that?*
      'What's her motive for saying that?'

      b. Sådan verksamhet$_i$ drivs      med motivet       att PRO$_i$ ge  ägarna         vinst
      *such  business  drive-*PASS *with the-motive to* PRO  *give the-owners profit*
      'Such business is run with the purpose of generating profit for the owners'

In (20b), generating profit is identical to *motivet* ('the motive'), but that is not the case in (20a). The 'saying' (*uttalandet*) and its motive are two distinctly separate things, standing in a certain dependency relation to each other.

  Quite often, the heads of valency-based infinitives are deverbal, and the control relation corresponds to that of the corresponding verb phrase. The control pattern in (21a) is perfectly equivalent to that of (21b).

(21)  a. Jag$_i$ var belåten med mig själv för min$_i$ halva vägran att PRO$_i$ göra mig vacker
       'I was quite happy with myself, due to my partial refusal to PRO make myself pretty'

      b. /.../ för att jag$_i$ hade vägrat PRO$_i$ göra mig vacker
       'since I had refused to PRO make myself pretty'

The identifying type, on the other hand, corresponds to predicative complements. If we paraphrase (18b) with a copula - *X's fate **was** to* PRO$_X$ *become* etc. – both the structure and the control relation match that of (17b).

  As a rough generalization about all three kinds of adnominals, we might say that the controller of PRO usually is the **possessor**, in a broad sense, of the head noun - or, put differently, the referent that could be expressed as a genitival determiner. This seems equivalent to the indirect control pattern discussed earlier in this section. Consider (18) again:

(18)  a. <u>Relative</u>
       Han$_i$ har ju          inget arbete att PRO$_i$ stiga upp till
       *he  has you-know no   work  to* PRO *get  up  to*
       'He has no work to get up to, you know'

      b. <u>Identifying</u>
       för att  PRO$_i$ undgå det  skandalösa   ödet att PRO$_i$ bli       ogift         mor
       *for to* PRO  *avoid  the scandalous  fate  to* PRO  *become unmarried mother*
       'to avoid the scandalous fate of becoming an unmarried mother'

      c. <u>Valency-based</u>
       kunde vara tillräcklig orsak att  PRO utebli       från  arbetet
       *could be  sufficient cause to*  PRO *stay-away from the-work*
       'could be a sufficient reason not to appear at work'

In all three cases, whoever stands in a possessive relation to *arbete* ('work'), *ödet* ('the fate'), and *orsak* ('excuse'), respectively, is also the controller of PRO in the adnominal infinitives – although actual possession is negated in (18a-b). The

controllers could be expressed as genitival determiners: *hans arbete* ('his work'), *hennes öde* ('her fate'), and *min orsak* ('my reason').

In OT terms, this may be covered by SELECT and – if the relation is generally obligatory – ORIENT. Applied to (18c) the analysis may look like Tableau 10.

*Tableau 11. Indirect control of PRO in a valency-based adnominal infinitive*

| Input: (18c) | ORIENT | SELECT | PRIN B | ANT | C-COM | MDP |
|---|---|---|---|---|---|---|
| PRO$_{orsak}$ utebli | | *! | | | | |
| PRO$_{arbetet}$ utebli | *! | * | * | | * | |
| PRO$_{arb.}$ utebli | *! | | | * | * | |
| ☞ PRO$_{indir.}$ utebli | | | | | * | |

This analysis depends on the assumption that the possessor is inherent in the head NP (otherwise it would violate ORIENT). This seems plausible for the valency-based adnominals, e.g. (18c), as valency by definition means that the head specifies its arguments; the controller is an agent/specifier and the adnominal is a complement. It also fits the identifying adnominals in the same way it fits predicative complements, since the head and the infinitival clause are co-referential.

However, I cannot make a case for the same claim about relative infinitives. Although the possessor of *arbete* ('work') – i.e. the worker – may be inherent in the head noun in (18a), that is just a coincidence due to *arbete* being a deverbal noun. In contrast to the other two types, the heads of relative infinitives do not need such verbal or clausal properties. Any noun can be modified by a relative. It would be pointless for me to assume that *book* requires an agent,[16] just because we can say *Jag har en bok att läsa* ('I have a book to read'). In syntactic terms, this is because relative clauses are not arguments but modifiers. Therefore, they are not dependent on their heads the way complements are. In the terms of the present proposal, ORIENT does not apply.

Assuming that the heads of these NPs lack inherent ORIENTATION, we still get the right predictions from the interaction between the other constraints. Therefore (18a) may be analysed as in Tableau 12, where the matrix subject *han* is nominated controller on the grounds of being the closest appropriate candidate available, not due to being the possessor of *arbete.* Thus it is arguably not a case of indirect control. Instead, this analysis is similar to that of adverbial adjuncts (cf. section 8 below).

(18)  a. <u>Relative</u>
    Han$_i$ har ju        inget arbete att PRO$_i$ stiga upp till
    *he   has you-know no    work  to PRO  get   up   to*
    'He has no work to get up to, you know'

*Tableau 12. Control of PRO in a relative infinitival clause*

| Input: (18a) | ORIENT | SELECT | PRIN B | ANT | C-COM | MDP |
|---|---|---|---|---|---|---|
| PRO$_{arbete}$ stiga | | *(!) | *(!) | | | |
| ☞  PRO$_{han}$ stiga | | | | | | * |
| PRO$_{arb}$ stiga | | | | *! | | |

By treating relative infinitives different from the other two main types of adnominal infinitives, I lose the broad generalization of possessive control for adnominals. However, it is not entirely general anyway. There are some exceptions to it, as shown in (22):

(22)  a. Jag$_i$ känner hela tiden frestelsen att PRO$_i$ slå mig till ro.
      'I constantly feel the temptation to PRO settle down'

    b. Så länge ån är översvämmad måste jag$_i$ ha Gotthards$_j$ hjälp att PRO$_i$ få käk.
       'As long as the stream is flooded I need Gotthard's help to PRO get food.

    c. Jag$_i$ är inte rätt man$_i$ att PRO$_i$ svara på detta
       'I'm not the right man to PRO answer this'

We would have to stretch the concept of possession quite far to make the subject *jag* ('I') in (22a) the possessor of *frestelsen* ('the temptation'). I would rather view it as an experiencer. Since *frestelsen* incorporates the experiencer role, obligatory indirect control through ORIENTATION and SELECT seems a plausible analysis.

   In (22b) it is shown that we could not attain full generality by reformulating possessive control as genitival control, since the genitival referent is not always the controller either. The controller of PRO in (22b) is *jag* ('I'), not *Gotthard*. Again, ORIENT can handle the matter. The deverbal noun *hjälp* ('help') is oriented towards its receiver, just like the corresponding verb *hjälpa* is oriented towards the object/receiver, not towards the subject/agent.

   The final nail in the coffin is (22c), where the head noun does not violate SELECT and may therefore itself serve as a controller. It satisfies all the constraints, even MDP. This construction is quite restricted in Swedish, and usually a regular relative clause is preferred, as in (23b). Nevertheless the existence of cases like (22c) helps to confirm the empirical benefits of the present OT proposal over the possessive control generalization.

(23)  a. ?? Du måste hitta någon att hjälpa dig.
      'You have to find someone to help you'

    b. Du måste hitta någon som kan hjälpa dig.
       'You have to find someone who can help you'

Note that I do not really refute the possessive control generalization as such, since it seems to hold in most cases. The claim is that these effects follow from interaction between more general constraints.

## 7. Control shift

Of the constraints assumed here, ORIENT is the highest ranked. Is it then inviolable, or are there cases where it may be overruled? The natural test to this is control shift, or coercion, as it is also called. Consider the following pair of sentences:

(24)   a. Hon$_i$ lovade honom$_j$ att PRO$_i$ komma på festen.
          'She$_i$ promised him$_j$ to PRO$_i$ come to the party'

       b. Hon$_i$ lovade honom$_j$ att PRO$_j$ få komma på festen.
          'She$_i$ promised him$_j$ to PRO$_j$ get to come to the party'

Normally, *lova* ('promise') assigns subject control, as in (24a). However, in (b) we get object control instead, presumably triggered by *få* ('get to'). This seems to imply that there is some property of *få* that is higher ranked than ORIENT. And since coercion is a well-known phenomenon that is not restricted to control shift, it could be the effect of some general constraint. Perhaps the possibility to overrule general patterns is a feature needed in languages. This constraint would then be satisfied vacuously in most cases.

Nevertheless, I am not quite happy with such an analysis. There is something suspicious about a top ranking constraint that almost never matters. I do not believe we need it either.

A crucial property of ORIENTATION is that it is a semantic constraint; it restricts the control relation with respect to the meaning of the matrix predication. Therefore it is likely that it assigns semantic rather than syntactic functions. In other words, it does not determine the subject of the complement clause but its agent. Or, to be more accurate, it specifies those thematic roles in the complement clause that depend on the matrix clause.

The subject of *få* ('get, be allowed') is not an agent but a patient. The agent is the allowing referent, namely the subject of *lova* in (24b). *Hon* ('she') makes the promise, and she is also the one who allows him to come to the party – but that does not make her the controller of PRO, since *få* is effectively a passive predicate (with respect to thematic roles).

Thus, the matter depends on the interaction between ORIENT and SELECT. The thematic roles of the complement clause depend on the matrix predicate (ORIENT), but its syntactic functions are assigned by the predicate in the complement clause (SELECT). Although ORIENT outranks SELECT, the optimal interpretation of PRO normally satisfies both.

The same kind of interaction can be observed in (25), which seems to imply that ORIENT is not affected by changes in transitivity. Like most di-transitive verbs, *be* ('ask') usually assigns object control, as in (25a), and may be coerced into subject control by *få* as in (25b). The interesting thing is that subject control with a mono-transitive use of *be* also requires *få*, as shown by the contrast between (25c) and (d)

(25)  a. Han$_i$ hade bett henne$_j$ att PRO$_j$ inte komma.
       'He$_i$ had asked her$_j$ not to PRO$_j$ come'

    b. Han$_i$ ber flickan$_j$ att PRO$_i$ få veta vad hon har för planer
       'He$_i$ asks the girl$_j$ to PRO$_i$ be allowed to know what plans she have'

    c. Han$_i$ bönade och bad att PRO$_i$ få komma tillbaka till henne.
       'He$_i$ begged and asked to PRO$_i$ be allowed to come back to her'

    d. * Han$_i$ bönade och bad    att PRO$_i$ komma tillbaka till henne.
        *he$_i$   begged and asked to* PRO$_i$ *come    back   to  her*

Although PRO is controlled by the matrix subject in (25c), the agent of the complement clause is co-referent with the (implicit) object/addressee of *bad* ('asked'), just as in the ditransitive cases. The semantic control relations remain unaffected, and therefore, ORIENT is not violated.

Accordingly, *få* ('get to') is not really a lexical trigger for control shift, it is simply compatible with it. There are even cases where *få* may be either present or absent, without any significant difference in control structure:

(26)  Van Morisson$_i$ erbjöd Bono$_j$ att PRO$_j$ (få) vara med i Vans nästa video
      'Van Morisson offered Bono to PRO (get to) appear in Van's next video'

The optionality of *få* in (26) may serve to illustrate the fine semantic nuances of the role assignment. The puzzle is why we do not get a shift to subject control when *få* is present. Basically, *erbjuda* ('offer') is directed towards the object, which fits with the object *Bono* being the controller of PRO. But the predicate also depends on the subject. This dependence is emphasized by *få*, and downplayed when it is absent. With *få* we are reminded of who made the offer, we focus who may (or may not) act upon it. The basic semantics of the complement predicate remains the same in both cases.

As a related point, there are some differences in control pattern that are sometimes confused with control shift, though they really are just consequences of lexical ambiguity. Notably, this concerns *lova* ('promise') which is ambiguous in Swedish.

The standard sense of *lova* is 'commit oneself', parallel to *promise*. As noted above, commitments are oriented towards the subject/speaker and thus assign subject control. However, *lova* may also mean 'allow', which is oriented towards

the addressee for object control. Therefore, unlike English, a sentence like (27) is ambiguous in Swedish:

(27)   a. Mamma$_i$ lovade barnen$_j$ att PRO$_i$ köpa glass
            'Mum$_i$ promised the kids$_j$ to PRO$_i$ buy ice-cream'

        b. Mamma$_i$ lovade barnen$_j$ att PRO$_j$ köpa glass
            'Mum$_i$ allowed the kids$_j$ to PRO$_j$ buy ice-cream'

Note that there is no control shift involved in (27). The two senses 'commit' and 'allow' simply assign different control patterns. Note that the 'allow' sense, though object oriented, depends on the subject just like *erbjuda* ('offer') in (26). Accordingly, we could insert *få* without getting object shift: *Mamma lovade barnen att få köpa glass* ('Mum promised the kids to get to buy ice-cream').

There are also verbs that are neutral with respect to the agent of their complements, i.e. they do not project ORIENTATION at all. This property is actually quite widespread, especially among semantically light verbs. Such neutrality is crucial for several kinds of syntactic operations, including clefts (28a) and extractions like the one in (29a).

(28)   a. Det var PRO dansa (som) hon ville
            'It   was PRO dance (that)  she wanted'

        b. Hon ville PRO dansa.
            'She wanted to dance'

In (28a), *dansa* ('dance') is not treated as a complement of the finite  verb  *var* ('was') with respect to control. Instead it takes the same control pattern as the corresponding non-cleft clause, (28b).

Neither the copula nor the expletive subject really mean anything here except that they assign focus (and tense etc.), and therefore the copula does not project any ORIENTATION on its syntactic complement. But the verb *ville* 'wanted' does. The extracted infinitive *dansa* corresponds to a gap in the relative clause – and whatever determines the gap also applies to the manifestation. That way the ORIENTATION of *ville* projects out of the relative clause into the matrix clause.

Something similar holds in (29a), where the fronted noun corresponds to a gap in the infinitival clause, except that there is no misplaced control element to account for. We simply get arbitrary control, as in (29b–c).

(29)  a. Tuggummit        gick  inte att PRO peta bort.
*the-chewing-gum went not  to* PRO *remove*
'The chewing-gum wasn't possible to remove'

   b. Det gick  inte att PRO peta bort tuggummit
*it   went not  to* PRO *remove  the-chewing-gum*
'It wasn't possible to remove the gum'

   c. Att PRO peta bort  tuggummit        gick  inte
*to*  PRO *remove   the-chewing-gum went not*
'Removing the gum wasn't possible'

Arbitrary control is the normal pattern for non-finite subject clauses – including extraposed ones. As mentioned in section 5, this is resolved by SELECT and PRINCIPLE B being higher-ranking than ANTECEDENT. If there is a suitable controller present – a referent satisfying both these constraints - it will do the job. (Actually, many cases of arbitrary control are not quite arbitrary once context is taken into account, cf. section 8 below.)

This analysis of (29) depends on the assumption that the verb *gick* is neutral with respect to ORIENT, which would otherwise overrule SELECT. Under the present circumstances, ORIENT is satisfied vacuously, as in Tableau 13. The condition that the main verb lacks a specific ORIENTATION is crucial not only for (29a–b) but for all extraposed subjects. To me, this seems plausible enough.

*Tableau 13. Arbitrary control in an extraposed subject*

| Input: (29b) | ORIENT | SELECT | PRIN B | ANT | C-COM | MDP |
|---|---|---|---|---|---|---|
| PRO$_{tugg.}$ peta | | *(!) | *(!) | | * | |
| PRO$_{det}$ peta | | *! | | | | |
| ☞    PRO$_{arb}$ peta | | | | * | * | |

## 8. Adverbials

For most non-finite adverbial clauses, there is one control candidate that satisfies all the constraints, usually the subject, as in (30).

(30)  Tjuven$_i$ har tagit sig in genom att PRO$_i$ krossa ett fönster.
'The burglar entered by PRO breaking a window'

The subject *tjuven* ('the burglar') in (30) is semantically appropriate, and it is the closest c-commanding antecedent. ORIENT is satisfied vacuously in all  adjuncts, since it only concerns complements.

Unlike complements, e.g. (31a), adverbials usually receive subject control even if there is an intervening object, as in (31b). Presumably this is because they reside higher in the structural hierarchy.

(31)   a. Säkerhetsvakten$_i$ hindrade dem$_j$ från att PRO$_j$ komma in.
          'The security guard stopped them from PRO entering'

       b. Säkerhetsvakten$_i$ hindrade dem$_j$ genom att PRO$_i$ blockera dörren.
          'The security guard stopped them by blocking the door'

There are, however, some few cases of object control in adverbial non-finite clause too. Usually, this too is attributed to phrase structure. Consider for example the contrasting control patterns in (32), where the adverbial presumably is adjoined within VP in (a) but higher in the phrase structure in (b). This kind of structural difference is illustrated in Figure 4 above (section 5).

(32)   a. Vakten$_i$ släppte in dem$_j$ för att PRO$_j$ hämta sina jackor.
          'The guard let them in to PRO get their jackets'

       b. Vakten$_i$ släppte in dem$_j$ för att PRO$_i$ vara snäll.
          'The guard let them in to PRO be nice'

Just like prepositional complements, VP-adverbials like (32a) rarely constitute a problem to control, usually satisfying all constraints. I will therefore concentrate on the free adverbials in this section. Most of these are fairly straightforward as well, and in the few cases where the subject is ruled out as a controller (usually by violating SELECT), the matter is resolved through interaction between SELECT and ANTECEDENT.

(33)   Den andra hälften av arvet          skulle enligt       planen    användas
       *the other half    of the-heritage would according-to the-plan  be-used*

       för att PRO bygga upp en datoriserad      kunskapsbank.
       *for to* PRO *build   up   a  computerized knowledge-bank*

       'The other half of the heritage would, according to the plan, be used for PRO constructing a computerized bank of knowledge'

In (33), the controller of PRO is the agent of *användas* ('be used'). Although that agent is not expressed in the sentence, it is available as a potential antecedent. And since *bygga upp* 'construct' requires an animate agent, the c-commanding candidate *arvet* ('the heritage') is ruled out by SELECT, as shown in Tableau 14.

*Tableau 14. Agent control in a passive sentence*

| Input: (33) | ORIENT | SELECT | PRIN B | ANT | C-COM | MDP |
|---|---|---|---|---|---|---|
| PRO<sub>arvet</sub> bygga | | *! | | | | |
| ☞ PRO<sub>Agent</sub> bygga | | | | | * | |
| PRO<sub>bank</sub> bygga | | *(!) | *(!) | | * | |
| PRO<sub>arb</sub> bygga | | | | *! | * | |

Thus, even an implicit referent may satisfy ANT. This solution can be applied to quite a few cases of so-called logophoric control, for example (34), where PRO is controlled by the experiencer of *seem.*

(34)  PRO Having just arrived in town, the new hotel seemed like a good place to stop.
      (example from Williams 1992:300)

*Tableau 15. Experiencer control*

| Input: (34) + context | ORIENT | SELECT | PRIN B | ANT | C-COM | MDP |
|---|---|---|---|---|---|---|
| PRO<sub>hotel</sub> arrive | | *! | | | * | |
| ☞ PRO<sub>Exp.</sub> arrive | | | | | * | |
| PRO<sub>arb</sub> arrive | | | | *! | * | |

Even where the logophoric controller is not an argument of the matrix clause, maybe not part of the sentence at all, it is always part of the context and does therefore satisfy ANT, as in (35):

(35)  After PRO pitching the tents, darkness fell
      (example from Kawasaki 1993:)

The controller in a sentence like (35) must be the pragmatically most salient referent in the present context – which corresponds to concepts like topic, empathy, point-of-view, and the term that will be used here: **logophoricity** (cf. Sells 1987, Williams 1992).

In nearly all such cases, the constraints already introduced manage to pick out the logophoric candidate as optimal without reference to this notion. However, we do get logophoric control even in sentences where there is more than one referent satisfying both ANT and SELECT, as in the second sentence of (36).

(36)  Tiger Woods$_i$ var i praktiken borträknad från segerstriden, efter två "mänskliga" inledningsronder. Men efter att PRO$_i$ igår ha tangerat banrekordet vågar ingen$_j$ räkna bort golfens nye "Golden Boy"$_i$.

'Tiger Woods$_i$ was in practice dismissed from the winning competition, after two "human" starting rounds. But after PRO$_i$ having touched the record for the course yesterday, no one$_j$ dares to disregard golf's new "Golden Boy"$_i$.'

*Tableau 16. Logophoric control, incomplete account*

| Input: (36) | Orient | Select | Prin B | Ant | C-com | MDP |
|---|---|---|---|---|---|---|
| (☞)    PRO$_{Tiger}$ tangera |  |  |  |  | * |  |
| PRO$_{ingen}$ tangera |  |  |  |  | * |  |
| PRO$_{arb.}$ tangera |  |  |  | *! | * |  |

Since both *Tiger Woods* and *ingen* ('no one') are semantically appropriate, the constraints in Tableau 16 incorrectly predicts (36) to be ambiguous. To get the desired winner we also need to take the pragmatics of the sentence into consideration. I therefore assume the pragmatic constraint Log(ophoricity), which is satisfied by the logophoric referent – *Tiger Woods* in this case – and violated by all other candidates. Thus it correctly distinguishes *Tiger* as the optimal controller in (36).

Log     Here: PRO is coreferent with the logophoric centre of the sentence (cf. Williams 1992:299).

The logophoric centre is usually the topic of the sentence, typically an initial subject, and infallibly a pragmatically salient referent. Except for the requirement of pragmatic salience, however, there is little general agreement on what actually determines logophoricity – or the closely related notions topicality, empathy, or point of view, for that matter.

According to Sells (1987), logophoricity is not a unified notion but depends on several related factors. In OT terms, this would mean that it is not a single constraint, but a product of constraint interaction. To investigate these factors is a project in itself, which extends well beyond the realm of control. At present, I therefore refrain from defining the concept further (for a more extensive discussion, cf. Lyngfelt 1999). Log is simply meant to incorporate the pragmatic aspects of control; and the term *logophoricity* is chosen over e.g. *topicality* for two reasons. It is less laden with associations to other concepts, and it harmonizes with the notion of logophoric control.

The next thing to do is to determine where Log belongs in the constraint hierarchy. Since the two main candidates in (36) do equally well with respect to all the other constraints we get no clues from Tableau 16. The optimal output is

the candidate that best satisfies the highest ranked constraint *on which the candidates differ.*

However, it follows from the constraints themselves that ANT outranks LOG by way of inclusion. Whatever satisfies LOG also satisfies ANT, but not the other way around. Further, it is well asserted in the literature (cf. Landau 1999 for a recent survey) that the availability of logophoric control to a considerable extent depends on the relative position of the adjunct. The reading in (36) is much harder to get if the adverbial is not topicalized, as shown in (37):

(37)   ?? Men ingen<sub>i</sub> vågar räkna bort golfens nye "Golden Boy"<sub>j</sub> efter att PRO<sub>j</sub> igår ha tangerat banrekordet.

      'But no one<sub>i</sub> dares to disregard golf's new "Golden Boy"<sub>j</sub> after PRO<sub>j</sub> having touched the record for the course yesterday.'

The difference between (36) and (37) indicates that LOG is ranked below C-COM. Otherwise logophoric control would have been equally available in (37). Its relation to MDP, however, remains unclear. To determine the relative status of Log and MDP, we would need a sentence where there are two candidates that satisfy C-COM but differ with respect to MDP and LOG; and I cannot imagine such a sentence. Therefore I assume the ranking in Tableau 17 (note that context is now marked as part of the input):

*Tableau 17. Logophoric control*

| Input: (36) + context | ORIENT | SELECT | PRIN B | ANT | C-COM | MDP | LOG |
|---|---|---|---|---|---|---|---|
| ☞  PRO<sub>Tiger</sub> tangera | | | | | * | | |
| PRO<sub>ingen</sub> tangera | | | | | * | | *! |
| PRO<sub>arb</sub> tangera | | | | *! | * | | * |

The analysis in Tableau 17 crucially depends on phrase structure, in particular on the assumption that the topicalized adverbial is not c-commanded by the subject. If *ingen* satisfies C-COM in (36), whatever constraint rules it out must be higher ranked. However, since C-COM blocks logophoric control in (37), that does not seem to be the case. Also, the assumption that topicalized constituents reside above the subject position in the phrase structure is fairly standard in modern syntactic theory.

This solution implies that logophoric control is the rule for topicalized adverbials, and that the fact that they usually take subject control springs from the subject usually being the logophoric centre of the sentence (cf. Sells 1987, Williams 1992). Possibly, the alleged preference of PRO – as a subject – to be controlled by a subject, corresponds to some general constraint in itself, e.g. parallelism. However, that constraint would have to be ranked below LOG, or the

ranking would fail to make the right predictions. At present, I see no need to assume such a constraint.

The constraint ranking assumed in Tableau 17 also predicts that adverbials in their usual position take logophoric control only when all c-commanding candidates violate SELECT (or PRIN B). This actually seems to be the case in Swedish, according to my data (and in the PAROLE corpus, such cases are surprisingly rare). For an example, see (33) and Tableau 14 above.

In some of these cases, the adverbial is subject to indirect control. This is resolved in essentially the same fashion as indirect control in relative infinitives, that is, primarily through interaction between ANT and SELECT (cf. section 6 above). Normally, the indirect controller also happens to be logophoric, as shown in (38) and Tableau 18.

(38)  Det$_a$ var snyggare att PRO1$_i$ hålla sig till franskan, för att PRO2$_i$ slippa erkänna det$_b$ på ren svenska.

'It was neater to PRO1 stick to French, to PRO2 avoid admitting it in plain Swedish'

*Tableau 18. Indirect control of PRO in an adverbial*

| Input: (38) + context | ORIENT | SELECT | PRIN B | ANT | C-COM | MDP | LOG |
|---|---|---|---|---|---|---|---|
| PRO2$_{x.sub.}$ slipp | | *! | | | | | * |
| PRO2$_{det(a)}$ slippa | | *! | | | | * | * |
| PRO2$_{det(b)}$ slippa | | *(!) | *(!) | | * | | * |
| ☞  PRO2$_{PRO1}$ slipp | | | | | * | | |
| PRO2$_{arb.}$ slippa | | | | *! | * | | * |

Logophoricity also seems to play a role in so-called arbitrary control. As noted in earlier, arbitrary control is not entirely arbitrary, since it depends on SELECT. It is also sensitive to pragmatics, since arbitrary PRO is usually taken to refer to the speaker – if the speaker is logophoric. Consider (29b) again, where PRO is arbitrary with respect to sentence internal factors (cf. Tableau 13 above), but would get a specific reference in context.

(29b) Det gick  inte att PRO  peta bort tuggummit
      it   went not  to  PRO *remove  the-chewing-gum*
      'It wasn't possible to remove the gum'

The controller in (29b) would be the pragmatically most salient referent in whatever context it is uttered, i.e. the logophoric referent. Unless (29a) is e.g. part of a story, we would expect PRO to refer to the speaker, as in Tableau 19.

*Tableau 19. Logophoric control in an extraposed subject*

| Input: (29b) + context | ORIENT | SELECT | PRIN B | ANT | C-COM | MDP | LOG |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PRO~tugg.~ peta | | *(!) | *(!) | | * | | * |
| PRO~det~ peta | | *! | | | | | * |
| PRO~arb.~ peta | | | | *! | * | | * |
| ☞ PRO~speaker~ peta | | | | | * | | |

The analysis in Tableau 19 indicates that logophoric control is not restricted to adverbials, but extends into other kinds of constructions. This supports the notion of LOG as a general constraint. Note also that the concept primarily has been applied to other areas than control (cf. e.g. Sells 1987).

However, there is one kind of adverbials that remains a problem for this analysis, namely speaker oriented adverbials functioning as discourse markers[17]. If we take a look at (39), the (a) sentence is ambiguous as to whether the infinitival clause is a complement of *skräckslagen* 'terrified' or a discourse marker. In (b) we get only the latter reading.

(39)   a. Han är skräckslagen för att PRO säga sanningen.
        'He is terrified to PRO tell the truth'

       b. För att PRO säga sanningen är han skräckslagen.
        'To PRO tell the truth, he is terrified'

Even if (39b) may be analyzed as a regular topicalized adverbial, the discourse marker reading of (39a) does not exhibit the regular behaviour for adjuncts since the non-finite clause does not take subject control. Arguably, this is because it *is* no regular adverbial, since it is not really part of the proposition. The function of discourse markers is to show the speaker's attitude towards the proposition, which implies that they have semantic scope over it. Therefore it seems reasonable to assume a corresponding syntactic structure, where the adjunct is adjoined above the S-node (cf. Andersson 1976:29), as shown in the (a) tree of Figure 5.
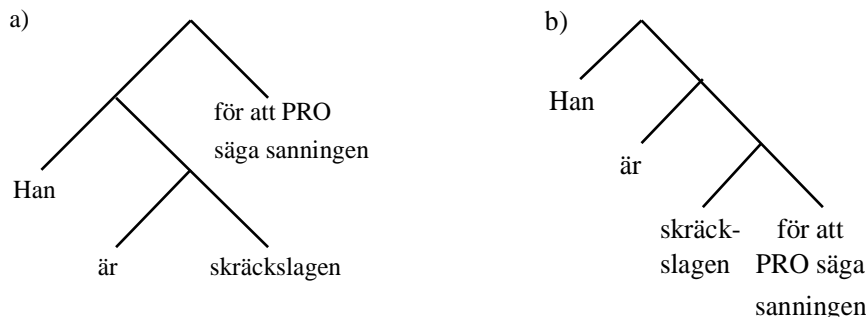


*Figure 5. Two interpretations of the phrase structure in (39a)*

According to the (a) structure in Figure 5, the adjunct is not c-commanded by the subject, and therefore it is open to a logophoric reading. In the (b) reading, the infinitival clause is a complement and therefore bound through ORIENT. Assuming the main candidates in (40), the ambiguity of (39a) may be represented as in Tableau 20.

*Tableau 20. Ambiguous subject/speaker control*

| Input: (39a) + context | ORIENT | SELECT | PRIN B | ANT | C-COM | MDP | LOG |
|---|---|---|---|---|---|---|---|
| ☞ I | | | | | | | |
| II | *! | | | | * | | * |
| III | | | | | * | | |
| (☞) IV | | | | | * | | |

    Han är  skräckslagen för att PRO säga sanningen
    'He is terrified to PRO tell the truth'

I      [Han [är [skräckslagen [för att PRO$_{han}$ säga sanningen]]]]
II     [Han [är [skräckslagen [för att PRO$_{speaker}$ säga sanningen]]]]
III    [Han [är  skräckslagen]] [för att PRO$_{han}$ säga sanningen]
IV     [Han [är  skräckslagen]] [för att PRO$_{speaker}$ säga sanningen]


In candidates I-II, corresponding to Figure 5b, the infinitival clause is a complement of *skräckslagen* ('terrified') and control is assigned primarily through ORIENT. This means that it effectively is an instance of indirect control in an adjective phrase, basically a parallel to valency-base adnominals, though no MDP violation is incurred here. Since the intervening head is not a noun phrase, the indirect controller *is* the closest c-commanding antecedent.

The reason why I still view it as indirect control is that the ORIENTATION depends on the adjective. Note for example the famous difference between *John is eager to PRO please* and *John is easy to PRO please*. I will not, however, explore the control patterns of adjectives in this paper.

Candidates III–IV (Figure 5a) represent the discourse marker interpretation of (39a). This is where the analysis runs into problems. First, both III and IV violate C-COM, which makes them both suboptimal to I if they are all part of the same competition. Since the difference between I–II and III-IV is usually indicated by intonation (or, in writing, by punctuation), we may perhaps assume that they do not really compete with each other for optimality.

That would leave the choice between III and IV to LOG, but to distinguish the logophoric referent in this case, we need a more precise definition of logophoricity than my present approximation. Worse still, even if we could come up with that definition it would not really solve the problem, as shown in (41).

(41)  a. Just nu är samarbetet "skakigt och osäkert" för att PRO citera ur statsminister
          Perssons ursäkt /.../
           'At present, the co-operation is "shaky and insecure", to PRO quote (from) prime
          minister Persson's excuse'

       b. Just nu är samarbetet – för att PRO citera Persson – "skakigt och osäkert".
           'At present, the co-operation is – to PRO quote Persson – "shaky and insecure"'

In both sentences in (41), the infinitival clauses are discourse markers. (41a) looks just like the discourse reading of (39a), and could be analysed the same way – but in (41b) the marker is right in the middle of sentence, and I cannot imagine a syntactic analysis that puts it anywhere else.

In other words, the infinitival clause has semantic scope over its proposition but not syntactic scope over the sentence. This is where c-command fails completely. It could indicate that LOG outranks C-COM, but then we run into problems elsewhere, since we would fail to capture the difference between (36) and (37).

Since discourse markers are not really part of their propositions, maybe we can just treat them as islands – immune to c-command. (The present analysis would then correctly predict arbitrary or logophoric control in these cases.) I am not quite happy with this, but it is the best I can do at present. At least the analysis can account for the adverbials that *are* part of the proposition.


## 9. Discussion

If we compare the verbal projections with the noun phrases, there are some striking similarities in control pattern. Valency-based adnominals correspond to regular verb complements, and identifying adnominals behave like predicative complements. Relative infinitives, adverbials, and subjects are less consistent, but they are so in pretty much the same way. They all simply take the most accessible antecedent – if semantically possible, determined by phrase structure; if not, interpreted on pragmatic grounds.

Complement control may arguably be handled by valency alone (in my terms by the interaction between ORIENT and SELECT), since the other constraints in effect only matter when ORIENT does not apply. That may seem to imply that the OT machinery is not needed, but then adjuncts and subjects would be left unaccounted for.

The purpose of the present proposal is to take a general grip on control. Since an OT framework can incorporate different, competing factors, it may capture a broader range of control phenomena. This is the main benefit of an OT approach to control over simpler accounts. Note also that several of the constraints assumed here have been applied to related issues of interpretation such as anaphora and ellipsis.

Nevertheless, ORIENTATION remains a key feature of this approach to control. It is also quite a complex concept. Therefore some comments about its general nature may be called for. It is essentially a semantic constraint, closely related to valency. Pollard and Sag (1994) ascribe it to the lexicon, whereas Comrie (1985) treats it as a pragmatic concept, on the ground that it seems to spring from general semantic principles rather than arbitrary lexical features.

In Lyngfelt (1999) I adopt Comrie's approach, partly due to the correlation between verbal and nominal projections, and partly in order to accommodate control shift more easily. The possibility of control shift implies that the correlation between lexical head and control pattern is not entirely consistent, which may indicate that the key feature is not coded in the lexicon. However, without reference to the lexicon we run into grave difficulties with how to represent the input.

In theory, it may be feasible to let the basic meaning of a sentence correspond to an abstract mental scene, in which the roles and their relations are determined but no lexical realisations assigned – though words that convey the appropriate meaning will be chosen, of course. This may seem reasonable *a priori*, but how would we represent such an input in an actual analysis? Further, even *a priori*, this reasoning applies to expressive OT only. The input for interpretive OT is a string of words (plus context), so the addressee's clues to the ORIENTATION of a predication must be tied to lexical information. This means that, at least from the viewpoint of OT semantics, ORIENT is due to the lexicon. A lexical interpretation of ORIENT is also better suited to standard definitions of the input for OT syntax (see e.g. Grimshaw 1997:375f, cited in section 4 above).

At the other end of the constraint set, one may ask whether LOG really belongs to the realm of grammar. It is quite possible that the constraint ranking of OT applies to grammar, as a fairly automatized system; but not to text pragmatics, which presumably involves a higher degree of conscious thought. Since LOG depends on the context and is ranked below c-command, one might conclude that we resort to pragmatics only when the interpretation is underspecified by the grammar.

This is the position of Speas (1997). In her OT analysis of control, which does not make use of pragmatic notions, PRO "must be controlled only when there is a c-commanding antecedent in its control domain" (Speas 1997:191f, based on Manzini 1983). Underspecification is also the crucial assumption behind the notion of arbitrary control, which essentially should be understood in the restricted sense of 'arbitrary with respect to the grammar'.

Arbitrary control primarily concerns non-finite subject clauses. Whether the notion of underspecification also applies to adjuncts, however, is a different matter. According to the simplified treatment of (11) in section (5), it does:

(11)  /.../ innan  jag  måste  köra   iväg   honom  för att PRO tentamensläsa.
          *before I    must  drive away him     for  to PRO exam-study*
       'before I have to make him leave to PRO study for the exam'


Given that (11) is ambiguous (from a grammatical point of view), L*og* is not part of the grammar, since it would disambiguate the sentence. This would, however, make the domain of arbitrary control quite large, covering any and all sentences in which no c-commanding candidate satisfies S*elect*.

   Note that although L*og* is ranked below C-*com*, logophoric control is quite common. Whenever C-*com* is overruled, it is L*og* that picks out the optimal controller from the set of the antecedents satisfying S*elect*. I cannot readily bring myself to view agent control of adjuncts in passive sentences as instances of arbitrary control. Neither do I find it plausible that arbitrary control  applies  to (36) (repeated below for convenience). Since neither *Tiger Woods* nor the subject *ingen* ('no one') c-commands PRO, the choice of controller would be arbitrary with respect to grammar unless the context is considered.

(36)  Tiger Woods var i praktiken borträknad  från  segerstriden,  efter  två "mänskliga"
       inledningsronder. Men efter att PRO igår ha tangerat banrekordet vågar ingen räkna
       bort golfens nye "Golden Boy".

       'Tiger Woods was in practice dismissed from the winning competition, after two
       "human" starting rounds. But after PRO having touched the record for the course
       yesterday, no one dares to disregard golf's new "Golden Boy".'


Therefore I prefer  to  treat  logophoricity (or topicality, empathy, point-of-view etc.) as relevant to grammar. This is done not only by  assuming  L*og*  as a constraint, but also by including context in the input. Accordingly, the interpretation of (11) is whichever of candidates I and IV that satisfies L*og* with respect to the context. Only if the relevant context is missing will (11) be ambiguous, as represented by the question marks in Tableau 21.


*Tableau 21. Ambiguous subject/object control*

| Input: (11) + context | Orient | Select | Prin B | Ant | C-com | MDP | Log |
|---|---|---|---|---|---|---|---|
| (☞)   I |  |  |  |  |  |  | ? |
|        II |  |  |  |  | *! |  | ? |
|        III |  |  |  |  |  | *! | ? |
| (☞)   IV |  |  |  |  |  |  | ? |

       innan  jag  måste  köra   iväg   honom  för att PRO tentamensläsa.
       'before I have to make him leave to PRO study for the exam'

I      innan [jag [[måste [köra  iväg honom]] [för att PRO_{jag} tentamensläsa]]]
II     innan [jag [[måste [köra  iväg honom]] [för att PRO_{honom} tentamensläsa]]]
III    innan [jag [måste [köra  iväg [honom [för att PRO_{jag} tentamensläsa]]]]]
IV     innan [jag [måste [köra  iväg [honom [för att PRO_{honom} tentamensläsa]]]]]

Note, however, that the consideration of context does not turn the analysis into a species of functional grammar. The absoluteness of the constraint ranking and the ambition to generate all and only the optimal (grammatical) interpretations, place the approach firmly within the realm of generative grammar.

Returning to the distinction between interpretive and expressive OT, the above reasoning means that LOG depends on the input (since context is part of the input). Would not that imply that candidates III-IV in (12) and Tableau 21 partake in a different competition than candidates I-II? And would not that, in turn, render my reasons for assuming that phrase structure is *not* part of the input for interpretive OT rather mote?

The answer to this is no. Being dependent on the input does not make LOG inviolable. It was shown in section 8 (examples (36–37)) that LOG is outranked by C-COM. This applies to Tableau (21) as well, since candidates II and III are ruled out regardless of logophoricity.

If, for example, *honom* ('him') in (11) refers to my dog, candidates II and IV would violate SELECT. Then MDP would rule I superior to III and the phrase structure of III-IV would not be available. This is essentially because SELECT outranks the configurational constraints. LOG, however, is ranked below them (or at least below C-COM) and therefore it cannot by itself rule out one phrase structure to the benefit of another.

On a more general level, one may ask whether the distinction between expressive and interpretive OT is necessary at all. Assuming that ORIENT and SELECT depend on the lexicon, they follow from the input to syntax and semantics both (according to the definitions in section 4, following Grimshaw 1997 for the syntax part). So does LOG, which is due to the context. Given my definition of OT semantics, phrase structure is not part of the input for either syntax or semantics. Does not that make the distinction between the two perspectives collapse?

Again, the answer is no. There is still quite a difference between a semantic input for syntax, essentially consisting of an argument structure, and a string of words as input for semantics. Nevertheless, some of the crucial factors for determining PRO seem to be present in the input to both syntax and semantics. Additionally, the constraints assumed in this paper are probably relevant from both perspectives. These similarities may indicate that the distinction is not absolutely necessary for an analysis of control. In other words, most of the present proposal could be incorporated in an inventory perspective approach. However, such an analysis would face the same problem that such approaches do, namely the failure to properly account for the distribution of PRO. Only after that problem is solved are we ready to successfully attempt a unified analysis of both the distribution and interpretation of PRO.

A common benefit of shifting perspective is that one thereby highlights aspects that could otherwise easily be overlooked. To define PRO as the implicit subject of a non-finite clause does not really account for the distribution of either. For

models in which phrase structure is assumed to be part of the input, however, that problem does not arise. Consequently there is no incitement to find a solution either.

By treating production and interpretation separately, one may keep either the form or the meaning entirely fixed. That leaves more room to freely explore the other of these two variables. If, on the other hand, neither is fixed, the input has to include a little of both. What to restrict and what to leave variable in such a model is no trivial matter, and the consequences are hard to predict. To me, this implies the usefulness, if not the necessity, of not taking the inventory perspective as the one and only valid approach to grammar.

Most of the virtues of OT are ascribed to the idea of soft constraints. For example, it is often noted how a ranking of violable constraints may resolve what Archangeli (1997:27) calls the "nonuniversality of universals" problem, i.e. the fact that few alleged universals are entirely universal. On top of that, I believe that the process orientation of the OT architecture may by itself raise new issues and provide new insights into language, and thus prove to be an additional benefit of OT.

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[2] There is some disagreement on whether PRO occupies a syntactic position or not, i.e. whether it corresponds to an actual subject constituent or just constitutes the base of predication without having any real syntactic status. Since I do need to make any crucial assumptions about this for the present analysis, I happily avoid the issue. PRO is thus simply used as a convenient label for the interpretive element in question.

[3] This is a simplification, since there are languages, e.g. Italian, where so called *pro*-drop is obligatory (see Grimshaw & Samek-Lodovici 1998 for an OT analysis). For a more elaborate discussion on the relation between PRO and *pro*, see Platzack 1998.

[4] C-command has to do with syntactic scope and roughly means that a c-commanding element resides higher in the phrase structure hierarchy of a sentence (cf. e.g. Haegeman 1994: 132ff).

[5] As shown in example (4), Swedish often uses infinitives where the corresponding English sentence would have a participle. I will disregard this difference, since control does not seem sensitive to it but applies uniformly to both types of non-finite clauses.

[6] The constraint SUBJECT has also been defined as "The highest A-specifier in an extended projection must be filled" (Grimshaw & Samek-Lodovici 1998:194). Also note that the constraint corresponds to the Extended Projection Principle of Chomsky (1981).

[7] However, what I call the inventory perspective manifests itself quite differently in traditional structuralist grammar and modern generative grammar. In the structuralist traditions of de Saussure (1916) and Bloomfield (1933), languages are pretty straightforwardly treated as inventories of signs. Generative grammar since Chomsky (1957) takes a step away from that approach, not only in shifting from the level of signs to the level of sentences, but also in shifting from describing the set of grammatical sentences directly to focussing on the set of rules that may generate it. Nevertheless, generation in this sense is not equivalent to either production or interpretation, but to a process in which form and meaning are generated more or less simultaneously.

[8] It should be noted that Wilson (1999) uses these terms in a slightly different context, namely bidirectional OT syntax. Within the process of determining the optimal expression of a given input, he recognizes two sub-processes, one dealing with expressive factors and the other with interpretational concerns.

[9] Note, however, that an OT model closer to the inventory perspective is currently being developed. Smolensky and Wilson (Smolensky 2000) are developing a model of dual optimization, in which form-meaning pairs are derived directly from an initial input of unordered sound and unordered meaning, in an almost Saussurean fashion,

distinguishing the possible candidate outputs from the impossible ones. The candidates generated this way then partake in a second optimization, in which the optimal outputs are determined.

[10] Lyngfelt (2000) is written in Swedish, and is a pilot study of the distribution of non-finite clauses in Swedish and English. Except for the fact that English generally allows more non-finite clauses (or, put differently, that Swedish more often requires full subordinate clauses), no simple generalizations are made. On the contrary, one hypothesis is tried and found insufficient, namely the Binding Hierarchy of Givón (1980). Givón hypothesizes that the strength of the semantic binding between a complement clause and its head correlates with the degree of syntactic integration of the complement. This iconic idea is shown to have empirical problems, since it fails to capture the actual distribution of phrase types in Swedish and English. The main conclusion of Lyngfelt (2000) is that the distribution of non-finite clauses is a complex matter requiring a lot of further study before any real conclusions can be drawn.

[11] Speas does not distinguish between PRO and *pro*, using Pro for both. Also note that I presently disregard the interpretive aspects of her analysis, e.g. the issue of whether a bound of free interpretation (both with the same reference) of the pronoun is optimal.

[12] Optionality – or free variation – is one of the main problems to OT syntax, and it seems to me that all the difficulties associated with it apply to ambiguity too. I will not explore this issue here, but for a critical overview of OT approaches to optionality, cf. Müller (1999).

[13] In Lyngfelt (1999), as well as in earlier versions of the present paper, this constraint was called FORCE.

[14] This observation does not depend on the assumption of movement and traces, although I use such notation for convenience. The same information could easily be represented in, e.g., an LFG *f*-structure or an HPSG sign.

[15] Perhaps it should be noted that Hendriks and de Hoop (1999) do not use PRINCIPLE B for the interpretation of implicit elements but for the interpretation of pronouns.

[16] I am aware, however, that such assumptions can be quite useful for other purposes, e.g. in lexical semantics (cf. Pustejovsky 1995).

[17] What I refer to as *discourse markers* (cf. Schiffrin 1987) have also been called *speech act adverbials* (Andersson 1976) and *disjuncts* (Quirk et al. 1985:612ff) in the literature.