*A PRO-less theory of control**

VIKKI JANKE

Abstract

In this paper I present a theory of obligatory control which is PRO free. The account is binding-based, but grounded in minimalist principles, in that it assumes an encoding of syntactic properties that satisfies Inclusiveness. The control relation is expressed in terms of how lexical semantic properties of a predicate are mapped onto lexical syntactic properties. Its advantages are that it can derive the universal absence of controlled objects as well as provide an answer for why the locality of obligatory control resists any reduction to Shortest Move.

1 Introduction

The phenomenon of control pertains to the distribution and interpretation of the null-subject in non-finite clauses following control verbs, and in clause-initial gerunds and infinitives. This subject exhibits a number of properties, some of which look like those of syntactic dependencies, others of which pattern more with extra-syntactic requirements. On the basis of this distinction control is split into two types, namely Obligatory and Non-Obligatory Control (OC and NOC, respectively). OC covers structures in which PRO must, in most cases, be interpreted as identical to the closest c-commanding argument in the matrix clause, a property it shares with other syntactically dependent elements, such as reflexives. In this paper I argue that a reduction of OC to a version of binding that satisfies Inclusiveness can explain the universal absence of controlled objects.

In section 2 I lay out the most typical properties of OC. In the next I evaluate the repercussions Inclusiveness has for the syntactic encoding of dependencies, including control, and adopt a theory of grammatical dependencies developed in Neeleman and van de Koot 2002a. The core idea in this paper is that grammatical dependencies are mediated by syntactic functions, the introduction of which allows a syntactic encoding of relations that satisfies the Inclusiveness condition. The final

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section proposes a theory of control within this new mode. In essentials it shares much with previous theories that treated control as a binding phenomenon, but it also departs from these in its implementation, in that it expresses control in terms of variation in the way in which lexical semantic properties of a predicate are related to lexical syntactic properties. The resulting theory sheds light on the absence of controlled objects.

2 Obligatory control

2.1 Properties of obligatory control

Among the properties that OC PRO possesses is the need for a theta-marked antecedent, and a requirement that this antecedent be local, c-commanding and unique:

(1) a. Max_1 tried [PRO_1 to hide himself]
b.* It_1 was tried [PRO_1 to hide himself]
c. * Max_1 thinks it was tried [PRO_1 to hide himself]
d. *$Max's_1$ aunt tried [PRO_1 to hide himself]
e. *Max_1 asked $Moritz_2$ [$PRO_{1/2}$ to protect each other]

Example (1b) shows that an argument bearing no theta-role cannot be an antecedent, whilst (1c) demonstrates that PRO is subject to a locality constraint. (1d) establishes that PRO must be c-commanded by its antecedent and (1e) that PRO cannot host split antecedents. To this list of constraints may be added the obligatorily sloppy reading of PRO under ellipsis and the forced de se interpretation of PRO.

f. Max_1 wanted [PRO_1 to escape] and Moritz did too (= Moritz wanted Moritz to escape)
g. The unfortunate expects that he will get a medal
h. The unfortunate expects that getting a medal will be boring
i. The $unfortunate_1$ expects [PRO_1 to get a medal] (= false under OC)

(g – i from Hornstein 2000)

(1f) is self-explanatory, but (1g) requires one to imagine the unfortunate as an amnesic war veteran watching himself, without recognising himself, in a medal ceremony on the TV. Under these circumstances, although (1g) and (1h) can be said to represent 'the unfortunate's beliefs', (1i) cannot. The fact that OC predictably conforms to the above structural pattern makes a syntactic account for control highly motivated. It does not, however, argue for any particular account

within the syntax, as the same properties have been used to reduce control to predication (Williams 1980), binding (Manzini 1983), and more recently, movement (Hornstein 2000). But there is further reason to adopt a binding-based line, namely a similarity that both binding and OC share in terms of locality. We see this in 2.2.

2.2 Obligatory control and its similarity to binding

In both binding and control configurations it is possible to skip the closest antecedent:

(2) Max_1 showed Moritz_2 $\text{himself}_{1/2}$ (in the mirror)

(3) Max_1 promised Moritz_2 [$\text{PRO}_{1/*2}$ to laugh]

A movement analysis of binding and/or control is problematic for both of these cases because the MLC, which states that the only possible antecedent is the closest c-commanding argument, incorrectly renders 'Moritz' the only possible antecedent in both examples. At the same time, no constructions which undisputedly involve move ever violate the MLC. This makes it unlikely that it is this absolute condition to which binding and control relations must adhere.

In the following sections I develop a binding-based theory of OC. I argue for a version of binding that has its roots in Williams 1994, but adopts the minimalist implementation put forward in Neeleman & van de Koot 2002a. The proposal permits an understanding of control as a product of free mapping between a predicate's lexical semantic properties and their respective syntactic selectional properties.

3 Dependencies in Minimalism

3.1 Inclusiveness and dependencies

Inclusiveness (Chomsky 1994) requires that information in phrase markers be restricted to lexical items and the lexical features associated with them. As a result, bar levels, co-indexation, etc., must be dispensed with, which means that grammatical dependencies can no longer be indicated by what was the standard means. But the banning of indices leaves us apparently unable to establish grammatical dependencies at all. Movement is characterised as a dependency between a moved element and a trace, with the two connected via an index. The binding relation between an anaphor and its antecedent also depends on co-indexation. The problem extends to theta-assignment since this relation, too, relies

on index alpha, and the removal of this principle leaves no means of identifying which argument receives which theta-role[1].

Chomsky suggests that, under optimal circumstances, conditions constraining lexical items and their operations hold from the start of a derivation, uniformly throughout the derivation to LF. An important consequence of this is that Inclusiveness must hold of each node, individually, in a tree, not just the structure as a whole. This translates into a much stricter use of the term. It requires the properties of every node in a tree to be retrievable from one of the nodes it immediately dominates, in order for these properties to be traced right back to the lexicon. Neeleman and van de Koot (2002a) argue that this uniform version of Inclusiveness determines an encoding of grammatical dependencies within the syntax that has the properties illustrated in (1a-e). I consider this proposal next.

3.2 A syntactic encoding of dependencies

The Configurational Matrix (CM) (Neeleman and van de Koot 2002a) develops a syntactic encoding of dependencies that is compatible with Inclusiveness. Properties that hold of what are arguably syntactic operations can be clearly distinguished from those that hold of non-syntactic operations, as demonstrated by Koster (1986), who illustrates five properties manifest in binding, movement, NPI and predication phenomena. The first four of these are absent from uncontroversially syntax-external affairs:

(4) a. obligatoriness – a dependent must have an antecedent
b. c-command, by the antecedent of the dependent
c. a requirement that an antecedent be unique
d. a locality restriction between a dependent and its antecedent.
e. antecedents may take multiple dependents

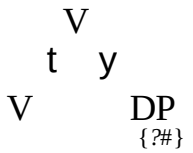
The dependencies in binding, movement, NPI licensing and predication all involve a chain-like relation between the antecedent and dependent(s), and these chains consistently exhibit Koster's five properties; an unlikely coincidence. The CM's proposal is that the properties shared can be shown to be the very consequence of syntactic encoding. That is, the syntactic operations through which these dependencies are mediated, are constrained by the same conditions and hence display identical properties.

[1] This is not a problem for a Hale-Keyser approach to theta-theory, where theta- assignment is reinterpreted as a particular syntactic configuration. But see Neeleman and van de Koot (2002b), for why this view of theta-theory falls short.

There are four basic assumptions on which the theory of syntactic dependencies in the CM hinges. I introduce these in turn, to demonstrate the system devised through their collective implementation. Foremost comes Inclusiveness: this condition, in its original guise, states that "…the interface levels consist of nothing more than arrangements of lexical features" (Chomsky 95, p225), which amounts to saying that elements in the tree must find their source in the lexicon. But this version of Inclusiveness is relatively weak: it allows a lexical item's features to be dispersed across several nodes in a tree. Neeleman and van de Koot argue that this is an undesirable outcome of Chomsky's condition and propose to strengthen it so that it applies uniformly to each node in a syntactic structure. This uniform version of Inclusiveness rules out the unwanted dispersal of features.

(5) *Inclusiveness*
The syntactic properties of a non-terminal node are fully recoverable from the structure it dominates; the syntactic properties of a terminal node are fully recoverable through mapping procedures.

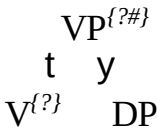
Although Inclusiveness is a condition on nodes themselves, and not the relations between these nodes, it can be shown to have consequences for such relations. In particular, it disallows relations established under sisterhood. We see this by looking at the standard implementation of the theta marking of a direct object. A verb assigns a theta-role to its DP-sister, but this cannot be determined by looking at the structure the DP dominates:

(6)


That Inclusiveness in such a circumstance is violated, requires a revision of how theta-assignment is construed, because in order to adhere to this condition, a node that has a satisfied theta-role must dominate the node from which it obtained this property in the tree.

We have seen then that Inclusiveness demands that if two nodes, A and B, are related, then whatever relates A to B must originate in either A or B. If A is dependent on B, then this dependency must be encoded as a syntactic property of A. One way of implementing this syntactic encoding, and the one which the CM pursues, is by positing syntactic functions as the means by which such dependencies are mediated. The dependent element introduces a selectional function, which seeks a feature, on its antecedent, to satisfy it.

To pin this notion to a concrete example we can look again at the theta-assignment in the previous example. The transitive verb is the dependent element in that it must find an argument to which its internal theta-role must be assigned. Now we replace the notion of theta-roles with theta-functions. A function is a syntactic object, which encodes the verb's syntactic property of being a dependent. The function's only goal is to find the argument that will satisfy it, a task achieved by being copied recursively upward along the path of projections until it immediately dominates this argument. Under the configuration of immediate domination, the function is satisfied by its argument.[2]

(7)


The requirement that relations between nodes require immediate domination constitutes the second of the main assumptions underpinning the CM:

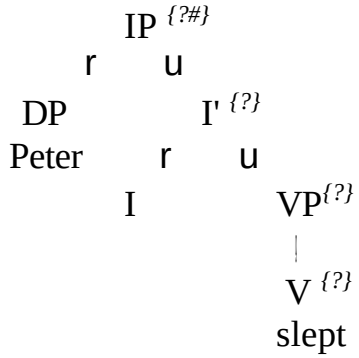
(8) *Accessibility*
Relations between nodes require immediate domination

Note that the satisfaction of functions does not include any downward transmission of information onto a node. Function application obtains when the function is in an immediate domination relation – Accessibility – with the sought after node, from where it can ascertain whether this node matches the property it seeks. Thus the downward relation is not one of copying, and it is strictly local. Downward copying would constitute a violation of Inclusiveness, because the information on the receiving node would not be recoverable from the structure it dominates. That application be restricted to the first node down is required by Accessibility. Without this condition, relations between nodes could be established, regardless of what intervenes between them. Immediate domination ensures that each relation is established on a strictly local, node-to-node basis.

The restrictions imposed by Inclusiveness and Accessibility on the copying and application of functions derives the first of Koster's five conditions, namely c-command. Tracking the path of copying from the dependent to the antecedent, we see that the condition is derived bottom-up:

[2] As in the CM, satisfied functions are indicated by the # symbol, but for expository purposes only.

(9) Peter$_1$ slept$_1$



The function is recursively copied until it directly dominates a node of the right type. This node is its antecedent. If I upset the c-command relation the function-based system rules the unwanted construction out:

(10) *[$_{IP}$ [$_{DP}$ [$_{DP}$ Peter [$_{D}$ s$_i$ [$_{NP}$ mother [$_{I}$ [$_{VP}$ slept$_i$]]]]]]]

Again the function can be recursively copied to the topmost node. But from here it will only directly dominate the complex DP, *Peter's mother*, so under the reading that it is Peter sleeping, rather than his mother, the construction is ruled out. This c-command condition has been derived solely on the basis of Inclusiveness and the added statement that all relations between nodes require immediate domination, Accessibility.

The third assumption underpinning this framework is a general economy condition; this requires that any information introduced in a tree be indispensable. Used in conjunction with Accessibility, the resulting condition is more demanding than the standard Economy condition of the MP, because it requires the effects of new information to be felt locally.

(11) *Economy*
Information in a node must be minimally motivated in its immediate environment (as defined by Accessibility)

Economy will not sanction the presence of any information in the tree that does not have effects. So if a function is introduced, it must have an effect, i.e. find something to satisfy it.

The fourth and final grounding assumption of the CM is Distinctness. This condition states that the features and selectional functions which make up a node, must, if they are to retain their identity in the syntax, be distinguishable from each other. This can be achieved in one of two ways: through their inherent properties, or through ordering introduced on the node.

(12) *Distinctness*
The syntax interprets attributes of a node that cannot be distinguished as one and the same.

This condition can explain another of Koster's properties, namely that a single antecedent may take multiple dependents. We see an instance of this in the following example, where two negative polarity items (NPIs) take the same antecedent:

(13) They would $[_{NEGP}$ never$_{\{NPI\text{-}f\#\}}$ divulge $[_{DP}$ any$_{\{NPI\text{-}f\}}$ answers to any$_{\{NPI\text{-}f\}}$ students]

Both NPIs introduce an NPI-function. So long as these functions are on different nodes, the problem of their needing to be distinguished doesn't arise. But if, through recursive upward copying, they meet on a node, the syntax can make no distinction between them and so interprets them as identical. Such function identification answers for why dependents can take more than one antecedent. In the example above, both NPI-functions are copied upwards until they meet on the DP, where they collapse into one. This one function continues to be copied until it immediately dominates the negative element by which it will be satisfied.

But sometimes a terminal node will need to contain the same function more than once. Take, for example, a di-transitive verb. According to Distinctness, there exists a problem of how to distinguish the verb's three theta functions from each other. If we label them according to their semantic roles, we accredit the syntax with the ability to interpret these purely semantic notions. An alternative, and the one pursued in the CM, is that functions are linked to an ordering tier, this tier being the means by which they are distinguished:

(14) give$_{\langle V\rangle}$: $\{?, ?_1, ?_2\}$

Order is an instance of information, so Economy demands that this order be minimal. Because there is already a difference between a linked and unlinked function, the authors capitalise on this free information by not linking the external function to this tier as well. The order in which thematic functions are linked to the ordering tier reflects the thematic hierarchy.

Neeleman and van de Koot assume that the categorial features of a node are also associated with the ordering tier. This carries with it a particular view of projection. Whenever a linked function is copied, so, too, must the ordering tier. This much is determined by Economy because the effect of linking is that it allows the linked function to be distinguished. But if aside from order, the tier contains categorial

features, copying of this tier is tantamount to projection; as long as linked functions are copied, so are the categorial features.

Economy ensures that linked functions are never copied beyond the maximal projection of the head which introduces them (see 11): If there is nothing in the projection to satisfy a linked function, the function would have to leave the XP on pain of losing its link. Unused linking constitutes an economy violation, forcing the conclusion that a linked function must be applied within its projection.

The authors draw a distinction between licensing and non-licensing functions. The former are so called, because the argument to which they are applied literally depends on this function's satisfaction for its presence in the tree to be legitimate. An argument that has not satisfied a licensing function, is not licensed itself:

(15) * John sleeps *Susan*
{?}

The intransitive verb introduces one unlinked, therefore external, theta-function, which can be satisfied by John. In contrast, Susan, in the absence of any further theta-function, is unlicensed. Non-licensing functions differ in that the element that satisfies them does not depend on this particular function's satisfaction to be licensed:

(16) a. John didn't buy any apples
{NPI-f#} *{NPI-f}*

b. John didn't buy apples

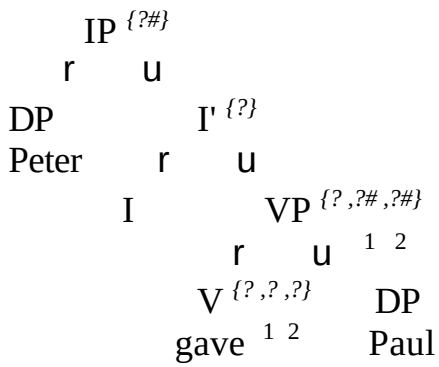
The distinction between licensing and non-licensing functions is important, because it pertains to a restriction introduced on the application and identification of licensing functions, which will replace the Theta-Criterion. This condition, Exclusivity, states that the application of a licensing function in a node cannot be accompanied by any further reduction in the number of licensing functions in that node.

There are two ways in which the number of licensing functions can be reduced: through application, or through identification. Application occurs when the function reaches a node that immediately dominates an argument of the right type. Identification occurs when two unordered identical functions meet on a node (see 13) In such a circumstance the syntax is unable to tell them apart (Distinctness), and the two functions effectively collapse[3]. The following example demonstrates that by ensuring a node only sanctions the application of one licensing function, the

[3] I return to a violation of Exclusivity through application followed by identification later.

one-to-one mapping between semantic roles and arguments that the Theta-Criterion demands, is procured:

(17) *Peter gave Paul



The di-transitive verb introduces three theta-functions, all of which need to be satisfied. Copying up of linked functions entails the copying of the whole node, bound up with the ordering tier as it is. On the VP-node the immediate domination relation between function and argument, necessary for a function's satisfaction, obtains, enabling one internal function to be satisfied by the indirect object, *Paul*. Once this function has been applied, Exclusivity kicks in prohibiting any further reduction on this node. The external function can be copied in isolation until it reaches the uppermost node from where it can be applied to the subject. But this is not an option available for the remaining linked function, which cannot leave the VP. The satisfaction of this function by *Paul*, which has already satisfied an internal function, violates Exclusivity.

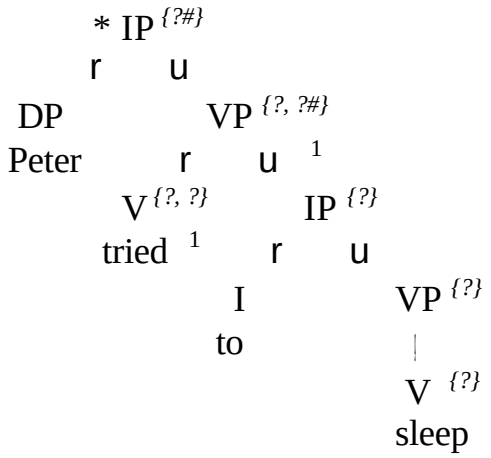
4 Control as a dependency mediated by an anaphoric function

Armed with the main principles of the paper, we can put this system of function application to work on OC, with the aim of assessing whether it can deal adequately with the OC data. I first demonstrate that OC cannot be a relation mediated by a licensing function, but go on to argue that OC could be mediated by the same function responsible for the binding of overt reflexives. Williams' (1994) claim, that theta-roles, as opposed to overt DPs, are the antecedents of reflexives, is an essential part of this analysis and will provide an explanation for the fact that neither binding nor control obey the MLC. I will finally settle on a PRO-less theory of control that can answer for a property of OC that hitherto has proved underivable, namely the universal absence of controlled objects.

4.1 Can control be mediated by a licensing function?

Theta-functions and Move functions are licensing functions, which means they are constrained by Exclusivity, the CM's reformulation of the Theta-Criterion. With Exclusivity in mind, it can be shown that control cannot be understood as a relation mediated by a licensing function, be it a theta- or a move-function. This condition will always be violated, the only difference being the points at which the violation will occur. I demonstrate this first with a theta-function, before repeating the example with a move-function.

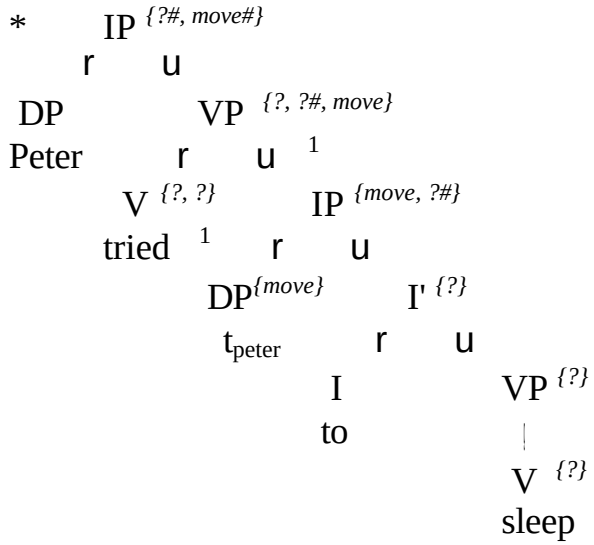
(18) Peter tried to sleep



The control verb, *try*, introduces two theta-functions, which are distinguished through the ordering shown, whilst the embedded intransitive predicate in the infinitival introduces one, unlinked, function. Suppose the controlled clause does not contain a PRO argument. Then the single external function of *sleep* can be copied up out of the infinitival clause to the matrix VP-node. The two theta-functions from the matrix verb are also present on this same node, having been copied from V. The theta-function copied from the infinitival must now identify with one of the two other functions, since it is not linked to a position on the ordering tier of the receiving node. The internal function of *try* is ruled out as a potential candidate, since it is applied to the infinitival clause from which the theta-function originates. It must be, then, the external function of *sleep* that collapses with the external theta-function of *try*. Because function satisfaction has taken place, Exclusivity is triggered. This condition rules out the satisfaction of one function, together with the identification of two functions on the same node. We may conclude that an unavoidable Exclusivity violation renders the suggestion that control be mediated by a theta-function a dead end.

The suggestion that PRO is an NP-trace, as argued for by Hornstein (2000), cannot be translated into this framework, because whether NP-trace introduces a move- or a theta-function[4], an Exclusivity violation will always occur, only at different points in the tree. I demonstrate this for a move-function first.

(19) Peter tried t_{Peter} to sleep
{?, ?} {move} {?}
1



The theta-function of the embedded infinitival is copied up to where it immediately dominates the trace and is satisfied by it. The move-function introduced by the trace is copied beyond the infinitival where it meets the theta-functions of the matrix predicate on the VP-node. Since the move-function is inherently different from the theta-function, no function identification takes place. The internal theta-function is applied to the complement clause. Now both the move-function and the external theta-function are copied up to the topmost node, where they look to the same subject for satisfaction. Since both of these functions are licensing, this step is ruled out by Exclusivity.

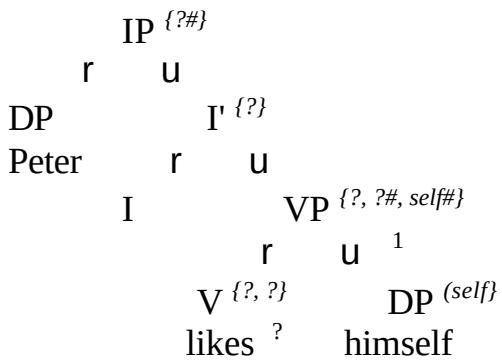
If NP-trace introduces a theta-function, as is the claim in the CM, an Exclusivity violation can again not be avoided, for the same reason as in (19). The only difference is that the theta-role copied from the embedded clause originates in the trace rather than in the VP.

[4] It is argued in the CM that NP-trace differs from wh-trace and the trace of head movement, in introducing a theta-function rather than a move-function. For the details of this argument, I refer the reader to the text itself.

4.2 Can control be reduced to binding?

In the CM anaphoric binding is characterised as a dependency mediated by an anaphoric, 'self-function'. But, following Williams 1994, the antecedent in this binding relation is a theta-role, not the overt DP to which this theta-role is ultimately assigned:

(20) Peter$_i$ likes himself$_i$



The reflexive introduces a self-function, which is copied to the VP-node from where it is satisfied by the external theta-function of the verb. The subsequent satisfaction of this theta-function by the matrix subject gives the required reflexive reading. Like the NPI-function illustrated in (16), a self-function is non-licensing, which is to say that its antecedent, in this case *Peter*, does not depend on this function for its presence in the tree. If I substitute the reflexive with '*apples*', the DP *Peter* is still licensed, because it is the theta-function introduced by the verb that licenses its presence, not the self-function. We can now look at how such a binding approach might work for OC.

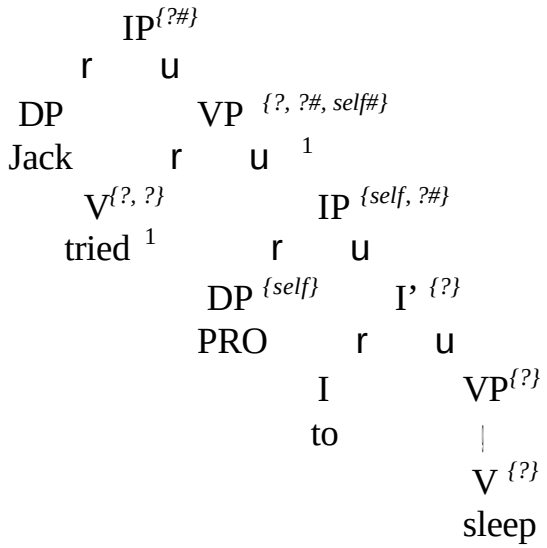
There are two possible routes. It could be that PRO exists, and introduces the anaphoric function itself. Given that in the case of overt reflexives, it is also a nominal element that introduces the self-function, this seems the most obvious path to take. But an alternative prospect is that the predicate in the infinitival is the element introducing an anaphoric function, and that this alone can answer for the distribution of OC. As we will see the notion of a predicate introducing a function which is not theta-based, is a natural development of a system based on functions. Looking at both options, it appears that either could in principle work, but that an analysis based on anaphoric PRO fails to rule out the occurrence of PRO in object positions. The latter, PRO-free option is able to rule out this occurrence of

controlled objects.[5] It also has the advantage of being able to explain why both binding and control do not conform to the MLC, and so is the preferred option.

4.2.1 Anaphoric PRO. This function-based theory can derive easily a typical control construction where PRO, as the subject of the infinitival, is also 'controlled' by the matrix subject. PRO introduces a non-licensing self-function. That the function is non-licensing is essential to this analysis, because no problems with Exclusivity will occur, since the condition pertains to licensing functions only.

As stated earlier, the antecedent in a binding relation is argued to be a theta-role, not the DP to which the theta-role is applied:

(21) Jack tried PRO to sleep
{?,?} *{self}* *{?}*
1



The theta-function on the embedded intransitive verb is copied up until it immediately dominates PRO, and is then applied to it. PRO introduces a self-function, which is copied up till it reaches the matrix VP. From here Accessibility allows it relations with either of the matrix verb's theta-functions. But the internal theta-function is applied to the complement clause from which the self-function originates, which would result in an I-within-I type violation, leaving only the external theta-function free to satisfy the self-function. Finally, this external function is copied to the top-most node and applied to the subject-DP, yielding a reading where the matrix subject binds, and hence controls, PRO.

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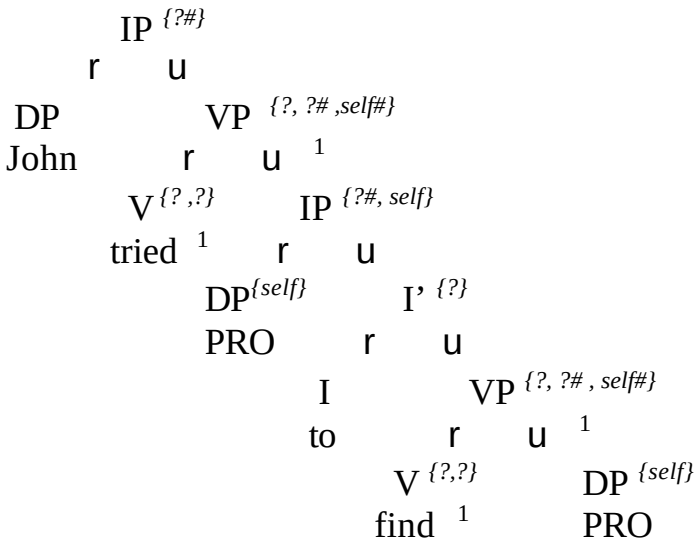
[5] But see Hudson (forthcoming) who presents data from Russian, Icelandic and Ancient Greek, which, he argues, necessitate the existence of PRO.

But positing an anaphoric PRO as the function-introducing element results in over-generation, because, in the absence of further stipulations, a controlled object-PRO, which is cross-linguistically non-existent, can also be derived. Such a sentence would involve the hypothetical construction in (22), which would have an interpretation such that John controls both the subject- and object-PRO, all interpreted as identical. Such unattested sentences should be ruled out, but here fail to be so:

(22) John$_1$ tried PRO$_1$ to find PRO$_1$ *(John$_i$ tried John$_i$ to find John$_i$)*



The self-function introduced by the object-PRO following the infinitival verb, *find*, is copied to the embedded VP where it is satisfied by this verb's external theta-role. It must be the external theta-role to which this self-function is applied, because the internal function is satisfied by the PRO which introduces this self-function, so cannot be available itself. Thus the external theta-function, having satisfied the self-function, is copied upward until it dominates the subject-PRO, to which it will be applied. This PRO also introduces a self-function, which will be copied up to the matrix VP node, where it dominates, and is applied to, the external theta-function of this verb. The verb's internal theta-function is again satisfied by the complement of this verb. The last instance of function application is achieved through the final copying of the external theta-function that satisfied the subject-PRO's self-function. This external function reaches the matrix IP, where it is applied to the DP-subject, *John.*

The successful generation of sentences with a controlled object is an unwelcome outcome, which makes the idea of PRO being the anaphoric element far less attractive, calling for a more restrictive alternative. Of course, the above derivation

could be blocked if we made additional assumptions. Chomsky and Lasnik's (1993) 'null-case' idea is a case in point (Chomsky 1995, p119 –120). This proposes that PRO is licensed by null case, and that only infinitival I can check this case peculiar to PRO. The incorporation of such an assumption would rule out the above example, but one might be wary of depending on a notion that has no bearing on anything beyond the particular problem for which it was introduced. At this early point the better option, to try and derive the absence of controlled objects, is not yet discounted.

4.2.2 Anaphoric V. An alternative option is that control still be represented as a binding relation between a self-function and a theta-function, but that this self-function originates in the verb itself. In the previous section we considered the consequences of letting PRO introduce this function. Bearing in mind that this function is non-licensing, this PRO-free approach shares with the PRO-based one the advantage of avoiding an Exclusivity violation, but unlike the PRO-based account, it can avoid the generation of controlled objects. Before turning to the syntactic representation of this account, I explore the system of syntax-semantics mapping on which this proposal depends, and then go on to suggest a typology of functions.

4.2.2.1 Syntax-semantics mapping. A theory based on theta-grids must be accompanied by an account of the lexical interface, stating how semantic roles are mapped to theta-functions. Following in the steps of Jackendoff 1972, Grimshaw (1990) assumes a thematic hierarchy, which determines how roles are mapped to theta-grids. Here I adopt her version of the hierarchy in which the prominence relations are as follows:

(23) (Agent (Experiencer (Goal/Source/Location (Theme))))

The relation of prominence is relative, the more embedded an argument is, the less prominent. By combining Grimshaw's thematic hierarchy with syntactic functions, themselves forming a part of the ordering tier that we looked at in detail in section 3, the following syntax-semantics mapping emerges. Given the transitive instantiation of the verb, *open*, the mapping between this verb's arguments and the theta-functions to which they are linked, is represented as below:

(24)

open (	Agent	(Theme))	?	thematic hierarchy
	¦	¦		
	?	*?*	?	ordering tier
		1		

The prominence relations indicated by the bracketing along the thematic tier are shared exactly by the ordering of the functions imposed by the ordering tier. That is, the most prominent semantic argument, the Agent, is mapped to the unlinked, and hence external, function. The less prominent argument, the Theme, is mapped to the linked, and hence internal, function.

Adopting an analysis of unaccusatives along the lines of Reinhart 2000 and Neeleman and van de Koot 2002b, the rules for the syntax-semantics mapping state that only the most prominent argument is mapped to the unlinked (external) theta-function.

(25) Only the most prominent semantic argument can be mapped to an unlinked theta-function.

In the event that the most prominent argument is reduced, as in the case of the unaccusative variant of *open*, the only representation possible is that in (26a), not (26b). This is because despite it being reduced, the argument is still present semantically, which prevents the Theme from being mapped to the unlinked function.[6]

(26) a. open [*Agent* [Theme]] b. * open [*Agent* [Theme]]

Ø	?	Ø	?
	1		

A question that comes to mind in this theory is whether these semantic arguments must always be mapped to the same type of function. Functions represent the semantic properties of the element to which they are mapped. But these functions also differ in their syntactic properties in a number of respects. For example, functions may be licensing or non-licensing, they may look for a head or a non-head, they may reconstruct properties of their argument or not etc. We would expect, then, a typology of functions that reflects their heterogeneity, where different combinations of syntactic properties of functions correspond to different semantic properties. Of particular interest for present purposes is how closely related to each other theta- and self-functions are in this typology.

One property which distinguishes functions from each other is whether they are satisfied by a phrase or head. In the CM head-movement is regulated by a function different from the one in charge of wh-movement. The former is satisfied by a head whereas the latter by a displaced phrase. Satisfaction of the function is indicated by the hash symbol beneath the head or phrase respectively:

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[6] Reduction of the Agent is indicated by it appearing in italics.

(27) a. Did Jack t_{did} leave
{#} *{Hd-Move}*

b. Which person did Jack meet$t_{which\ person}$
{#} *{Wh-Move)*

A second property that distinguishes functions from each other is whether they forbid, permit or require reconstruction. This would reflect the fact that A-bar movement, but not A-movement shows reconstruction effects. Again we can look at the function used for wh-movement, which does show these effects, and contrast it with the function introduced by NP-trace, which does not:

(28) a. [Which picture of himself] did Jack like $t_{which\ picture\ of\ himself}$

b. Alleen zichzelf$_i$ vindt Piet$_i$ aardig.[7]
only himself finds Piet *t nice*
'It is only himself that Piet likes.'

b.' *Ik zie [zichzelf$_i$ Piet$_i$ *t* getooned worden].
I see himself Piet shown be
'I see Piet being shown to himself.'

In (28a) the move function on the root CP gives rise to reconstruction of all the syntactic properties contained in the DP-node that satisfies it (*which pictures of himself*). Since this node also contains the self-function copied up from the reflexive, the trace in the structure is licensed to carry this self-function as well. As a result binding of the reflexive can proceed as if no movement had taken place. In (28b) we see a direct comparison between A-bar and A-movement in Dutch. The topicalisation of the anaphor in (28b) does not prevent the trace from behaving like an anaphor, where it is bound by *Piet.* But the same doesn't hold of (28b'), where the trace left behind by A-movement, cannot share the self-function of the passivised reflexive.

We have already seen in detail how a theta-function encodes the fact that a verb has the property of being syntactically dependent on an appropriate argument. This function was said to have the property of being licensing, in that the argument to which such a function is assigned, depends on this function for its legitimacy in the tree (see section 3).

So far our informal typology of functions consists of three differences:

[7] This example is taken from the CM, their no (60).

(29) a. what the function seeks e.g. head or phrase
b. whether it exhibits reconstruction effects [+/-]
c. whether or not it is licensing [+/-]

Given this working typology, we can now look in more detail at the nature of self- and theta-functions, and determine along what lines they differ. If we look at the first property, what the function seeks for its satisfaction, we see that they are satisfied by different items. A theta-function looks to a DP for satisfaction, whereas a self-function is satisfied by a theta-function. But the theta-function that satisfies this self-function, is ultimately applied to a DP itself, which ensures that the element that introduces the self-function shares the reference of the argument which satisfies this theta-function, so the difference between these two functions is less marked than assumed.

The next property was reconstruction, which neither theta- or self-function exhibit, not being used to mediate A-bar movement. So in this respect they are a match. But the last property, that of being licensing, is one on which they markedly differ. As a licensing function, a theta-function was shown to license the presence of its arguments whereas a self-function does not (see 20).

We can now return to the present proposal, in which it is claimed that the self-function is introduced by the controlled verb itself. This requires us to consider the possibility that there are occasions, such as OC, in which semantic arguments can be linked to self-functions rather than theta-functions. Given the formal similarity just established between theta- and self-functions, such variation should not really surprise us. The idea that there is freedom in mapping of arguments to functions is not without empirical motivation either. Take the next example; here we see a reflexive, which in this framework normally introduces a self-function, acting as a predicate. In this circumstance, then, it must be that the reflexive introduces a theta- rather than a self-function:

(30) Jack isn’t himself today
{?}

So the hypothesis that the opposite can occur, i.e. where a predicate introduces a self-function, does not seem implausible. On this view, OC constructions contain a predicate which behaves as a reflexive element. The remainder of this section concentrates on when this variability in mapping between functions and their semantic arguments can occur.

Focussing on theta- and self-functions only, there are six potential syntax-semantic mappings:

(31) a. [Agent [Theme]] b. [Agent [Theme]]
? self *self ?*

(32) a. [Agent [Theme]] b. [Agent [Theme]]
self self *? self*
1 *1*

(33) a. [Agent [Theme]] b. [Agent [Theme]]
? ? *self ?*
1 *1*

In (31a) the most embedded semantic argument is mapped to a self-function, whilst the least embedded is mapped to a theta-function. In (31b) the reverse holds. But in both examples the semantic arguments are mapped to unlinked functions, and we will see that although (31a) constitutes an acceptable syntax-semantics mapping, (31b) does not. The examples in (32) represent cases where the most prominent semantic argument is mapped to an unlinked function, whilst the less prominent argument is mapped to a linked self-function. These potential mappings, which are not independently ruled out by the syntax-semantics mapping rules, will be shown to be ruled out by syntactic conditions. In contrast (33) represents those cases which respect the thematic hierarchy and also succeed syntactically.

Focussing on (31) first, in these examples both semantic arguments are mapped to unlinked functions. Example (31b) is immediately ruled out, since it violates the constraint that only the most prominent semantic argument may be mapped to an unlinked theta-function (see 25). The constraint does not rule out (31a), which contains a Theme mapped to an unlinked self-function, which begs the question of why the constraint in (25) is specific to theta-functions. We know that such a mapping is permissible from the following example, which has a controlled unaccusative:

(34) Jack tried to arrive early
{?,?} *{self}*

The single argument of the unaccusative verb, arrive, can never be the most prominent argument, because the Agent of the unaccusative verb although reduced by a lexical operation, is still there semantically (see 26). If the mapping between semantic arguments of the thematic tier and the self-functions on the ordering tier also had to be isomorphic, then the above example is predicted not to occur, contrary to fact. In this example the self-function must be copied out of the

infinitival clause in order to be satisfied by the external theta-function of try, which is applied to Jack. And recall that to leave the VP, a function must be unlinked, which requires the following mapping to be possible:

(35) [*Agent* [Theme]]
Ø *self*

I consider the potential problems that such a mapping creates in section 4.2.2.2.

We are now left with four potential mappings, namely those in (32) and (33). I defer the cases in (32) until the next section, where I discuss the absence of controlled objects. Here I concentrate on the latter cases, repeated in (36), which have a permissible thematic mapping and also conform to the syntactic conditions of the present framework:

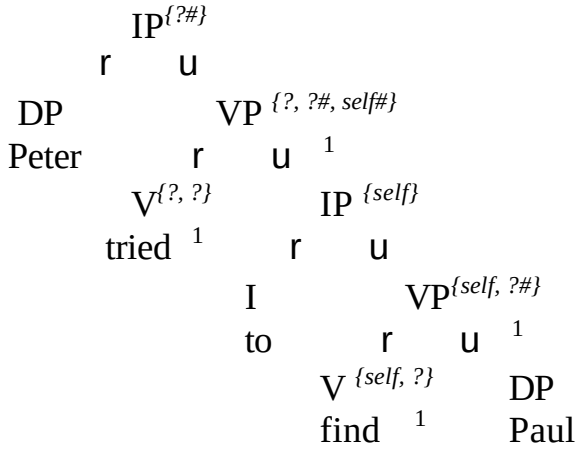
(36) a. [Agent [Theme]] b. [Agent [Theme]]
? ?$_1$ *self* ?$_1$

Example (36a) represents the straightforward case in which a transitive verb introduces two theta-functions distinguished through ordering. The unlinked function is mapped to the most prominent semantic argument, and the linked function to the less prominent one, with prominence relations represented by the embedding of the arguments in the brackets shown. I conclude that a theta-function can be mapped freely to a most- or less prominent semantic argument:

(37) Most prominent semantic Argument ? Theta function
Less prominent semantic Argument ? Theta-function

I now return to the question of anaphoric V, and to the occasions that a verb introduces a self-, rather than a theta-function. The mapping this entails is that of (36b), where the most prominent argument is mapped to a self-function, and the less prominent to a theta-function. In the following example a self-function is introduced by the infinitival V, *find*.

(38) Peter tried to find Paul



The matrix verb introduces two theta-functions, whilst the verb in the infinitival clause introduces one unlinked, hence external, self-function and a linked theta-function. Both these functions are copied up to the VP node, from where the internal theta-function is applied to the DP, *Paul*. But the self-function continues, beyond the infinitival, to the matrix VP. Here it is satisfied by this verb's external theta-function. At this same point, the verb's internal theta-function is satisfied by the infinitival clause. Note that the fact that the self-function originates in the clause that satisfied this internal theta-function means that this same theta-function cannot satisfy the self-function itself. On the VP node, then, the satisfaction of two functions occurs: that of the licensing theta-function and that of the non-licensing self-function. Since the banning of double satisfaction on a node by Exclusivity pertains to licensing functions only, the satisfaction of the self-function on this node incurs no violation. The unlinked theta-function, having satisfied the self-function, continues up the path of projections until it immediately dominates, and so is applied to, the matrix subject. The sequence of copying and application of these functions is the means by which the syntax ensures that one element, here the DP, *Peter*, can be the external argument of both predicates.

The proposal carries with it the assumption that the syntax-semantics mapping allows, in principle, a semantic argument a choice as to whether it is mapped to a theta- or a self-function. We can formalise this variation in the mappings between the most prominent semantic argument and their respective syntactic functions in the following way:

(39) Most Prominent Semantic Argument ? Theta-function or Self-function

If there exists this flexibility in the mapping of the most prominent semantic argument to a function, an immediate question is whether or not this same

flexibility exists for the mapping between less prominent semantic arguments, and if not, why not. That is, we must now return to the question of why the syntax-semantic mapping in example (32) fails. The reasoning will be that although the mapping principles themselves operate freely, and so do not rule these mappings out, the syntax will.

4.2.2.2 Why there is no object-PRO. One of the advantages of the idea that control can be understood as a binding relation involving the infinitival verb as the dependent element, is that the non-existence of controlled objects can be derived. All theories which claim that control is mediated by PRO fail to derive the unavailability of this construction, relying on a stipulation to this effect. The early PRO of Chomsky 1981 appeals to government. PRO must occur in ungoverned positions and so cannot follow a transitive verb, which would govern it. Later work, Chomsky and Lasnik 1993, introduces the notion of PRO needing 'null-case', a case peculiar to infinitival I, thus prohibiting its occurrence in a typical accusative case position. Manzini (1983) resorts to a restatement of the Case filter. Case in her framework becomes something that must be assigned whenever possible, a suggestion that aligns case assignment with theta-assignment. PRO in this theory must remain case-less, which means its occurrence can be ruled out through being unable to escape case assignment from the transitive verb. But reliance on any one of these assumptions should be considered a last-resort option, and so I will seek to avoid this route.

The present proposal can exclude controlled objects. The question that needs to be answered is why a transitive verb in an infinitival clause can only introduce an unlinked self-function and never a linked one. I now return to the final pair of syntax-semantics mappings, those in (32), repeated here as (40), where the part of the representation in need of attention is the mapping of a less prominent argument to the linked self-function. The most prominent argument, can, as has already been shown, be mapped to either theta- or self-function.

(40) a. [Agent [Theme]] b. [Agent [Theme]]

self *self* *?* *self*

1 *1*

A consideration of the syntactic structures that correspond to these mappings, shows that the unattested constructions into which they translate, cannot give rise to grammatical syntactic structures: the required result. Consider first a structure involving the mapping in (40a):

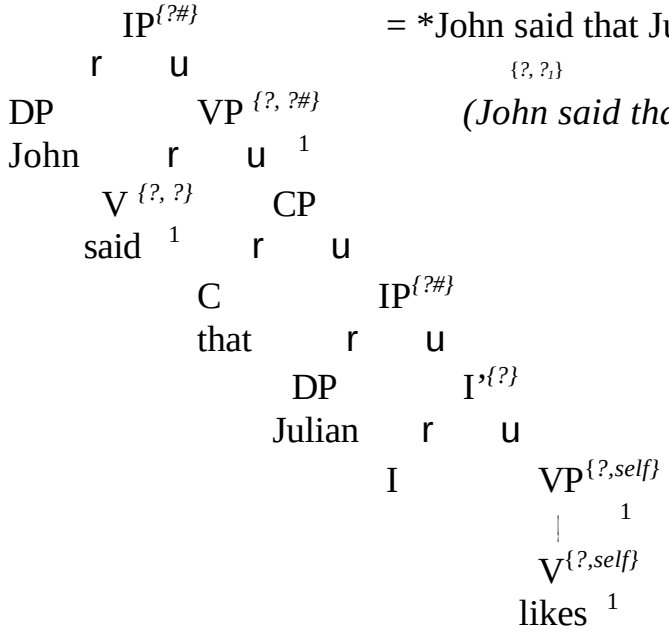
(41) * IP {?#} = Jack tried to find
r u *(Jack$_i$ tried to find Jack$_i$)*
DP VP {?, ?#, self#}
Jack r u 1
V{?, ?} IP {self}
tried 1 r u
I VP {self, self}
to 1
V {self, self}
find 1

The two functions introduced on the embedded V are distinguished through the ordering tier to which they are linked. Copied together, they maintain their position in the ordering tier, and so retain their identity. But once the maximal projection is reached, they must part, order only being maintained under projection. If the external self-function continues in isolation, it can be successfully copied to the matrix VP-node from where it can be satisfied by the external theta-function. But this leaves the internal self-function stranded in the embedded VP with no means of satisfaction. An unsatisfied function can have no effect, something Economy demands it to have. Such a representation then is correctly ruled out.

An alternative way of generating the structure in (41), would involve both self-functions being copied from the infinitival VP-node, yet separately. In this way they might reach the matrix VP-node. Copied in isolation, one self-function loses its link to the ordering tier. In this circumstance, the syntax interprets them as one, and the two functions collapse. But this is not permitted because the original order introduced to distinguish the two nodes has been discarded without having had any effect: unused linking also violates Economy.

I turn now to the structure corresponding to the mapping in (40b):

(42)



The embedded predicate introduces both the theta- and self-function. A function can never be satisfied by a property of the node in which it originates. If this were possible, then a nominal head could not c-select a nominal complement, for instance (see Neeleman and van de Koot 2002a for further discussion). It follows that the self-function cannot be related to a co-argument in the embedded clause. We have already seen that an internal function cannot be copied out of the VP without violating Economy, so if the self-function cannot escape the clause, it must be satisfied in the embedded clause. But again, with nothing else in the VP, there is no element to do so. And since Economy requires the self-function to have an effect, the absence of such an effect rules the structure out.

We should also consider a variant of the tree in (42) where the self-function is unlinked. This would correspond to the mapping in (31a), where the less prominent semantic argument has been mapped to an unlinked self-function. But given that binding relations cannot be established across a tensed C, we may assume that a self-function cannot leave a tensed clause:

(43) *Jack$_i$ thinks that himself$_i$ is clever

If this is true then the unlinked variant of the example in (42) is not a problem. The unlinked self-function has no means of being satisfied: it cannot leave the tensed clause, and the theta-function in the embedded clause originates from the same verb as the self-function, ruling it out as a possible binder.

In this section I have made the assumption that the syntax-semantics mapping allows a semantic argument to vary in terms of the syntactic function with which it is linked. The adoption of this assumption has the consequence that both the

presence of controlled subjects and the absence of controlled objects can be derived. In standard PRO-based terminology, this amounts to accounting for why there can be no PRO in the object position of a transitive predicate.

4.2.2.3 Why the locality of control and binding does not reduce to the MLC. Reducing control to a CM-based binding relation carries with it no added complications of the binding theory, since it states, without exception, that self-functions are satisfied by theta-functions. In particular no locality problems ensue, in fact problems of locality are solved. In section *2.2.1* I discussed the locality of OC and binding, demonstrating the parallel between them. To recall, it was shown that neither of them behave in accordance with the MLC. I revisit the problem below.

Although a subject can never be skipped in control, this strict locality restriction does not stretch to objects. We see these facts in (44). (44a) violates the MLC and so is predictably bad, yet (44b), despite breaking this condition, is good. The problem is not limited to English promise-constructions. If we turn to German[8], in (44c), a similar effect can be seen. Here the understood subject of the infinitival can be co-indexed with either the matrix subject or object:

(44) a. *DP_{SUBJi} DP_{SUBJ} PRO_i
a.' *$John_i$ expected Julian to try PRO_i to win

b. DP_{SUBJi} DP_{OBJ} PRO_i
b.' $John_i$ promised Julian PRO_i to win

c. Ich_i habe ihm_j angeboten mich $PRO_{i/j}$ zu fotografieren
I have him_{DAT} offered me/myself to photograph
'I offered him to photograph myself' or:
'I offered him that he could photograph me'

The effects just seen for control are also found with binding:

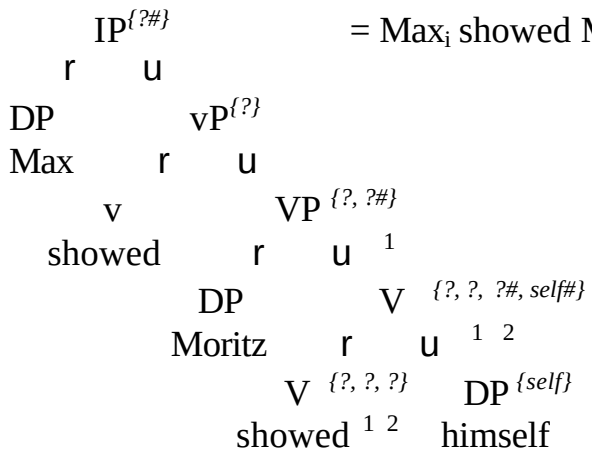
(45) a. *DP_{SUBJi} DP_{SUBJ} $REFLEXIVE_i$
a.' *$John_i$ expected Julian to behave $himself_i$

b. DP_{SUBJi} DP_{OBJ} $REFLEXIVE_i$
b.' Max_i showed $Moritz_j$ $himself_{i/j}$ (in the mirror)

[8] Example adapted from Wurmbrand 2002, where it is noted that the possibility of this shift is subject to variation both across and within languages.

These problems dissolve under a binding approach that incorporates Williams' theta-as-antecedent notion. The absence of the purported locality effect in binding, (45b), is illustrated in the tree below:

(46)

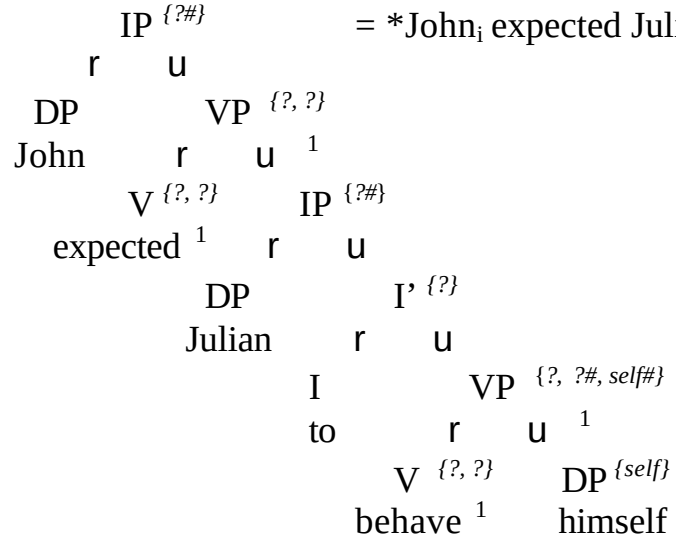


The self-function introduced on the reflexive is copied to the V-node, where it meets with the theta-functions copied from the transitive verb. Here it can either be satisfied by the unlinked, external theta-function, or the first linked, internal function.[9] If the self-function is satisfied by the external function, which is ultimately assigned to the matrix subject, then this subject will be the antecedent of the reflexive. Alternatively, if it is satisfied by the internal function, the subsequent application of this function to the matrix object, allows this object to act as antecedent.

But the approach put forward here can also answer for the presence of a locality effect for subjects, where the example sentence was provided in (45a'):

[9] The most embedded theta-function, linked to two, is satisfied by the clause in which the self-function originates so is not a suitable antecedent. It would lead to an I-with-I-type interpretive circularity.

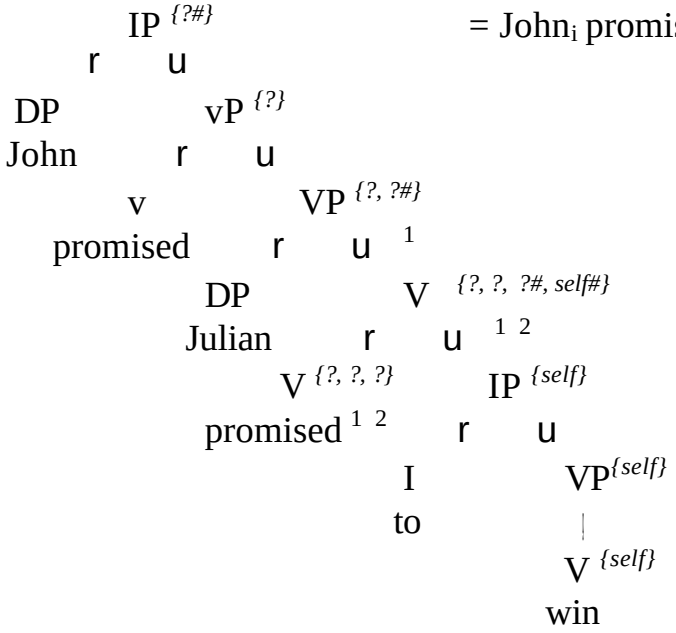
(47) * = *John$_i$ expected Julian to behave himself$_i$



John cannot be the antecedent under this analysis, because the self-function can never reach the matrix clause, it being satisfied by the theta-role of the embedded verb, *behave,* which will itself be satisfied by *Julian*.

If we now return to the control example of (44b'), which shows the same locality pattern, the problem yields to exactly the same analysis:

(48) = John$_i$ promised Julian to win$_i$



The self-function introduced on the infinitival verb, is copied to the V-node, where it is applied to the external theta-function. The application of this theta-function to the matrix subject results in the sought after interpretation, where it is the understood subject of the infinitival clause. The third theta-role, linked to two on the ordering tier, is satisfied by the clause in which the self-function originates,

so is not a possible antecedent. It would lead to an I-with-I-type interpretive circularity.

5 Summary

OC patterns with other syntactic dependencies, like movement and binding, in exhibiting the five properties of the CM. But unlike movement it does not obey the MLC. In this respect it patterns again with binding, which, like control, can skip an object in favour of the subject. A binding approach to OC allows an analysis that does not reject the Theta-Criterion, whereas a movement analysis, such as Hornstein 2000 must. I have argued that the infinitival verb itself, rather than any empty category, is the anaphoric element in this binding relation. I incorporated an assumption regarding the mapping between semantic arguments and the syntactic functions with which they were linked, assuming that there was variability in this syntax-semantic mapping. Specifically, the claim made was that there are cases when a semantic argument of a predicate can be mapped to a self- rather than a theta-function. When the most prominent semantic argument of a predicate was mapped to a self-function the result was an anaphoric verb such as is found with infinitival complements following control verbs. The incorporation of this claim allowed an answer for the universal absence of controlled objects. Finally, the combination of Williams' theta-role-as-argument notion together with the CM's system of function introduction and application, rendered the locality effects exhibited by both binding and control unproblematic.

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