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ET SEMANTIQUE 8

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Olivier Bonami & Patricia Cabredo Hofherr

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Avant-propos / *Foreword*

Les articles regroupés dans ce volume ont tous été présentés au cours de la huitième édition de CSSP, colloque de syntaxe et de sémantique qui s'est tenu à Paris en septembre 2009. Comme lors des précédentes éditions, le comité scientifique a sélectionné des travaux en syntaxe et en sémantique alliant à la fois le souci des problèmes empiriques et la recherche d'une présentation des données de langue dans un cadre formel et explicite. Nous souhaitons remercier les membres du comité scientifique de CSSP (Anne Abeillé, Claire Beyssade, Patricia Cabredo Hofherr, Alda Mari, Louise McNally, Philip Miller, Chris Piñon, Henk van Riemsdijk) pour leur aide dans la préparation de ce volume, et en particulier pour le travail de relecture auquel ils ont accepté de participer; ainsi que Grégoire Winterstein, qui a assuré une grande partie du travail de mise en page.

The articles collected in this volume have all been presented at the eighth edition of CSSP, the Conference on Syntax and Semantics that was held in Paris in September 2009. As for the previous editions, the scientific committee has selected papers on syntax and semantics that combine the study of an empirical problem with a presentation in a formal and explicit framework. We wish to thank the members of the CSSP scientific committee (Anne Abeillé, Claire Beyssade, Patricia Cabredo Hofherr, Alda Mari, Louise McNally, Philip Miller, Chris Piñon, Henk van Riemsdijk) for their help in the preparation of this book, and in particular for accepting to participate in the reviewing process; and Grégoire Winterstein, who was in charge of much of the page layout.

Olivier Bonami & Patricia Cabredo Hofherr

Constructions, Functional Heads, and Comparative Correlatives

Robert D. Borsley*

1 Introduction

In this paper I will discuss two theoretical concepts and one area of syntax. The concepts are CONSTRUCTIONS, which play a central role in some frameworks but are rejected in others, and FUNCTIONAL HEADS, which appear to be the main alternative to constructions. The area of syntax is what is generally called the COMPARATIVE CORRELATIVE or comparative conditional (CC) construction although of course whether this is anything more than a convenient label is a matter for debate. I will consider what sort of account of this area the two approaches can provide. I will argue that the first is the more promising.

The paper is organized as follows. In section 2, I outline the main current views of constructions and explain how functional heads might be seen as an alternative. In section 3, I introduce the CC construction, highlighting its idiosyncratic properties and the properties it shares with certain other constructions. In section 4, I present a construction-based analysis of the data. In section 5, I consider what a functional head-based analysis would involve. Finally, in section 6, I summarize and conclude the paper.

2 Background

Informal discussions of syntax often talk about constructions even if the author does not regard them as a necessary theoretical concept. Thus, to take one striking example, the term is used over a hundred times in Den Dikken's (2005) paper on the CC construction, a paper which emphatically rejects the idea that constructions are real. There are two very different views about the status of constructions in the literature. On the one hand, for a variety of work, beginning perhaps with Fillmore et al. (1988), they play a central role in syntactic analyses. Particularly important here is the Head-driven Phrase Structure Grammar (HPSG) framework, as it has developed since the mid-1990s

*This paper is partly based on joint work with Anne Abeillé, represented especially in Abeillé and Borsley (2008). An earlier version of the paper was presented at the meeting of the Linguistics Association of Great Britain at the University of Edinburgh in September 2009. I am grateful to the audience there and at CSSP 2009 for their comments. I am also grateful to an anonymous referee for a number of interesting comments. Any bad bits are my responsibility.

(see especially Sag 1997, 2010, and Ginzburg and Sag 2000). In contrast, Chomsky has long claimed that constructions do not exist. For example, Chomsky (1995: 6) asserts that there are ‘no grammatical constructions of the traditional sort within or across languages’. Thus, it may be convenient to speak of constructions, but on the Chomskyan view they are not required in a formal analysis.

The objection to constructions is not normally spelled out in any detail. However, the idea seems to be that they miss generalizations because constructions share properties with other constructions. In a brief discussion of the issue, Rizzi (2004: 328) suggests that there are ‘more elementary computational elements’. This is undoubtedly right. It has been clear, for example, since Ross (1967) and especially Chomsky (1977), that the various unbounded dependency constructions share properties such as being subject to island constraints. However, the fact that there are families of constructions with shared properties is well understood in construction-based work, and as we will see below, it is not difficult to capture the similarities between constructions within a construction-based approach. Thus, the fact that constructions share properties with other constructions is no objection to such an approach.

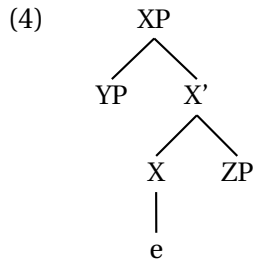
Rizzi goes on to assert that constructions are ‘mere conglomerates of such finer ingredients’ (2004: 328). He seems to be suggesting that all the properties of any construction are shared with some other construction and hence that constructions do not have any distinctive properties. On the face of it, however, constructions often have such properties. Consider, for example, non-finite relative clauses. Unlike finite relative clauses, they only allow a PP filler. Thus, whereas both versions of (1) are fine, only the second version of (2) is grammatical:

- (1) someone $\left\{ \begin{array}{l} \text{who I rely on} \\ \text{on whom I rely} \end{array} \right\}$
- (2) someone $\left\{ \begin{array}{l} * \text{who to rely on} \\ \text{on whom to rely} \end{array} \right\}$

Such idiosyncrasies look like a problem for the view that there are no constructions.

Given idiosyncrasies like these, how might the position that there are no constructions be maintained? An uncharitable answer would be: by ignoring the data. It is certainly true that a lot of work which rejects constructions ignores a lot of data. Culicover and Jackendoff (2005: 535) note that ‘much of the fine detail of traditional constructions has ceased to garner attention’, and various people have said similar things. A more charitable answer would be: with phonologically empty functional heads. Instead of assuming structures like (3), one can assume structures like (4).

- (3)
- $$\begin{array}{c} \text{XP} \\ \swarrow \quad \searrow \\ \text{YP} \quad \text{ZP} \end{array}$$



Then instead of stipulating that XP has YP as its first daughter and ZP as its second daughter, one can stipulate that X has YP as its specifier and ZP as its complement. This is the alternative to constructions which has been assumed within Principles and Parameters Theory and Minimalism.

It seems, then, that constructions and functional heads provide two rather different approaches to syntactic phenomena. It clearly makes sense to try to see which approach works best. Any construction might provide a suitable testing ground. One could look at relative clauses, where a detailed construction-based analysis is available in Sag (1997), or *wh*-interrogatives, where Ginzburg and Sag (2000) provide a comprehensive construction-based account. In the following pages I will look at the comparative correlative construction, exemplified by (5), and consider what the two approaches can say about it.

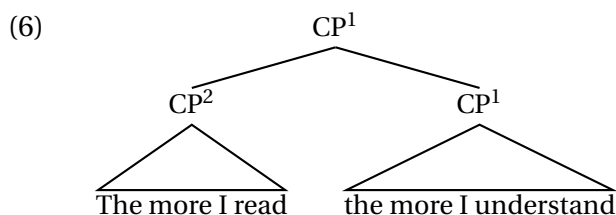
(5) The more I read, the more I understand.

I will outline the properties of the construction in the next section.

3 The comparative correlative (CC) construction

The CC construction was first highlighted within syntactic theory in Ross (1967), and it has received quite a lot of attention since the publication of Culicover and Jackendoff (1999).

Culicover and Jackendoff argue that it is a special construction, which ‘does not conform to the general patterns of X-bar theory’ (1999: 567). They discuss its properties, but they do not provide an explicit analysis. In a response, den Dikken (2005) rejects their position, commenting that ‘[t]he idea here is emphatically not that the comparative correlative is a “construction” with a fixed template; rather, the comparative correlative has a number of lexical ingredients, in language after language, that incontrovertibly lead to projection of a structure like (30) in syntax’ (516). His (30) is a structure in which the first clause is adjoined to the second, i.e. the structure in (6).



Adjunction is presumably a feature of X-bar theory. Hence, this structure conforms to ‘the general patterns of X-bar theory’. However, as discussed in Abeillé and Borsley

(2008), den Dikken does not explain how the lexical ingredients lead to the projection of such a structure or how the various idiosyncrasies of the construction highlighted by Culicover and Jackendoff might be handled. Thus, he has not shown that it is not a special construction.

The CC construction consists of a pair of finite clauses, each with an initial constituent containing *the* and a comparative word of some kind. In other words, it has the following form:

- (7) [[*the* comparative ...] ...] [[*the* comparative ...] ...]

I will call the clauses *the*-clauses and the initial constituents *the*-phrases. Ross (1967) and Culicover and Jackendoff (1999) show that *the*-clauses are filler-gap constructions rather like *wh*-interrogatives and *wh*-relatives. However, the construction has some unusual properties, which pose an important challenge for theories of syntax.

Firstly, as noted by Culicover and Jackendoff (1999: 546), the *the*-phrase may be followed by the complementizer *that*:

- (8) The more that I read, the more that I understand.

This contrasts with the situation in *wh*-interrogatives and *wh*-relatives, as the following illustrate:

- (9) a. I wonder how much (*that) he reads.
b. the books which (*that) he reads

Secondly, the construction allows the omission of a copula under certain circumstances (Culicover and Jackendoff 1999: 554). This is possible if: (i) its complement is fronted, (ii) it is the main verb of the clause, (iii) *that* is not present, and (iv) the subject has a non-specific interpretation. All four conditions are met in (10), but (11a) violates the first, (11b) and (11c) violate the second, (11d) violates the third, and (11e) violates the fourth.

- (10) The more intelligent the students, the better the marks.
(11) a. *The more intelligent the students, the more marks given.
b. *The more intelligent the students, the better the marks will.
c. *The more intelligent the students, the better it seems the marks.
d. *The more intelligent that the students, the better that the marks.
e. *The more intelligent they, the more pleased we.

It is not normally possible to omit the copula even if it is a main verb and its complement is fronted, as the following show:

- (12) a. *The students very intelligent.
b. *How intelligent the students?
c. *I wonder how intelligent the students.

Thirdly, the *the*-phrase may not contain a pied piped preposition (Culicover and Jackendoff 1999: 559). Thus, while (13a) is fine, (13b) is ungrammatical.

- (13) a. The more people I talk to, ...

- b. *To the more people I talk, ...

This is unlike the situation in *wh*-interrogatives and *wh*-relative clauses, as the following show:

- (14) a. How many people did Kim talk to?
b. To how many people did Kim talk?
- (15) a. the people Kim talked to
b. the people to whom Kim talked

Finally, it seems that the first clause is a rather unusual kind of adjunct clause. Culicover and Jackendoff (1999: 549–550) show that there is a variety of evidence that the second clause is a main clause. For example, it is possible to have a tag question reflecting the second clause but not one reflecting the first clause.

- (16) a. The more we eat, the angrier you get, don't you?
b. *The more we eat, the angrier you get, don't we?

Similarly, in the right context, the verb in the second clause may have subjunctive morphology, but this is not possible with the verb in the first clause.

- (17) $\left\{ \begin{array}{l} \text{It is imperative that} \\ \text{I demand that} \end{array} \right\} \left\{ \begin{array}{l} \text{the more John eatsn the more he pay.} \\ \text{* the more John eat, the more he pays.} \end{array} \right\}$

Culicover and Jackendoff also note (1999: 559) that subject–auxiliary inversion is possible in the second clause but not in the first clause. Thus, (18a) seems acceptable, but not (18b):

- (18) a. ?The more Bill smokes, the more does Susan hate him.
b. *The more does Bill smoke, the more Susan hates him.

Given that subject–auxiliary inversion does not normally occur in subordinate clauses but occurs in various types of main clause, this provides further evidence that the second clause is a main clause. It seems that the first clause is a subordinate clause, and since it is not the complement of some lexical head, it is presumably an adjunct. However, it is obligatory and confined to initial position. Thus, (19a) is ungrammatical and (19b) has a meaning different from (5).

- (19) a. *The more I read.
b. The more I understand, the more I read.

This is unlike the situation with a typical adjunct clause, e.g. a *when*-clause, which is optional and can appear in initial or final position, as the following show:

- (20) a. I understand more.
b. When I read more, I understand more.
c. I understand more when I read more.

Although the construction is an unusual one, it is not unique. Both the construction as a whole and the component *the*-clauses are similar in certain ways to certain other

constructions and clauses.

Looking first at *the*-clauses, we have already indicated that they are filler-gap constructions like *wh*-interrogatives and *wh*-relatives. Like other filler-gap constructions, they are subject to island constraints, as Ross (1967) observed. More specifically, *the*-clauses resemble what Huddleston and Pullum (2002: 14.6) call exhaustive conditionals.¹ The latter also allow copula omission, as the following illustrates:

- (21) However good the students (are),...

It seems, then, that copula-omission is a feature of two English constructions.²

Turning to the construction as a whole, we can note that it is similar in certain ways to the *if-then* construction, highlighted by McCawley (1988), and the *as-so* construction, highlighted by den Dikken (2003). The following illustrate:

- (22) a. If I read more, then I understand more.
b. As I read more, so I understand more.

Here, as in the CC construction, the second clause has a distinctive form and cannot easily appear on its own. The following are only possible if the context provides an interpretation for *then* and *so*, and *so* at least seems to be a different element here.

- (23) a. ?Then I understand more.
b. ?So I understand more.

As in the CC construction, the order of clauses is fixed in the *if-then* and the *as-so* constructions. The following have a different interpretation from the examples in (22) and, again, are only possible if the context provides an interpretation for *then* and *so*.

- (24) a. ?Then I understand more if I read more.
b. ?So I understand more as I read more.

The CC construction, the *if-then* construction, and the *as-so* construction all have related simpler constructions, as the following illustrate:

- (25) a. I understand more the more I read.
b. I understand more if I read more.

¹ Huddleston and Pullum argue that these clauses, which look rather like free relatives, are in fact a type of interrogative. (See also Rawlins 2008.) In Abeillé and Borsley (2008) we referred to them as adjunct free relatives. I now think this was a mistake.

² An anonymous referee suggests that a further similarity between *the*-clauses and exhaustive conditionals is that both allow multiple occurrences of key phrase types. He/she cites the following examples:

- (i) The more people drive at higher speeds on narrower roads, the more accidents you are going to get.
(ii) Whichever book you buy in whichever store, you always end up paying too much.

Notice, however, that whereas (ii) contains two *wh-ever* phrases, (i) contains just a single *the*-phrase and the in-situ comparative phrases lack *the*. Thus, there is an important difference here. Notice also that the possibility of multiple *wh-ever* phrases in exhaustive conditionals is unsurprising if they are a type of interrogative, as Huddleston and Pullum and Rawlins argue.

- c. I understand more as I read more.

(25a) is an example of what McCawley (1988) calls the reversed CC construction. All three examples seem to involve a main clause followed by an adjunct clause, which, like standard adjunct clauses, is optional, as (26) shows:

- (26) I understand more.

Unlike the other examples, (25a) requires the main clause to have a comparative interpretation.³ It also does not allow the fronting of the adjunct clause, unlike the examples in (25b, c).

- (27) a. *The more I read, I understand more.
b. If I read more, I understand more.
c. As I read more, I understand more.

Otherwise, however, the reversed CC construction seems to be a fairly standard main clause + adjunct clause structure.

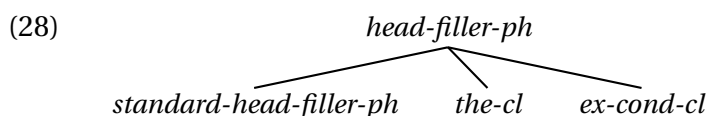
Thus, both the construction and its component clauses have distinctive properties and also properties that they share with other constructions and clauses. A satisfactory analysis must capture both the distinctive properties and the shared properties.

4 A construction based analysis

In this section, I will present a construction-based analysis of the CC construction within the version of HPSG developed in Ginzburg and Sag (2000). This will be similar although not identical to that presented in Borsley (2004).

Before we proceed we can note that an unstructured set of constructions, each with a stipulated set of properties, would make no distinction between the idiosyncratic properties of a construction and the properties it shares with other constructions, and generalizations would be missed. This is essentially Rizzi's objection to a construction-based approach. However, much construction-based work, including work in HPSG, assumes a hierarchical classification of constructions. This allows the two sorts of properties to be distinguished and the generalizations to be captured.

An analysis needs an appropriate set of hierarchically classified constructions (or phrase types) and constraints on them. I will look first at *the*-clauses and then consider the CC construction as a whole. *The*-clauses and exhaustive conditionals can be analysed as two non-standard types of head-filler phrase, giving the following hierarchy of phrase types:



³It need not contain a comparative word. As noted by McCawley (1988), examples like the following are fine:

- (i) My knowledge increases, the more I read.

Wh-relatives, *wh*-interrogatives and other filler-gap constructions will be subtypes of *standard-head-filler-ph*. The type *head-filler-ph* will be subject to the following constraint:

$$(29) \quad \textit{head-filler-ph} \rightarrow \left[\begin{array}{ll} \text{SLASH} & \{\} \\ \text{DTRS} & \langle [\text{LOC } \boxed{1}], \boxed{2} [\text{SLASH } \boxed{1}] \rangle \\ \text{HD-DTR} & \boxed{2} \end{array} \right]$$

This requires a head-filler phrase to be SLASH $\{\}$ and to have a head daughter and a non-head daughter whose LOCAL value is the local feature structure within the value of SLASH on the head daughter. This captures the properties which all head-filler phrases, both standard and non-standard, share, and in particular ensures that filler and gap match. The type *standard-head-filler-ph* will be subject to the following constraint, which requires it to be verbal and to be [NULL-].

$$(30) \quad \textit{standard-head-filler-ph} \rightarrow \left[\begin{array}{ll} \text{HEAD} & \nu \\ \text{NULL} & - \end{array} \right]$$

This constraint rules out standard head-filler phrases headed by a complementizer and with a missing copula, and thus accounts for the ungrammaticality of the following:

- (31) a. *I wonder [who that I saw].
b. *I wonder [how good the students].

The type *the-cl* will be subject to the constraint in (32).

$$(32) \quad \textit{the-cl} \rightarrow \left[\begin{array}{ll} \text{HEAD} & \left[\begin{array}{ll} \text{VFORM} & \textit{fin} \\ \text{MOD} & \text{'S[imp-comp]'} \end{array} \right] \\ \text{CORREL} & \textit{the} \end{array} \right]$$

This requires a *the*-clause to be finite, unlike, for example, *wh*-interrogatives and *wh*-relatives. It also requires it to modify a clause with an implicit comparative interpretation, which I represent informally as 'S[imp-comp]'. Finally, it requires it to be [CORREL *the*]. I assume that [CORREL *the*] is realized as a degree word *the*, which can only appear as a specifier of a comparative adjective.⁴ I also assume that CORREL is an EDGE feature in the sense of Miller (1992). As such, it will be realized on the leftmost constituent of the expression it is associated with, ruling out a pied-piped preposition as in (13b) above. Since *the*-clauses are not standard head-filler phrases, they are not required to be verbal, and hence may be headed by a complementizer, and may be [NULL +], and hence have a missing copula. Thus, (8) and (10), repeated here as (33), are allowed:

⁴Henk van Riemsdijk suggested to me that the appearance of the could be explained if *the more I read* has essentially the same structure as 'the extent to which I read'. The problem with this suggestion is that English is very unusual in having the definite article in its CC construction. Most languages have other pre-comparative words or no pre-comparative words at all. See den Dikken (2005) for a variety of examples.

- (33) a. The more that I read, the more that I understand.
 b. The more intelligent the students, the better the marks.

How exactly should missing copula examples be analysed? An obvious approach is to assume that [NULL +] picks out a phonologically null finite copula with the following properties:

$$(34) \left[\begin{array}{l} \text{HEAD} \left[\begin{array}{l} \nu \\ \text{VFORM } fin \\ \text{NULL } + \end{array} \right] \\ \text{SUBJ} \langle \boxed{} \text{NP['F']} \rangle \\ \text{COMPS} \langle \rangle \\ \text{SLASH} \{ \text{XP}[\text{SUBJ} \langle \boxed{} \rangle] \} \end{array} \right]$$

‘F’ here stands for whatever restrictions need to be placed on the subject, the COMPS feature ensures that this form does not have an in-situ complement, and the SLASH feature ensures that it has a fronted complement. Within this approach, (11a) is out because it has an in-situ complement, and (11b) is out because it is a non-finite form of the copula that is missing. (11c) and (11d) will be out if only the head of a head–filler phrase can be [NULL +]. Finally, (11c) is excluded by ‘F’.

Turning to the type *ex-cond-cl* we can propose a constraint requiring it to be finite and verbal, to modify a clause, and to have a first daughter which is a WH-EVER expression as follows:⁵

$$(35) \text{ ex-cond-cl} \rightarrow \left[\begin{array}{l} \text{HEAD} \left[\begin{array}{l} \nu \\ \text{VFORM } fin \\ \text{MOD } S \end{array} \right] \\ \text{DTRS} \langle [\text{WH-EVER} \boxed{}], [\boxed{}] \rangle \end{array} \right]$$

This constraint rules out an exhaustive conditional headed by a complementizer, as in (36).⁶

- (36) *However good the students are, ...

Since exhaustive conditionals are not standard head–filler phrases, they may be [NULL +] and hence have a missing copula, as in (37).

- (37) However good the students, ...

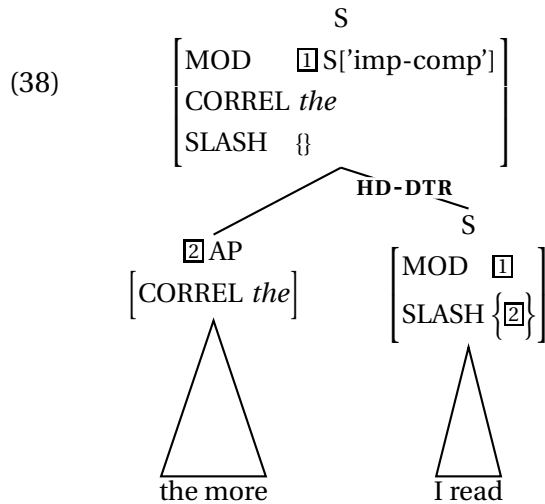
⁵The analysis needs to be extended in some way to accommodate a second type of exhaustive conditional.

(i) $\left\{ \begin{array}{l} \text{No matter} \\ \text{Irrespective of} \\ \text{Regardless of} \end{array} \right\} \text{ how good the students (are), ...}$

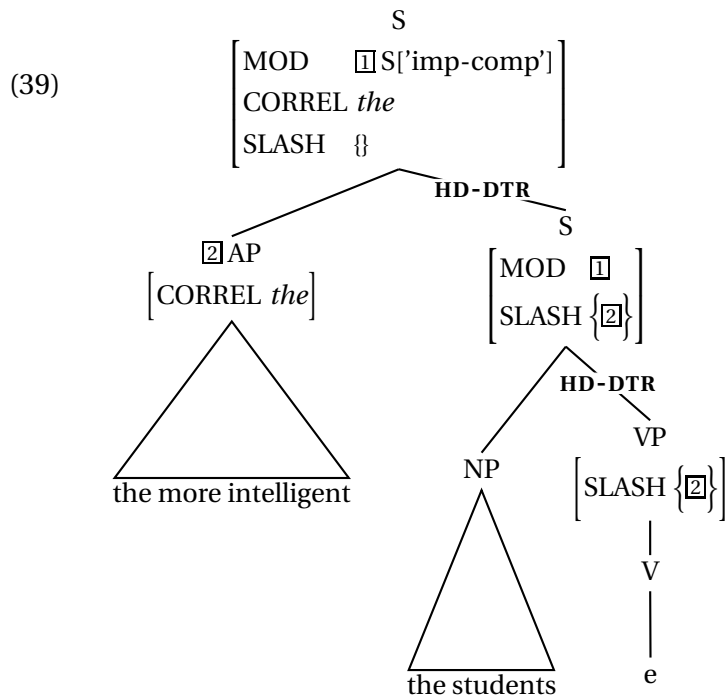
I will not consider how this might be done.

⁶If such examples are acceptable for some speakers, they will have a simpler constraint, without ν in the value of HEAD.

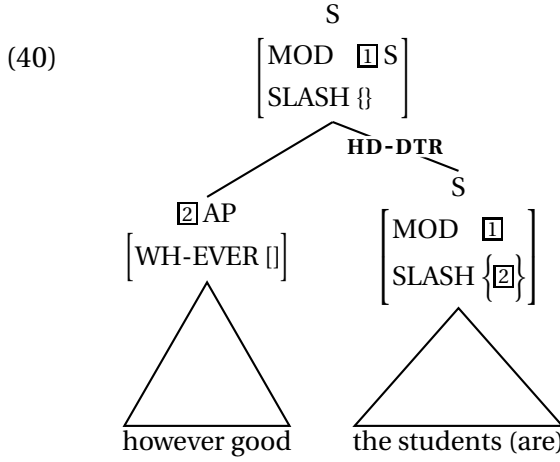
Within this analysis, the first clause in (5) will have the structure in (38), where 'S' is an abbreviation for [HEAD ν , SUBJ $\langle \rangle$, COMPS $\langle \rangle$]:



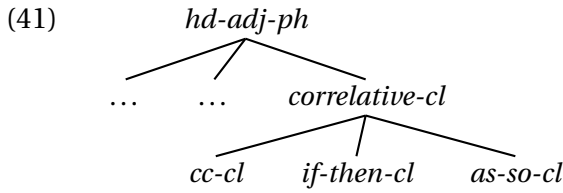
The second clause will have the same structure. The first clause in (10) will have the structure in (39):



Again, the second clause will have the same structure. The exhaustive conditional in (21) will have the following structure:



We can turn now to the construction as a whole. The CC, *as-so*, and *if-then* constructions can be analysed as subtypes of correlative clause, the latter being a non-standard type of head-adjunct phrase, giving the following hierarchy of phrase types:



Other types of head-adjunct phrases will be VP + adverb structures, adjective + nominal structures and noun + relative structures. The type *hd-adj-ph* will be subject to a constraint requiring the head daughter to have the syntactic and semantic properties in the MOD value of the non-head daughter as follows:

$$(42) \quad \text{hd-adj-ph} \rightarrow \left[\begin{array}{l} \text{DTRS} \quad \langle \boxed{1} [\text{SS } \boxed{2}], [\text{HEAD } [\text{MOD } \boxed{2}]] \rangle \\ \text{HD-DTR} \quad \boxed{1} \end{array} \right]$$

In most head-adjunct phrases the phrase and its head will have the same category. This will follow from the Generalized Head Feature Principle of Ginzburg and Sag (2000: 33), which we can formulate as follows:

$$(43) \quad \text{hd-ph} \rightarrow \left[\begin{array}{l} \text{SYNSEM} \quad / \boxed{1} \\ \text{HD-DTR} \quad [\text{SYNSEM } / \boxed{1}] \end{array} \right]$$

This is a default statement, as indicated by the slash notation. It requires a headed phrase and its head-daughter to have the same syntactic and semantic properties unless some other constraint requires a difference.

In correlative clauses, the clause and its head will not have the same category. The head will be [CORREL *the*], [CORREL *then*], or [CORREL *so*], but the clause must be [CORREL *none*] to rule out an example like the following, in which a CC construction is the head of another CC construction:

(44) *The more I think [the more I read, the more I understand].

It may be that head–adjunct phrases should be required to be [CORREL *none*], but I will just impose this restriction on correlative clauses. I suggest the following constraint:

$$(45) \quad \text{correlative-cl} \rightarrow \left[\begin{array}{l} \text{HEAD} \quad \left[\begin{array}{l} v \\ \text{MOD} \quad \text{none} \end{array} \right] \\ \text{CORREL} \quad \text{none} \end{array} \right]$$

This requires correlative clauses to be verbal, to be [MOD *none*], and to be [CORREL *none*]. The first restriction ensures that the construction is verbal even when the main clause is headed by a complementizer, as in (8), repeated here as (46).

(46) The more that I read, the more that I understand.

The second restriction is necessary in the case of the CC construction, where the head will be [MOD 'S[imp-comp]']. It prevents the construction from being a modifier, ruling out an example like (47).

(47) *I know more, [the more I read, the more I understand].

The role of the third restriction has just been discussed.

Of course we also need to accommodate the distinctive properties of the three subtypes of correlative clause. We can do this with the following constraints:

$$(48) \quad \begin{array}{ll} \text{a.} & \text{cc-cl} \rightarrow \left[\text{DTRS} \quad \langle [\text{CORREL } \textit{the}], [\text{CORREL } \textit{the}] \rangle \right] \\ & \quad \quad \quad \left[\text{INV} \quad - \right] \rangle \\ \text{b.} & \text{if-then-cl} \rightarrow \left[\text{DTRS} \quad \langle [\text{CORREL } \textit{then}], [\text{CORREL } \textit{if}] \rangle \right] \\ \text{c.} & \text{as-so-cl} \rightarrow \left[\text{DTRS} \quad \langle [\text{CORREL } \textit{so}], [\text{CORREL } \textit{as}] \rangle \right] \end{array}$$

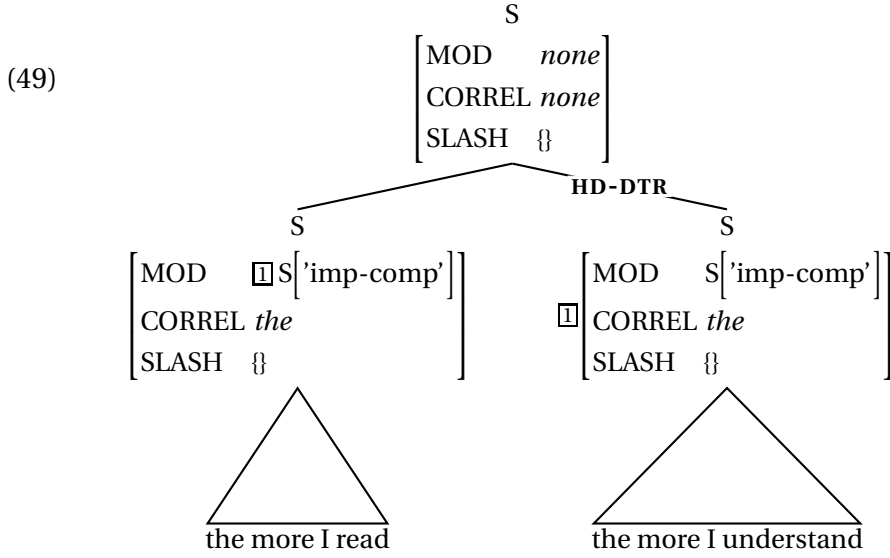
Notice that the first member of the DTRS list is the head. This follows from the fact that correlative clauses are head–adjunct structures, subject to the constraint in (42). The [INV–] specification on the second daughter in (48a) ensures that there is no inversion in the first clause of the CC construction. The absence of any value for INV on the first daughter means that inversion is possible.⁷

Within this approach, (5) will have the following structure:

⁷The second daughter in (48c) should also be [INV–]. However, this is probably not required for the second daughter in (48b) given examples like the following:

- (i) Had I been there, then I would have seen you.

We can analyse this as an example of the *if–then* construction if we do not require the second daughter to be [INV–] and if we allow certain finite auxiliaries to be [CORREL *if*].



Here the first clause is an adjunct modifying the second clause, which is a head. Although it is a head, the construction has different values for MOD and CORREL, as required by (45). The *as-so* and *if-then* constructions will have similar structures.

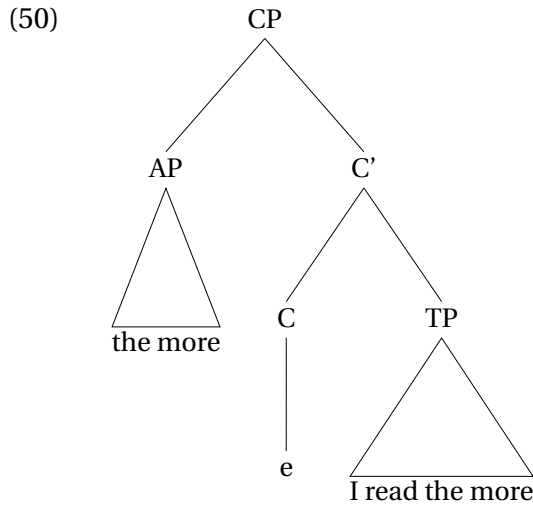
Here, then, we have a fairly detailed construction-based analysis of the English CC construction, one which captures both the idiosyncratic properties of the construction and the properties it shares with other constructions. As far as I am aware, it does not miss any generalizations.⁸

5 A functional head-based approach

We can now consider what the functional head-based approach to the CC construction might look like. As far as I am aware, there are no functional head-based analyses in the literature, only certain sketches, which need to be fleshed out. As emphasized in Abeillé and Borsley (2008), a sketch is all that den Dikken (2005) provides. As in the previous section, I will first look at the clauses that make up the construction and then consider the construction as a whole.

Within the functional head-based approach *the*-clauses will have something like the following structure:

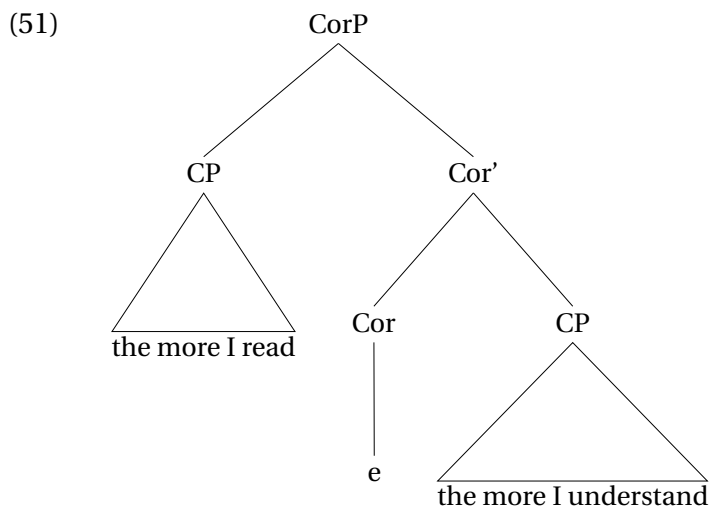
⁸An important limitation of this approach is that it says nothing about meanings. For an HPSG analysis of the CC construction which incorporates a semantic analysis see Sag (2010).



The two clauses of the CC construction will have somewhat different complementizers, one heading an adjunct and not attracting an auxiliary, the other not heading an adjunct and optionally attracting an auxiliary. Both complementizers may be realized as *that*. Both must also allow TP to be headed by a phonologically null form of the copula whose complement is obligatorily fronted. However, they must only allow this if they are phonologically null. It is not really clear how this approach could exclude a pied piped preposition.

Within this approach, exhaustive conditionals will require another complementizer. This will always be phonologically empty but like the two complementizers for *the*-clauses will allow TP to be headed by a phonologically null form of the copula.

What about the construction as a whole? As noted earlier, den Dikken (2005) proposes that the first clause is adjoined to the second. However, this analysis does not explain why the first clause is obligatory. The obvious alternative is an analysis in which the first clause is the specifier and the second the complement of an empty functional head. If we call this Cor(relative), we will have the following structure:



The *if-then* and *as-so* constructions will require further empty functional heads selecting an appropriate specifier and complement. *If* and *as* can probably be analysed as complementizers heading the clauses they introduce. However, *then* and *so*

would probably be analysed as specifiers. If so, *then*- and *so*-clauses will involve further phonologically empty complementizers.

Thus, whereas a construction-based approach needs a variety of phrase types to handle the data, a functional head-based approach needs a variety of mainly empty functional heads. These elements need to take the right sort of specifier and complement, to either head an adjunct or not, and to either attract an auxiliary or not. The following table spells out these properties:

Functional head	Form	Specifier	Complement	Adjunct heading	Aux-attraction
C(<i>the</i> -main)	(<i>that</i>)	<i>the</i> -phrase	finite TP with copula omission	No	Optional
C(<i>the</i> -subord)	(<i>that</i>)	<i>the</i> -phrase	finite TP with copula omission	Yes	No
C(ex-cond)	e	<i>wh-ever</i> phrase	finite TP with copula omission	Yes	No
Cor(CC)	e	subordinate <i>the</i> -CP	main <i>the</i> -CP	No	No
Cor(<i>if-then</i>)	e	<i>if</i> -CP	<i>then</i> -CP	No	No
Cor(<i>as-so</i>)	e	<i>as</i> -CP	<i>so</i> -CP	No	No
C(<i>if</i>)	<i>if</i>	No	finite TP	Yes	No
C(<i>then</i>)	e	<i>then</i>	finite TP	No	No
C(<i>as</i>)	<i>as</i>	No	finite TP	Yes	No
C(<i>so</i>)	e	<i>so</i>	finite TP	No	No

Table 1: The properties of functional heads

A real analysis would need to provide lexical entries for these elements which encode these properties. However, it is not really clear what form these entries should take.⁹ There don't seem to be any generally accepted positions within Minimalism on how these properties should be handled. It seems to be generally assumed that specifiers of functional categories are filled by movement, but at least in the case of movement to SpecCP there are different positions in Chomsky's writings. In Chomsky (2000), C and the moved constituent undergo Agree and movement to SpecCP is triggered by an EPP feature on C. In Chomsky (2008), Agree is not involved here, and movement is triggered by what Chomsky calls an Edge Feature (which is something quite different from Miller's EDGE features). Complement selection seems to have had little attention within Minimalism. As for adjuncts, one view, developed in Cinque (1999), is that they are the specifiers of functional heads, but of course there are various ways in which this idea might be implemented. Movement of an auxiliary to C is often said to be triggered by the affixal nature of the head to which movement occurs, but it is not really clear what this means other than that the head triggers head-movement.

Given appropriate lexical entries, it should be possible to get most of the facts right.

⁹While the properties of lexical elements, especially empty functional heads, are central for Minimalism, lexical entries are almost never provided. As Newmeyer (2003: 95, fn. 9) notes, 'in no framework ever proposed by Chomsky has the lexicon been as important as it is in the MP [Minimalist Program]. Yet in no framework proposed by Chomsky have the properties of the lexicon been as poorly investigated'.

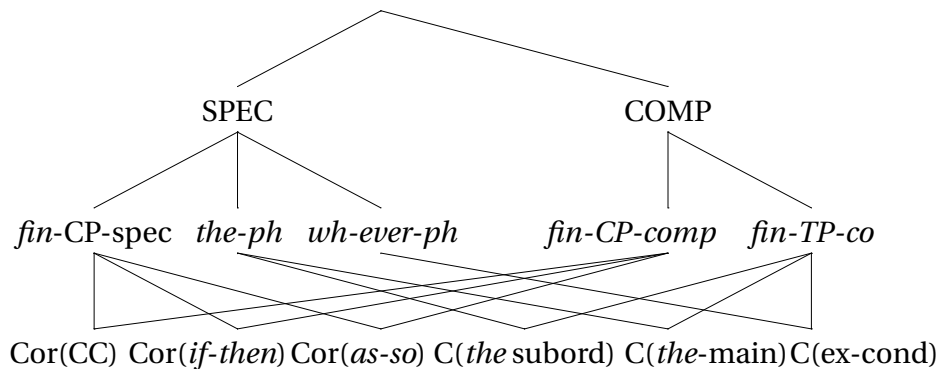
However, there is a rather obvious problem. An unstructured set of functional heads makes no distinction between properties shared by some or all elements and properties restricted to a single element, and thus misses generalizations. Here are the main similarities:

- (52)
- a. $C(\textit{the-main})$, $C(\textit{the-subord})$, and $C(\textit{ex-cond})$ have the same complement.
 - b. $C(\textit{the-main})$ and $C(\textit{the-subord})$ have the same specifier.
 - c. $F(\textit{CC})$, $F(\textit{if-then})$, and $F(\textit{as-so})$ are similar in taking CP as specifier and complement.
 - d. $C(\textit{the-subord})$, $C(\textit{if})$, and $C(\textit{as})$ are similar in modifying a clause.

Thus, an unstructured set of functional heads has exactly the same problem as an unstructured set of constructions. It is somewhat surprising that this point has been missed by advocates of functional head-based approaches. This is probably a reflection of the fact that they do not develop detailed analyses.

The obvious response to this problem is to introduce some structure, more precisely to introduce a hierarchical classification of functional heads. Such a classification has been assumed in HPSG since Pollard and Sag (1987) to allow properties that are shared between different words to be spelled out just once. I will not try to work out a complete classification, but I will sketch a partial classification. In (53), I classify six of the functional heads postulated above on the basis of their specifier and complement selection properties. These are independent dimensions of classification identified by upper-case letters, as is standard in HPSG. It may well be that other dimensions would be appropriate for adjunct-heading and auxiliary-attracting properties.

(53)



These types will be associated with features as follows:

Type	Features
<i>fin-CP-spec</i>	features that ensure that a head has a finite CP as a specifier
<i>the-ph</i>	features that ensure that a head has a <i>the</i> -phrase as a specifier
<i>wh-ever-ph</i>	features that ensure that a head has a <i>wh-ever</i> -phrase as as specifier
<i>fin-CP-comp</i>	features that ensure that a head takes a finite CP as a complement
<i>fin-TP-co</i>	features that ensure that a head takes a finite TP allowing a copula omission as a complement

Table 2: Types and features for functional heads

If fully developed, this approach should be able to distinguish between properties shared by some or all elements and properties restricted to a single element, and thus not miss any generalizations. It looks, then, as if it may be possible to develop a functional head-based approach which both gets the facts right and does not miss any generalizations.

How does this approach compare with the construction-based approach presented in the last section? An anonymous referee suggests that the choice between the two approaches is ‘mainly a matter of taste’. Using LGB as an abbreviation for *Lectures on Government and Binding* (Chomsky 1981), he/she concedes that ‘[t]he desire to establish sweeping principles that go well beyond specific constructions in specific languages is often so dominant in LGB/minimalist thinking that analytical details often end up being neglected’ but goes on to suggest that ‘the construction-based approach ... tends to get bogged down in idiosyncrasies, at the expense of trying to establish truly overarching principles of the type that LGB-style work has been relatively successful in discovering’. He/she doesn’t explain in what sense construction-based work is ‘bogged down in idiosyncrasies’. Is Sag (1997) bogged down in the idiosyncrasies of English relative clauses? Is Ginzburg and Sag (2000) bogged down in the idiosyncrasies of English interrogatives? Is the analysis presented in section 4 bogged down in the idiosyncrasies of the CC construction? Such charges would only be justified if the attention to idiosyncrasies that is a feature of these analyses led them to miss important generalizations. I don’t see any reason to think that this is the case. Moreover, it is not clear to me that there are any ‘truly overarching principles’ that have been missed in construction-based work. Hence, I don’t think the choice between the two approaches is just a matter of taste with one preferable if one is interested in general principles and the other preferable if one is interested in idiosyncrasies.

One point to emphasize about the two approaches is that we are not in a position to make a real comparison. We have a fairly detailed construction-based analysis but just a sketch of a functional head-based analysis (though a rather more detailed sketch than den Dikken 2005 provides). The latter needs to be developed more fully. I leave this task to those who favour such an approach.

Although it is not easy to compare the two approaches, we can say certain things about the relation between them. One point we can make is that there are important similarities. One might say that the functional head-based approach mimics the construction-based approach. Another point we can make is that there is no reason to think that the functional head-based approach is any less stipulative than the construction-based approach. It involves different sorts of stipulation, but there is no reason to think that it requires any fewer stipulations. There is also no reason to think that the functional head-based approach is more explanatory than the construction-based approach, as is suggested by Chomsky’s remark that Minimalism ‘encourages us to distinguish genuine explanations from “engineering solutions”’ (Chomsky 2000: 93).

The similarities between the two approaches might lead someone to suggest that they are notational variants. I think this would be wrong. One approach involves a classification of phrases, while the other involves a classification of mainly phonologically empty lexical elements. The former unquestionably exist, but there is room for debate about the existence of the latter where they are phonologically empty. Arguably an

approach involving a classification of elements which undoubtedly exist is preferable other things being equal to one involving a classification of elements whose existence is debatable.

There is a rather different argument which suggests that a construction-based approach is preferable. As Culicover and Jackendoff (2005: chapter 1) point out, canonical idioms such as (54) and constructional idioms such as (55) suggest that linguistic knowledge includes phrases with full and partial lexical content.

(54) Kim kick the bucket.

(55) Elmer hobbled/laughed/joked his way to the bank.

This makes it hard to see what objection there could be to allowing phrases with no specific lexical content as a further component of linguistic knowledge. But this is what canonical constructions are.

Thus, while a real comparison between a construction-based approach to CCs and a functional head-approach requires the fuller development of the latter, there are certain things that we can say about the relation between the two approaches and one is that there seem to be reasons for favouring the former.

6 Concluding remarks

In this paper, I have investigated the relation between two rather different approaches to syntax: the construction-based approach developed especially within HPSG and the functional head-based approach assumed within Principles and Parameters Theory and Minimalism. I have looked in particular how the two approaches might handle the CC construction. I have come to a number of conclusions. In particular I have suggested that there are reasons for preferring a construction-based approach.

As emphasized in the previous section a comparison of the two approaches is hampered by the fact that there are no detailed functional head-based analyses of the CC construction and it is only possible to spell out in fairly general terms what form such an analysis should take. This is not an isolated situation. Consider, for example, English relative clauses, where a detailed construction-based analysis is available in Sag (1997) but where there is no comparable functional head-based analysis, or consider English *wh*-interrogatives, analysed in terms of constructions in Ginzburg and Sag (2000) but never analysed in the same sort of detail in terms of functional heads. Ginzburg and Sag (2000: 1) remark that '[o]nly when comprehensive grammar fragments are commonplace will it become possible to meaningfully compare available frameworks for grammatical description'. It is hard to see how anyone could disagree with this. However, at present there seem to be no real functional head-based grammar fragments. If none are forthcoming, some may draw some negative conclusions about functional head-based approaches.

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Robert D. Borsley
University of Essex
rborsley@essex.ac.uk

Move and accommodate: A solution to Haddock's puzzle

Lucas Champollion and Uli Sauerland*

1 Introduction

What licenses the use of a definite description? The formal and philosophical literature has approached this question in two ways. The *uniqueness approach* (Frege, 1892; Russell, 1905; Strawson, 1950) holds that we may use a definite determiner only if the property denoted by its complement holds of exactly one individual in some domain: Sentence (1) and (2) can only be true if there is exactly one king of France, and exactly one American governor, respectively. Since this is not the case in the actual world, the sentences are either false or (on most modern accounts) fall prey to a presupposition failure.

- (1) The king of France is bald.
- (2) Today, the American governor appeared on TV.

The *familiarity approach* (Christophersen, 1939; Heim, 1982; Groenendijk and Stokhof, 1991) holds that definite descriptions are anaphoric to a discourse referent that is already in the discourse context: A discourse like (3) is felicitous even given that there is more than one doctor in the universe. Within the familiarity approaches, Roberts (2003) contrasts the notions of *strong familiarity*, which usually involves explicit previous mention of the entity in question, and *weak familiarity*, where its existence need only be entailed in the linguistic or nonlinguistic context, for example on the basis of perceptually accessed information.

- (3) There's a doctor in our little town. The doctor is Welsh. Roberts (2003)

Many actual accounts fall somewhere in the spectrum between the uniqueness and the familiarity approach. For example, Schwarz (2009) argues on independent grounds that there are two types of definites in natural language, and that each of them is characterized by one of the approaches mentioned.

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This paper discusses the use of *embedded definites*, or definite descriptions embedded in other definite descriptions, such as the following:

- (4) a. the circle in the square
 b. the rabbit in the hat
 c. the lady with the dog
- Haddock (1987)
 Meier (2003)

Embedded definites pose a problem for all the approaches mentioned. On the uniqueness approach, they pose a problem because their uniqueness presupposition is weaker than expected. For example, it is possible to utter (5) in a context that contains more than one square. The sentence comes out as true in Fig. 1.

- (5) The circle in the square is white.

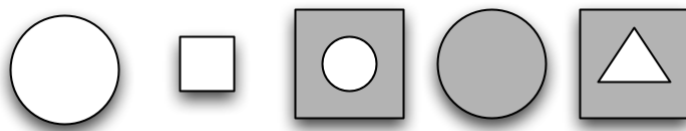


Figure 1: The basic example

Haddock's puzzle, as we will refer to it, consists in the fact that the inner definite *the square* does not introduce a presupposition to the effect that there is only one square (Haddock, 1987). We would expect such a presupposition because in general, definite determiners introduce uniqueness presuppositions on their syntactic complements and do not take surrounding material into account. For example, it is odd to utter any of the sentences in (6) in the context of Fig. 1. This is expected if the uniqueness presuppositions of *the* are computed with respect to their complements only. Otherwise, these sentences should be acceptable, because Fig. 1 contains exactly one circle in a square, exactly one small circle, and exactly one square on the right.

- (6) a. The circle is in the square.
 b. The circle is small.
 c. The square is on the right.

Embedded definites also pose a problem for the familiarity approach. First, sentences like (5) can be uttered with respect to situations like Fig. 1 without any previous talk of circles and squares. This is unexpected under the strong familiarity approach, which requires that the referents of definite descriptions have been previously mentioned. The weak familiarity approach may look at first sight like it fares better, because it holds that definite descriptions are licensed whose referent is known by the extralinguistic context alone. But, like all other approaches, it too fails to account for the contrast between (5) and the sentences in (6), since Fig. 1 provides potential referents for the definite descriptions in all these sentences.

The problem for both approaches is compounded by the fact that even embedded definites introduce presuppositions. While sentence (5) is acceptable in Fig. 1 above,

it is unacceptable in Fig. 2 below. The only difference between the two figures is the addition of a second circle-in-a-square pair. Apparently, sentence (5) introduces the presupposition that there is exactly one nested circle-in-a-square pair. This presupposition seems to arise from an interaction of the two definite descriptions, which is unexpected and problematic on either approach. Higginbotham (2006) playfully referred to the challenge of accounting for this interaction as “the simplest hard problem I know”.

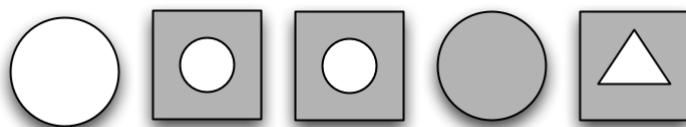


Figure 2: The scene from Fig. 1, with an additional nested circle-in-a-square shape

The claim of this paper is that embedded definites can, despite the appearances, be accounted for on the uniqueness approach. Far from being a surprise, we argue that the behavior of embedded definites is actually expected once two independent facts are taken into account: the ability of noun phrases to take scope, i.e., to be interpreted in a different place from their syntactic position, and the interaction of presuppositions and scope-taking elements. Specifically, we analyze embedded definites as a case of *inverse linking* (Gabbay and Moravcsik, 1974; May, 1977): the embedded definite takes scope over the embedding one. The presupposition of the embedded definite is weakened as a result of the independently motivated process of *intermediate accommodation* (Kratzer, 1989; Berman, 1991). In our case, this process transfers the presupposition of the embedding definite into the restrictor of the embedded one.

Like other scope-taking processes, inverse linking is generally taken to be subject to locality constraints: if a syntactic island, such as a finite clause boundary, intervenes in the path of a scope-taking element, then the resulting reading is unavailable or degraded (Rodman, 1976). Since our account views embedded definites as cases of inverse linking, we predict that inserting an island into an embedded definite, all else being equal, should lead to a similar degradation. We report results from an online survey with 800 participants that confirm this prediction.

2 The Proposal

This section motivates and spells out our solution to Haddock's puzzle. We start from a naïve account of definites that implements the standard uniqueness approach and fails on embedded definites such as (5). We then add a simple implementation of intermediate accommodation and demonstrate how it correctly derives weakened presuppositions for embedded definites. Finally, we show that intermediate accommodation does not interfere with the interpretation of nonembedded definites such as (6).

We adopt a semantic notion of presupposition, according to which sentences have presuppositions that are compositionally computed from the denotations of their lexi-

cal items, in tandem with their assertions. The framework we use is fairly standard (see e.g. Karttunen and Peters, 1979; Muskens, 1996); an accessible introduction is found in Heim and Kratzer (1998). Sentences are interpreted as pairs of propositions: an assertion and a global presupposition, which is the conjunction of all the presuppositions provided by the lexical items in the sentence. Sentences whose global presupposition is true have the same truth value as their assertion; sentences where it is false lack a truth value. Denotations of lexical items that carry a presupposition are represented as partial functions that are undefined whenever this lexical presupposition is false. We write $\lambda x : \varphi . \psi$ for the partial function that is defined for all x such that its lexical presupposition φ holds, and that returns ψ wherever the function is defined. We write $\exists!$ for the generalized quantifier *exactly one*. The term $\iota x R(x)$ denotes the unique individual x such that $R(x)$ holds, and fails to denote if there is either no or more than one such individual (Hilbert and Bernays, 1939). With these conventions, the denotation of the word *the* can be represented as follows:

$$(7) \quad \llbracket \text{the} \rrbracket = \lambda R : [\exists! x R(x)]. [\iota x R(x)]$$

What (7) says is that the word *the* is translated as a partial function which is defined on any predicate R that applies to exactly one entity, and that this partial function returns the unique entity of which R holds.

In such a framework, the challenge consists in deriving the presuppositions of both embedded and non-embedded definites in a compositional way. Consider first the baseline case, a nonembedded sentence. Sentence (6a), repeated here as (8), presupposes that there exist exactly one circle and exactly one square.¹

(8) The circle is in the square.

This presupposition is straightforwardly derived with the standard syntax and lexicon given in Fig. 3.

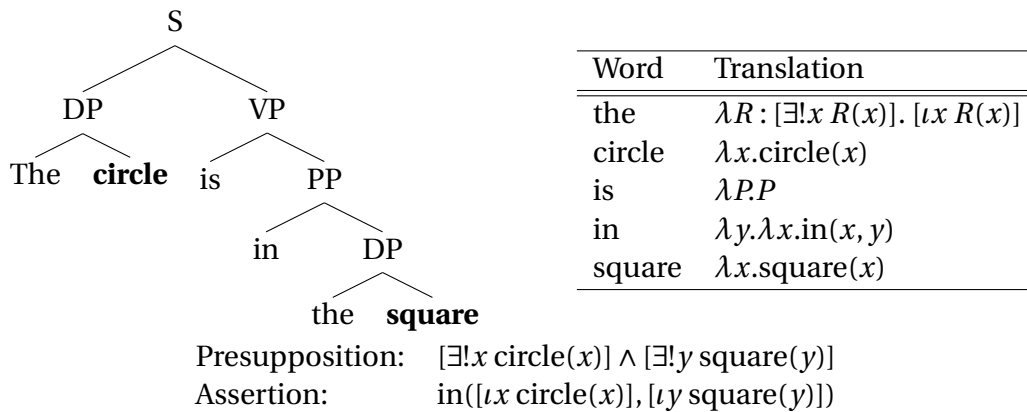


Figure 3: The naïve account illustrated on nonembedded definites.

¹This and all other presuppositions have to be relativized to the given context, to avoid presupposition failure due to shapes which are not shown in our pictures. Any implementation of the uniqueness approach must take this relativization into account somehow. We will largely ignore this issue in the following, since it is orthogonal to the phenomenon of embedded definites.

The formalization described so far models a naïve version of the uniqueness approach. Given the discussion in Sect. 1, it is unsurprising that it fails for embedded definites. For example, sentence (5), repeated below as (9), is incorrectly predicted to presuppose that there is exactly one square, and that this square is contained in exactly one circle. This prediction is illustrated in Fig. 4, which uses a standard syntax and the same lexicon as before; the word *white* is translated as $\lambda x.\text{white}(x)$. As we have seen, the predicted presupposition is too strong: sentence (9) is acceptable in Fig. 1, even though there is more than one square in that figure.²

(9) The circle in the square is white.

The problem is a consequence of an assumption left implicit in the naïve account: it was assumed that the semantic contribution (in this case, the uniqueness presupposition) of a definite determiner is determined exclusively by its complement. This assumption may have seemed justified in the case of nonembedded definites, but it can no longer be maintained. Rather, embedded definites force us to conclude that definite determiners make their semantic contribution in the context of the entire clause in which they appear. As we will see in Sect. 3, this fact has been recognized, but not explained, by previous authors.

We propose an explanation from a novel angle: Insofar as definite determiners act semantically on their clause rather than just on their complements, they are analogous to quantificational determiners (Barwise and Cooper, 1981). Based on this parallel, the null assumption is to expect definite and quantificational determiners to share other properties too, for example as regards their interaction with presuppositions. Specifically, we expect definite determiners to exhibit *intermediate presupposition accommodation* as quantificational determiners do. We use intermediate accommodation as a descriptive term for the phenomenon in which the presuppositions of the nuclear scope of a quantificational determiner are optionally accommodated into its restrictor (Kratzer, 1989; Berman, 1991).³ For example, (10) displays intermediate accommodation because it quantifies only over those men that have a wife, rather than presupposing that every man has a wife.⁴

(10) Every man loves his wife. (van der Sandt, 1992)

The constraints on the availability of intermediate accommodation are not well understood. For example, von Stechow (1994), Sect. 2.4.3, offers examples illustrating that intermediate accommodation of the presuppositions supplied by definites is, in his words, “far from automatic”. In the following, we will not attempt to model the constraints on intermediate accommodation of presuppositions supplied by definites. We base our claim on the fact that such accommodation is sometimes if not always pos-

²We assume that the predicates denoted by *circle* and *in the square* are conjoined via a *predicate modification* rule (see e.g. Heim and Kratzer, 1998) and that the result of this rule inherits the lexical presuppositions of the conjuncts.

³Intermediate accommodation is called local accommodation by some authors, e.g. von Stechow (1994). This is potentially confusing because the term local accommodation is used in most other work to refer to a separate phenomenon in which the presupposition is added to the assertive content of the *nuclear* scope, rather than the restrictor.

⁴See Beaver (2001) and Chemla (2009) for further discussion of similar examples.

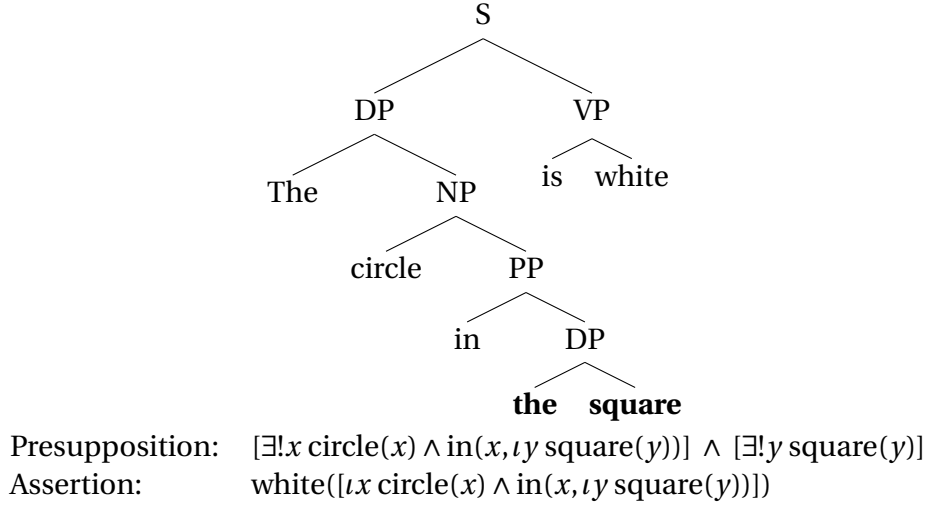


Figure 4: The naïve account makes the wrong prediction for embedded definites.

sible, and therefore must be made available in principle by any formal account. The following attested example illustrates this fact, and shows that the presuppositions of definites can be accommodated intermediately in the same syntactic configuration as that of embedded definites.

- (11) On enlistment, **the wife of every soldier** receives from the government a separation allowance of \$20 a month, recently increased to \$25 a month.⁵

The highlighted noun phrase in (11) can be paraphrased as *the wife of every married soldier*. In other words, the restrictor of *every* is evaluated only with respect to those soldiers x for which the presupposition of *the wife of x* is satisfied. As a whole, (11) does not have the presupposition that every soldier has a wife. This is exactly what intermediate accommodation predicts, provided that the nuclear scope of *every* contains the term that corresponds to *the wife of x* and that this term projects a presupposition.

We will now extend our account to represent the scopal and presuppositional behavior of quantifiers exhibited by the last example. For this purpose, we equip our syntactic trees with a scope-shifting operation: Quantifier raising (QR) replaces quantifiers with a coindexed trace, and adjoins them at the closest node of type t (May, 1977; Heim and Kratzer, 1998). The trace is interpreted as a variable that is bound by the quantifier, and it does not introduce any presuppositions. Example (11) and other constructions we are concerned with are cases of inverse linking, that is, a quantificational determiner takes syntactic scope in the restrictor of another one but takes semantic scope over it. Inverse linking configurations have been variously analyzed as involving adjunction of the quantifier at either S (May 1977; Sauerland 2005 and others) or DP (e.g. May 1985; Barker 2001; see also Charlow 2009). Our analysis is compatible with either assumption. For concreteness, we assume here that quantifiers adjoin at S. This also simplifies the presentation, since adjoining at DP would require adjusting the type of the quantifier (Heim and Kratzer, 1998).

⁵Source: Sir Hebert Ames, Canada's War Relief Work. The Annals of the American Academy of Political and Social Science 1918, 79: 44. Available online through books.google.com.

As a stand-in for a more elaborate model of intermediate accommodation, we adopt a simple mechanism that applies after QR and that operates directly on logical subformulas. Our mechanism is illustrated in Fig. 5, which models a simplified version of (11). Following von Fintel (1994) and others, we assume that all determiners contain a free and uniquely named variable C, C', \dots which ranges over subformulas and which is interpreted conjunctively with the complement of the determiner. For example, $every_C$ is interpreted as $\lambda R \lambda N [\forall x (R(x) \wedge C) \rightarrow N(x)]$. When the sister node of a quantificational noun phrase whose free variable is C imposes a presupposition φ , then C may optionally resolve to φ . In this case, φ is not added to the global presupposition of the sentence.⁶ Otherwise, C is trivially resolved to *true*. If C is resolved to a formula φ that contains a variable which is free in φ , we allow this variable to be bound from outside C . That is, the variable is not renamed, in contrast to beta reduction. This avoids the binding problem discussed by Karttunen and Peters (1979). As an example, in Fig. 5, the variable x introduced by the trace is free within C , but after presupposition accommodation it is bound by the quantifier introduced by *every soldier*. This treatment of intermediate accommodation is perhaps not very elegant, but it is not our concern here to provide a theory of intermediate accommodation per se. We adopt it here because it is simple and does not distract from our main goal. We leave it for future work to decide whether our account of embedded definites is compatible with attempts to reduce intermediate accommodation to independent principles, such as contextual domain restriction (von Fintel, 1994, 2006; Beaver, 2001, 2004) or anaphora resolution (van der Sandt, 1992; Geurts, 1999).

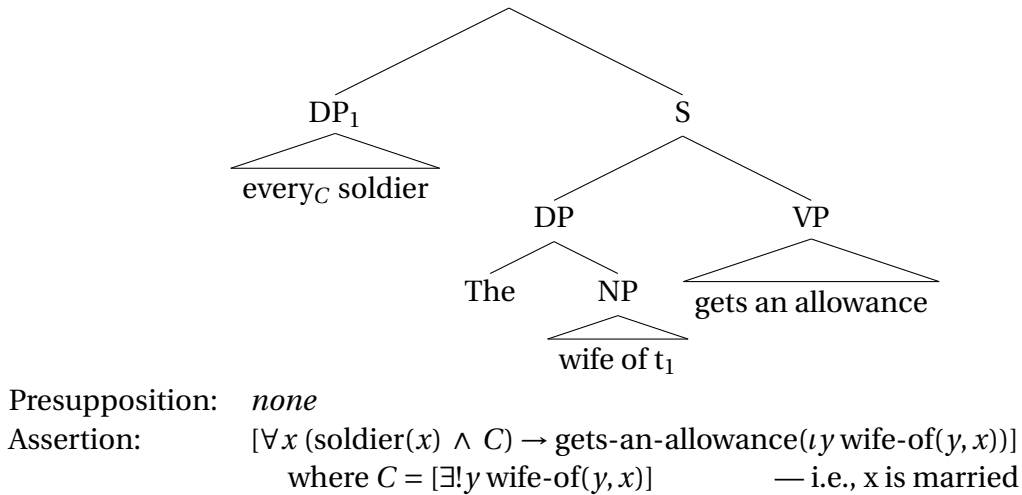


Figure 5: Intermediate accommodation in inverse linking: “The wife of every soldier gets an allowance”

Because of the parallels between definites and other quantifiers mentioned earlier, we assume that QR can apply to definite descriptions, and that they too contain a free variable C which can be resolved by intermediate accommodation. The assumption

⁶A more elaborate treatment may well add something similar to φ to the global presupposition even then. The question of exactly what is presupposed by a sentence with intermediate accommodation is controversial (Beaver, 2001; Singh, 2008).

that QR can apply to definites is independently motivated in accounts that assign definites the same type as quantifiers (e.g. Isac 2006), since QR is one strategy to resolve type mismatches of quantifiers in non-subject positions (though a type-shifting strategy is another option, see Heim and Kratzer 1998). However, our proposal is equally compatible with referential accounts of definites in the tradition of Frege (1892) and Strawson (1950) in which definites map predicates to individuals, as was implicitly assumed for example (7). In such accounts, we assume that QR can apply to definites to prevent presupposition failure.

Table 1 shows our entries for each account. In both cases, R stands for the predicate supplied by the complement of *the*. As in the case of quantifiers, the variable C is interpreted conjunctively with that predicate. On the quantificational account, R is a mnemonic for restrictor and N for nuclear scope. To simplify the discussion, we will refer to R as the restrictor as we discuss both accounts, even though this terminology is strictly speaking not appropriate in the case of the referential account.

Word	Translation
the_C (<i>referential</i>)	$\lambda R: [\exists!x R(x) \wedge C]. [\iota x R(x) \wedge C]$
the_C (<i>quantificational</i>)	$\lambda R: [\exists!x R(x) \wedge C]. [\lambda N. N(\iota x R(x) \wedge C)]$

Table 1: Proposed lexical entries for *the* on referential and quantificational accounts.

We can now formally model our explanation of Haddock’s puzzle. The account as presented predicts that the presupposition of an embedded definite is weaker than that of a regular definite. The reason for this is that QR applies to the embedded definite. Since it takes scope above the embedding definite, the presupposition of that definite is accommodated into the restrictor of the embedded definite. Note that C in the lexical entries in Table 1 appears in the scope of the iota operator. So C resolved nontrivially (i.e. if intermediate accommodation takes place), the result is a weaker uniqueness presupposition than otherwise. This fact is the key to understanding why the presuppositions of embedded definites are weakened.⁷

Fig. 6 illustrates the application of our account to our example (5). QR raises the inner definite, *the square*, above the rest of the sentence, which imposes the presupposition “there is exactly one circle in x ” on the referent of the trace. The C variable of the raised definite is resolved to that presupposition.⁸ As a consequence, that presupposition is not added to the global presuppositions of the sentence. After resolving C ,

⁷We are agnostic about whether this free variable C should also be used to account for the general context dependency of determiners and quantifiers mentioned in footnote 1, as in von Stechow (1994). If it turns out that C also plays this role, then this provides further motivation for the entries we propose in Table 1.

⁸The outer definite also contains a variable, call it C' , but we omit it from the picture for clarity. Here is why this has no consequences for the predictions we make. The nuclear scope of the outer definite, *is white*, does not have any (relevant) presuppositions, so no intermediate accommodation takes place and C' gets resolved trivially. The outer definite stays *in situ* because there is no reason for it to move. On a quantificational account, this can be explained due to the absence of a type mismatch. On a referential account, movement can be seen as a strategy to repair presupposition failures, therefore there is no reason to do so in the contexts we consider. Whether the reading that would result from moving the outer definite is available is a question we do not consider in this paper.

the presupposition of the raised definite is weakened from “the number of squares is exactly one” to “the number of squares that contain exactly one circle is exactly one”. Since there are no other determiners that could accommodate it, this surfaces as a global presupposition, i.e., the sentence will only have a truth value in models that satisfy it. In such a model, let x be the square that contains exactly one circle, and let y be the circle contained in x . The assertion of the sentence is that y is white. We see that our account correctly predicts that embedded definites have weakened presuppositions.⁹

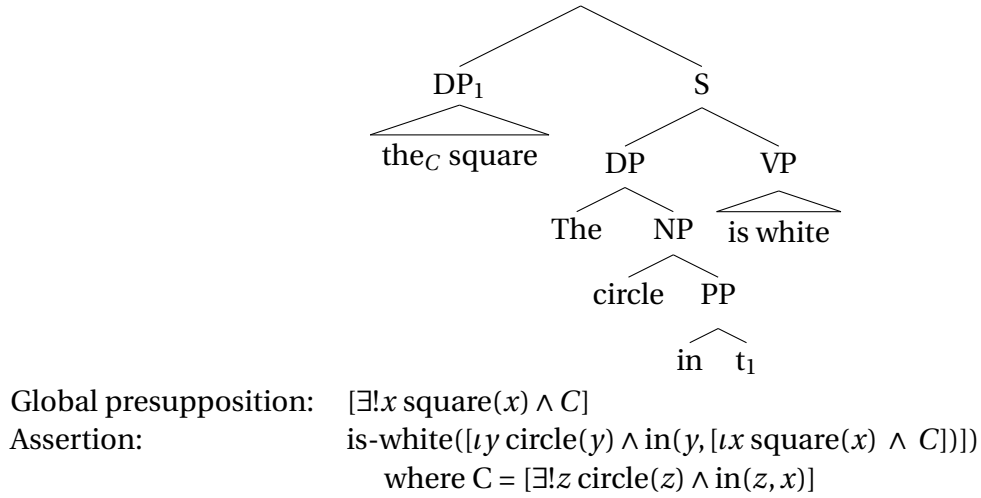


Figure 6: Embedded definites: “The circle in the square is white”

In the process of extending the naïve account, we have added two new devices to it: QR and intermediate accommodation. We now show that the extended account still makes the right predictions for nonembedded definites. Such cases are illustrated by our baseline sentence (6a), repeated here as (12). Note that (12) is not a case of inverse linking: the two noun phrases are not nested.

(12) The circle is in the square.

We have seen in Fig. 3 above that the naïve account predicts the correct presupposition for (12). That presupposition is shown in (13). It is obtained by conjoining the presuppositions supplied by the two definite descriptions.

(13) $[\exists!x \text{ circle}(x)] \wedge [\exists!y \text{ square}(y)]$

In our extended account, QR and intermediate accommodation are available. QR by itself does not change the presuppositions and truth conditions of (12), no matter how often we apply it: the two definite descriptions are scopally commutative, and the C

⁹As noted by a member of the CSSP conference audience, it is not clear whether the presupposition of (9) is indeed “the number of squares that contain exactly one circle is exactly one” or the slightly stronger “the number of squares that contain *at least one* circle is exactly one”. This latter presupposition fails in a picture in which one square contains one circle and another square contains two circles. The account presented in the running text predicts the former presupposition. We leave this question for future work.

variables make no contribution because they are resolved trivially. By contrast, intermediate accommodation has the potential to change the overall presupposition. Nevertheless, it turns out that will not result in a different global presupposition. Consider first the case where QR has not applied. Since the lower definite description *the square* does not itself contain any embedded presuppositional items, its presupposition is not affected by intermediate accommodation, so it comes out as $[\exists!y \text{ square}(y)]$. As for the presupposition of the higher definite, it starts out as $[\exists!x \text{ circle}(x) \wedge C]$. If intermediate accommodation applies, C is resolved to the presupposition of the lower definite. The result is (14), which is truth-conditionally equivalent to (13).

$$(14) \quad [\exists!x \text{ circle}(x) \wedge [\exists!y \text{ square}(y)]]$$

Now suppose QR is applied one or more times. No matter how often it is applied, one of the definites will end up in the syntactic scope of the other one. QR does not affect presuppositions, so if the order of the definites is the same as before QR, intermediate accommodation will once again result in the presupposition (14). If QR inverts the order of the definites, intermediate accommodation will result in the presupposition (15), which again is equivalent to (13). This explains why only inverse linking configurations result in weakened presuppositions.

$$(15) \quad [\exists!y \text{ square}(y) \wedge [\exists!x \text{ circle}(x)]]$$

3 Comparison with Previous Accounts

In this section, we evaluate previous accounts of the problem of embedded definites. Haddock (1987) proposes a solution based on incremental processing; van Eijck (1993) models regular and embedded definites in a dynamic framework; and Meier (2003) argues that embedded definites are predicative and therefore devoid of presuppositions. Superficially, our proposal might look needlessly complicated because it relies on theories of the effects of QR and intermediate accommodation, which are not considered in the work reviewed in this section. We wish to emphasize, however, that these effects are well attested independently of embedded definites. So any accurate theory of language as a whole will of necessity predict them in some way. Our account simply relies on the null assumption, which is that these effects also occur in embedded definites.

3.1 Haddock (1987)

Haddock (1987) views the phenomenon of definiteness in a computational setting; the problem he considers is to parse embedded definites incrementally and to identify their referents on the fly. His solution to this problem is expressed in Combinatory Categorical Grammar (see e.g. Steedman 2000), a formalism that is well suited for incremental left-to-right evaluation. Semantic representations consist of constraints on variables and are built up incrementally in tandem with parsing. Each word contributes a constraint, and the syntactic rules specify how variables introduced by different words have equal referents. Simplifying somewhat, parsing a nested definite like

the circle in the square generates the following representation:¹⁰

$$(16) \quad \text{unique}(e_1) ; \text{circle}(e_1) ; \text{in}(e_1, e_2) ; \text{unique}(e_2) ; \text{square}(e_2)$$

This representation is thought of as being interpreted incrementally against a model by entertaining a candidate set of referents for each variable and successively narrowing it down. For example, when *circle*(e_1) is first introduced, the candidate set of e_1 contains all the circles in the model, but by the time all the constraints in (16) have been processed, the candidate set of e_1 contains only those circles that are contained in a square. The constraint *unique*(e_n) is a meta-constraint: it is true if and only if the candidate set for its variable is a singleton set. Unlike the other constraints, which are evaluated as soon as the words that generate them are read, Haddock stipulates that *unique*(e_n) is only evaluated “when the NP corresponding to the variable e_n is syntactically closed”. In left-to-right evaluation, the inner and the outer NP of a nested definite are both closed at the same time, so the uniqueness constraints are both checked simultaneously, after all the other constraints in (16) have been processed.

Besides identifying the problem and realizing that the embedded definite is influenced by the larger embedding definite, the merits of Haddock (1987) consist in improving on previous computational treatments of definite reference, which would fail to find referents for embedded definites.¹¹ However, this early account does not provide any insight as to why there should be a contrast between embedded definites (9) and their nonembedded counterparts illustrated in (6). The system in Haddock (1987) models this contrast by requiring that the uniqueness constraints of definites are evaluated exactly at the time the NP that contains them has been processed entirely, rather than later. From a theoretical point of view, one would want to find an explanation for such a requirement, and not just stipulate it.

3.2 Van Eijck (1993)

In van Eijck (1993), embedded definites are analyzed only in passing as an example of the context dependency of the uniqueness presupposition of definite descriptions. The main purpose of his article is to propose semantic representations for definite and indefinite descriptions in a framework based on dynamic predicate logic (DPL, Groenendijk and Stokhof, 1991). When a DPL formula is interpreted, information about the values of variables is encapsulated in an assignment function that is passed sequentially from one subterm to the next. This allows quantifiers to bind variables introduced by pronouns in subsequent sentences. Predicates are interpreted as checks on the values of variables. In van Eijck's system, definites whose uniqueness presupposition is not met generate errors, implemented as special assignment functions which prevent the formula from having a truth value. As in the present work, definites are translated with a uniqueness-presupposing, variable-binding operator written as ι , but there is a difference. Roughly, while we let $\iota x : \varphi$ denote an individual, namely the

¹⁰Haddock's actual example uses the noun phrase *the rabbit in the hat* and has been adapted here.

¹¹We were not able to consult Haddock (1988). As quoted in Dale and Haddock (1991), this work introduces the important observation that we can avoid an infinite regress in modeling the truth and felicity conditions of nested definites if the quantifiers introduced by the determiners are both given wide scope over the entire noun phrase.

unique individual x for which φ is true, for van Eijck the formula $\iota x : \varphi$ has a truth value: it is true just in case there is exactly one way of assigning a value to x that makes φ true. The translation of our basic example (9), based on van Eijck’s translation of an analogous sentence, is shown in (17). The semicolon (;) is interpreted as an instruction to sequentially interpret its left-hand side and then its right-hand side.

$$(17) \quad \iota v_1 : (\text{circle}(v_1) ; \iota v_2 : (\text{square}(v_2) ; \text{in}(v_1, v_2))) ; \text{white}(v_1). \quad \text{van Eijck (1993)}$$

Informally, (17) is interpreted as an instruction to do the following: Pick an entity at random and call it v_1 ; check that this entity is a circle; pick an entity at random and call it v_2 ; check that it is a square; make sure v_1 is in v_2 ; produce an error if any of the checks failed; produce an error if any other choice for v_1 or v_2 would not (!) have led to an error by now; finally, check if v_1 is white. (17) has a truth value if and only if there is a way to pick v_1 and v_2 that does not lead to an error, and its truth value is determined by whether or not the last check succeeds (i.e., whether v_1 is white).

Given van Eijck’s system, (17) correctly captures the presupposition and the truth conditions of the nested definite in (9). However, van Eijck does not give a compositional procedure for translating syntactic structures into formulas. Without adopting an approach similar to ours, it is difficult to see how such a procedure could be given that would translate the syntax tree in Fig. 4 into the DPL formula (17). As we have seen in Fig. 4, the complement of the upper definite description is “circle in the square”, while the complement of the lower definite description is “square”. In the absence of movement and intermediate accommodation, the two instances of “the” would be translated as ι operators that apply to the denotations of their syntactic complements. In (17), the ι operator that corresponds to the lower definite description takes as its argument the formula (18), which corresponds to the words “square” and “in”. Of these, the word “in” is not contained in the complement of the lower “the”. The question why the lower “the” should be able to take a semantic argument that is not exclusively denoted by its syntactic complement is not addressed by van Eijck (1993). We regard this question as the core of Haddock’s puzzle.

$$(18) \quad \text{square}(v_2) ; \text{in}(v_1, v_2)$$

3.3 Meier (2003)

Meier (2003) is the only formal semantic work entirely devoted to embedded definites prior to this article. Meier argues that in a sentence like *The circle in the square is white*, the inner definite *the square* introduces no presupposition of its own, and that this is so because it is in a predicative rather than quantificational position (Partee, 1987). Meier notes that definites in predicative positions fail to license anaphora, as shown by the contrast between the predicative definite in (19a) and the non-predicative one in (19b):

- (19) a. De Gaulle wasn’t the greatest French soldier_{*i*}. #He_{*i*} was Napoleon.
 b. De Gaulle didn’t meet the greatest French soldier_{*i*}. He_{*i*} was already dead.

Observing that the embedded definites in (20) fail to license anaphora, she concludes that they are also in predicative position.

- (20) a. The rabbit in the hat_i was grey. #It_i was black.
 b. The lady with the dog_i is a princess. #It_i is extremely big.

Meier observes that Haddock's puzzle does not arise with relational nouns. Specifically, she reports that "The destruction of the city occurred at midnight" is odd if there are two cities, of which one was destroyed, and a small village was also destroyed. She observes that the examples in (21), which are built around relational nouns, license anaphora, in contrast to the examples in (20).

- (21) a. The encounter with the bear_i was terrifying. It_i was extremely big.
 b. The journalist's book_i appeared in 1993. He wrote it_i on a train.

Meier therefore assumes that definites embedded by a nonrelational noun have a separate lexical entry (the_{pred}) than other definites (the_{ref}). She postulates the syntax and lexical entries shown in Fig. 7.

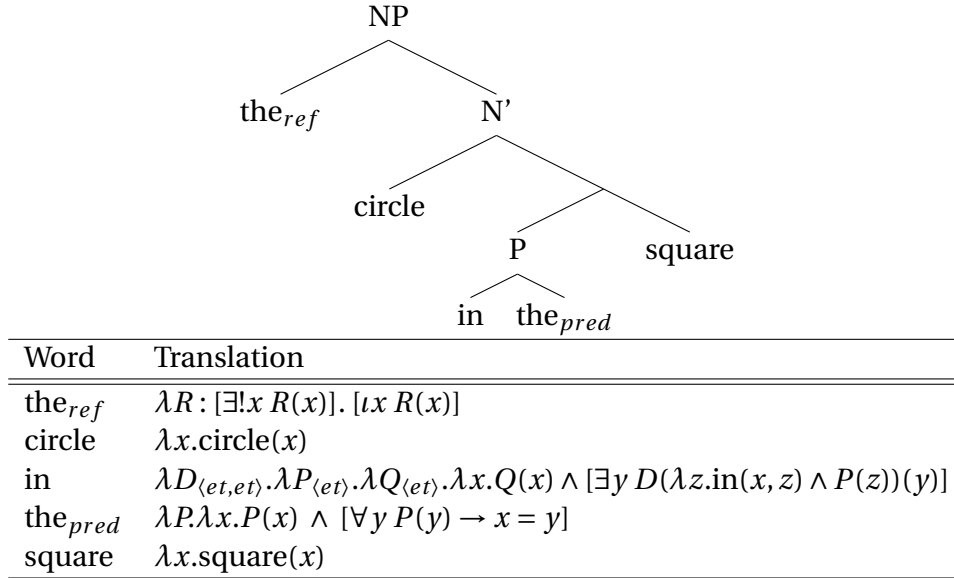


Figure 7: Meier (2003).

From these entries, we obtain the prediction that the meaning of the N' constituent *circle in the square* is as follows:

- (22) $\lambda x[\text{circle}(x) \wedge [\exists y \text{in}(x, y) \wedge \text{square}(y) \wedge [\forall y' (\text{in}(x, y') \wedge \text{square}(y')) \rightarrow y = y']]]]$

This predicate is true of any circle that is contained in exactly one square. The predicate is defined on all entities, that is, it does not introduce any presuppositions. Assuming that the outer definite presupposes that this predicate applies to exactly one entity, a sentence like (9), *The circle in the square is white*, is predicted to presuppose that the number of circles that are contained in exactly one square is exactly one.

We see problems both with the syntactic and with the semantic claims of this account. As illustrated in Fig. 7, the account in Meier (2003) starts from the assumption that the words "in" and "the" form a syntactic constituent. This requires her to formulate needlessly complicated lexical entries for these words. Meier adduces German

contraction phenomena, such as *in + dem = im*, as evidence for this nonstandard syntax. While German determiner contraction is indeed sensitive to the properties of the definite determiner (it is only licensed when the determiner is not anaphoric, as shown by Schwarz 2009), this in itself does not constitute evidence for the constituent structure proposed. It is well known that phonological contraction can happen across constituent boundaries, so contraction does not constitute evidence for a nonstandard constituent structure. For example, *wanna-* or *to-*contraction (Chomsky and Lasnik, 1977; Postal and Pullum, 1982) is possible across constituent boundaries, and in fact even across NP traces (23a) and PRO (23b).

- (23) a. I'm [going [to stay]]. \rightarrow I_i'm [gon- [t_i -na stay]].
 b. I want [PRO [to stay]]. \rightarrow I wanna stay. (Boeckx, 2000)

Moreover, the extraction tests in (24) are compatible with the standard constituent structure and not with the one proposed by Meier. We conclude that the standard constituent structure is the correct one.

- (24) a. [What]₁ is the circle in t₁?
 b. *[What]₁ is the circle in the t₁?

Turning to the semantic claims of Meier (2003), we doubt that the inner definite fails to introduce any presuppositions, and we also doubt that (22) is the correct denotation of the N' constituent. In essence, Meier's account predicts that the N' constituent "circle in the square" means "circle in exactly one square". But the two are clearly different in meaning and felicity conditions, as shown in the following minimal pair:

- (25) a. Every circle in the square is white.
 b. Every circle in exactly one square is white.

Sentence (25a) has a presupposition that is absent from sentence (25b), namely, that there is exactly one square in total. Clearly, this presupposition is introduced by the embedded definite. Moreover, for (25a) to be true, there has to be a square that contains every circle. In contrast, (25b) is also compatible with a scenario in which different circles are contained in different squares, as long as no white circle is contained in more than one square.¹²

Finally, we disagree with the factual claim that motivated Meier's proposal, namely that definites embedded under nonrelational nouns fail to license anaphora. This was supposed to be shown by her examples in (20) above, in contrast to the examples with relational nouns in (21). However, this contrast is not a minimal pair. The examples in (21) contain several factors absent from (20) that make it easier for the hearer to establish the anaphoric link in question. First, in (21), selectional restrictions help the hearer quickly rule out coindexings other than the one in question. For example, both rabbits and hats can be black (20a), but only bears and not encounters can be big

¹²We also doubt that an embedded definite like *the circle in the square* presupposes that the number of circles that are contained in *exactly* (rather than at least) one square is exactly one, as Meier predicts. Her presupposition is satisfied in a scenario where one circle is contained in one square, and another circle is contained in two (nested) squares. It seems that the noun phrase *the circle in the square* fails to refer in such a scenario. This objection is similar to one that is faced by our own account, see fn. 9.

(21a). Second, the examples are not equivalent from the point of discourse coherence (Mann and Thompson, 1988): Intuitively, the discourses (21a) and (21b) are coherent because the second sentence elaborates on the first; the discourses in (20a) are less coherent because the second sentence stands in contrast to the first or introduces an unrelated fact. It is known that discourse coherence affects anaphoric links across sentences (Kehler, 2002), especially when the potential antecedent is embedded under a quantificational element (Wang et al., 2006).¹³ We conjecture that absence of selectional restrictions and low discourse coherence contribute to the degraded status of the examples in (20). Once these factors are controlled for, anaphoric reference to an embedded definite is possible:

- (26) The rabbit in the hat_{*i*} was satisfied. It_{*i*} was much roomier and more comfortable than the other hats.

This example differs from (20a) in its tighter selectional restrictions (a rabbit can be black, but it cannot be roomy) and in its higher discourse coherence: the second sentence elaborates on the first, rather than standing in contrast to it.

Summing up this section, we conclude that none of the previous accounts of the phenomenon of embedded definites is satisfactory.¹⁴ In the remainder of the paper, we consider a prediction that is inherent in our movement-based proposal and that provides further evidence to distinguish between the accounts.

4 The Locality Prediction

In this section, we introduce a prediction that sets apart our analysis from the other proposals summarized in the previous section. Since the prediction arises from syntactic locality conditions that affect QR, we will refer to it as the *Locality Prediction*. This prediction is not shared by accounts like those mentioned in the previous section, because neither of them relates Haddock's problem to scope shifting processes. In this section, we first introduce the relevant constraints on QR that give rise to the locality prediction. We then spell out in detail how the prediction is derived. The locality prediction then arises from the interaction of the constraints on QR and principles that determine the choice between definite and indefinite determiners. As we argue, the prediction is expected to be subtle in relevant examples. For this reason, we set aside the empirical test of the prediction for Sect. 5. The goal of this section is only to show how the locality prediction arises from the premises of our account.

Since Rodman (1976), it has been known that scope shifting processes are subject to locality restrictions. In fact, cases of the type Rodman discussed are directly relevant for our problem since they concern a constraint on inverse linking. Specifically, Rodman

¹³Psycholinguistic factors also militate against anaphoric reference to an embedded definite. For example, the preference for resolving pronouns to subjects arguably favors the embedded definite over the embedded one, as does the preference for resolving pronouns to the first mentioned antecedent in the sentence (e.g. Frederiksen, 1981; Gernsbacher and Hargreaves, 1988).

¹⁴Chris Piñón (p.c.) points out that quantification over pairs is a further intuition one might try to pursue. The idea would be to interpret *the circle in the square* as something paraphrasable as 'the x of the pair (x, y) such that x is a circle in y and y is a square'. While the intuition is clear, an account along these lines would also require independent motivation of all the assumptions it relies on.

observed that inverse linking is degraded or impossible in subject relatives containing an object quantifier. The examples in (27) and (28) illustrate this constraint: In both cases, inverse linking is possible in example a, and the examples are chosen in such a way that the inverse linking interpretation is pragmatically preferred. The b-examples, on the other hand, do not permit an inversely linked interpretation. Because inverse scope is not available, only a surface scope interpretation is easily available. The two b-examples are pragmatically odd because the surface scope interpretation conflicts with our world knowledge.

- (27) a. An apple in every basket is rotten.
 b. #An apple that is in every basket is rotten.
- (28) a. The wife of every soldier attended the ceremony.
 b. #The woman who married every soldier attended the ceremony.

The relevant syntactic configuration is a difference of locality. In both (27a) and (28a), the universal quantifier is embedded in a PP that is either adjoined or an argument of the head noun of the outer DP. In (27b) and (28b), on the other hand, the universal quantifier is the object of a relative clause that is attached to the head noun of the outer DP. Rodman's generalization is that the object of a relative clause cannot take scope over the DP that the relative clause is attached to.¹⁵ Assuming QR as the scope shifting process, Rodman's generalization is captured as a syntactic constraint on the application of QR. In syntactic terminology, such a restriction is referred to as an *Island Effect* (Ross, 1968). Specifically, the effect in (27) and (28) can be described as the following: Subject relative clauses are islands for QR of the object.

The investigation of island effects in syntax is an area of active research (see e.g. Cecchetto 2004). However, as far as we can see, the issues that are under debate do not affect our locality prediction. For the locality prediction to arise, it is sufficient if there is a consistent effect of syntactic configuration on the applicability of QR. This is widely accepted by current research in the field. One current discussion is important for the predicted strength of the effect due to locality: A number of researchers have found that, in many cases, island phenomena are gradient effects rather than all or nothing. Specifically, Snyder (2000) shows satiation effects for some island effects in English. Furthermore, islands vary across languages. Rizzi (1982) and, more specifically, Engdahl (1997) argue that subject relative clauses in Swedish are not islands for some types of overt movement.¹⁶ Though these studies did not look directly at QR, but instead at instances of overt movement, the results lead us to expect that the effect of locality on QR also may be gradient, and therefore more difficult to detect. This is indeed what we found. For this reason, we demonstrate our prediction by a large-scale survey.

The examples in (29) illustrate the locality prediction entailed by our analysis. (29a) was discussed in Section 2 above. Recall that part of our account of (29a) was QR of the definite description *the square* to a position with clausal scope. In (29b), however, the definite *the square* occurs inside of a subject relative clause. As in the examples above, we expect the subject relative clause to make QR of the definite description more diffi-

¹⁵The subject of a relative clause can, at least in some cases, take scope above the outer DP that the relative clause is attached to (see for example Hulsey and Sauerland 2006).

¹⁶Engdahl attributes the original observation to Andersson (1974) and Allwood (1976).

cult in (29b) than it is in (29a).

- (29) a. The circle in the square is white.
b. #The circle that is in the square is white.

While some native speakers perceive the predicted contrast in (29), others describe both examples as perfect. Our experimental evidence in the next section shows that there is indeed a contrast between the two sentences in (29) in the expected direction. However, it would not be suitable for an experiment to directly compare the relative acceptability of (29a) and (29b), since (29b) is longer and may therefore be perceived to be more difficult and less acceptable than (29a).

In the experiment, we instead compare definite with indefinite descriptions. The experiment then tests the interaction of the locality prediction with the pragmatic licensing of definite and indefinite determiners. The basic principle we assume for the licensing of the indefinite determiners is described by Hawkins (1981) and Heim (1991). Since Heim's version ties into the theoretical assumptions about presuppositions that we assume, we follow her account in the following. Heim's account is based on the general principle of *Maximize Presupposition* (see also Sauerland 2008). The effect of this principle is that the presupposition-less indefinite determiner is blocked in case the presupposition of a definite determiner is satisfied in the same position. The principle is motivated by the complementary distribution of definite and indefinite determiners in examples like (30):

- (30) a. The capital of France is pretty.
b. #A capital of France is pretty.

In examples like (29), the prediction of Heim's proposal is more intricate because *Maximize Presupposition* is predicted to interact with the possibility of QR, though Heim does not discuss this possibility. Consider the indefinite version of (29) in (31). We assume that the indefinite is licensed only if replacing it with a definite in the same logical form representation would lead to a presupposition failure. That is, *Maximize Presupposition* does not compare representations in which QR has applied with representations in which it has not applied. As we have seen in Sect. 2, our proposal entails that in the scenario represented by Fig. 1, the presupposition of the definite can be fulfilled only in a logical form representation where it has undergone QR. The prediction for (31a) depends therefore on whether QR of the indefinite *a square* to a clausal position is optional or obligatory. We assume that it is optional because we have found no empirical difference in acceptability between (29a) and (31a) in pilot testing that we have done so far.¹⁷ If QR is optional, two logical form representations are predicted to be generated for (31a): one where the indefinite takes clausal scope and a second one where it remains *in situ*. In the former, the indefinite determiner could be replaced with a definite determiner without causing a presupposition failure, and therefore the indefinite should be blocked by *Maximize Presupposition*. In the latter representation, however, the same replacement would lead to a presupposition failure since it would

¹⁷Higginbotham (2006) reports relevant introspective judgments where the indefinite version is ungrammatical, while the definite is not. Therefore it seems possible that our pilot testing on this matter was not sensitive enough to detect the difference.

result in the structure shown in Fig. 4. So (31a) is predicted to be acceptable: Maximize Presupposition does not rule it out.

- (31) a. The circle in a square is white.
b. The circle that is in a square is white.

In the case of (31b), the prediction of our account is more straightforward because QR to a position outside of the relative clause is discouraged by the island effect. Replacing the indefinite with a definite determiner is predicted to lead to a presupposition failure on any representation of (31b) that does not violate the island. In this way, the indefinite determiner is expected to be licensed as well.

In sum, our account makes a novel locality prediction. Specifically, there should be a greater contrast in acceptability between (29b) and (31b) than between (29a) and (31a). This prediction sets apart our account from the previous accounts discussed in Sect. 3. The experiment described in the following section confirms that the locality prediction is indeed correct.

5 Experiment

To test the locality prediction described in the previous section, we conducted an online experiment. We used the online marketplace Amazon Mechanical Turk (MTurk, www.mturk.com) to design and conduct the study and to recruit and pay subjects. We chose this method over others because it allowed us to test a large number of subjects in a convenient and low cost manner.

The experiment was designed to directly compare definite and indefinite versions of the two critical sentences. We created a three-part questionnaire that is reproduced in the Appendix. The first part asked for demographic information including the participants' gender, native language, country of residence, and year of birth. The second part consisted of instructions, a picture, and four test sentences. The picture was the one in Fig. 1 above. The sentences each contained a drop-down box presenting both an definite and an indefinite determiner. The subjects were instructed that the test sentences were intended as descriptions of the picture, and that they should in each case choose the determiner that fits best and sounds most natural. The third part of the questionnaire gave the participants an opportunity to provide us with feedback.

There were four versions of the questionnaire, which differed only with respect to the experimental items. In each case, the experimental item was the third of the sentences presented. The other three sentences acted as distractors and did not differ across versions of the questionnaire.¹⁸ The two experimental items are shown here:

¹⁸For technical reasons, it was impossible to randomize the order of the sentences or of the items in the drop-down boxes. To simulate the latter, half of the questionnaires contained drop-down boxes with a definite as the topmost item, and the other half had an indefinite as the topmost item.

No-island condition: The circle in

Select
the
a

 square is white.

Island condition: The circle that is in

Select
the
a

 square is white.

In the experiment, the participants were asked to choose one of the determiners from the drop-down box. This choice was recorded by the MTurk system and we used the summary report provided by the MTurk system for our data analysis.

A total of 1200 participants participated in the survey at a total cost of about \$38 (about 3 cent per answer). We decided not to restrict the survey to native speakers, because this might have encouraged MTurk workers interested in participating to lie about their native language. Instead, we subsequently filtered the results and kept only native speakers who grew up and now live in the US by their own report in the demographic part of our survey. We furthermore removed repeat participants and incomplete answers, leaving us with data from 797 participants.

Overall, the result confirms the locality prediction made by our account. In reporting our results, we added the results from the two items that differed only with respect to the order of presentation of the two determiners in the drop-down box. Thus summarized, the result of the experiment is the following for the condition without island:

The circle in	the	85.5%	(N = 336)	square is white.
	a	14.5%	(N = 57)	

For the condition with an island, we obtained the following result:

The circle that is in	the	76.2%	(N = 308)	square is white.
	a	23.8%	(N = 96)	

As shown, subjects chose the definite determiner more frequently in the condition without an island than in the condition with an island. The chi-square test shows that the effect is significant ($\chi^2 = 11.0088$ (1 degree of freedom); $p < 0.001$). We interpret this effect as indicating that subjects are indeed sensitive to an island effect of the subject relative clause when it comes to licensing the definite determiner *the*. Even in the second condition, where the relevant determiner occurs inside of an island, still more than 75% of subjects preferred the definite determiner over the indefinite. We interpret this fact as indicating that the island effect of the subject relative clause is relatively weak.

6 Conclusion

In this paper, we have provided a solution to what we call *Haddock's puzzle*: the problem of accounting for the unexpectedly weak presuppositions of definite descriptions that are embedded in other definite descriptions (Haddock, 1987).

Our solution to Haddock's puzzle, described in detail in Sect. 2, relies entirely on independently motivated assumptions: namely, that definite descriptions can undergo

scope shifting operations in the same way quantificational noun phrases do, and that intermediate accommodation can move presuppositions from the sister node of such a noun phrase into its denotation. Applied to the example *the circle in the square*, we assume that the definite *the square* can move to a position where its sister node is the definite *the circle in t_1* , with t_1 a variable bound by *the square*. In this configuration, the sister node of *the square* presupposes that there is a unique item that (i) is a circle and (ii) contains that square. When this presupposition is accommodated into *the square*, this definite is restricted to squares that are contained by a circle.

To the best of our knowledge, our account is the first solution to Haddock's puzzle that is derived entirely from independently established assumptions. Furthermore, our proposal makes a novel locality prediction (Sect. 4) that sets it apart from other approaches to the puzzle. The prediction stems from the role played by QR in our account. Like other movement operations, QR is known to be degraded in island environments, so our account predicts that the presupposition-weakening effect should be less clearly observable in embedded definites that are separated by an island. As reported in Sect. 5, we tested this prediction experimentally by using a subject relative clause as an island environment. We found that in a context that satisfies only the weaker presupposition, participants asked to choose between a definite and an indefinite were indeed less likely to insert a definite into the island environment *the circle that is in __ square* than into the control environment *the circle in __ square*. However, this island must be characterized as weak, because participants still inserted a definite more often than an indefinite, even though they had to violate the island to do so.

While some of our readers might perhaps have expected a more dramatic confirmation of our locality prediction, the weakness of the observed island effect is in fact expected, because independent research has established the weakness of island effects in general (see Sect. 4). The explanandum is therefore not the weakness of the observed effect, but its presence, for which previous accounts do not provide an explanation.

Our proposal has at least one broader implication. Specifically, it relies on the assumption that definite descriptions can undergo QR or other scope shifting operations. QR of definites has been controversially discussed and evidence for it is hard to come by, since definites generally do not exhibit scope ambiguities with other quantifiers (Isac, 2006). Our findings support the view that definite descriptions are not always interpreted *in situ*. However, it is important to note that definite descriptions may be conceived of as undergoing QR regardless of their type (Glanzberg, 2007). So our findings do not conclusively show that they have the type of quantifiers and do not resolve the old debate between referential (Frege, 1892; Strawson, 1950; Kaplan, 1972) and quantificational (Russell, 1905; Barwise and Cooper, 1981; Neale, 1990; Isac, 2006) accounts of definites. Moreover, to account for our experimental finding that definites and indefinites are not in complementary distribution, we have assumed that QR of definites is optional. This is compatible with the position that definites are of quantificational type only if type mismatches of nonsubject definites can be resolved by strategies other than QR, such as type-shifting (Heim and Kratzer, 1998).

Finally, there is one additional facet of Haddock's puzzle to which our account does not directly extend. Namely, Meier (2003) observes that Haddock's puzzle does not arise with relational nouns. Within the account that we provided, Meier's observation would follow if either relational nouns created islands for QR of their complements or

if the presupposition of a relational definite could not be accommodated in intermediate positions. At present, we have no solid evidence to decide whether either of these possible accounts of Meier's effect is correct, and we leave the matter up to future work.

Appendix: Experimental Materials

Demographic Questions:

1. Are you male or female? [Choices offered: male/female]
2. What year were you born in?
3. What is/are your native language or languages?
4. In which country have you spent the majority of your life from birth till age ten?
5. Are you left-handed or is one of your blood-relatives (father, mother, brothers, sisters, grandparents, aunts, uncles) left-handed? [Choices offered: I am right-handed, and so are all my blood-relatives. / I myself or at least one of my blood-relatives is left-handed.]

Complete Instructions:

1. Below, we show you a picture and a few sentences. Each sentence is meant to describe some part of the picture.
2. In each sentence a word is replaced by a dropdown menu. Please select the word that fits best into the sentence, keeping in mind that it should be accurate and sound natural.
3. Please answer according to your own feeling for the language. We're interested in natural everyday English, i.e. in what you feel sounds right, not in what other people have taught you about it.
4. We're interested in your spontaneous reactions. If you can't decide, go with your first reaction. Once you've completed this HIT [Human Intelligence Task – a term which refers to this questionnaire in the context of MTurk], please submit it right away. Do not go back over it to change your answers.

[The following are three fillers and a test sentence, where the material in parentheses stands for drop-down menus implementing the forced-choice condition:]

1. The grey circle is (between/left of) two squares.
2. The big square that contains the triangle is (on/to) the right.
3. [four different versions of the test sentence as discussed in the text]
4. The big squares are (grey/black).

Text used in part three of the survey:

1. OK, you're almost done. We're very interested in any comments on this HIT you might have. Please leave some comments for us:
2. Important: We will only accept one HIT per worker. Please do not submit additional HITs like this one, or you might not get paid for any of them.

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Lucas Champollion
University of Tübingen
champoll@gmail.com

Uli Sauerland
ZAS Berlin
uli@alum.mit.edu

On French Possessive *son propre* ('his own'): Evidence for an Interaction between In- tensification and Binding

Isabelle Charnavel*

1 Introduction

1.1 Theoretical background and goal of the study

Some typological studies (cf. König and Siemund: 2005) document a striking empirical fact about binding and intensification: in many languages, the elements that serve as reflexives are either identical to the elements serving as adnominal intensifiers (e.g. English *himself*, Chinese *ziji*, French *lui-même*) or partially overlap with adnominal intensifiers (e.g. German *sich selbst*, Dutch *zichzelf*, Danish *sig selv*).

Nevertheless, most binding theoretical accounts of reflexives (cf. Chomsky: 1981; Pollard and Sag: 1992; Reinhart and Reuland: 1993...etc) have not taken into consideration this fact for a long time. Only in the mid-nineties, several researchers (cf. Baker: 1995, Zribi-Hertz: 1995...) began to examine the close link between intensifiers and reflexives. The essence of these studies¹ consists in separating intensification and binding into two independent modules of the grammar.

In this paper, I will show that the link between reflexives and intensifiers must be taken into account in theoretical analyses of binding, but in a different way: binding and intensification do not constitute separate modules in the grammar, but interact with each other. To this end, I will use the example of the French complex possessive *son propre* (e.g. 1) because it has specific properties that reveal this phenomenon in a particular way: the correlations that the analysis of *son propre* brings to the fore cannot appear in the study of better analyzed expressions such as *himself*.

- (1) Cécile a invité son propre frère.
Cécile has invited her own brother
'Cécile invited her own brother'

*Thanks a lot to Dominique Sportiche and Daniel Büring for useful advice and discussion.

¹See Bergeton: 2004 for a detailed realization of this theoretical direction.

1.2 Background about *propre* in French - Distribution and readings of possessive *son propre*, target of the study

This study will concentrate on *propre* meaning 'own'.² More specifically, I will focus on *propre* combining with the possessive determiner *son*³ and I will call it possessive *propre*.

Possessive *propre* is identifiable by its DP-internal distribution: even if it looks like an adjective (in particular, it agrees in number with the head noun⁴), possessive *propre* has a unique distribution different from the distribution of French adjectives. It presents the following characteristics:

1. It can only occur in a possessive DP expressing both a possessor and a posses-

²The term *propre* presents various other uses in French, which are also historically related to Latin *proprius* ('exclusively belonging to, peculiar to'). Here is a classification proposed by some dictionaries:

- a. *propre* can mean 'clean':

- (i) Ce mouchoir n'est pas propre.
This handkerchief NEG is not PROPRE
'This handkerchief is not clean.'

- b. *propre* can mean 'peculiar to':

- (ii) C'est une coutume propre au Berry.
It is a custom PROPRE to the Berry
'It's a custom peculiar to the Berry region.'

- c. *propre à* can mean 'liable to':

- (iii) Voici des déclarations propres à rassurer les investisseurs.
Here are some statements PROPRE to reassure the investors
'These are statements liable to reassure investors.'

- d. *propre* has some other particular uses:

- (iv) Le rire est le propre de l'homme.
The laugh is the PROPRE of the human being
'Laughing is peculiar to human beings.'
- (v) au sens propre
in the sense PROPRE
'in the literal sense'
- (vi) appartenir en propre
belong in PROPRE
'to belong exclusively to'
- (vii) amour-propre
love-PROPRE
'self-esteem'

³The possessive determiner *son* in French agrees in gender and number with the possessum (unlike English 'his') and in person with the possessor.

⁴The presence of a plural marker (e.g. *ses propres enfants* 'his own children') is made clear by the liaison phenomenon.

sum:

- (2) son propre chien 'his own dog'
his own dog
- (3) votre propre chien 'your own dog'
your own dog
- (4) le propre chien de Jean 'John's own dog'
the own dog of John
- (5) *le propre chien
the own dog
- (6) *propre Jean
own John

2. It is exclusively prenominal⁵:

- (7) sa propre voiture 'his own car'
his own car
- (8) #sa voiture propre
his car own
- (9) la propre voiture de Jean 'John's own car'
the own car of John
- (10) #la voiture propre de Jean
the own car of John

3. It cannot be used predicatively:

- (11) #son chien est propre
his dog is own
- (12) #il a un chien propre
he has a dog own

4. It cannot coordinate with any adjective:

- (13) son premier chien 'his first dog'
his first dog
- (14) *son propre et premier chien
his own and first dog

⁵But the examples (8),(10), (11) and (12) are fine if *propre* means 'clean'.

- (15) *son premier et propre chien
his first and own dog

5. It is only compatible with the definite determiner: it cannot combine with indefinites and quantifiers.

- (16) le propre chien de Jean 'John's own dog'
the own dog of John

- (17) *un propre chien de Jean
a own dog of John

- (18) *quelques propres chiens de Jean
some own dogs of John

- (19) *deux propres chiens de Jean
two own dogs of John

So possessive *propre* has a very specific DP-internal distribution different from the adjectival distribution of the other uses of *propre*, which makes possessive *propre* easily identifiable. It will be the target of this study since it is in the particular environment where it occurs that interesting properties arise with respect to binding and intensification.

Possessive *son propre* presents three main readings⁶ as illustrated in the following sentences: the paraphrases in (b) make the differences clear.

- *possessor propre*: *propre* contrasts the possessor with another individual: in (20), Paul is opposed to Jean, as rendered by the construction *à* + strong pronoun in the paraphrase in (b):

- (20) a. Jean a pris sa propre voiture au lieu d'emprunter encore
Jean has taken his own car instead of borrow again
celle de Paul.
that of Paul
'Jean took his own car instead of borrowing Paul's again'
- b. Jean a pris sa voiture à lui au lieu d'emprunter encore
Jean has taken his car to him instead of borrow again
celle de Paul.
that of Paul

⁶A possible fourth reading occurs in sentences such as the following ones, which involve verbs of possession:

- (i) Luc possède son propre avion.
'Luc owns his own plane.'
- (ii) Anne veut avoir son propre appartement.
'Anne wants her own apartment.'

- *possessum propre*: *propre* contrasts the possessum with another individual and contains a notion of surprise: in (21), the passers-by are contrasted with Michel's children, whose murder by their father is unexpected; this is shown by the addition of *même* 'even' in the paraphrase in (b):

- (21) a. Dans un moment de folie, Michel n'a pas seulement tué
in a moment of madness Michel has not only killed
deux passants: il a tué ses propres enfants.
two passers-by he has killed his own children
'In a moment of madness, Michel not only killed two passers-by, but
also his own children'
- b. Dans un moment de folie, Michel n'a pas seulement tué
in a moment of madness Michel has not only killed
deux passants, il a même tué ses enfants.⁷
two passers-by he has even killed his children

- *agentive propre*: *propre* indicates that the participant is the only agent and is not assisted with this action; it can be paraphrased with agentive *lui-même* 'himself' (cf. Hole 2002),

- (22) a. Claire a créé son propre site internet.
Claire has created her own website
'Claire created her own website.' (without any help)
- b. Claire a créé son site internet elle-même.
'Claire created her website herself.'

1.3 Outline of the study

I will focus on the first two readings of possessive *son propre* to shed light on the presence of a link between binding and intensification. It will be argued that the complex behavior of this expression can only be understood if one pinpoints the specific intensifying properties of *propre* and correlate them with the binding properties of *son propre*.

First, I will show that *propre* behaves like a flexible intensifier specialized in possessive DPs: its semantic effect consists in contrasting either the possessor (possessor *propre*) or the possessum (possessum *propre*) with a set of contextually determined alternatives.

Then, I will argue that these double intensifying properties of *propre* correlate with the binding properties of *son propre*. In the first case (possessor *propre*), *son propre* exhibits anaphoric properties. More specifically, when *propre* intensifies the possessor,

⁷Of course, both possessor *propre* and possessum *propre* involve possessors, but the difference is the target of the contrast with contextual alternatives. Thus, a paraphrase involving the construction preposition *à* + strong pronoun would be weird in the context of (21), since it is not question of any other children: Michel's children can only be contrasted with other individuals, not with other children. Conversely, a paraphrase with *même* 'even' would not be suitable in (20) since there is no notion of unexpectedness in this case with respect to possessor: Jean's car is not less expected than Paul's car to be taken by Jean. This will be made clearer in the analysis.

i.e. the referent of the antecedent of *son propre*, *son propre* behaves like an anaphor or a logophor (long distance anaphor): either it obeys the syntactic constraints of binding theory (principle A) or it follows the constraints of logophoricity. In the second case however (possessum *propre*), neither of these requirements holds: *son propre* obeys constraints different from binding. This means that the binding properties of *son propre* depend on the intensification of the referent of its antecedent. Therefore, the case of *son propre* shows that intensification and binding interact with each other.

This empirical result should have important consequences on linguistic theory, given that binding and intensification are not supposed to apply at the same level: the syntactic principles of the binding theory deal with the distribution of pronominal and anaphoric elements (cf. Chomsky 1981, Pollard and Sag 1992, Reinhart and Reuland 1993, Huand and Liu 2001...) while the semantic and pragmatic principles of intensification deal with the distribution of intensifiers, which belong to focusing devices (cf. König and Siemund 2000, Eckardt 2001, Bergeton 2004...). Therefore, this paper leads to question the locus and the principles of the binding theory and the intensification module. However, these crucial theoretical issues cannot be addressed in detail here, since this would go far beyond the scope of this paper. The aim of this article is mainly to establish empirical facts: it presents new data and correlations that raise crucial issues for binding theory and intensification.

2 *Propre* and intensification: *propre* as a flexible intensifier specialized in possessive DPs

The goal of this section is to show that *propre* behaves like a flexible intensifier specialized in possessive DPs: its semantic effect consists in contrasting either the possessor (possessor *propre*) or the possessum (possessum *propre*) with a contextually determined set of alternatives.

2.1 First case: possessor *propre*

Let's compare the two following sentences:

- (23) a. Anne_i a présenté son_i travail devant la classe.
 Anne has presented her work in front of the class
 'Anne presented her work to the class.'
- b. Anne_i a présenté son_i propre travail devant la classe.
 Anne has presented her own work in front of the class
 'Anne presented her own work to the class.'

Both sentences are true in the same situation where Anne worked on a topic and set out her results: the presence of *propre* does not change the truth-conditions of (23b) as compared to (23a).

However, the two sentences do not have the same felicity conditions: (23b) is felicitous only if some other work is relevant in the discourse background to be contrasted with Anne's work. For example, (23b) could be felicitous in the following context: in this

linguistics class, the students can choose between presenting articles written by well-known researchers or results of the research that they conducted themselves; instead of presenting someone else's work, the student Anne chose to tell about the results that she got herself. Thus, *propre* requires some other contextually salient referent(s) that play(s) the role of alternative(s): *propre* imposes a contrastiveness condition.

More specifically, the alternatives induced by *propre* in this case target the possessor;⁸ that's why I call this first case possessor *propre*. Thus in (23b), the referent of Anne is contrasted with another contextual possessor, i.e. some well-know researcher.

This means that possessor *propre* has an effect similar to focusing the possessor by stressing it:⁹

- (24) Anne_i a présenté SON_i travail devant la classe.
 Anne has presented her work in front of the class
 'Anne presented HER work to the class.'

2.2 Second case: possessum *propre*

In the first case called possessor *propre*, the semantic effect of *propre* consists in contrasting the referent of the possessor with a contextually determined set of alternatives. We observe a second case in which the alternatives target the possessum, as illustrated by the following example. I call it possessum *propre*.

- (25) a. Arnaud_i est devenu si insupportable que sa_i fille a cessé de
 Arnaud is become so unbearable that his daughter has stopped of
 lui rendre visite.
 him visit
 'Arnaud has become so unbearable that his daughter stopped visiting him.'
 b. Arnaud_i est devenu si insupportable que sa_i propre fille a
 Arnaud is become so unbearable that his own daughter has
 cessé de lui rendre visite.
 stopped of him visit
 'Arnaud has become so unbearable that his own daughter stopped visiting him.'

⁸Note that *propre* can also target the possessor if it is expressed by a prepositional phrase *de X*, although it is not judged as good as the other case by all native speakers of French.

- (i) Donc me voilà débarquant dans un appartement plus grand que le propre appartement de
 so me here turning up in a apartment more big than the own apartment of
 mes parents en France! [attested on Google]
 my parents in France
 'And then, I was turning up at an apartment that was bigger than my parents' own apartment in France!'

⁹The capital letters are not meant to transcribe a precise prosodic phenomenon here (a detailed prosodic analysis of the sentence would be required for that), but only indicate some kind of stress related to focus.

As in the case of *possessor propre*, both sentences are true in the same situation, but they have different felicity conditions: alternatives come into play in (25b).

However, it is not the referent of the possessor that is targeted in this sentence: Arnaud – the possessor – is not contrasted with other fathers. Rather, it is Arnaud's daughter – thus the possessum – that is contrasted with other individuals. For example, (25b) would be felicitous in the following context: Arnaud's friend and Arnaud's cousin have already stopped visiting Arnaud because he is too bad-tempered. Thus, *propre* targets the possessum in this case¹⁰ since it is the referent of the whole possessive DP *sa fille* ('his daughter') that is contrasted with other individuals¹¹. Furthermore, as opposed to possessor *propre*, possessum *propre* requires an ordering of the alternatives on a scale of likelihood: the individual intensified by *propre* corresponds to an unlikely one in the context: in (25b), Arnaud's daughter is less likely than his friend or his cousin to stop visiting him.

This means that in this case, *propre* has an effect comparable to focusing the possessum by stressing it as shown in (26).

- (26) Arnaud_i est devenu si insupportable que sa_i FILLE a cessé de lui
 Arnaud is become so unbearable that his DAUGHTER has stopped of him
 rendre visite.
 visit
 'Arnaud has become so unbearable that his daughter stopped visiting him.'

To sum up this section, *propre* has two possible interpretations: it can contrast either the possessor (*possessor propre*) or the possessum (*possessum propre*) with a contextually determined set of alternatives. That's in this sense that *propre* can be considered as a flexible intensifier specialized in possessive DPs.

¹⁰As in the previous case, the possessum can also be targeted when the possessor is expressed by a prepositional phrase *de X*: here, the referent of the victim's son is contrasted with other individuals:

- (i) Le meurtrier présumé qui a été placé en hôpital psychiatrique n'est autre que le
 the murderer presumed who has been placed in hospital psychatric NE is other than the
 propre fils **de la victime**. [attested on google]
 own son of the victim
 'The presumed murderer who has been placed in a psychatric hospital in no other than the victim's own son.'

¹¹The example (25b) could suggest that it is not the possessum individual, but rather the relation ('daughter') that is contrasted with other relations ('friend' or 'cousin' in the context). But this is incorrect: it is not necessary that the alternatives be related to the possessor as shown by the following example. In the example below, at least one of the salient alternatives – the witness – does not stand in a specific relationship to John. Therefore, the relation of motherhood cannot be contrasted with other relations; it is rather the individual referent of John's mother that is contrasted with other individuals.

- (i) Ce n'est pas la victime qui a dénoncé Jean_i, ni un témoin, c'est sa_i propre mère qui
 it NE is not the victim who has denounced John nor a witness it is his own mother who
 l'a dénoncé!
 him has denounced
 'It's not the victim who denounced John, nor a witness, it's his own mother who denounced him!'

2.3 Formalization: *propre* as a Flexible Intensifier Counterpart of *-même* in Possessive DPs

2.3.1 *Selbst* and *propre*

The main semantic intuitions about *propre* are similar in several respects to the intuitions that have been reported for German *selbst* ('-self'; cf. French *-même*) referred to as an intensifier. So based on the analysis that has been proposed for *selbst*, I will argue that *propre* is a counterpart of the intensifier *-même*¹² in possessive DPs and that *propre* therefore falls into the class of intensifiers.¹³

It has been argued (Eckardt: 2001, Hole: 2002) that the focus accent that is typically observed on *selbst* leads to a Rooth-style focus meaning of *selbst* (cf. Rooth: 1985, 1992): *selbst*, which does not make a difference in the ordinary denotation, makes a crucial difference in the focus meaning by introducing alternative functions on the domain of individuals. The focus meaning of *selbst* is the set of all functions which map individuals to other individuals. Thus in (27), *selbst* does not change the truth-conditions of the sentence, but involves alternatives to the referent of the DP to which it adjoins, namely here, alternatives to the referent of the king.

- (27) Der König selbst wird teilnehmen.
 the king himself will attend
 'The king himself will attend.'

Here are therefore the meanings that have been proposed for *selbst*:

- Ordinary meaning

$$\llbracket \text{selbst} \rrbracket^o = \lambda x_e . x$$

- Focus meaning

$$\llbracket \text{selbst} \rrbracket^f = \{f_{\langle e, e \rangle} : f(x) \neq x\}^{14}$$

Similarly, *propre* has no semantic effect in the narrow sense: truth-conditions remain unchanged. Moreover, *propre* has a semantic effect in that it relates to alternatives. Thirdly, *propre* bears focal stress itself. That's why I propose that *propre* like *selbst* falls into the class of intensifiers.

Nevertheless, *propre* exhibits several specificities as compared to *selbst*. First, as shown in the introductory section, it has a distribution restricted to possessive DPs. Moreover, as argued in the second section, it presents flexible intensification: the alternatives it involves target either the possessor or the possessum. Therefore, I am going to argue that *propre* corresponds to two specific type-lifted variants of the identity function in focus, with two different targets for the identity function (possessor or possessum).

¹²I assume here that the analysis provided for German *selbst* can be adapted to French *-même*.

¹³See Charnavel: 2010 for more details about the semantic analysis of *propre*.

¹⁴This is the formulation proposed by Hole (2002), who purposefully chooses not to include the identity function in the set of alternatives even if strictly speaking, a p-set à la Rooth has the focused element in it.

2.3.2 The Ordinary Meaning of *propre*

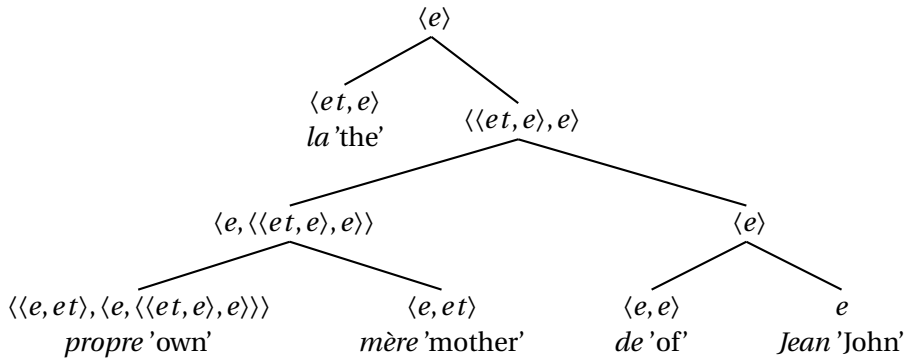
I propose that the right analysis can be derived if we formulate the two following ordinary meanings for possessor *propre* and possessum *propre*:

- $\llbracket \text{possessor propre} \rrbracket^o = \lambda R. \lambda x. \lambda a. a(R(ID(x)))$
- $\llbracket \text{possessum propre} \rrbracket^o = \lambda R. \lambda x. \lambda a. ID(a(R(x)))$
 - ID is the identity function on the domain of individuals: $\langle e, e \rangle$
 - R is a variable over possessive relations: $\langle e, e \rangle$
 - x is a variable over individuals: $\langle e \rangle$
 - a is a specific kind of choice function defined for singleton sets: $\langle et, e \rangle$

These denotations capture three main aspects of *propre*: (a) its distribution in definite possessive DPs (b) its vacuous meaning with respect to truth-conditions and (c) its flexibility in intensification.

- (a) First, these denotations predict the right distribution for *propre*: it has to combine with a possessive relation (R , which is commonly expressed by a relational noun), a possessor individual (x), and it is only compatible with definite articles, as opposed to indefinite articles or quantifiers, as predicted by a , which corresponds to the definite article (cf. $THE = \lambda P. \lambda x. P(x)$).
- (b) Moreover, this ordinary meaning is vacuous with respect to the truth-conditions since neither the identity function nor the simple combination of the possessive relation, the individual and the definite article can yield a semantic effect in the narrow sense. Thus, this correctly predicts that *la propre mère de Jean* ('John's own mother') has the same ordinary meaning as *la mère de Jean* ('John's mother'), as illustrated in (24). This is the case whether we deal with possessor *propre* or possessum *propre*, since the fact that the identity function takes different arguments in both cases does not make any difference in the ordinary meaning¹⁵.

(28) *la propre mère de Jean* 'John's own mother'



¹⁵Note that in the case of non relational nouns, I suppose as is standard the presence of an abstract POSS ($\lambda f_{et}. \lambda x_e. \lambda y_e. f(y) = 1$ and y is possessed by x).

Moreover, in the case of the possessive determiner *son* ('his'), I assume that *son* is decomposed into *'the'* and *de lui* ('of him').

- $\llbracket \textit{propre} \rrbracket^o = \lambda R_{e,et}. \lambda x_e. \lambda a_{et,e}. a(R(ID(x)))$
- $\llbracket \textit{mère} \rrbracket = \lambda x_e. \lambda y_e. y \text{ is mother of } x$
- $\llbracket \textit{propre mère} \rrbracket^o = \lambda x_e. \lambda a_{et,e}. a([\lambda x_e. \lambda y_e. y \text{ is mother of } x](ID(x)))$
- $\llbracket \textit{de} \rrbracket = \lambda x_e. x$
- $\llbracket \textit{Jean} \rrbracket = \llbracket \textit{de Jean} \rrbracket = \text{John}^{16}$
- $\llbracket \textit{propre mère de Jean} \rrbracket^o = \lambda a_{et,e}. a([\lambda x_e. \lambda y_e. y \text{ is mother of } x](ID(\text{John}))) = \lambda a_{et,e}. a(\lambda y_e. y \text{ is mother of John})$
- $\llbracket \textit{la} \rrbracket = \lambda f_{et}$; and there is exactly one x such that $f(x)=1$ · the unique y such that $f(y) = 1$
- $\llbracket \textit{la propre mère de Jean} \rrbracket^o = \text{the unique } y \text{ such that } [\lambda y_e. y \text{ is mother of John}](y) = 1 = \text{the unique } y \text{ such that } y \text{ is mother of John}$

- (c) Thus, the denotation for the ordinary meaning of *propre* expresses the vacuity of *propre* with respect to the truth-conditions. However, it crucially predicts a difference in the focus meaning of possessor *propre* and possessum *propre*: since the identity function takes two different arguments (possessor (x) or possessum ($a(R(x))$)), two different contrast-sets of alternatives are involved. In other words, this scope difference of the identity function predicts the flexibility in intensification of *propre*. This will be made clearer by examining the focus meaning of *propre*.

2.3.3 The Focus Meaning of *propre*

Like *selbst*, *propre* is stressed and this is the case for both possessor and possessum *propre*.¹⁷

This empirical observation suggests that *propre* is in focus, and this will predict the effect of *propre* on the felicity conditions of the sentence. While *propre* does not contribute anything to the meaning of the sentence, it will become meaningful if it is in focus: focused *propre* will, like any other focused item, evoke focus alternatives that will enter in the meaning of the respective focus construction.

Therefore, I propose that *propre* has a focus meaning à la Rooth (1985, 1992): the focus meaning of an item in focus is the set of all type-identical alternatives to it. However, the case of *propre* is a little more specific: since *propre* denotes a type-lifted variant of the identity function, I assume that the focus alternatives of *propre* are type-lifted variants of other functions from D_e to D_e ¹⁸: *propre* in focus relates to alternative functions on the domain of individuals.

¹⁶The preposition *de* ('of') is considered to be semantically vacuous here because of the presence of the relational noun *mère* ('mother'), that already expresses the relational meaning.

¹⁷This is at least the case in my dialect of French. Note however that this seems to be different for German *eigen* or English *own* according to several German and English speakers: in these two cases, possessor *propre* is stressed whereas possessum *propre* is not, but the possessee is.

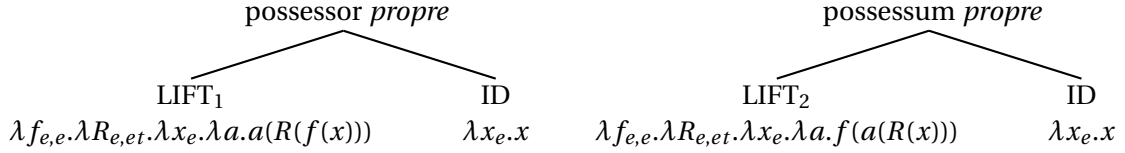
a) possessor *own*: his OWN daughter (cf. German: seine Elgene Tochter)

b) possessum *own*: his own DAUGHTer (cf. German: seine eigene TOCHter)

¹⁸I adopt here the same strategy as Eckardt, who proposes type-lifted variants of the identity function for adverbial *selbst* (2001: 381).

$\llbracket \text{propre} \rrbracket^f = \{\text{Lift}_n(f) \mid f \text{ is a contextually salient alternative to } ID\}$ for appropriate lifts Lift_1 – Lift_2 .

To this end, two lifts are necessary depending on which argument the identity function takes (the possessor or the possessum):



Thus, since focus on *propre* generates alternative functions on the domain of individuals, I predict that focused *propre* indirectly induces a set of alternative individuals in D_e , as shown below.

- Let a be the referent of the element intensified by *propre*.
- Let $\{f_1, f_2, f_3, \dots, f_k\}$ be salient alternatives to ID in the given context C .
- Here is the induced set of alternatives to a in D_e ¹⁹ in context C :
 $Alt(C)(a) = \{f_1(a), f_2(a), f_3(a) \dots f_k(a)\}$

Note that it is the context that restricts the potentially infinite set of individuals to the salient alternatives relevant in the discourse situation. Also, this analysis does not say anything about the truth of the alternatives, which correctly predicts that alternative propositions to the sentence including focused *propre* may be true (additive reading; cf. 25b) or false (exclusive reading; cf. 23b).

Let's apply this analysis to example (23b) repeated here:

- (29) Anne_i a présenté son_i propre travail devant la classe.
 Anne has presented her own work in front of the class
 'Anne presented her own work to the class.' = (23b)

As shown above, this is an example of possessor *propre* since in this context, Anne is contrasted with researchers whose work could have presented by her too: instead of presenting other researchers' work, Anne presented her own work. Thus, the ordinary meaning of *propre* is the following one, where the identity function takes the possessor individual as argument:

$$\llbracket \text{propre} \rrbracket^o = \lambda R. \lambda x. \lambda a. a(R(ID(x)))$$

Therefore, the focus meaning of *propre* in this sentence is the set of type-lifted variants (using Lift_1) of contextually salient alternative functions to the identity function, i.e. the set of type-lifted₁ variants of salient functions from individuals to individuals except for the identity function. Let's suppose that Anne could have presented the work of three possible researchers. The relevant alternative possessors in the context are then these three researchers, and there are three contextually salient alternative functions to the identity function, namely the functions that take Anne as argument and return one of the three researchers; I call these functions r_1, r_2, r_3 .

$$\begin{aligned} \llbracket \text{propre} \rrbracket^f &= \{\text{Lift}_1(f) \mid f_{\langle e, e \rangle} \text{ is a contextually salient alternative to ID} \\ &f_{\langle e, e \rangle} \in \{r_1, r_2, r_3\}\end{aligned}$$

¹⁹I borrow this name from Eckardt (2001: 382).

Therefore, the induced set of alternatives to Anne in the domain of individuals is as follows:

$$Alt(C)(Anne) = \{r_1(Anne), r_2(Anne), r_3(Anne)\}$$

Thus, the focus semantic value of (25) is the following set of propositions:

$\llbracket \text{Anne a présenté son } [propre]_F \text{ travail devant la classe} \rrbracket^f = \{\text{Anne presented } x\text{'s work to the class} / x \in Alt(C)(Anne)\}$

This correctly means that the focus semantic meaning of the sentence 'Anne presented her own work to the class' is the alternative proposition 'Anne presented some researcher's work to the class.'

Possessum propre works the same except that alternatives are ordered on a scale of likelihood: *possessum propre* induces a scalarity effect, that is the proposition containing the intensified element is an unlikely one as compared to the alternative propositions. For example in (25b) (repeated below), Arnaud's daughter is an unlikely individual to stop visiting Arnaud among the contextual alternatives Arnaud's cousin and Arnaud's friend.

- (30) Arnaud_i est devenu si insupportable que sa_i propre fille a cessé
 Arnaud is become so unbearable that his own daughter has stopped
 de lui rendre visite.
 of him visit
 'Arnaud has become so unbearable that his own daughter stopped visiting him.'
 = (25b)

This is the same kind of scalarity effect as the one induced by the focus sensitive particle *même* but the difference consists in the absence of an existential presupposition in the case of *propre*.

To account for this scalarity effect, I propose that *possessum propre* is associated with a silent element *even* that triggers a scalar presupposition. This is probably related to the possibly hidden *even* involved by minimizers (cf. Heim 1984) that denote the low endpoint of the contextually relevant pragmatic scale as illustrated in (29):

- (31) He didn't (EVEN) lift a finger.

I have thus argued that *propre* is a counterpart of *-même* in possessive DPs. Like *-même*, *propre* is an intensifier, and its specificities come from its restricted distribution in possessive DPs: it is a flexible intensifier in that it can intensify either the possessor or the possessum.

3 *Son propre* and binding: interaction between intensification and binding

The goal of this section is to argue that the intensifying properties of *propre* interact with the binding properties of *son propre*: *son propre* exhibits anaphoric properties only when the possessor (referent of its antecedent) –vs. the possessum– is intensi-

fied²⁰.

Target of intensification (<i>propre</i>)	Binding properties (<i>son propre</i>)
Possessor (= referent of the antecedent of <i>son</i>)	Anaphoric
	Logophoric
Possessum	Neither

3.1 Possessor *son propre*: anaphoric and/or logophoric properties

In this subsection, I show that *son propre* exhibits anaphoric or/and logophoric properties when *son* is associated with *possessor propre* (*possessor son propre*): when it is the possessor that is intensified by *propre*, *son propre* behaves like an anaphor, which can be long distance bound if the antecedent is a logophoric center.

3.1.1 First case: anaphoric *son propre*

When the referent of the possessor, i.e. the antecedent, is inanimate, possessor *son propre* has anaphoric properties, unlike the pronoun *son*. As stated by the principle A of Binding Theory, this means that *son propre* needs to be locally bound, i.e. it requires a locally c-commanding and coindexed antecedent.

- Principle A of Binding Theory (cf. Chomsky 1981, 1986 and subsequent revisions of it): an anaphor must be bound in its domain.

The following sentences, which involve possessor *propre*, illustrate the c-command requirement.

- (32) a. [Cet hôtel] protège sa_k (*propre*) plage sans se préoccuper des
 this hotel protects its own beach without SE care of the
 plages des hôtels voisins.
 beaches of the hotels neighboring
 'This hotel protects its (own) beach without caring about the beaches of
 the neighboring hotels.'
- b. Les clients de [cet hôtel]_k préfèrent sa_k (**propre*) plage à celles des
 the guests of this hotel prefer its own beach to the ones of the
 hôtels voisins.
 hotels neighboring
 'The guests of this hotel prefer its (*own) beach to the beaches of the neigh-
 boring hotels.'

²⁰All the judgments for the data in this section have been informally checked with a few other native speakers of French. Moreover, I have just made a more systematic questionnaire involving many speakers of French, which verifies the pattern presented here. For timing reasons, it cannot be presented here, but will be presented in future work.

In (32a), both *sa propre plage* ('its own beach') and *sa plage* ('its beach') license *cet hôtel* ('this hotel') as antecedent. However, in (32b), *cet hôtel* ('this hotel') is only a possible antecedent for *sa plage* ('its beach'), not for *sa propre plage* ('its own beach'). Since the crucial difference between the two sentences is that *cet hôtel* ('this hotel') does not c-command *sa (propre) plage* ('its (own) beach') in (32b), but does in (32a), this means that *sa propre plage* as opposed to *sa plage* needs to be c-commanded by its antecedent.

Moreover, the binder must be local, as exemplified by the following sentence.

- (33) [Ce pont]_j a bénéficié du fait que les autorités ont donné plus
this bridge has benefited of the fact that the authorities have given more
d'avantages à son_j (*propre) architecte qu'à celui du musée.
of benefits to its own architect than to the one of the museum
'This bridge benefited from the fact that the authorities provided more benefits
to its (*own) architect than to the architect of the museum.'

In (33), *son architecte* ('its architect') licenses the long-distance antecedent *ce pont* ('this bridge'), but *son propre architecte* ('its own architect') does not.

Therefore, the following generalization holds:

In the case of inanimate possessors, possessor *son propre* is a complex possessive anaphor obeying principle A of Binding Theory (as formulated by Chomsky 1981, 1986 and subsequent revisions).

3.1.2 Second case: logophoric *son propre*

However, this generalization does not hold for animate possessors, as illustrated by the following contrast:

- (34) a. [Ce pont]_j a bénéficié du fait que les autorités ont donné plus
this bridge has benefited of the fact that the authorities have given more
d'avantages à son_j (*propre) architecte qu'à celui du musée.
of benefits to its own architect than to the one of the museum
'This bridge benefited from the fact that the authorities provided more
benefits to its (*own) architect than to the architect of the museum.'
- b. [Le patron de cette entreprise]_j a bénéficié du fait que les
the boss of this company has benefited of the fact that the
autorités ont donné plus d'avantages à ses_j (propres) employés
authorities have given more of benefits to his own employees
qu'à ceux de son concurrent.
than to the one of his competitor
'The boss of this company benefited from the fact that the authorities pro-
vided more benefits to his (own) employees than to the employees of his
competitor.'

(34b) shows that *ses propres employés* ('his own employees') licenses a long-distance antecedent *le patron de cette entreprise* ('the boss of this company') as opposed to *son propre architecte* ('its own architect') in (34a). Since the crucial difference is that the possessor is animate in (34b), this means that *son propre* does not require a local binder

when the possessor antecedent is animate.²¹

Similarly, it is not always true that *son propre* must be c-commanded by its antecedent in the case of animate possessors:

- (35) a. L'opinion de Sébastien_j portait autant sur sa_j (propre) mère
 the opinion of Sébastien was about as much on his own mother
 que sur la mère de sa femme.
 than on the mother of his wife
 'Sébastien's opinion was as much about his (own) mother than about his wife's mother.'
- b. Le sujet de [l'article]_j contredisait autant son_j (*propre) titre
 the topic of the article was contradicting as much its own title
 que le titre du film en question.
 than the title of the movie in question
 'The topic of the article was as much in contradiction with its (*own) title than the title of the movie in question.'

(35a) contrasts in this respect with (35b) since *sa propre mère* ('his own mother') licenses the animate non c-commanding antecedent Sébastien in (35a), while *son propre titre* ('its own title') cannot have the inanimate non c-commanding *l'article* ('the article') as antecedent in (35b). So, in the case of animate antecedents, *son propre* does not require a locally c-commanding antecedent.

Therefore, *son propre* seems to fall into the class of long-distance anaphors such as Mandarin Chinese *ziji* (cf. Huang and Liu 2001), which pose a challenge to the standard theory of anaphor binding. The hypothesis that has been proposed in such cases is the theory of logophoricity (cf. Huang and Liu 2001; Giorgi 2007...): long-distance anaphors are logophoric, i.e. they do not have to obey the syntactic constraints of binding, but the constraints of logophoricity requiring that the antecedent be a center of perspective of the sentence. This idea is based on the fact that some West African languages have specific pronouns used to express the perspective of the person they refer to. The term logophor has been originally coined for such cases (cf. Hagège 1974) and has then been extended to situations in other languages where the usual rules of binding do not apply, that is in the case of long distance anaphors, which have their antecedents outside their binding domains (e.g. Mandarin Chinese *ziji*).

I propose that *possessor son propre* supports this hypothesis: possessor *son propre* can be long distance bound if it is logophoric. This means that in such cases, *son propre* refers to a specific type of antecedent, namely a logophoric center: the antecedent refers to a person whose words, thoughts or point of view are being reported.²² More

²¹It would be worth defining the notion of locality and the anaphoric domain in detail; but since I do not have space to investigate all the relevant examples here, I simply assume for now that the anaphoric domain is the clause; this approximation is sufficient for my purposes here.

²²Sells (1987) proposes three primitive roles for the antecedent of logophors and he suggests that these roles characterize certain cross-linguistic variations:

- a- Source: the one who is the intentional agent of the communication,
- b- Self: the one whose mental state or attitude the proposition describes,
- c- Pivot: the one with respect to whose (time-space) location the content of the proposition is evaluated.

specifically, I argue that *son propre* belongs to the class of logophors that require a *de se* reading.²³

The distinction between *de re* and *de se* readings corresponds to the distinction between the report of the knowledge of the speaker and that of the knowledge of the referent of the antecedent (cf. Chierchia 1989). This means that the antecedent of *son propre* corresponds to a logophoric center if and only if its referent is aware of the reflexivity of the possession, i.e. if and only if its referent could knowingly say *mon propre* ('my own').

Thus, I propose that the *de se* reading is the primitive property defining *son propre* as a logophor. This property is therefore sufficient as a diagnostic for logophoricity. However, for methodological reasons, I also use two other properties that derive from this one to identify logophoric *son propre*, because they are clearer diagnostics, i.e. animacy and consciousness of the referent of the antecedent. *De se* reading entails consciousness of the referent of the antecedent since it is necessary to be conscious to be able to knowingly say *mon propre*. Moreover, consciousness entails animacy, and therefore, by transitivity, animacy of the referent of the antecedent is also entailed by the *de se* reading. That's why following Huang and Liu (2001), I use the following three criteria as diagnostics for the logophoricity of possessor *son propre*: (a) animacy of the referent of the antecedent; (b) consciousness of the referent of the antecedent; (c) *de se* reading.

(a) Animacy of the referent of the antecedent. As already suggested in the pair (34) repeated here as (36), the referent of the antecedent has to be animate to license logophoric *son propre*. Put another way, possessor *son propre* does not require a locally c-commanding antecedent if the referent of the antecedent is a center of perspective, and this is possible only if it is animate.

- (36) a. [Ce pont]_j a bénéficié du fait que les autorités ont donné plus
this bridge has benefited of the fact that the authorities have given more
d'avantages à son_j (*propre) architecte qu'à celui du musée.
of benefits to its own architect than to the one of the museum
'This bridge benefited from the fact that the authorities provided more
benefits to its (*own) architect than to the architect of the museum.'
- b. [Le patron de cette entreprise]_j a bénéficié du fait que les
the boss of this company has benefited of the fact that the
autorités ont donné plus d'avantages à ses_j (propres) employés
authorities have given more of benefits to his own employees
qu'à ceux de son concurrent.
than to the one of his competitor
'The boss of this company benefited from the fact that the authorities pro-
vided more benefits to his (own) employees than to the employees of his
competitor.'

²³Mandarin Chinese *ziji* in Huang and Liu's dialect (2001:19) or Italian *proprio* (cf. Giorgi 2007:333) also belong to this class of logophors.

Ses propres employés ('his own employees') in (36b) licenses a long distance antecedent *le patron de l'entreprise* ('the boss of the company'), but the long distance antecedent *ce pont* ('this bridge') in (36a) for *son propre architecte* ('its own architect') is ungrammatical. This is so because 'the boss of the company' can be a perspective-holder in (36b) as opposed to 'this bridge' in (36a). This difference can be easily diagnosed by the animacy of the referent of *le patron de l'entreprise* vs. *ce pont*.

(b) Consciousness of the referent of the antecedent. Similarly, the center of perspective of a sentence has to be conscious; therefore, if the referent of the antecedent is not conscious, logophoric *son propre* is not possible, as shown by the following contrast:

- (37) a. [Le pharaon]_i a beaucoup aimé les embaumeurs qui à présent
the Pharaoh has a lot liked the embalmers who at present
prennent soin de son_i (*propre) corps.
take care of his own body
'The Pharaoh had liked a lot the embalmers who are now taking care of his
(*own) body.'
- b. [L'esprit du pharaon]_i devait penser que les embaumeurs prenaient
the spirit of the Pharaoh must think that the embalmers took
bien soin de son_i (propre) corps.
well care of his own body
'The Pharaoh's spirit was probably thinking that the embalmers were tak-
ing great care of his (own) body.'

In (37a), the Pharaoh is dead, therefore not conscious, and this diagnostic shows that the Pharaoh cannot be the center of perspective of the sentence. Thus, *son propre corps* ('his own body'), which is not locally c-commanded by *le pharaon* ('the Pharaoh'), is not possible, as predicted by the logophoricity hypothesis. However in (37b), *son propre corps* ('his own body') can be long distance bound by *l'esprit du pharaon* ('the Pharaoh's spirit') because the referent of this antecedent is conscious, thus a possible center of perspective.

(c) De se reading. The *de se* reading is the strictest criterion to define the logophoric center in the case of possessor *son propre*. The context of Beaumarchais's *Marriage of Figaro* can exemplify this property: in this setting, the maid Marceline knows that Suzanne will marry Figaro, but she does not know until the end of the play that Figaro is her own son. In this context, the following contrast holds:

- (38) a. Marceline_i disait que Suzanne allait épouser son_i (# propre) fils.
Marceline said that Suzanne was going to marry her own son
'Marceline said that Suzanne would marry her (# own) son.'
- b. Marceline_i disait que Suzanne avait épousé son_i (propre) fils.
Marceline said that Suzanne had married her own son
'Marceline said that Suzanne had married her (own) son.'

If (38a) is uttered at the beginning of the play, the *de se* reading is not available since Marceline does not know yet about her motherhood. Therefore, as predicted by the lo-

gophoricity hypothesis, she cannot be the center of perspective and Marceline cannot long-distance bind *son propre fils* ('her own son'): *son propre* cannot be logophoric in this case. However, if (38b) is uttered at the end of the play, the sentence is appropriate because Marceline knows at that time that Figaro is her son; thus, Marceline is the center of perspective according to the criterion that I propose, which licenses the long distance anaphor *son propre fils* ('her own son'). This contrast demonstrates that the *de se* diagnostic appears to be the most relevant one to define the notion of logophoric center in the case of possessor *son propre*. Conversely, this means that if the *de se* reading is not available, possessor *son propre* cannot be logophoric and has therefore to be an anaphor requiring a locally c-commanding antecedent.

To sum up, the following generalization holds for possessor *son propre*:

Possessor son propre is either an anaphor obeying the syntactic constraints of anaphoricity (local c-commanding antecedent) or a logophor obeying the discourse-related constraints of logophoricity (antecedent as perspective holder).²⁴

3.2 *Possessum son propre*: no anaphoric properties

While *possessor son propre* exhibits anaphoric properties, I show in this section that *possessum son propre* does not. This argues for the presence of an interaction between binding and intensification: when the possessor, i.e. the referent of the antecedent of *son propre*, is intensified, anaphoric properties arise, but it is not the case when it is the possessum that is intensified.

As illustrated by the following examples, *possessum son propre* lacks both anaphoric and logophoric properties:

- (39) a. [Ce pont]_i a l'air très fragile. Son_i (propre) architecte a demandé
 this bridge has the air very fragile its own architect has asked
 un contrôle de sécurité.
 a control of security
 'This bridge looks very fragile. Its (own) architect asked for a safety check.'
- b. [Ce pont]_i a l'air très fragile. Son_i (*propre) architecte a reçu
 this bridge has the air very fragile its own architect has received
 moins de moyens que tous les autres architectes des ponts de la
 less of means than all the other architects of the bridges of the
 région.
 area
 'This bridge looks very fragile. Its (*own) architect got less means than all the other architects of the bridges of the area.'
- c. [Cet enfant]_i a l'air très perturbé. Sa_i (propre) mère passe moins
 this child has the air very disturbed his own mother spends less
 de temps à la maison que toutes les autres mères des enfants de
 of time at the house than all the other mothers of the children of

²⁴Note that the sets of anaphoric and logophoric uses of *son propre* are not in complementary distribution, but overlap since their properties are not exclusive of each other. Thus, *possessor son propre* can be both anaphoric and logophoric if its antecedent both locally c-commands it and is the center of perspective (*de se* reading).

la classe.

the class

'This child looks very disturbed. His (own) mother spends less time at home than all the other mothers of the children in the class.'

In (39b), *son propre architecte* ('its own architect') is a case of *possessor propre*: this bridge is contrasted with other bridges as 'possessors' of an architect. In (39a) however, *propre* intensifies the possessum: the bridge's architect is opposed to other individuals who would ask for a safety check too, and he is an unlikely individual among the alternatives to express such a request since he designed the bridge himself. Crucially, this difference in intensification correlates with a difference in binding: (39b) is ungrammatical if it includes *propre* because *son propre architecte* ('its own architect') is an anaphor requiring a local antecedent, but (39a) is grammatical because *son propre architecte* ('its own architect') does not exhibit binding properties. In other terms, this contrast shows that *possessum son propre* does not require a local antecedent and therefore argues for the non anaphoric status of *possessum son propre*.

Moreover, the same example shows that *possessum son propre* also lacks logophoric properties. Recall that *possessor son propre* may be long distance bound if the antecedent is a logophoric center and we established that a logophoric center has to be animate. That's why (39b), which presents the inanimate *ce pont* ('this bridge') as antecedent of *possessor son propre*, is ungrammatical with *propre*, while (39c), in which *possessor son propre* has the animate *cet enfant* ('this child') as antecedent, is grammatical: it is because a child, unlike a bridge, can be a center of perspective that (39c), unlike (39b), is well-formed. However, the sentence (39a), in which *propre* does not intensify the possessor, but the possessum, is crucially grammatical, even if *son propre architecte* ('its own architect') has the inanimate *ce pont* ('this bridge') as long distance antecedent. This demonstrates that *possessum son propre*, unlike *possessor son propre*, lacks anaphoric and logophoric properties altogether.

So as opposed to *possessor son propre*, *possessum son propre* does not obey any binding constraints: its antecedent does not have to c-command it, nor to be local. Moreover, it does not have to be non c-commanding or non local either, as shown by the following example:

- (40) Dans un moment de folie, après avoir tué les voisins, Michel_i a
 in a moment of madness after have killed the neighbors Michel has
 tué ses_i propres enfants.
 killed his own children
 'In a moment of madness, after he killed the neighbors, Michel killed his own children.'

To sum up, *possessor son propre* obeys the constraints of anaphoricity or/and the constraints of logophoricity while *possessum son propre* does not. As shown in the second section, *possessor son propre* intensifies the possessor, i.e. the referent of the antecedent of *son propre*, while *possessum son propre* intensifies the possessum. Crucially, this correlation therefore shows that there is an interaction between the modules of binding and intensification: it is only when the referent of its antecedent is intensified that *son propre* needs to be bound.

4 Conclusion

Son propre is a piece of evidence for the existence of an interaction between intensification and binding in two respects:

- First, *possessor son propre* has to obey anaphoric or logophoric constraints while *son* does not. This shows that the intensifier *propre* turns the pronoun *son* into a (long distance) anaphor.

Besides, this also reveals that French has an anaphor that behaves like well-studied anaphors (while otherwise, anaphoric relations are typically coded by the reflexive clitic *se* in French) and a logophor, which is a long distance anaphor: this supports the theory of logophoricity.

- Second, *possessor son propre* has to obey anaphoric or logophoric constraints while *possessum son propre* does not. And crucially, the possessor (vs. the possessum) corresponds to the referent of the antecedent. This shows that it is not the combination of the intensifier and the pronoun *per se* that matters, but the intensification of the referent of the pronoun, corresponding to the referent of the antecedent. Therefore, this argues for the presence of an interaction between intensification and binding.

This correlation is visible due to the semantic specificity of *propre* as a flexible intensifier: *propre* can have two different targets for intensification (the possessor or the possessum), which I formalized as two type-lifted variants of the identity function in focus.

Further investigation would now need to establish how exactly the modules of binding and intensification interact with each other.

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Isabelle Charnavel
ENS-IJN/UCLA

Agreement with quantified nominals: implications for feature theory

Gabi Danon

1 Introduction

1.1 The phenomenon

Over the last two decades, agreement has played a central role in shaping different generative frameworks. In addition to accounting for canonical agreement patterns, a syntactic model must also be able to account for various non-canonical patterns observed in natural language. This paper focuses on one area where subject-verb (or subject-Aux) agreement does not always follow the canonical pattern: the agreement triggered when the subject is a quantified noun phrase (QNP), as in the following schematic structure:

- (1) [Q N] (Aux) Pred

In Modern Hebrew, two agreement patterns are attested in such cases:

1. Agreement with Q (“Q-agr”)
2. Agreement with N (“N-agr”)

These two patterns are illustrated below:

- (2) 20 axuz-im me-ha-zman mukdašim / ?mukdaš le-kri’a.
20 percent-M.P of-DEF-time(M.S) devoted.M.P / devoted.M.S to-reading
‘20% of the time is devoted to reading.’ (Q-agr/?N-agr)
- (3) maxacit me-ha-tošavim ovdim / *ovedet be-xakla’ut.
half(F.S) of-DEF-residents(M.P) work.M.P / work.F.S in-agriculture
‘Half of the residents work in agriculture.’ (N-agr/*Q-agr)

The existence of more than one agreement pattern for QNPs is not unique to Hebrew. As we show below, however, not all languages display the same alternation; from a theoretical point of view, it will be claimed that the alternation pattern in Hebrew is particularly revealing of the nature of agreement.

A third agreement pattern, which will not be discussed in this paper, is often termed ‘semantic agreement’; this is illustrated in (4):

- (4) ? xelek me-ha-kita higi'u be-ixur.
 part(M.S) of-DEF-class(F.S) arrived.P late
 'Some of the (students in the) class arrived late.'

Unlike in the previous examples, in (4) the number feature on the verb matches neither the grammatical number of the quantifier nor that of the noun. This is usually seen as an expression of the QNP's semantic number, under the interpretation given in the gloss. This paper will focus only on the two *syntactic* agreement patterns, N-agr and Q-agr. It is quite likely, however, that the analysis of QNP agreement to be proposed can also be extended to account for the semantic agreement pattern.

At this point we wish to avoid committing to one specific structural analysis of quantified noun phrases; we will therefore use the following notation, keeping open for the moment the question whether quantifiers should be analyzed as heads or as specifiers:

- 'NP': the maximal (extended) projection of the noun (which might actually be DP).
- 'QP': the maximal projection of the quantifier.
- The entire quantified nominal will be referred to informally as 'QNP'; depending on its exact internal structure, this might actually be NP, DP or QP.

1.2 The theoretical problem

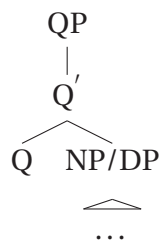
The first theoretical problem raised by the existence of two agreement patterns has to do with locality. An assumption shared by both the Minimalist framework and HPSG is that agreement is subject to strict locality constraints. Specifically, in the framework of Chomsky (2000, 2001), it is assumed that a head such as T can only agree with the *closest* matching goal. In the HPSG framework, agreement is assumed to always be with the *head* of the relevant phrase. The existence of two different agreement patterns with QNPs seems to pose a problem for these views:

1. If QP is structurally higher than NP, then N-agr seems to violate these locality conditions.
2. If NP is structurally higher than QP, then Q-agr seems to violate these locality conditions.

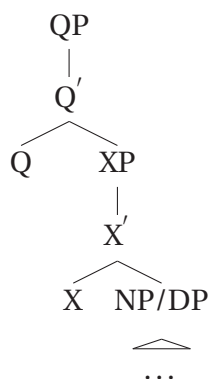
Put differently, under both Minimalist and HPSG assumptions, agreement is seen as a deterministic process that allows no optionality given the hierarchical structure and presence of features; therefore, free alternation between two well-formed agreement patterns is not predicted to be possible, unless each agreement pattern follows from a different underlying structure – a possibility to be argued against below.

Our main focus will be on QNPs for which the vast majority of previous work has argued that Q occupies a higher position than NP; hence, our goal is to account for N-agr in one of the following simplified structures:

(5) a.



b.



In what follows, we will focus mostly on providing an analysis which is compatible with Minimalist assumptions. Given the Minimalist model of agreement and no further assumptions, the prediction, which is clearly false, is that only Q-agr should be possible in configurations such as those in (5).

A second, related, problem, has to do with the relation of agreement with case. A well-established generalization is that in nominative-accusative languages, if T agrees with a single XP it is with a *nominative* one (see e.g. Bobaljik 2008). The agreeing NPs in many Hebrew QNPs allowing N-agr, however, have often been analyzed as being embedded genitives or obliques. N-agr therefore seems to involve agreement with a non-nominative XP. The question, then, is what makes this (apparent) violation of the case-agreement generalization possible in this environment.

1.3 Goals of this paper

The issues introduced above raise at least two kinds of questions:

Empirical question: What factor determines whether N-agr, Q-agr, or both will be possible for a given QNP–predicate pair?

Theoretical question: How can the syntax allow both patterns?

This paper will focus only on the *theoretical* question. More specifically, rather than using the theoretical framework as a means to analyze the data, we will attempt to use the data as a means to examine some aspects of the Minimalist framework – specifically, some aspects of its feature theory. Our main claim will be that certain assumptions about features in “standard” Minimalism make it impossible to express what might in fact be the right theory of QNP agreement; and that relatively small (and independently justified) modifications to Minimalist feature theory would make it possible to express this theory. Thus, my main goal is to highlight one specific area where, I will argue, Minimalist feature theory as it is usually used seems to be a little too restrictive.

2 Data overview

2.1 QNP agreement in Hebrew

In Modern Hebrew, it is possible to distinguish 3 major types of QNPs:

- Construct states headed by the quantifier, as in (6a). A construct state is a prepositionless genitival constructions in which the head is immediately followed by an obligatory genitive NP/DP.
- Partitives using the preposition *me-*, as in (6b).
- Simple quantifier-noun constructions, as in (6c).¹

- (6) a. kol/maxacit ha-anašim
all/half DEF-people
'all/half the people'
- b. kama/harbe me-ha-anašim
some/many of-DEF-people
'some/many of the people'
- c. kama/harbe anašim
some/many people
'some/many people'

Of these, the Q-agr/N-agr alternation occurs with the first two types: construct states (which often receive a partitive interpretation when headed by a quantifier) and partitives with *me-*. This has two important outcomes:

1. The alternation is not tied to one particular type of construction, and hence any analysis of this phenomenon must be flexible enough to be applicable to both of these QNP types.
2. The alternation cannot be reduced to a semantic distinction between partitive and non-partitive QNPs (Selkirk, 1977).

Before illustrating the agreement patterns with the two QNP types that display an alternation between Q-agr and N-agr, it should be noted that the data regarding QNP agreement in Hebrew shows a very high degree of variability in at least two dimensions: first, QNPs that look quite similar, syntactically and semantically, may sometimes trigger different agreement patterns; and second, native speakers often have strikingly different judgments, and many speakers often report a difficulty in judging the grammaticality of sentences with QNP subjects. At the descriptive level, it should be kept in mind that some of examples annotated in this paper with the grammaticality judgment '?' are judged as grammatical by some (but not all) speakers; while other examples annotated in this way are more or less consistently judged as marginally acceptable. A

¹One difference between the construct state (CS) QNP shown in (6a) and the simple QNPs in (6c) is that only the former may (and usually must) contain a definite article *following* the quantifier. In some cases, the head of a CS is also morpho-phonologically distinct from non-CS quantifiers.

proper classification of these judgments would be necessary for a full analysis of the factors favoring one agreement pattern over another; in this paper, however, we focus on the theoretical questions raised by the mere existence of both patterns.

As mentioned above, *partitive* QNPs often allow both N-agr and Q-agr. The following two examples illustrate partitives with the quantifier *xelek* ('part'); this quantifier allows both options, with the choice of preferred pattern often correlating with the type of noun: with plural count nouns, many speakers accept only the N-agr pattern, while with collective singular nouns like *oxlosiya* ('population'), *cibur* ('public') etc, many speakers accept both patterns, sometimes with a preference for Q-agr.

- (7) *xelek gadol me-ha-našim maskimot im de'a zo.*
 part(M.S) large.M.S of-DEF-women(F.P) agree.F.P with opinion this
 'A large proportion of (the) women agree with this opinion.' (N-agr)
- (8) *xelek gadol me-ha-oxlosiya eyno megiv tov le*
 part(M.S) large.M.S of-DEF-population(F.S) NEG.M.S react.M.S well to
 statinim.
 statins
 'A large part of the population doesn't react well to statins.' (Q-agr)

Similarly, *construct state* QNPs may trigger either N-agr or Q-agr, often with the same quantifier:

- (9) *maxacit ha-talimidim eynam nizkakim le-ezrat ha-mora.*
 half(F.S) DEF-students(M.P) NEG.M.P needy.M.P to-help DEF-teacher
 'Half of the students don't need the teacher's help.' (N-agr)
- (10) *maxacit ha-cava niš'ara ne'emana la-melex.*
 half(F.S) DEF-army(M.S) remained.F.S loyal.F.S to.DEF-king
 'Half of the army remained loyal to the king.' (Q-agr)

Note, however, that the alternation is not always free. Both construct state QNPs and partitive QNPs sometimes allow only the N-agr pattern:

- (11) *rov ha-našim mevinot / *mevin et ze.*
 most(M.S) DEF-women(F.P) understand.F.P / understand.M.S OM this
 'Most women understand this.' (N-agr/*Q-agr)
- (12) *harbe me-ha-tošavim ha-mekoriyim azvu / *azav.*
 many of-DEF-inhabitant.P DEF-original.P left.P / left.S
 'Many of the original inhabitants have left.' (N-agr/*Q-agr)

One question that might arise from example (12), which allows only N-agr, is whether this restriction has anything to do with the quantifier's morphology. Unlike many other Hebrew quantifiers, which have clear gender and number morphology, the quantifier *harbe* ('many') does not fit into any known morphological template; and as it cannot take its own modifiers, it seems like there is no way to determine whether it has any agreement features of its own, which might justify classifying this quantifier as lacking agreement features altogether. Therefore, it might seem somewhat trivial that N-agr is the only available option in this case. It should, however, be noted that Q-agr is not

The option of Q-agr is not discussed in these works; however, as reported to me by several native speakers, Q-agr is in fact possible in Russian with quantifiers that are more ‘nominal’, which give rise to patterns similar to those discussed above for Hebrew.

Serbo-Croatian Other Slavic languages display somewhat different patterns of agreement. In Serbo-Croatian, as discussed in Bošković (2006) and Wechsler and Zlatić (2003), QNPs with numerals and quantifiers that assign genitive to the noun can only trigger default agreement in the normative language; for some speakers, however, this optionally alternates with N-agr.

Basque Another language with an alternating pattern is Basque. As reported in Etxeberria and Etxepare (2008) and Etxeberria and Etxepare (2009), Basque QNPs with ‘vague’ weak quantifiers trigger optional number agreement with the noun (i.e., either N-agr or default agreement). Unlike Hebrew and the other languages discussed above, in Basque the alternation seems to be highly dependent on semantic properties of the quantifier as well as on factors like distributivity/collectivity of the predicate.

Some generalizations In summary, we find the following similarities and differences between Hebrew and the other languages discussed:

- Many languages allow more than one agreement pattern with QNPs.
- In Hebrew, the two options are N-agr and Q-agr.
- In Arabic, Serbo-Croatian, Basque and Russian (at least with ‘real’ quantifiers), on the other hand, the alternation is between N-agr and default agreement.
- When there is overt case morphology, the alternation occurs in QNPs where the noun is non-nominative.

3 Against structural ambiguity

Given the data discussed so far, the question is what is it that makes two different agreement patterns possible. One approach that immediately comes to mind would be to postulate some sort of structural ambiguity. Under this approach, we might hypothesize that alternating QNPs can have two different syntactic structures, where each structure leads to a different agreement pattern. Another variation on this idea would be to argue for two distinct positions within the clause for the QNP as a whole.

Such approaches have indeed been proposed for some of the languages discussed above (see section 4.1). There are, however, some good reasons to reject this kind of analysis for Hebrew. Below I briefly discuss some arguments against this approach.

3.1 Previous work on Semitic QNPs

Over the last two decades, there has been a lot of interest in the internal structure of noun phrases, in Semitic as well as in other languages. Many previous studies have

In the previous sections we have seen that, given previous evidence that Q occupies a higher head position than N, represented schematically as in (5), the existence of N-agr

raises the following problems:

Locality: How can T agree with the lower NP, ‘skipping over’ the higher QP?

Case: How can T agree with NP that isn’t nominative?

We will start by quickly surveying the major previous analyses of QNP agreement in other languages; while none of the analyses discussed in section 4.1 can account for the Hebrew data, certain insights from these analyses are in fact present in the proposal that I eventually argue for.

4.1 Previous accounts

One of the most influential analyses of QNP agreement is the one proposed in Pesetsky (1982) for Russian; this analysis was later modified and extended by Franks (1994) to other Slavic languages. These authors argue that in Russian and Serbo-Croatian there is a categorial difference (NP/DP versus QP) between agreeing and non-agreeing QNPs; furthermore, they argue that agreeing and non-agreeing QNPs occupy two different subject positions – one giving rise to agreement with the noun, and one giving rise to default agreement.

There are, however, several reasons why this kind of analysis cannot work for Hebrew. First, in Hebrew there is no evidence for a categorial difference or for a positional difference between QNPs that trigger N-agr and those that trigger Q-agr; the various tests given by Pesetsky, which nicely show that agreeing and non-agreeing QNPs in Russian behave differently in a variety of ways, fail to show any similar distinctions in Hebrew. Furthermore, the alternation in Hebrew, unlike in Russian, is not between agreement and lack of agreement, but between two ‘real’ agreement patterns; thus, an analysis designed to capture the existence of a no-agreement pattern is simply not suited for the task of explaining the Hebrew pattern.

In another analysis of a Slavic language, Bošković (2006) argues that N-agr in Serbo-Croatian is a two-step process: first, Q agrees with NP; then, T agrees with QP. Following the hypothesis that agreement and case are tightly related, Bošković claims that instances where there is no agreement (default agreement) correlate with lack of a case feature on QP.

Trying to apply this kind of analysis to Hebrew, we encounter two major problems. First, as in the case of the previous approach, the fact that in Hebrew no default agreement is possible undermines the whole goal of this analysis. Other than this, in Hebrew Q and N may have different features, which means that this kind of two step agreement ‘chain’ analysis does not straightforwardly work for Hebrew N-agr, as it seems that the ‘percolation’ step should be blocked if Q has its own features.

Another work that shares many of the basic insights of Bošković’s is LeTourneau (1995). LeTourneau argues that in Standard Arabic, there is optional agreement (feature sharing) between Q and NP/DP in a construct-state QNP. As this is claimed to be optional, when this agreement does not take place, Q receives default features. In both cases, T in this analysis agrees with the entire QNP, hence avoiding both the locality problem and the case problem raised by N-agr.

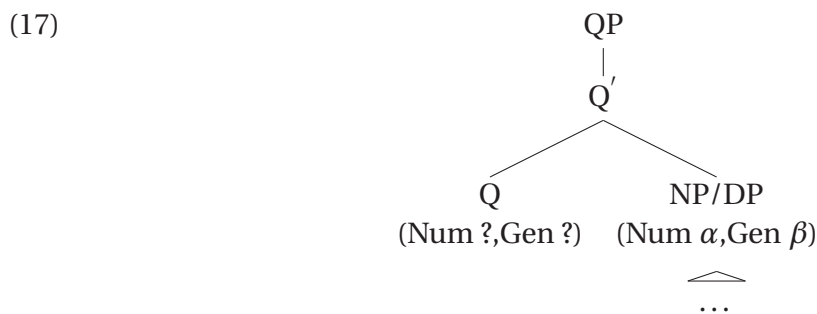
The objections to applying this analysis to Hebrew are mostly the same as those for applying Bošković's analysis: in Hebrew, no default agreement is possible; and furthermore, Q and N may have different features, which means that neither N-agr nor Q-agr in Hebrew follow directly from this analysis. Note also that N-agr in Hebrew is possible not only in construct-state QNPs, and hence for this kind of analysis to work the feature-sharing step cannot be taken as a construction-specific operation but must be generalized to other kinds of QNPs.

Finally, Etxeberria and Etxepare (2008,2009) account for the N-agr/default agreement alternation in Basque by arguing that in Basque, NumP is not always present in a QNP; lack of NumP leads to default number agreement and to a variety of semantic effects. Extending this analysis to Hebrew is problematic in at least two ways: First, the specific systematic semantic effects reported for Basque are not witnessed in Hebrew; and second, the N-agr/Q-agr alternation in Hebrew applies not only to number but also to gender, and hence we would have to assume an optional functional projection associated with gender, whose presence or absence coincides with the presence/absence of NumP.

4.2 Feature percolation

A dominant idea in much of the previous work surveyed above is that N-agr is the result of N's features somehow 'percolating' upwards (possibly via agreement) to the whole QNP. Under this approach, default agreement is in fact lack of agreement, which is caused either by a failure of this feature percolation to take place, or by independent factors. This line of reasoning can be found in LeTourneau (1995) for Standard Arabic; Franks (1994) for Russian/Serbo-Croatian; and Bošković (2006) for Serbo-Croatian.

Using Minimalist notation, a schematic, somewhat naive, representation of this kind of percolation analysis of N-agr, might involve an intermediate representation like the following:

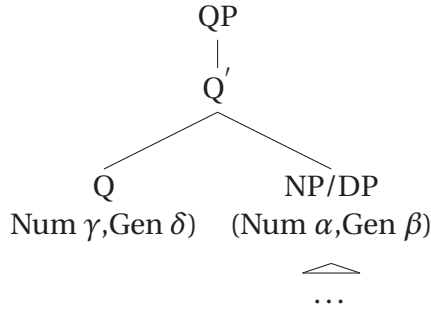


N-agr, in this approach, would be the result of a two-step derivation:

1. Q enters the derivation with unvalued gender and number
2. Q's features are valued via agreement with NP/DP

As discussed above, the main reason why, without further modifications, this kind of analysis of N-agr cannot work for Hebrew is that Q in Hebrew often has lexically-specified gender and number; in this case, N's features cannot be copied to Q because no agreement configuration exists:

(18)



In order to make an analysis of this kind work for Hebrew, what we need is a way to let features of NP be ‘copied’ to QP *while co-existing with Q’s lexically-specified features*. In other words, what we need is for QP to have *two* separate feature sets.

This indeed has been proposed in the HPSG literature; in the next section, we briefly summarize the main points of this proposal that will be relevant for the proposed analysis of QNP agreement.

5 INDEX and CONCORD features

5.1 INDEX and CONCORD in HPSG

Perhaps the most direct piece of evidence in favor of the hypothesis that NPs carry not one, but two, sets of agreement features comes from the phenomenon of split agreement found in languages such as Serbo-Croatian. Wechsler and Zlatić (2000, 2003) discuss examples like the following:

- (19) Ta dobra deca su došla.
 that.F.S good.F.S children(F.S) AUX.3P come-PPRT.N.P
 ‘Those good children came.’ (Wechsler and Zlatić 2000)

The agreement in this sentence raises the question what is the gender/number of the noun *deca*: on the one hand, based on the agreement on the demonstrative and on the adjective, we may want to claim that this noun is feminine singular; but on the other hand, based on the agreement on the auxiliary and participle we may claim that it is neuter plural. Similar examples can be found in other languages; in Biblical Hebrew, for instance, the noun ‘*am* (‘people’) triggers singular agreement on demonstratives and adjectives, but may simultaneously trigger *plural* pronominal agreement:

- (20) ... hineni ma’axil-am et ha-‘am ha-ze la’ana...
 AUX.1S feed-them(M.P) OM DEF-people DEF-this(M.S) wormwood
 ‘...I will feed this people wormwood...’

Following earlier proposals by Pollard and Sag (1994) and Kathol (1999), Wechsler and Zlatić (2000, 2003) propose that the solution is that an NP carries not one, but *two* sets of *syntactic* agreement features, referred to as INDEX and CONCORD features:

INDEX features constrain the NP’s referential index, and are relevant to pronoun binding and subject-predicate agreement.

CONCORD features are more closely related to the noun's morphology, and are relevant to NP-internal concord.

According to Wechsler and Zlatić (2000, 2003), several constraints typically apply to INDEX and CONCORD features:

INDEX-CONCORD: INDEX and CONCORD features match each other

INDEX-SEMANTICS: INDEX features match the noun's semantics

CONCORD-DECLENSION: CONCORD features match the noun's morphology

In most cases, all 3 constraints apply, giving rise to 'consistent' NPs for which there is no direct evidence for the existence of two distinct sets of features. But for 'exceptional' nouns, not all of these constraints apply, and this gives rise to various kinds of mismatches.

Going back to the split agreement facts illustrated in (19) above, according to the analysis of Wechsler and Zlatić (2000, 2003), the gender and number features of a noun like Serbo-Croatian *deca* are:²

INDEX: neuter plural

CONCORD: feminine singular

In this case, what is reflected in the noun's morphology is only the CONCORD features; as in other cases of INDEX-CONCORD mismatches, evidence for the value of the NP's INDEX features comes only from the agreement that it triggers.

5.2 An INDEX/CONCORD analysis of QNPs

In section 4.2, the main difficulty that we saw with applying a feature percolation analysis of N-agr to the Hebrew facts was that the percolating features had to somehow coexist with the lexical-morphological features of the quantifier. The INDEX-CONCORD hypothesis provides an immediate solution to this problem. In fact, Wechsler and Zlatić (2003) discuss the QNP agreement facts in Serbo-Croatian and propose an analysis which, with very small modifications, can also be applied to the Hebrew data.

Adapting the analysis in Wechsler and Zlatić (2003) to a derivational framework, the analysis to be discussed can be summarized as following:

- Subject-verb agreement (in Hebrew) is *always* INDEX agreement with the QNP; thus, even 'N-agr' involves no direct agreement between T and the noun.³
- The QNP's INDEX features (which are the same as those of its head, the Q) do not always match the Q's CONCORD features; specifically, N-agr is always the result of such a mismatch.

²We ignore at the moment person features, which are part of the INDEX feature; and case features, which are part of CONCORD.

³In the remainder of this paper, I follow standard assumptions in the Minimalist literature and refer to 'subject-verb' agreement as agreement between the subject and the functional head T; there is nothing in the proposed analysis, however, that hinges on this assumption.

- Different agreement patterns follow from different mechanisms for assigning values to the QNP's INDEX features; while the grammar itself has no 'preference' for one mechanism over another, the resulting structures differ in their feature composition in a way that might be relevant at the interface with semantics.

Starting with the case of Q-agr, the derivation would thus proceed as following:

1. Q enters the derivation with lexically specified INDEX features which match its CONCORD features.
2. The QNP gets the INDEX features from its head, Q.
3. T agrees with QNP, giving rise to T carrying the same features as those specified in the lexicon for the Q.

Note that in this derivation there is no locality or case problem: what the T agrees with is the entire (nominative) QNP's INDEX features.

The case of N-agr, which seems like the one that poses the real challenge, would proceed as following:

1. Q enters the derivation with *unvalued* INDEX features.
2. The INDEX features of the Q *agree with the* INDEX features of NP (=‘percolation’); as a result, they may differ from the Q's CONCORD features.
3. The QNP gets the INDEX features from its head, the Q.
4. T agrees with QNP.

In this derivation, too, there is therefore no locality or case problem, as agreement is once again with the entire (nominative) QNP's INDEX features. This is despite giving the impression of agreement with the more deeply embedded NP.

We thus have a relatively straightforward analysis, in which the only factor that differs between the N-agr and the Q-agr case is the source of Q's INDEX features, which are valued either in the lexicon or in the syntax, via agreement. Unlike the analysis of Wechsler and Zlatić (2000, 2003), in which identity between INDEX and CONCORD is the default option, in the derivational analysis proposed above there is no default; empirically, this seems to be supported by the fact that there is no general preference for either N-agr or Q-agr in Hebrew QNPs.

There are a number of immediate advantages to this analysis:

- It is based on the INDEX/CONCORD dichotomy, which is independently motivated by the existence of mixed/split agreement constructions.
- Subject-verb agreement receives a uniform analysis, even for QNPs: It is always INDEX agreement with the whole QNP.
- Because of the ways in which INDEX and CONCORD features are related to semantics, morphology and to each other, this analysis provides a framework for analyzing the effect of interfaces with semantics, morphology and the lexicon on QNP agreement.

The issue of interactions with the semantics is particularly intriguing. Since INDEX features are not mere symbols, but constraints on the referential index, we should expect a certain semantic difference between the case in which Q and NP share INDEX features (N-agr) and the case in which each has its own (Q-agr). This might provide the basis for an explanation of the fact that N-agr is sometimes judged as marginal with singular count nouns, as illustrated in the following contrast:

- (21) xeci me-ha-mexonit nirtav / ??nirteva.
 half(M.S) of-DEF-car(F.S) got.wet.M.S / got.wet.F.S
 ‘Half of the car got wet.’ (Q-agr/??N-agr)
- (22) xeci me-ha-anašim nirtavu / *nirtav.
 half(M.S) of-DEF-people(M.P) got.wet.P / got.wet.M.S
 ‘Half of the people got wet.’ (N-agr/*Q-agr)

The salient reading of the fully grammatical Q-agr case in (21) is that in which it refers to some identifiable half of the car (the left half, the front half, etc). In contrast, the salient reading of (22) is the ‘true’ quantificational one (‘the number of people who got wet is half the total number of people’). Under the proposed analysis, this might follow from the hypothesis that (21) has a distinct INDEX on the Q, thus making it more referential. It is beyond the scope of the current paper to fully develop this semantic analysis; but I believe that an analysis along these lines could provide an elegant account for some of the subtle semantic consequences of the N-agr/Q-agr alternation. Furthermore, the same kind of reasoning could account for the loss of agreement with certain nouns like *min* (‘kind’, ‘sort’) when used non-referentially in constructions like the following:⁴

- (23) hayta li min txuša mešuna.
 was.F.S to.me kind(M.S) feeling(F.S) strange.F.S.
 ‘I had a kind of strange feeling.’

While the noun phrase in (23) has the form of a construct state headed by the masculine noun *min*, verb agreement in this case is with the feminine *txuša*. Applying the same analysis as for QNPs, this could be explained as being the result of *min* lacking in this case independent INDEX features and sharing the same INDEX as the referential noun that follows it. Thus, while normally nouns would enter the derivation with INDEX features valued to match the noun’s CONCORD features, certain nouns used modificationally may enter the derivation with unvalued INDEX, which would then be valued via agreement with a structurally lower noun phrase. The generalization that seems to emerge is that a referential head enters the derivation with its own valued INDEX features, while a non-referential head (whether quantificational or not) may value its INDEX features via agreement.

⁴I am grateful to Olivier Bonami for pointing my attention to these facts by providing me with similar French data involving the noun *espèce* (‘sort’). The fact that a nearly identical pattern is found in two unrelated languages such as Hebrew and (informal) French is of course expected under the proposed analysis, which relies on the core properties of supposedly universal features rather than on any language-specific phenomenon.

5.3 Adapting the analysis to the Minimalist framework

The analysis presented so far is essentially the analysis of Wechsler and Zlatić (2000, 2003). While implementing this analysis within the HPSG framework, for which it was originally proposed, is straightforward, the question that the remainder of this paper will focus on is whether it is possible to formulate the same kind of analysis within the Minimalist framework.

Before addressing this question, we must first of all answer a much more fundamental question: What is a feature? Somewhat surprisingly, the Minimalist framework does not have an integral, explicit feature theory; the following 3 basic questions are still, to a large extent, without formal and universally-accepted answers within mainstream Minimalism:

1. Are features atomic symbols or ordered pairs of symbols (attribute-value pairs)?
2. Can/do features have their own features or sub-features?
3. Does the grammar contain a mechanism (beyond legibility at the interfaces) for constraining possible feature combinations?

Obviously, the first two questions are tightly related: in a grammar where features are atomic symbols (i.e., in a grammar using privative features), features obviously have no sub-features. Let us therefore focus on the view that ‘features’ are ordered pairs of symbols, an attribute and a value:

Attribute: the feature ‘name’, e.g., *case*, *number*, etc

Value: the feature value, e.g., *nominative/accusative...*; *singular/plural*; etc

While attributes are more or less universally assumed to be atomic symbols, it is less obvious how complex the values may be. While constraint-based formalisms such as HPSG and LFG explicitly define values recursively as potentially complex, there has been very little explicit discussion in Minimalism of the possibility of assuming complex features. While in common practice, Minimalist analyses almost always limit themselves to values that are atomic symbols, very little has been said about whether the value of a feature could also be a *set* of symbols, or a set of attribute-value pairs.

One of the few works that have addressed this question explicitly is Adger (2010). According to Adger, features have no hierarchical structure, i.e., values cannot be attribute value pairs; Adger argues for this view as part of the hypothesis that Merge is the only mechanism for creating structure in human language. Hence, Adger explicitly hypothesizes that complex features are not necessary for formulating adequate Minimalist theories of natural language phenomena.

In another paper, Adger and Svenonius (2009) propose a somewhat more complicated answer to the question ‘what is a (syntactic) feature?’, which makes a distinction between several types of features:

- First order features, which are atomic symbols
- Second order features, which are also atomic symbols

- Complex features, which are a combination (an ordered pair) of a first order feature and a second order one

To take one concrete example, Adger and Svenonius claim that *T* is a first order feature, *EPP* is a second-order feature, and *T_{EPP}* is a complex feature ('*T* that has an *EPP* feature'). While this notion of 'complex feature' is much more restricted than the kind of complex feature assumed in HPSG/LFG, Adger and Svenonius' proposal does bring forth the fact that an attempt to formalize some uses of the term 'feature' in Minimalism might require some amount of complexity that goes beyond simple atomic features. Some other Minimalist notions that seem to imply a certain amount of complexity within features are feature strength, feature interpretability, and features that are dependent on other features (such as tense, which depends on finiteness).

Back to the issue of formulating an INDEX/CONCORD analysis of QNPs within the Minimalist framework, the question is whether this can only be done using complex features. For the analysis of *N-agr* in terms of INDEX agreement between *Q* and *NP*, we want to be able to say things like:

Informal statement: In a partitive QNP with a plural noun, a quantifier like *xelek* ('part') has an INDEX plural feature and a CONCORD singular feature.

This means that we need to allow *two separate number features* on the same head. The question is whether this can be done without complex features. What is quite clear is that this cannot be done using privative (monovalent) features, as allowing PLURAL and SINGULAR to co-exist on the same node would lead to meaningless or contradictory representations if nothing distinguishes the two features from each other.⁵ Similar objections apply to the possibility of allowing for the co-existence of [NUMBER *plural*] and [NUMBER *singular*] on the same node as simple features in a multivalent (attribute-value) system; grammars formalizing features as attribute-value pairs usually explicitly prohibit the option of a node carrying two attribute-value pairs with the same attribute but with two different values.

One technical way to avoid this problem, without assuming complex features, would be to use two different attribute names. Thus, something like [NUMBERI *plural*] and [NUMBERC *singular*] (using two different feature labels) would not be a contradictory representation. The problem with this approach, however, is that, if nothing else is added, it would lead to a grammar that does not *explicitly* express the fact that both of these are NUMBER features, instead leaving this fact as an implicit 'understood' property of the formulation of the analysis. The only way to make such an approach fully explicit would be to augment it with an additional module (outside of 'narrow syntax') to express relationships and dependencies between different features, perhaps along the lines of the 'Feature Co-occurrence Restrictions' of the GPSG framework of Gazdar et al. 1985; or, simply, by explicitly specifying as part of the grammar all the possible values of each feature, hence grouping together both number features by virtue of having the property of allowing the same possible values (which would mean that this approach is not compatible with a grammar based on binary features, where all features can have the values '+' or '-'⁶). From the point of view of the architecture

⁵There have been proposals to account for things like dual number in terms of coexisting singular and plural, but this is irrelevant to the kind of phenomenon under discussion here.

⁶This has been pointed out to me by Olivier Bonami.

of Minimalist grammar, such ‘auxiliary’ modules would imply a relatively high price in terms of the overall complexity of the theoretical framework; whether this is better than the alternative to be discussed below is left as an open question.

An alternative way to express the INDEX/CONCORD distinction would be to use complex features (as in the original HPSG analyses), which would make forming an explicit and coherent representation quite straightforward: there is no incompatibility or contradiction between [INDEX [NUMBER *plural*]] and [CONCORD [NUMBER *singular*]], where the fact that both of these are number features is stated explicitly. The intermediate conclusion is that expressing an INDEX/CONCORD analysis of QNP agreement in a fully explicit manner requires either complex features, or having the grammar augmented by some additional system that would state relationships between features that have distinct labels in their syntactic representation.

We should note, on the other hand, that even though the discussion above points towards the need for a certain amount of complexity in the representation of features, the amount of complexity that is required in this case is quite minimal. Specifically, the problem of QNP agreement does not seem to require *unlimited recursion* in the feature system, of the type used in HPSG and LFG, but only a fixed amount of structure. Thus, what is proposed here does not entail turning Minimalism into something like a derivational version of HPSG, but merely adopting one specific formal detail that is used in the latter framework into the former. It should also be noted that this kind of structure within the feature system is, in fact, already implicit in most Minimalist analyses that involve rules that refer specifically to the cluster of ϕ -features, as opposed to all other features; the degree of complexity that is argued for in this paper would also allow for this kind of ‘clustering’ of features to be formally and explicitly expressed with no need for any additional machinery.

5.4 The mechanism of agreement

While allowing complex features is a crucial step towards making the proposed analysis compatible with the Minimalist framework, there is an additional issue that we need to consider, which has to do with the mechanism of agreement.

According to Chomsky (2000, 2001), following successful Agree, the features of the probe are deleted and are no longer available for further operations. This, however, poses a problem to the proposed analysis of N-agr. According to the analysis proposed above, N-agr follows from agreement between Q and NP:

1. Q enters the derivation with unvalued INDEX features.
2. Q’s INDEX features are valued by Agree with NP’s INDEX features.
3. T’s (INDEX) features are valued by Agree with the QNP’s INDEX features.

The problem with this derivation is that if Q’s features are deleted after the second step, as expected under Chomsky’s formulation of the Agree operation, they should not be available as goals for T’s features in step 3. More generally, deletion following Agree seems not to be compatible with any kind of bottom-up feature percolation analysis.

Luckily, there is an alternative view of the operation Agree which does not raise this problem. According to Frampton and Gutmann (2006) and Pesetsky and Torrego

(2007), Agree is a *feature sharing* operation, and not feature copying; and, what is crucial to the current discussion, these authors argue that features are *not* deleted following Agree, but remain present on all nodes on which the features are shared, with various interface conditions determining where each feature is to be interpreted.

Under this formulation of Agree, the proposed analysis of N-agr is straightforward:

1. Q enters the derivation with unvalued INDEX features.
2. Q and NP agree (share INDEX features)
3. T and QNP agree (share INDEX features)

Thus, using feature sharing, the apparent non-local agreement between T and N can be accounted for in this way as a sequence of two local agreement operations, thus providing a current formal account of the intuition that N-agr involves some sort of upwards feature percolation. We hence conclude that the patterns of QNP agreement provide additional evidence in favor of the feature sharing model of Agree as opposed to the copy-and-delete model.

6 Conclusion

This paper has argued that the facts of Hebrew QNP agreement, which seem at first to pose a real problem to the hypothesis that agreement is subject to strict locality constraints, can in fact be shown to be compatible with these constraints if one adopts some sort of upwards feature percolation analysis of N-agr; this, in turn, was shown to require the use of two distinct sets of agreement features which co-exist on the same node. Thus, if, as we have claimed, there is no structural ambiguity in alternating QNPs, analyzing N-agr in Hebrew requires the framework to allow a certain amount of complexity in its feature system – either by using complex features, where sets of features can be ‘embedded’ as values of other features, or by augmenting ‘narrow syntax’ with an ‘external’ system specifying constraints on what values each feature can take. However, I have argued that even under the complex feature approach, only a minimal amount of feature-internal complexity is required, and that the data under discussion does not provide evidence that unlimited recursion is required in the feature system.

A second general theoretical conclusion has to do with the model of agreement and feature valuation. I have shown that for the proposed analysis to work, an INDEX feature on a QNP must not be deleted after it has been valued by agreement with the lower nominal. This, in turn, supports the recently-proposed feature sharing formulations of Agree, which make it possible to implement the analysis of N-agr without running into the problems that arise if this analysis is implemented using Chomsky’s (2000, 2001) model of Agree as copying and deletion.

Even though the motivation for the proposed analysis was based purely on syntactic considerations, it naturally leads to interesting questions regarding feature interpretability. If we distinguish between INDEX and CONCORD features, the question that arises under a modular model of grammar is where each of these features is interpreted. The natural hypothesis, which mirrors the role of these features in the HPSG

framework, is that INDEX features are interpretable at the syntax-semantics interface, while CONCORD features can only be (optionally?) interpretable at the syntax-morphology interface. This implies that either ‘interpretability’ cannot be defined as only ‘LF interpretability’; or, that *all* CONCORD features – and not only Case (which has not been discussed in this paper, but is classified as a CONCORD feature in the HPSG literature) – are uninterpretable. Either way, the distinction between the two types of features might lead to a more structured account of the ways in which features are mapped from syntax to other modules, with each of the two feature ‘clusters’ acting in a uniform manner.

Back to the empirical problem of QNP agreement, the INDEX/CONCORD analysis provides a simple way to account for the availability of both N-agr and Q-agr, where the source of the alternation between the two agreement patterns is simply that Q’s INDEX features are only optionally valued in the lexicon. Under this analysis, N-agr does not really pose a problem to standard assumptions regarding the locality of agreement and the interaction between agreement and case. Thus, while the analysis does incur a certain theoretical ‘price’ in terms of the complexity of features, this allows us to maintain other central hypotheses for which otherwise the data under consideration might seem to pose a counterexample.

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Gabi Danon
Bar-Ilan University
danong1@mail.biu.ac.il

Reconstructing functional relatives

Nicolas Guilliot*

Introduction

The goal of this study is to present empirical limits to standard assumptions on distributive readings of relative clauses (pair-list or natural function), and to propose a more adequate formalization based on two fundamental statements about the syntax and semantics of relative clauses. The first one relates multiple individual readings of relative clauses to syntactic reconstruction of the antecedent via presence of a copy. The second one argues that such copies can be interpreted either as definite, as proposed by Fox (2003) among others, hence giving rise to individual or natural function readings with presupposition accommodation constraints (property of the definite), or as indefinite, as proposed in Kratzer (1998) and Agüero-Bautista (2001) among others, hence giving rise to pair-list readings.

The first section discusses classical reconstruction data and how it relates to the notion of distributivity. Section 2 presents standard assumptions about distributive readings of relative clauses, and introduces highly problematic data for such hypotheses. Section 3 develops my analysis based on the two fundamental mechanisms stated above, while Section 4, on the one hand, shows how such problematic data come as no surprise in my account, and, on the other hand, gives further arguments for such approach.

1 Reconstruction and distributive readings

Reconstruction standardly refers to a general phenomenon which can be summarized as the interaction between displacement structures (dislocation, topicalization, interrogation, relativization) and structural constraints on interpretation, such as scope or binding constraints (see Chomsky (1995) or Sauerland (1998)). Notice that, following standard literature on the topic, I'm using the term reconstruction to describe the general phenomenon, although it was first introduced as a particular analysis by which a moved item could be lowered in the gap/thematic position at Logical Form, hence literally reconstructed in that position. Consider the following examples from French as

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an illustration of the phenomenon, where distributive readings occur with interrogative structures:¹

- (1) A: *Quelle femme₁ est-ce que tu as dit que chaque homme*
 which woman is-it that you have said that each man
 inviterait ₋₁?
 would-invite
 A: ‘Which woman did you say that each man would invite?’
- B: *Son épouse.*
 his wife
 B: ‘His wife’
- (2) A: *Quelle photo₁ de lui₂ est-ce que tu penses que chaque homme₂*
 which picture of him is-it that you think that each man
 a déchirée ₋₁?
 has torn
 A: ‘Which picture of him(self) do you think that each man tore?’
- B: *Celle de son mariage.*
 that-one of his wedding
 B: ‘The one from his wedding’

(1) and (2) correspond to what Engdahl (1980) or Jacobson (1999) call functional questions as they can have a distributive reading of the *wh*- constituent with respect to the universal quantifier. The availability of functional answers in (1) and (2) clearly show the existence of the distributive reading of the questions. As proposed by several authors, that distributive reading in both examples can be seen as cases of reconstruction.

1.1 Scope reconstruction: distributive reading of indefinites

The distributive reading of (1) can be seen as following from a reconstruction effect on the peripheral constituent *quelle femme* (‘which woman’), and more precisely from the indefiniteness property of that constituent.² Such an example then illustrates what is standardly referred to as scope reconstruction in the sense that the indefinite *quelle femme* appearing at the left edge can be interpreted as if it were (at least partially) ‘reconstructed’ in its thematic position, i.e. within the scope of the quantified expression *chaque homme* (‘each man’). The interpretation of an indefinite within the (syntactic) scope of a universal quantifier gives rise to a distributive reading mapping every man to a possibly different woman. Evidence for this is given by the contrast between the following examples:

¹Notice here that the availability of a distributive reading extends to parallel examples with negative quantifiers.

²For more arguments to analyze interrogative constituents as indefinites, see Reinhart (1997) among others.

- (3) (a) *Chaque homme a dit qu'il inviterait une femme.*
 each man has said that-he would-invite a woman
 'Each man said that he would invite a woman.'
- (b) *Une femme a dit que tu avais invité chaque homme.*
 a woman has said that you had invited each man
 'A woman said you had invited each man.'

When the universal quantifier takes scope over the indefinite *une femme* ('a woman'), as in (3a), the latter can be understood to refer to a different woman respective to every man. But when the indefinite is forced to take scope over the universal quantifier, as in (3b), then the distributive reading disappears and only the individual reading is available. The generalization can be stated as follows:

- (4) *The distributive (multiple individual) reading of an indefinite is tied to its narrow scope with respect to a universal quantifier in syntax (or at LF).*

Coming back to the example in (1), notice that the distributive reading is indeed available. Partial reconstruction³ in the thematic position then comes as a way of getting the indefinite within the scope of the universal quantifier, hence predicting the distributive reading.

1.2 Binding Reconstruction: bound variable reading

Similarly, (2) also illustrates reconstruction, and more precisely binding reconstruction. In that sentence, the pronoun *lui* ('him') can crucially be interpreted as a variable bound by the quantified expression *chaque homme* ('every man'). Again, the availability of that reading might appear surprising if we assume that the bound variable reading of a pronoun is syntactically constrained in the following way:

- (5) *Constraint on Bound Variable Anaphora:*
 An anaphoric expression can be interpreted as a variable bound by a quantifier iff it is syntactically bound (c-commanded and coindexed) by that quantifier.

The example in (2) then argues for (binding) reconstruction of the displaced constituent in order for the pronoun *lui* ('him') to be interpreted within the scope of the universal quantifier.

1.3 Distributivity: natural vs pair-list (PL) function

A further distinction within distributive readings is the one given in Sharvit (1999) between pair-list function readings on the one hand, and natural function readings on the other. Consider again the example in (1) repeated below, and the two alternative answers corresponding to distributive readings:

³Reconstruction within interrogative structures is commonly assumed to be partial, as the interrogative element (i.e. *quel* 'which') is *also* interpreted in the peripheral position to get the standardly assumed semantics for the question as a set of propositions. For more details, see Karttunen (1977). Partial reconstruction can be contrasted with total reconstruction where the displaced constituent would only be interpreted in the base position.

- (6) A: *Quelle femme₁ est-ce que tu as dit que chaque homme inviterait* _1?
A: 'Which woman did you say that each man would invite?'

(a) Natural function answer:

B: *Son épouse.*

B: 'His wife'

(b) Pair-list function answer:

B: *Pour Paul, c'est Marie; (pour) Jean, Suzanne;...*

B: 'For Paul, it is Mary; (for) John, Suzann;...'

One question arises at this stage: why should we posit a clear distinction between those two distributive readings? Interestingly enough, the natural and pair-list function readings are very similar in the sense that a natural function does also provide a list of pairs of individuals.

However, one argument for such distinction is given by Sharvit (1999): the fact that the two readings are not equally available. Crucially indeed, Sharvit (1999) provides contexts which only allow for the natural function reading, but not the pair-list function. One such context is tied to presence of a negative quantifier. Consider the following example from French which corresponds to a very similar example from Hebrew given in Sharvit (1999):

- (7) A: *Quelle femme est-ce qu'aucun homme n'a invitée?*
which woman is-it that-no man Neg-has invited
A: 'Which woman did no man invite?'

(a) B: *Marie.*

(b) B: *Sa mère.*

B: 'His mother.'

(c) B: **Pour Jean, c'est Marie; Fred, Justine; Benoît, Valérie.*

B: **'For Jean, it is Marie; Fred, Justine; Benoît, Valérie.'*

Although both the individual answer in (7a) and the natural function answer in (7b) are available, the pair-list function answer in (7c) is not an option anymore. In other words, negative quantifiers seem to ban the pair-list reading of the question, the only distributive reading being the natural function. Such example then gives more credit to a clear distinction between the two distributive readings.

2 Relative clauses: assumptions and paradoxes

Having settled some fundamental assumptions about reconstruction and how it relates to distributive readings, we are now in a position to tackle the main topic of the paper: distributive (multiple individual) readings of relative clauses. Consider the following example as an illustration of the phenomenon:

- (8) *Nous avons contacté le patient que chaque médecin s'est vu attribuer.*
 we have called the patient that each doctor Refl-is seen assign
 'We called the patient each doctor was assigned.'

In the same way that questions can somehow be interpreted as either individual or distributive (be it pair-list or natural function), similar readings seem to occur with relative clauses. The individual reading of (8) corresponds to a context referring to a unique patient for the set of doctors, i.e. a context in which only one person was called in the end. But crucially, the sentence also allows for a distributive reading of the relative clause and its antecedent. In other words, a context in which there is a different (and specific) patient for each doctor would also make the sentence true, i.e. a context in which several persons were contacted in the end.⁴

Two major assumptions about such distributive readings of relative clauses have been proposed in the literature. The first one given in Sharvit (1999) tries to build on the distinction between pair-list and natural function readings. The second one proposed by Alexopoulou and Heycock (2002) relates such distributive readings of relative clauses to the presence of the external definite determiner. The following sections first develop those two assumptions in more details, before introducing novel data that clearly seem to disprove such hypotheses.

2.1 Pair-list vs natural function readings

Sharvit (1999)'s work on multiple individual readings of relative clauses builds on her initial distinction between the two kinds of distributive readings, pair-list versus natural function. She considers examples from Hebrew like the following one:

- (10) *ha-iSa₂ Se kol gever₁ hizmin ₂ hodeta lo₁.*
 the-woman Op every man invited thanked him
 'The woman every man₁ invited thanked him₁.'

⁴As such readings may not be natural for the reader, consider the following examples taken from the newspaper *Le Monde* which confirm the availability of distributive readings with relative clauses. I thank the reviewers of this paper for providing these attested examples.

- (9) (a) *Les études faites sur la pénurie de logements avaient seulement jusqu'ici porté sur les besoins de l'ensemble de la population, sans distinguer les difficultés que rencontrait chaque catégorie de Français.* (31 janvier 2003)
 'Studies about the lack of housing only dealt with the overall needs of the population so far, without any distinction based on the difficulties that each category/class of French people was confronted with.'
- (b) *L'impact sur les marchés financiers de la politique que mènerait chaque candidat commence à nourrir les notes de recherche des banques d'investissements américaines.* (8 avril 2004)
 'The impact on financial markets of the policy that each candidate would defend is now feeding the research notes of American banks.'

Sharvit (1999) argues that the relative clause in (10) allows for a distributive reading relating a different ‘woman’ for ‘every man’. Confirmation for this reading, according to her, comes from the availability for a covariant/distributive interpretation of the pronoun *lo* ‘him’ in the matrix, which can refer back to ‘every man’. Notice here that such a distributive reading of the pronoun cannot be seen as a case of bound variable anaphora (recall the constraint on the availability of such an interpretation, stated in (5)), but rather corresponds to a case of *donkey* or E-type anaphora as described in Evans (1980).

More precisely, Sharvit (1999) further makes a strong assumption about such distributive readings of the relative clause in (10), which can be stated as follows:

Hypothesis #1: *the multiple individual reading of a relative clause corresponds to a pair-list (function) interpretation of that relative (and crucially not a natural function one), at least when the matrix sentence is predicative.*⁵

Two empirical arguments are provided in favor of such an assumption. The first one builds on the use of negative quantifiers, the second one concerns the case of resumption.

The first piece of evidence in favor of Hypothesis #1 is related to the availability of distributive readings with negative quantifiers. Recall indeed that negative quantifiers only allow for a natural function reading, as shown by the possible answers for (7) repeated below:

(11) A: *Quelle femme est-ce qu'aucun homme n'a invitée?*

A: ‘Which woman did no man invite?’

(a) B: *Marie.*

(b) B: *Sa mère.*

B: ‘His mother.’

(c) B: **Pour Jean, c'est Marie; Fred, Justine; Benoît, Valérie.*

B: **‘For Jean, it is Marie; Fred, Justine; Benoît, Valérie.’*

Negative quantifiers clearly ban the pair-list answer, hence the pair-list reading. Now consider the use of a negative quantifier within a relative clause:

(12) (a) *J'ai déchiré la photo qu'aucun homme n'avait choisie.*

I-have torn the picture that-no man Neg-had chosen

‘I tore the picture that no man had chosen.’

(b) **ha-iSa₂ Se af gever₁ lo hizmin ₂ higia bil'ad-av₁.*

the-woman Op no man Neg invited arrived without-him

*‘The woman no man₁ invited arrived without him₁.’

Very strikingly, neither the French nor the Hebrew example allows for a distributive reading in that predicative sentence. Confirmation for this comes from the fact

⁵The case of equative/specificational sentences will be discussed in Section 4.5.

that the pronominal element *-av* in the example from Hebrew can no longer be interpreted as covariant. The absence of the distributive reading in those sentences is a direct consequence of Hypothesis #1. The argument goes as follows. Relative clauses in predicative sentences only allow for a pair-list interpretation; but that interpretation is banned with negative quantifiers; it logically follows that no distributive reading can occur in (12). In other words, if relative clauses licensed natural function readings, the distributive reading should be available with both types of quantifiers, which is clearly not the case.

The second argument in favor of Hypothesis #1 is highly similar as it introduces another context traditionally considered to ban the pair-list interpretation: resumption. Consider indeed the following example in Hebrew:

- (13) A: *Ezyo iSa kol gever hizmin ota?*
 which woman every man invite.past-3s her

A: (lit.) ‘Which woman did every man invite her?’

- (a) B: *Et im-o.*
 acc mother-his

B: ‘His mother.’

- (b) B: **Yosi et Gila; Rami et Rina...*
 Yosi acc Gila Rami acc Rina

B: *‘Yosi, Gila; Rami, Rina’

As first noticed by Sharvit (1999), in the same way that negative quantifiers block the pair-list reading, that reading also disappears when resumption is at stake, i.e. when a pronoun is introduced in the ‘gap’ position. More precisely, adding the object pronoun *ota* (‘her’) resuming the *wh*-element *ezyo iSa* (‘which woman’) suffices to ban the pair-list answer.

Very interestingly, adding a resumptive pronoun in the relativized site of a relative clause leads to a similar effect. The multiple individual reading of the relative clause seems to disappear, as shown by the following example:⁶

- (14) *??ha-iSa₂ Se kol gever₁ hizmin ota₂ hodeta lo₁.*
 the-woman Op every man invited her thanked him
 (lit.) ‘The woman every man₁ invited her thanked him₁.’

Again, the absence of the multiple individual reading for the relative clause is correlated with the unavailability of the covariant reading for the pronoun *lo* (‘him’). Hypothesis #1 now accounts for the fact that only the individual reading will be an option, as such structures induce a pair-list reading (and crucially not a natural function reading), but that reading is blocked by resumption in the relativized site.

⁶Grammaticality judgments come from Sharvit (1997). Notice that she further indicates that distributive readings of relative clauses with resumption seem more readily available when a context is given to the speakers that clearly favors the distributive reading: ‘(it) becomes more acceptable if the previous discourse establishes a mapping between men and the women they invited’.

To summarize, the absence of multiple individual reading of relative clauses with negative quantifiers and/or resumption provides strong empirical support for Hypothesis #1, i.e. the fact that relative clauses in predicative sentences can only induce one type of distributive reading, the pair-list reading. Two natural predictions that such an assumption makes is the fact that multiple individual readings of relative clauses should never occur in presence of either a negative quantifier or a resumptive pronoun in the relativized position.

2.2 Definite vs indefinite antecedents

Alexopoulou and Heycock (2002) also discuss the availability of distributive readings with relative clauses, and propose another restriction on such readings based on a fundamental property of the antecedent of the relative clause, whether it is indefinite or definite. The first aim of their study is to provide arguments against Bianchi (1995)'s approach to contrasts such as the one given below:⁷

- (15) (a) *The secretary called the two patients that every doctor will examine tomorrow.*
 (b) *The secretary called two patients that every doctor will examine tomorrow.*

As noticed by Bianchi (1995), only (15a) allows for a multiple individual reading of the relative clause and its antecedent mapping *two* different *patients* to *every doctor*. Such distributivity is clearly not available in (15b). Bianchi (1995) proposes an account of the contrast based on the notion of reconstruction. More precisely, the cardinal *two* in (15a) could be reconstructed in the relativized site as a case of scope reconstruction leading to wide-scope of the universal quantifier over the cardinal expression.⁸ This scope configuration leads to the distributive reading. As for (15b) however, the cardinal *two* now behaves as the external determiner of the relative clause, and as such, could not be reconstructed in the relativized site, hence predicting the absence of a distributive reading.

Alexopoulou and Heycock (2002) argue against such an account based on reconstruction of the cardinal, as the same contrast holds in similar examples without any cardinal. Consider indeed the following contrast:

- (16) (a) *We contacted the patient each doctor was assigned.*
 (b) *?We contacted a patient each doctor was assigned.*

(16a) allows for a multiple individual reading of the relative clause and its antecedent whereas only the individual reading prevails in (16b). Alexopoulou and Heycock (2002) further claim that the contrasts do not result from the (un)availability of reconstruction, but rather from a crucial distinction between relative clauses headed by a definite antecedent and relative clauses headed by an indefinite antecedent:

⁷The examples in (15) correspond to English translations to similar examples from Italian introduced by Bianchi (1995).

⁸Notice here that Bianchi (1995)'s account builds on Kayne (1994)'s structural approach to relative clauses, called the head-raising analysis, in which the restriction of the antecedent itself moves. Also notice that Section 3.2.1 will provide an alternative way to get reconstruction in relative clauses.

Hypothesis #2: *the distributive reading of a relative clause and its antecedent is crucially tied to the presence of the definite determiner.*⁹

Again, a natural prediction comes out from Hypothesis #2: the fact that the multiple individual reading of a relative clause and its antecedent should never occur with indefinite antecedents, but only with definite antecedents.

2.3 Paradoxes: binding reconstruction

This section introduces data which, according to us, cast doubt on the two hypotheses stated above. Recall indeed that both assumptions make strong predictions as to when a distributive reading of a relative clause should be available, or more precisely should *not* be available. Sharvit (1999)'s claim predicts that a distributive reading could never occur when either a negative quantifier or resumption appears within the relative clause. Alexopoulou and Heycock (2002)'s claim also predicts that the distributive reading of a relative clause should not be available when it is introduced by an indefinite determiner. As will be shown, all the paradoxical data introduced in this section have a fundamental common property: they all correspond to cases of binding reconstruction.

Considering first Sharvit (1999)'s claim and its logical consequence, the following data from French, English and Jordanian Arabic seem highly problematic:¹⁰

- (17) (a) *J'ai déchiré la photo de lui₁ qu'aucun homme₁ n'avait choisie.*
 I-have torn the picture of him that-no man Neg-had chosen
 'I tore the picture of him(self) no man had chosen.'
- (b) *The picture₂ of himself₁ which no candidate₁ liked _₂ ruined his₁ career.*
- (c) *S-Surah₂ tabaʕat ʔibin-ha₁ illi kul mwaʕaf₁ ʕab-ha₂ riʕʕat l-uh₁.*
 the-picture of son-his that every employee bring.past.3s.-it give-back.passive to-him.
 'The picture of his₁ son that every employee₁ brought (it) was given back to him₁.'

The example (17a) from French allows for a distributive reading of the relative clause, on a par with the availability of the bound variable reading of *lui* ('him'), being bound by *aucun homme* 'no man'. Consider for example a context with three men in the room, each one being told to choose pictures of himself among several ones (one picture of his childhood, one of his wedding, one with his family). Under such a context, the

⁹More precisely, Alexopoulou and Heycock (2002)'s analysis is indebted to Loebner (1985)'s work on what he calls *functional concepts* and how such concepts crucially rely on the presence of the definite determiner/property. For more details, see Alexopoulou and Heycock (2002).

¹⁰(17b) from English was originally given by Alexopoulou and Heycock (2002) as a challenge for Sharvit (1999)'s analysis, and (17c) from Jordanian Arabic comes from a parallel study of resumption developed with Nouman Malkawi.

sentence more or less states that, for each of those men, there was one picture of his that he had not chosen and that I tore, for example the picture of his wedding. Notice that this distributive reading of the relative clause (mapping a different picture with respect to every man) is completely unexpected with a negative quantifier like *aucun homme* ‘no man’. If only a pair-list reading could give rise to distributivity of the relative clause, presence of the negative quantifier should ban any distributive reading of that sentence, contrary to fact.

The example (17b) from English is very similar, as the predicative sentence also allows for a distributive reading of the relative clause despite presence of a negative quantifier. And confirmation for that reading in the example comes from the availability of both the bound variable reading of *himself* and the covariant (E-type) interpretation of the possessive *his*.

The piece of data from Jordanian Arabic in (17c) goes against the second prediction of Sharvit (1999)’s claim, the fact that distributive readings of relative clauses should never occur when resumption appears in the relativized position. Again, this prediction is not borne out if we consider the availability of the distributive reading in (17c) despite presence of the resumptive clitic *-ha* in the relativized position. That the multiple individual reading of the relative is present is correlated with the availability of both the bound variable reading of *-ha* (‘his’) and the covariant (E-type) interpretation of the clitic *-hu* (‘him’).

Now considering Alexopoulou and Heycock (2002)’s claim based on the distinction between definite and indefinite antecedents of relative clauses, empirical data from French as in (18) clearly go against the prediction that it makes. Recall indeed that Alexopoulou and Heycock (2002)’s approach predicts that indefinite antecedents should never allow for a distributive reading.

- (18) *Marie a accroché au mur une photo de lui₁ que chaque*
 Mary has hung to-the wall a picture of him that each
homme₁ avait choisie.
 man had chosen
 ‘Mary displayed on the wall a picture of him(self)₁ each man₁ had chosen’

But crucially in (18), multiple individual reading of the relative clause and its antecedent seems more easily available, although the antecedent is indefinite. Consider again a context with three men in the room, each one being told to choose pictures of himself among several ones (one picture of his childhood, one of his wedding, one with his family). The example then just states that one picture was displayed for each man, for example the picture of his wedding (if it was chosen by all of them). Notice again that the unexpected distributive reading is correlated with the bound variable interpretation of *lui*, being bound by *chaque homme*.

Having introduced crucial data that seem incompatible with both Sharvit (1999) and Alexopoulou and Heycock (2002)’s assumptions about distributive readings of relative clauses, notice that they all share a fundamental property though: presence of an anaphoric expression in the antecedent of the relative clause. In other words, such data can all be seen as cases of binding reconstruction in the sense that the anaphoric expression can be interpreted as variable bound by the quantified expression although

it does not appear within the scope of that quantifier on the surface. Such examples thus appear very similar to classical reconstruction data such as (2) repeated below:

- (19) *Quelle photo₁ de lui₂ est-ce que tu penses que chaque homme₂ a déchirée _₁?*
 ‘Which picture of him(self) do you think that each man tore?’

Building on that common property of those examples, I argue that a proper analysis of distributive readings of relative clauses should somehow be linked to the reconstruction phenomenon. This will be developed in the following sections.

3 The Account...

The major claim of the analysis proposed in this paper is the following:

- (20) *Distributive readings of displaced constituents correspond to reconstructed readings of that constituent, be it with interrogation, dislocation or even relativization.*

The account is presented in two steps. I first introduce my general account of reconstruction, as developed in Guilliot (2006) and Guilliot and Malkawi (2009), and based on two fundamental assumptions, one syntactic, the other semantic. I will then try to show how such an account could be extended to relative clauses, and how it predicts when a multiple individual reading is available with such constructions.

3.1 ...of Reconstruction...

Before introducing my two fundamental assumptions to account for reconstruction of displaced constituents, first notice that this phenomenon is not restricted to the gap strategy where the displaced constituent just leaves a gap in its thematic position, but also extends to the resumptive strategy where a pronoun resumes the displaced constituent in the thematic position. Reconstruction cases with both strategies are given below:

- (21) Gap strategy (with interrogation):

- (a) *Quelle photo₁ de lui₂ chaque homme₂ a-t-il déchirée _₁?*
 which picture of him each man has-he torn
 ‘Which picture of his did each man tear?’
 (b) *Which woman₁ did each man invite _₁?*

- (22) Resumptive strategy (with interrogation¹¹ and dislocation¹²):

¹¹The question mark on the grammaticality judgment for (22b) does not relate to the distributive reading, but more broadly to the presence of resumption which French speakers do not always accept in questions, or at least consider as marginal.

¹²Notice that I consider dislocation as a case of resumption, following a standard trend in generative grammar. But resumption is sometimes defined in a more restricted way, so as to include only relative clauses and questions.

- (a) ?*Quelle photo₁ de sa₂ fille est-ce que tu te demandes*
 which picture of his daughter is-it that you *Refl* ask
si chaque homme₂ l₁'a gardée?
 whether each man it-has kept
 (lit.) 'Which picture of his daughter do you wonder whether each man kept it?'
- (b) *La photo qu'il₂ avait choisie, chaque homme₂ l'a déchirée.*
 the picture that-he had chosen each man it-has torn
 'The picture that he had chosen, each man tore it.'

All these examples allow for a distributive reading of the displaced constituent which, I argue, follows from reconstruction. In (22a) and (22b), presence of the resumptive clitic *l(a)* is compatible with a bound variable reading of *il* ('he') or *sa* ('his') respectively, and hence with a distributive reading of the displaced constituent.

3.1.1 Syntax: building on copies

To account for reconstruction, I first propose the following syntactic assumption, which corresponds to an extension of the standard minimalist account, proposed in Chomsky (1995) and Sauerland (1998) among others, and based on the copy theory of movement:

- (23) *Reconstruction of a displaced XP requires presence of a syntactic copy of that XP, resulting either from **movement**, or crucially from an **ellipsis** phenomenon.*

This claim, based crucially on the presence of copies, has several advantages. One is the fact that it preserves the empirical coverage of the preceding analysis, as movement remains one of the triggers for reconstruction. As such, examples in (21) are analyzed as below:

- (24) (a) *Quelle photo de lui chaque homme₁ a-t-il déchirée ~~quelle photo de lui₁~~?*
 'Which picture of his did each man₁ tear ~~which picture of his₁~~?'
 (b) *Which woman did each man invite ~~which woman~~?*

In (24a), the bound variable reading of *lui* 'his' follows from the presence of a copy within the c-command domain of *chaque homme* 'each man'. The case of binding reconstruction follows straightforwardly. Similarly in (24b), presence of a copy of the indefinite *which woman* within the syntactic scope of *each man* now accounts for the distributive reading of the question as a case of scope reconstruction.

Another advantage of the claim in (23) is that it further extends the account to reconstruction data with resumption if we assume Elbourne (2002)'s view on pronouns,¹³ stated as follows:

- (25) *A (resumptive) pronoun can be interpreted as E-type in the sense of Elbourne (2002), i.e. as a determiner followed by an NP complement elided under identity with its antecedent.*

¹³For independent arguments that ellipsis allows for reconstruction, see Guilliot and Malkawi (2009).

Consider now the syntactic representation for an example like (22):

- (26) *La photo qu'il avait choisie, chaque homme₁ a déchiré* [_{DP} *l(a)* [_{NP_Δ} ~~*photo qu'il avait choisie*~~]].
 'The picture that he had chosen, each man tore it.'

In (26), I argue, following Guilliot and Malkawi (2009), that the resumptive clitic *l(a)* can be interpreted as E-type, i.e. as a determiner followed by an elided copy of the antecedent's restriction.¹⁴ Binding reconstruction now follows from the presence of the elided copy containing the pronoun *il* 'he' within the c-command domain of *chaque homme* 'each man'.

3.1.2 Semantics: definite vs indefinite copies

Having introduced the syntactic hypotheses to account for reconstruction crucially based on the presence of copies, the question that arises is how such copies get interpreted in the semantic component. Putting together independent assumptions proposed in the literature on this topic (see Sauerland (1998), Agüero-Bautista (2001), Fox (2003), Heim and Jacobson (2005) among others), I argue for the following claim:

- (27) *Syntactic copies are interpreted either as **indefinite** descriptions, or as **definite** descriptions.*

Interpretation of a copy as an indefinite corresponds to the analysis given in Agüero-Bautista (2001) to account for pair-list readings in *wh*- structures, and also developed in Sauerland (1998) for *wh*- movement and Quantifier Raising. Following Kratzer (1998)'s analysis of indefinites and Agüero-Bautista (2001)'s account of *wh*- structures, I propose that a copy can be interpreted as a skolemized choice function, which takes two arguments, one individual *x* and a set of entities *P* and returns one individual of that set (written $f(P)(x)$).¹⁵

Applied to the example in (21b), such a mechanism leads to the partial LF representation in (29a), which, I argue, gives rise to the two types of distributive readings, a pair-list reading as in (29b) and a natural function reading as in (29c).¹⁶

¹⁴Guilliot and Malkawi (2009) provides several arguments to support the hypothesis that the copy does result from an ellipsis phenomenon, one of them being the availability of reconstruction within syntactic islands when resumption occurs. For more details, see Guilliot and Malkawi (2009).

¹⁵The notion of skolemized choice function was first introduced by Kratzer (1998) to account for distributive and specific readings of indefinites which, as she claims, are distinct from existential readings. Consider the example below as an illustration. The choice function *f* picks one entity from the set of women, and the skolemization (the fact that the function takes another argument, being bound by the universal quantifier in that case) insures that the choice is relative to *every man*.

- (28) Every man loves **a** (certain) woman.
 ⇒ one different & specific woman for each man
 LF: every man₁ loves f_1 (woman).
 $\forall x.[man(x) \rightarrow [Loves(x, f_x(woman))]]$

¹⁶Notice here that ~~what~~ refers to what is left uninterpreted at LF, whereas ~~xxx~~ refers to what is not pronounced (i.e. uninterpreted at PF).

- (29) (a) Which ~~man~~₁ did each man₂ invite ~~f~~₁(woman)?
 (b) What is the skolemized choice function $f_{\langle et, ee \rangle}$ such that each man_x invited $f(woman)(x)$?
 \Rightarrow PL reading (a set of arbitrary pairs): the *man-woman* relation can be different with respect to each man.
 (c) What is the function $g_{\langle ee \rangle}$ ranging over women such that each man_y invited $g(y)$?
 \Rightarrow Natural function reading: the *man-woman* relation is the same for each man.

According to Agüero-Bautista (2001), the semantic representation gives rise to a pair-list reading as the set of possible answers is composed of the set of choice functions f which for *each man* maps a member of the set of *women*, thus establishing a set of arbitrary pairs of men and women such that the former invited the latter. I further argue for a logical entailment from the pair-list reading in (29b) to the natural function reading in (29c), which can be stated as follows: a skolemized choice function $f_{\langle et, ee \rangle}$ ($CH_s(f)$) such that $f(P)$ holds corresponds to a *Skolem* function $g_{\langle ee \rangle}$ such that $range(g)=P$. One way to understand this entailment is to consider that among all the possible skolemized choice functions establishing a relation between men and women (and which define the possible answers for the question), some might not be arbitrary in the sense that it ends up defining a stable relation/function from men to women (*the mother_of* relation for example). In other words, the natural function reading can be seen as a sub-reading of the readings obtained with a skolemized choice function analysis of the copy.

Summarizing the analysis so far, interpretation of the copy as indefinite thus gives rise to either a PL reading, or a natural function reading. Also notice that interpreting the copy as indefinite obviously does not induce any presupposition on the functions considered.

Following Fox (2003) or Heim and Jacobson (2005), I further argue that a copy may also be interpreted as a definite description, be it ‘individual’ or ‘functional’.¹⁷ The distinction is essentially based on the existence of simple/individual *versus* complex/functional indices on the definite determiner introducing the copy.¹⁸ The representations in (30) illustrate how the individual and the natural function readings of (21b) can be obtained:

- (30) (a) Which ~~man~~₁ did each man₂ invite ~~the~~_{1/1(2)} woman?
 (b) What is the x such that each man_y invited the_x woman?
 \Rightarrow Individual reading with presupposition that x is a woman.

¹⁷This assumption corresponds to Fox (2003)’s notion of *Trace Conversion*, a syntactic mechanism to transform gaps/traces into definite descriptions composed of a determiner and a predicate restriction (the restriction of the moved item).

¹⁸This assumption merely corresponds to an extension of Engdahl (1980)’s approach to individual *versus* functional questions, the trace being replaced by a definite copy.

- (c) *What is the function $g_{\langle ee \rangle}$ such that each man_y invited the $g(y)$ woman?*
 \Rightarrow Natural function reading with presupposition that g maps men to women.

As stated in (30b), presence of an individual index on the definite determiner within the copy formalizes the individual reading, with a presupposition condition on the individuals considered (that presupposition being brought about by presence of the definite). (30c) represents the other option with a complex/functional index giving rise to the natural function reading. Again, presence of the definite determiner crucially leads to a presupposition condition on the functions considered within the context.¹⁹ At this stage, I argue that this presupposition should require some kind of accommodation in the absence of such a context.

To summarize, interpretation of the copy as a definite description gives rise to either the individual reading or the natural function reading. Notice that both readings add a presupposition condition on the individual or the function. Without any context, I assume that the individual reading should prevail over the natural function reading as it is easier to accommodate the presupposition linked to the former. As will be developed shortly, this assumption will be crucial to account for some of the paradoxes introduced in Section 2.

3.2 ...in Relative Clauses

Before showing how my general account for reconstruction can shed light on the paradoxical data about distributive readings of relative clauses, two independent assumptions must be made, the first one about the syntactic structure to get binding reconstruction in relative clauses, and the second one about copy interpretation to get scope reconstruction in relative clauses.

3.2.1 Structure of relative clauses

To get binding reconstruction in relative clauses, a standard assumption is to consider that relative clauses are ambiguous between two possible structures: the matching analysis (movement of an operator) *versus* the head-raising analysis (movement of the antecedent's restriction).²⁰ As an alternative, I argue that the relative pronoun can be interpreted like a (resumptive) pronoun, i.e. as inducing a similar ellipsis phenomenon (deletion under identity with its antecedent) as the one proposed for examples like (26).²¹ Consider first how a basic relative clause is represented under this account:

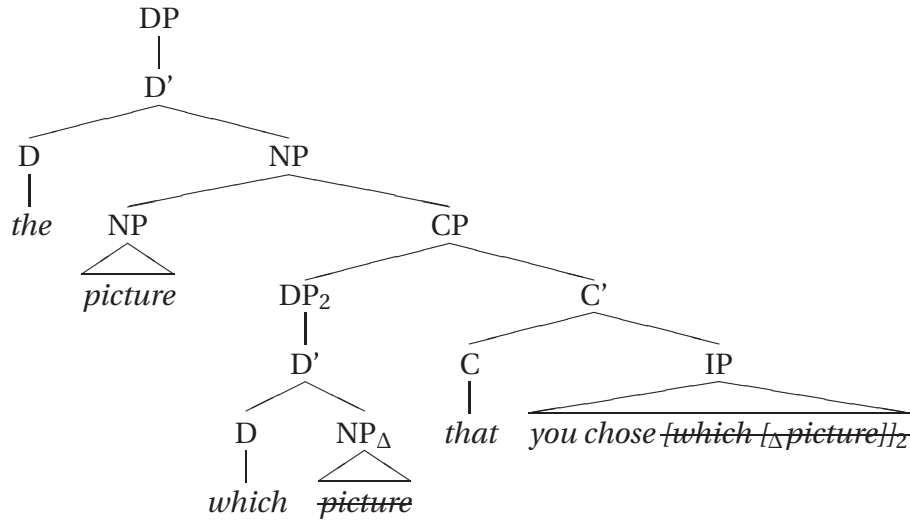
¹⁹A more detailed formalization of how presupposition should be projected is left for future research. But see Guillot (2006) for a first sketch of the process.

²⁰See Bianchi (1995) or Sauerland (1998) for more details.

²¹One argument for this assumption comes from the fact that both resumption and relative clauses obviate reconstruction with condition C, as shown in (31a) and (31b):

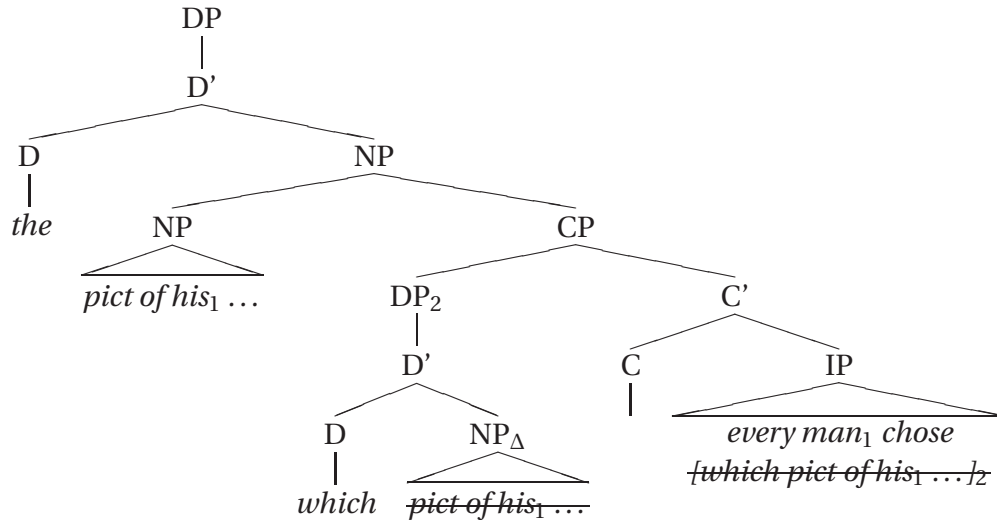
- (31) (a) *J'ai apporté la photo de Jean₁ qu'il₁ avait choisie.* 'I brought the picture of John that he had chosen.'
 (b) *Le crayon₂ de Laila₁, je pense qu'elle₁ l'₂ a acheté aux Galeries.* (lit.) 'Laila's pen, I think she bought it at the shopping mall.'
 (c) *I kissed the sister of John₁, and he₁ did [_{Δ}] too.*

- (32) *I saw the picture which/that you chose.*



Consider now a more complex case, the case of binding reconstruction within relative clause, and its syntactic structure:

- (33) *I tore the picture of his₁ daughter which each man₁ chose.*



As proposed, the relative pronoun *which* may induce an ellipsis phenomenon, hence be associated with an elided NP restriction corresponding to the antecedent's restriction. The reconstructed reading straightforwardly follows in (33) from presence of a copy resulting from both ellipsis and movement, and containing the bound variable anaphora *sa* 'his' within the syntactic scope of *chaque homme* 'each man'.

3.2.2 Copy interpretation in relative clauses

As for getting scope reconstruction with relative clauses, I argue, following Kayne (1994) and Cresti (2000) among others, that the relativized site (hence, the copy in that po-

The absence of condition C violation (i.e. the lack of reconstruction effect) is now on a par with classical examples of ellipsis like the one in (31c) taken from Fiengo and May (1994), where coreference between *John* and *he* is available.

sition) can be interpreted as indefinite,²² and more precisely as a skolemized choice function. The account is then very similar to the general account of scope reconstruction. A schema of the process is given below in the case of a relative clause:

- (35) (a) *the ~~patient~~₁ each doctor₂ was assigned f_1^2 (~~patient~~).*
 (b) *the unique choice function $f_{\langle et, ee \rangle}$ such that each doctor_x was assigned f_x (patient).*
 (c) *the unique function $g_{\langle ee \rangle}$ ranging over patients such that each doctor_y examined $g(y)$.*

Interpretation of the copy as indefinite now predicts that the two distributive readings of the relative clause are available. The pair-list reading follows from interpretation of the copy as a skolemized choice function (see the representation in (35)b). Contrary to Sharvit (1999), I argue that the natural function reading is also an option with relative clauses in predicative sentences, and formally follows from the logical entailment discussed in Section 3.1.2.²³

4 Accounting for the paradoxes

Having introduced my general account for reconstruction, and extended it to relatives clauses, I argue that the paradoxical data provided in Section 2 are now completely predicted, as cases of binding reconstruction. But I will first show how the account deals with the contrasts introduced in Sharvit (1999) and Alexopoulou and Heycock (2002), i.e. the fact that presence of resumption, negative quantifiers or indefinite antecedents seem to limit distributive readings of relative clauses.

4.1 Resumption limits distributive readings

Recall that Sharvit (1999) notes that the presence of a resumptive pronoun instead of a gap within the relativized site seems to ban the multiple individual reading, as shown by the example repeated below:

²²Notice that Kayne (1994) and Sauerland (1998) provide an independent argument for the assumption that the relativized site can be interpreted as indefinite: the availability of existential constructions in relatives. Consider indeed the grammaticality of the following example in French:

- (34) *J'ai invité les enfants qu'il y a dans cette salle.*
 (lit.) 'I invited the kids that there are in this room.'

The use of existential constructions being restricted to weak determiners (like an indefinite), such an example then suggests that the relativized can indeed be interpreted as indefinite.

²³A legitimate question that arises at this stage is how such a complex semantic object for the relative clause and its antecedent combines with the matrix predicate. Although this goes beyond the aim of this paper and should be developed in future work, several options can be considered. The most obvious one is to follow Sharvit (1999)'s analysis based on QR (when the headed relative is in the object position) and type-shifting rules: the relative clause and its antecedent can be QRed, and the matrix predicate is type-shifted to denote a set of functions (instead of a set of individuals). For more details, see Sharvit (1999). Another option would be to build on situations semantics and quantification over situations, as proposed in Elbourne (2002) to account for E-type anaphora. For more details, see Elbourne (2002).

- (36) ??*ha-iSa₂ Se kol gever₁ hizmin ota₂ hodeta lo₁.*
 the-woman *Op* every man invited her thanked him
 (lit.) ‘The woman every man₁ invited her thanked him₁.’

Why is the distributive reading unavailable in that example? Within an account based on reconstruction, it just follows from the fact that resumptive pronouns clearly bear a definite feature, which then forces a definite interpretation of the copy. In other words, interpretation of the copy as indefinite, leading to either a pair-list reading or a natural function reading without any presupposition, is not an option anymore. More precisely, two interpretations are still in principle available, the individual reading or the natural function reading, but both are correlated with presupposition conditions brought about by the definite property of the resumptive, as shown by the following representations:

- (37) (a) *the unique x such that each man _{y} invited the _{x} woman*
 \Rightarrow Individual reading with presupposition that x is a woman.
 (b) *the unique function $g_{\langle ee \rangle}$ such that each man _{y} invited the _{$g(y)$} woman*
 \Rightarrow Natural function reading with presupposition that g maps men to women.

At this stage, I argue that, in the absence of any context, the individual reading will prevail over the natural function one as it is easier to accommodate the presupposition linked to the former. In the case of the individual reading, accommodation consists in considering a context C which presupposes the existence of an individual x such that x is woman. In the case of the natural function reading, accommodation is a lot more complex as it consists in considering a context C presupposing the existence of a function g mapping men to women. Such a competition, I argue, leads to a very strong preference for the individual reading.²⁴

4.2 Negative quantifiers limit distributive readings

The second question that needs to be answered is why the distributive reading of the relative is so limited in the example repeated below, with a negative quantifier within the relative clause:

- (38) *J’ai déchiré la photo qu’aucun homme n’avait choisie.*
 I-have torn the picture that-no man Neg-had chosen
 ‘I tore the picture that no man had chosen.’

I argue that such a limitation follows if we assume that a skolemized choice function analysis of indefinites (for pair-list reading) must independently be restricted or banned under negative quantifiers. Notice indeed that for the simple example in (39),

²⁴Also recall from footnote 6 that, according to Sharvit (1997), the distributive reading of a relative clause with resumption ‘becomes more acceptable if the previous discourse establishes a mapping between men and the women they invited’. This comes as no surprise if we assume that context accommodation is at stake in examples like (36).

something has to be said so as to exclude the reading as stated below, which could in principle be obtained from interpretation of the indefinite as a skolemized choice function.

- (39) *No man kissed a woman.*
 Can not mean: $\exists f. \neg \exists x. [man'(x) \wedge kiss'(x, f(woman')(x))]$

Everyone agrees that a sentence like *no man kissed a woman* cannot mean that there exists a way of choosing women f such that it is not true that there exists a man who kissed the woman chosen. Whichever the way the restriction should be formalized, I basically conclude from such data that the skolemized choice function analysis of a copy should not be available under a negative quantifier, and therefore that only the definite interpretation of the copy will. This assumption now accounts for the fact that presence of negative quantifiers limits the multiple individual readings of relative clauses in the same way that resumption does, as it leads to the following readings in principle, individual or natural function, both with presupposition conditions:

- (40) (a) *the unique x such that no man_y had chosen the x picture*
 \Rightarrow Individual reading with presupposition that x is a picture.
 (b) *the unique function $g_{\langle ee \rangle}$ such that no man_y had chosen the $g(y)$ picture*
 \Rightarrow Natural function reading with presupposition that g maps men to pictures.

Again, accommodation of the presupposition in the absence of context leads to a strong preference for the individual reading as it is easier to consider a context presupposing the existence of a woman instead of a function mapping men to women.

4.3 Indefinite antecedents limit distributive readings

The contrast introduced in Alexopoulou and Heycock (2002) shows that the presence of an indefinite antecedent also seems to limit the distributive reading in the same way that resumption and negative quantifiers do. The crucial data, with the indefinite antecedent clearly favoring the individual reading, is repeated below:

- (41) *?We contacted a patient each doctor was assigned.*

So why is the multiple individual reading unavailable in that case? The answer is very similar to the other cases of limitation discussed above, as I argue that the presence of an indefinite antecedent also force a definite interpretation of the copy in the relativized position. This assumption might appear stipulative, but a major argument for that is the obvious contrast between the examples in (42) below:

- (42) (a) *J'ai invité les enfants qu'il y a dans cette salle.*
 I-have invited the kids that-it there has in this room
 (lit.) 'I invited the kids that there are in this room'

- (b) ??*J'ai invité des enfants qu'il y a dans cette salle.*
 I-have invited some kids that-it there has in this room
 (lit.) 'I invited (some) kids that there are in this room.'

Recall from footnote 22 that the availability of (42a) with an existential construction within the relative clause is commonly given as an argument that the relativized position can be interpreted as indefinite. Now considering the oddness of (42b) with an indefinite antecedent heading the relative clause, I conclude that the option of interpreting the relativized position as indefinite is no longer available, or at least highly marginal. That leaves us with a very straightforward answer as to why indefinite antecedents limit distributive readings. Again, the definite interpretation of the copy prevails, leading to a competition between the individual and the natural function readings with presupposition conditions: accommodation of that presupposition in the absence of context will then favor the individual reading as it is easier to accommodate.

To summarize, the fact that resumption, negative quantifiers and indefinite antecedents seem to ban distributive readings of relative clauses is now predicted under a uniform account based on presence of syntactic reconstruction together with a natural restriction on the interpretation of the syntactic copy within the relativized position. More precisely, all these contexts just ban interpretation of the copy as indefinite, and interpretation of the copy as definite leads to a competition between the individual and natural function readings with presupposition, the individual reading being favored as it is harder to accommodate the presupposition linked to the natural function reading.

4.4 Binding reconstruction as rescuer

As introduced in Section 2.3, all the problematic and paradoxical data reduce to cases of binding reconstruction. Crucially indeed, the distributive reading of the relative clause is suddenly available in the following examples, despite the presence of a negative quantifier in (43a) from French and (43b) from English, resumption in (43c) from Jordanian Arabic, or an indefinite antecedent in (43d) from French:

- (43) (a) *J'ai déchiré la photo de lui₁ qu'aucun homme₁ n'avait choisie.*
 I-have torn the picture of him that-no man Neg-had chosen
 'I tore the picture of him(self) no man had chosen.'
- (b) *The picture₂ of himself₁ which no candidate₁ liked _₂ ruined his₁ career.*
- (c) *S-Surah₂ tabaʕat ʔibin-ha₁ illi kul mwaʕaf₁ ʕab-ha₂*
 the-picture of son-his that every employee bring.past.3s.-it
riʕʕat l-uh₁.
 give-back.passive to-him.
 'The picture of his₁ son that every employee₁ brought (it) was given back to him₁.'
- (d) *Marie a vu une photo de lui₁ que chaque homme₁ avait choisie.*
 Mary has seen a picture of him that each man had chosen

‘Mary saw a picture of him(self)₁ each man₁ had chosen.’

Presence of a potential bound variable within the antecedent in all these examples seems to override the limitations on the availability of multiple individual readings. The question is how this follows from an account based on reconstruction.

First recall that presence of negative quantifiers, resumption or indefinite antecedents forces a definite interpretation of the syntactic copy obtained by reconstruction within the relativized position. But crucially in all the examples in (43), interpreting the embedded anaphoric item as a bound variable, as a case of binding reconstruction through a definite copy, clearly excludes the individual reading associated with the relative clause and its antecedent, and hence straightforwardly accounts for the availability of the natural function reading with the presupposition condition.²⁵ In other words, if a bound variable occurs within the antecedent, the competition between the two possible readings of the relative clause, and the accommodation of the presuppositions associated to them, is not present anymore: the distributive/natural function reading of the relative clause prevails, as reconstruction of the bound variable just blocks the individual reading.

4.5 What about specificational/equative sentences?

Interpretation of relative clauses within equative/copular sentences provides another argument for the account proposed in this study. As first noticed in Sharvit (1999), presence of a negative quantifier and/or resumption does not block the distributive reading of the relative when it is embedded in an equative sentence. Consider indeed the examples below, two from Sharvit (1999)’s study on Hebrew, and one from French:

- (44) (a) *ha-iSa₂ Se kol gever₁ hizmin ota₂ hayta iSt-o₁.*
 the-woman Op every man invited her was wife-his
 ‘The woman every man₁ invited was his₁ wife.’
- (b) *ha-iSa₂ Se af gever₁ lo hizmin _2 hayta iSt-o₁.*
 the-woman Op no man Neg invited was wife-his
 ‘The woman no man₁ invited was his₁ wife.’
- (c) *La photo qu’aucun homme₁ n’a déchirée est celle de son₁ épouse.*
 the picture that-no man Neg-has torn is the-one of
 his wife
 ‘The picture that no man₁ tore is his₁ wife’s.’

Contrary to relative clauses in predicative sentences, relative clauses in equative sentences suddenly allow for a distributive reading even in cases of resumption (see (44a)), or a negative quantifier (see (44b) and (44c)). Confirmation of this comes from the correlated availability of the covariant (E-type) reading of the anaphoric item in the other part of the equation. And notice that these examples are not cases of binding reconstruction which, as shown above, can override the various limitations.

²⁵ Obviously, the individual reading of the relative clause and its antecedent is still available (and prevails) if the embedded anaphoric item is interpreted referentially.

Similarly, presence of an indefinite antecedent of the relative clause in an equative sentence does not block the distributive reading either. Consider indeed the following example from English:

(45) *A woman that no man₁ invited is his₁ wife.*

Again, the fact that the multiple individual reading is available is confirmed by the fact that the possessive *his* allows for a distributive/covariant interpretation with respect to every man. Such a reading might appear surprising in presence of both an indefinite antecedent and a negative quantifier.²⁶

Summarizing the data, the generalization is that all the restrictions on distributive readings of relatives that appear in predicative sentences (with resumption, negative quantifiers, and indefinite antecedents) disappear in equative sentences.

How does the analysis predict such a contrast between predicative and equative sentences?

As predicted from the analysis, presence of resumption, a negative quantifier or an indefinite antecedent still forces a definite interpretation of the syntactic copy. But the availability of the distributive reading now comes as no surprise. It just follows from the fact that equative sentences crucially introduce the context that is required to satisfy the presupposition associated with the natural function reading. In other words, the distributive reading will be available, as it does not require any kind of accommodation: the second part of the equative sentence just provides the required function mapping men to women (the *wife_of* function in (44a), (44b) and (45)) or mapping men to pictures (the *picture_of_wife_of* function in (44c)).

5 Conclusion

Two main assumptions about distributive readings of relative clauses have been proposed in the literature, as stated below along with the logical predictions they make:

Hypothesis #1 (Sharvit (1999)): *the multiple individual reading of a relative clause corresponds to a pair-list interpretation of that relative (and crucially not a natural function one), at least when the matrix sentence is predicative.*

Prediction #1: the distributive reading of a relative clause should **never** occur with resumption and/or a negative quantifier in a predicative sentence, as they both ban the pair-list interpretation.

Hypothesis #2 (Alexopoulou and Heycock (2002)): *the distributive reading of a relative clause is crucially tied to presence of the external definite determiner.*

²⁶Similar examples in French are a bit harder to construct, as such equative sentences with an indefinite in subject position are not so natural in that language. A more natural way to express a similar proposition would be the following:

(46) *Il y a une femme qu'aucun homme₁ n'a invitée, et (cette femme) c'est son₁ épouse.*
(lit.) 'There is a woman that no man invited, and (this woman) it is his wife.'

Prediction #2: the distributive reading of a relative clause and its antecedent should **never** occur with an indefinite antecedent.

The paper introduces empirical data that clearly show that these two predictions are not borne out, hence casting doubt on the two assumptions. As all these unexpected data can be seen as cases of binding reconstruction, I argue for an analysis of distributive readings of relative clauses based on syntactic (scope and/or binding) reconstruction of the displaced constituent. Under that assumption, the case of distributive readings of relatives just corresponds to a sub-case of a more general phenomenon that appears in all displacement structures.

My general account of reconstruction is based on the following major claims.

- The distributive reading of a displaced constituent follows from syntactic reconstruction of that constituent, i.e. presence of a copy resulting either from movement or ellipsis (see Guillot and Malkawi (2009)).
- A copy can be interpreted as indefinite, and more precisely a skolemized choice function (see Kratzer (1998) and Agüero-Bautista (2001)); this mechanism gives rise to a pair-list reading or a natural function reading without any presupposition, as a case of scope reconstruction (presence of an indefinite under the scope of the quantifier).
- A copy can be interpreted as a definite description (see Fox (2003)), giving rise to an individual or natural function reading with a presupposition on the individual or function considered (property of the definite); in the absence of context, accommodation constraints favor the individual reading.

Extending this general account to relative clauses, I argue for the following assumptions to account for the wide range of empirical data about distributive readings of such constructions.

- The relativized site of relative clause can also be interpreted as indefinite, hence giving rise to a distributive reading of the relative clause resulting from scope reconstruction.
- Resumption, negative quantifiers, and indefinite antecedents generally block the distributive reading of the relative clause in predicative sentences, because they force an definite interpretation of the copy, leading to a competition between the individual or the natural function reading with presupposition conditions: in the absence of context, accommodation constraints clearly favor the individual reading.
- The distributive reading of a relative clause suddenly reappears with resumption, a negative quantifier and an external indefinite determiner when binding reconstruction is at stake, as the presence of the reconstructed bound variable bans the individual reading: the natural function reading with a presupposition condition now prevails, as being the only option available.

- The distributive reading of a relative clause also reappears in equative sentences, as the presupposed function required to get the natural function reading is now given by the context, i.e. the other part of the equation, and then does not require any kind of accommodation.

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Nicolas GUILLIOT
University of Nantes — LLING EA3827
nicolas.guilliot@univ-nantes.fr

Expressive Modifiers & Mixed Expressives

Daniel Gutzmann*

Abstract

In his work on expressives and conventional implicatures, Potts (2005, 2007b) develops the multidimensional logic \mathcal{L}_{CI} to formalize their main properties. In the type system of \mathcal{L}_{CI} , Potts implements two empirical claims. (i) There are no expressive modifiers, that is, expressions that have expressive type terms as their argument. (ii) There are no mixed expressives that contribute both descriptive and expressive content. I challenge both prohibitions by presenting data that speak in favor of the existence of expressive modifiers and mixed expressives. To overcome the restrictions built into \mathcal{L}_{CI} and to accommodate these cases, I extend the logic by adding new type definitions and corresponding composition rules.

1 Introduction

In his influential work on the logic of conventional implicatures, Potts (2005) develops a multidimensional logic \mathcal{L}_{CI} for dealing with *conventional implicatures* (CIs). In that work, he deals with two big classes of expressions which he regards as conveying conventionally implicated content. First, he addresses phenomena he calls *supplements* and which include non-restrictive relative clauses (1a), *as*-parentheticals (1b), nominal appositives (1c), evaluative adverbs (1d), or utterance modifiers (1e).

- (1) a. Ames, **who was a successful spy**, is now behind bars. (Potts, 2005, 90)
- b. Ames was, **as the press reported**, a successful spy.
- c. Ames, **a successful spy**, is now behind bars.
- d. **Luckily**, Ames is now behind bars.
- e. **Confidentially**, Ames is a successful spy.

The second phenomenon, studied by Potts (2005) is expressives, a class that encompasses many different expressions whose main function is to display some kind of evaluative attitude or emotion, mostly of the speaker. Examples for expressives are expressive attributive adjectives (2a), epithets (2b).

- (2) a. I have to mow the **damn** lawn. (Potts, 2005, 7)
- b. That **bastard** Kaplan was promoted. (Kaplan, 1999, 9)

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Expressives display a set of specific properties which seem to set them apart from all other kinds of meaning (Potts, 2005, § 2.4). First of all, the meaning they convey is independent of the descriptive content (“at-issue content” in Potts’ older terminology). This meaning is contributed by the conventional meaning of the expressive items, and the attitude or emotion expressives display is mostly speaker oriented (but see Harris and Potts, 2009a,b; Amaral et al., 2007).

To give a compositional semantics to these intriguing phenomena, Potts (2005) develops the multidimensional, type driven semantics \mathcal{L}_{CI} that is able to formalize the main properties obeyed by expressives and supplements. In Potts’ later work (Potts, 2007b,a), expressives receive a different interpretation than supplements, but from a type theoretic perspective and combinatorial perspective, the analysis remains essentially the same.

Although \mathcal{L}_{CI} is a great tool for studying and analyzing non-descriptive kinds of meaning, I will show in this paper that it still has some problems. These problems are raised by what I call *expressive modifiers* and *mixed expressives*. The former are expressions that modify expressive content, that is, functions from expressives to expressives, while the latter are expressions that contribute both expressive as well as descriptive content.

(3) That [**fucking** bastard] Burns got promoted!

(4) Lessing was a **Boche**. (Williamson, 2009, 146)

However, the problems they raise for \mathcal{L}_{CI} are not merely technical problems, as Potts is very insistent to claim that such expressions do not exist. In various places of his work, he makes the two following two claims:

(5) **Claim (1)**

Expressive types are only output types, i.e.: (Potts, 2007b, 169)

- a. At-issue content never applies to expressive content.
(Potts, 2005, §3.5.1)
- b. Expressive content never applies to expressive content.
(Potts, 2005, §3.5.2)

(6) **Claim (2)**

No lexical item contributes both an at-issue and a CI-meaning.
(Potts, 2005, 7)

Potts (2005) has built these restrictions directly into \mathcal{L}_{CI} in order to give a proper formalization to these claims, which is good, since then the claims as well as the formal system can directly be tested against linguistic data.

In this paper, I will show that both claims are invalid in face of the empirical data, as both expressives modifiers and mixed expressives do exist in various languages. The paper is structured as follows. In § 2, I will briefly sketch the main components of \mathcal{L}_{CI} and how they implement the two claims. Claim 1 is challenged in § 3, where I present data about expressive modifiers to argue that they should receive an intuitive semantic analysis instead of the one Potts (2007b) has to adopt. The other problem for \mathcal{L}_{CI} is posed by mixed expressives, which are dealt with in § 4. To overcome these problems, the type of \mathcal{L}_{CI} system must be extended. This is what I do in § 5, where I present two

enhancements of \mathcal{L}_{CI} , which I call \mathcal{L}_{+CI+EM} and $\mathcal{L}_{+CI+EM+ME}$ respectively. I end with a short conclusion and mention remaining problems in § 6.

2 Potts' Logic of Conventional Implicature

Before I will present empirical data against Potts' two main claims, I will sketch the formal logic \mathcal{L}_{CI} he uses to describe and analyze conventional implicature triggering expressions in more detail in order to illustrate how these claims are directly wired into the logic of conventional implicatures.

The logic \mathcal{L}_{CI} is a variant of type-driven translation (Klein and Sag, 1985) and differs in three respects from a more traditional model-theoretic semantics like Montague's (1974) intensional semantics. First, it introduces a new basic type for conventional implicatures/expressives and new construction rules for complex types together with appropriate denotation domains. Secondly, \mathcal{L}_{CI} makes use of so-called tree-admissibility conditions that regulate how expressions of the various types are combined with each other during the semantic derivation. The last new ingredient of \mathcal{L}_{CI} is a process called parse-tree interpretation according to which the denotation of a sentence is given by the interpretation of an entire semantic tree instead of just a single formula. While the third innovation is very important for \mathcal{L}_{CI} from a technical and theoretical point of view, it could in principle be substituted by a non-representational variant while keeping the empirical predictions made by \mathcal{L}_{CI} , as these are implemented in the type system and the tree-admissibility conditions.¹ By the former, the empirical claims in (5) and (6) are implemented, while the latter is used to model the independence of expressive content.

2.1 The type system

The core of \mathcal{L}_{CI} is its type system where the restrictions for expressive expressions are formulated. In addition to the ordinary recursive type definitions, we have two new clauses. (7b) defines that there is a new basic type ε for expressive. Clause (7d) regulates how this new basic type can be combined with other types to form complex expressives types.

(7) **Types for \mathcal{L}_{CI}**

- a. e and t are descriptive types.
- b. ε is an expressive type.
- c. If σ and τ are descriptive types, then $\langle \sigma, \tau \rangle$ is a descriptive type.
- d. If σ is a descriptive type, then $\langle \sigma, \varepsilon \rangle$ is an expressive type.
- e. The set of types is the union of the descriptive and expressive types.

To see how the claims in (5) are formalized by this type system, first note that a simple recursive formation rule for complex types like (8) is missing in the definitions.

¹That semantic parsetrees become a crucial part of the formal system via the mechanism of parse-tree interpretation is the source of strong criticism against Potts' system, since it leads to compositionality problems (cf. e.g. Amaral et al. (2007); Bonami and Godard (2007), and the articles in *Theoretical Linguistics* 33).

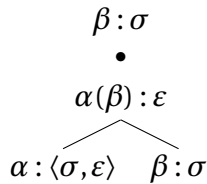
- (8) If σ, τ are types, the $\langle \sigma, \tau \rangle$ is a type.

Such a formation rule would allow for every combination of descriptive and expressive types. But the type system of \mathcal{L}_{CI} is much more constrained. Instead of having (8) in its pure form, it is restricted to descriptive types only in (7c). That is, we can only combine descriptive types in every combination but not if expressive types are involved. Furthermore, note that sentence (7d) which defines complex expressive types is only defined for complex types that have expressive types within its domain but not in its range. Of course, these gaps are intended by Potts' since they implement directly his main claims, namely that there are neither expressive expressions applying to descriptive content nor expressives that apply to other expressives. In addition, there are no types that have an output type that is both descriptive and expressive, a fact that corresponds to Potts' claim (6) that there are no expressions that contribute to both dimensions of meaning.

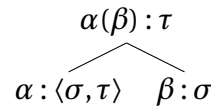
2.2 Tree-admissibility conditions

Special tree-admissibility conditions regulate how expressive and descriptive expressions combine with each other. To account for the independence of expressive content (Potts, 2007b, 166), which means that expressive content does not affect the descriptive content, a special derivation rule for expressives is used, which I called *expressive application*.² In contrast to ordinary functional application (9b), this rule ensures that expressive content is isolated during the derivation and does not get integrated into ordinary truth-conditional expression.

- (9) **Expressive application**



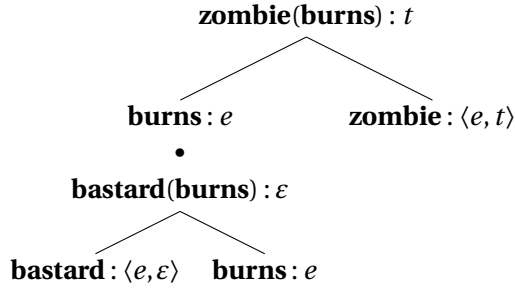
- (10) **Functional application**



According to (9), we can combine an expressive with a descriptive expression if the former is the functor and the latter is an argument of the appropriate type. The way the two expressions are combined is the functional application of the expressive term to its argument. But the derivation does not end here. After being plugged into the expressive function, the descriptive argument is returned and passed up the semantic parsetree unmodified. The expressive content is also passed up but is isolated from the at-issue expression by means of the metalogical bullet “•” that is used to distinguish independent expression at the same node. A sample derivation that makes use of (9) beside the basic functional application of descriptive terms is given in the following example.

- (11) That bastard Burns is a zombie.

²This is called *CI-application* in Potts (2005).



In this example, the expressive **bastard** applies to its entity-type argument **burns** to yield the expressive proposition **bastard(burns) : ε**. The descriptive expressive **burns** is then passed up the tree, where it could take part in the further derivations of the proposition that Burns is a zombie.

Since it is the descriptive expression at the root node of the semantic parsetree (that is, the topmost expression) that corresponds to the descriptive content of a sentence, the tree-admissibility condition in (9) formalizes the idea that expressive content does not affect the descriptive content of a sentence, as it ensures that expressive content never shows up at the descriptive part of the root node.

2.3 Parsetree interpretation

The tree-admissibility condition for CI-application captures the fact that expressive content is independent of descriptive content. However, expressive content should receive an interpretation, too. To enable this, Potts (2005) employs a mechanism which he calls *parsetree interpretation*.³

(12) Parsetree interpretation

Let \mathcal{T} be a semantic parsetree with the descriptive term $\alpha : \sigma$ on its root node, and distinct expressive terms $\beta_1 : \varepsilon, \dots, \beta_n : \varepsilon$ on nodes in it (intentionally, $\beta_1 : \langle s, \varepsilon \rangle, \dots, \beta_n : \langle s, \varepsilon \rangle$). Then the interpretation of \mathcal{T} is the tuple:

$$\langle \llbracket \alpha : \sigma \rrbracket, \llbracket \beta_1 : \varepsilon \rrbracket, \dots, \llbracket \beta_n : \varepsilon \rrbracket \rangle$$

As controversial as it may be conceptually, technically it is very simple way to ensure the separation of truth-conditional and expressive content. In order to get the entire meaning of a sentence, we interpret the entire tree instead of just the root node. The mechanism (12) then distributes the different types of meaning found in the parsetree into two dimensions of meaning. The descriptive dimension (the first member of the tuple) is given by the interpretation of the descriptive expression at the root node of the semantic parsetree. To get the expressive meaning of a sentence, we have to collect all expressive expressions of type ε that have been isolated by the tree-admissibility condition for expressive application and interpret them in the second dimension. In

³I have adjusted Potts' original definition of parsetree-interpretation (cf. Potts, 2005, 68) to the type conventions used in this paper. Instead of descriptive and expressive types – with ε as the basic expressive type – Potts (2005) speaks of *at-issue* and *conventional implicature* types respectively. Besides the truth-functional types t^a and t^c , he introduces entity types for both dimension, namely e^a and e^c . However, the latter plays no role in his book. The conventions used here are more in line with his more recent approach (Potts, 2007b).

this way, the rule for parsetree interpretation allows that expressive content can be set aside during the derivation of a semantic parsetree while at the same time ensuring that expressive content nevertheless gets interpreted.

3 Expressive modifiers

Having sketched the logic of conventional implicatures, I will now come to the problems it faces when it comes to the two major predictions that can be derived from the way it computes expressive content. The first one that concerns what I like to call *expressive content* is dealt with in this section. The other one, referred to as *mixed expressives*, will be the topic of the next section.

Recall that Potts (2005) designed the type system of \mathcal{L}_{CI} in such a way that it contains a major gap. There are no expressions that take expressive content as an argument. Therefore, the following two possible definitions are absent from the type definition of \mathcal{L}_{CI} as given in (7).

(13) **Gaps in the type system**

- a. If σ is a descriptive type, then $\langle \varepsilon, \sigma \rangle \dots$
- b. If σ and τ are *expressive* types, then $\langle \sigma, \tau \rangle \dots$

Therefore, there are neither expressions mapping expressive content to descriptive content nor expressions that apply to expressive content to yield expressive content. This is captured by Potts' first empirical claim already mentioned in the introduction and repeated here.

(14) **Claim (1)**

Expressive types are only output types, i.e.: (Potts, 2007b, 169)

- a. At-issue content never applies to expressive content.
(Potts, 2005, §3.5.1)
- b. Expressive content never applies to expressive content.
(Potts, 2005, §3.5.2)

The first subthesis of the general claim seems valid to me. At least I am not aware of any good example of an expression that takes expressive content as its argument to deliver non-expressive descriptive content. However, the type system of \mathcal{L}_{CI} also predicts that there are no expressions mapping expressive content to expressive content. That means that in \mathcal{L}_{CI} we will never have that kind of expressions that I like to call *expressive modifiers*, that is, expression that somehow modify or alter expressive content, e.g. by strengthening it.

This claim, however, does not seem to be supported by empirical data, as already shown by Geurts (2007). While it may be suitable for the other major class of expressions Potts (2005) deals with in his book – appositives – it seems to be implausible for expressives. *Prima facie*, *fucking* in (15a) seems to modify the expressive *bastard*, and *holy* seems to modify the expressive *shit* in (15b). Furthermore, *fucking* is modified by *really* in (15c).

(15) **Expressive modifiers**

- a. That fucking bastard Burns got promoted!
- b. Holy shit, my bike tire is flat again!
- c. I feel really fucking brilliant.

The intuitive semantic structure for a sentence like *fucking bastard Burns* is one in which **fucking** modifies **bastard**. The new complex expressive term should then apply to **burns**. This structure is depicted in (18). However, such a structure is not possible in \mathcal{L}_{CI} since **fucking** cannot modify **bastard** directly because in order to do so, it would have to have an expressive type in its domain which is not defined in the first place.

Potts (2007a,b) presents as work-around to solve the problem raised for his type definition by cases like the one in (15a). Instead of assigning an intuitive structure like (18) to (15a), Potts (2007a,b) presents an analysis along the lines of (19), where each expressive item applies to **burns** one after the other.

- (16) Intuitive structure: (cf. e.g. Geurts, 2007)

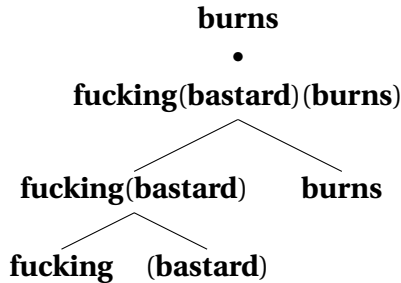
That (fucking(bastard))(Burns) got promoted!

- (17) Structure assigned by \mathcal{L}_{CI} :

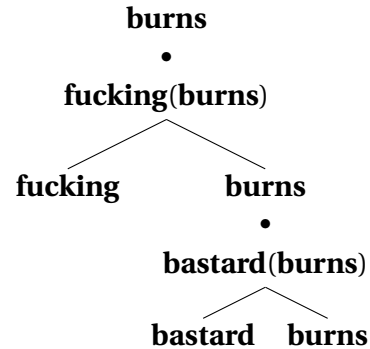
That fucking(Burns) • bastard(Burns) got promoted!

That is, they are treated like non-restrictive modifiers on the same argument instead of one expressive modifying the other.

- (18) Intuitive structure



- (19) Structure assigned by \mathcal{L}_{CI}



Potts (2007b) then defines the meaning of expressive items in such a way that it somehow models the superficial observation that *fucking* intensifies the expressive meaning of *bastard*. However, there are some problems with this way of handling expressive modifiers. First, Potts has to resort to pure syntactic arguments to explain why (20) is not possible.

- (20) *That bastard fucking Burns got promoted!

This is of course not such a big problem. More problematic are cases like (15b) in which a treatment along the lines of (19) seems highly implausible. In the case of *fucking bastard Burns*, each expressive could be dropped, and hence it could at least be argued that in the semantics, both expressives are modifying **burns**. However, this does not hold for *holy shit* because only *holy* may be dropped but not *shit*.

- (21) a. Shit, my bike tire is flat again!

- b. *Holy, my bike tire is flat again!

Even if it is clear from a syntactic point of view why *holy* cannot modify a sentence – it is an adjective not a sentence adverb – according to an analysis within \mathcal{L}_{CI} , it still needs a propositional argument in the semantics. However, it is far from clear why an expression that needs a propositional argument must be combined with an NP in the syntax to be able to apply to its argument in the semantics, where it does not even interact with the NP.

Further examples of this kind are provided in constructions that include intensifiers (Schwager and McCready, 2009) like *absolutely* or Germ. *voll* ‘totally’ that clearly modifies the expressive and not the noun that is modified by the expressive.

- (22) a. That absolutely fucking bastard Burns got promoted!
 b. *That absolutely Burns got promoted!
- (23) a. Dieser voll bescheuerte Idiot Peter ist zu spät!
 “This totally daft idiot Peter is too late!”
 b. *Dieser voll Peter ist zu spät!

A further argument for a structure like (18) in which the expressive modifiers are modifying the expressive is provided by case marking in languages like German.

- (24) a. Verdammt-*e* Scheiße, mein Fahrrad hat wieder einen Platten!
damn.fem shit.fem my bike has again a flat
- b. Verdammt-*er* Mist, mein Fahrrad hat wieder einen Platten!
damn.masc shit.masc my bike has again a flat
 “Damn shit, my bike tire is flat again!”
- c. Verdammt, mein Fahrrad hat wieder einen Platten!
damn my bike has again a flat
 “Damn, my bike tire is flat again!”

Depending on the gender of the expressive that is modified, the expressive adjective *verdammt* ‘damn’ shows different inflection since in German, there is gender concord within an NP. Accordingly, *verdammt* is inflected differently when combined with the feminine *Scheiß* ‘shit’ as when it modifies the masculine *Mist* ‘crap’. This could not be easily explained if a structure in which *verdammt* ‘damn’ also modifies the proposition that the speaker’s bike tire is flat instead of the expressive. Furthermore, if *verdammt* would really apply to the proposition, it should appear as an uninflected adverb, as in (24c) where it is used without any other expressive and comments the proposition.

A third argument based on inflectional data is provided with the following example. If *verdammt* ‘damn’ would be a modifier of *Peter*, it should show masculine gender marking. However, it agrees with the neuter *Arschloch* ‘asshole’.

- (25) a. Das verdammt-*e* Arschloch Peter hat mich abgezockt!
the damn.NEUT asshole.NEUT Peter.MASC has me off-ripped
 “That damn asshole Peter ripped me off!”
- b. *Das verdammt-*er* Arschloch Peter hat mich abgezockt!
the damn.MASC asshole.NEUT Peter.MASC has me off-ripped

I do not see how all this data could be accounted for within \mathcal{L}_{CI} or Potts' (2007b) modified system. Instead, I take it as empirically well founded, that there are at least some expressions in natural language that take expressive content as their argument. The type system of \mathcal{L}_{CI} should therefore be extended to deal with these cases, too. Before this will be done in § 5, I will discuss another problem for \mathcal{L}_{CI} first.

4 Mixed expressives

Beside not defining complex types with an expressive argument type, Potts' logic \mathcal{L}_{CI} also lacks types for expressions that contribute to both dimensions of meaning. This is formulated by Potts' second empirical claim.

(26) **Claim (2)**

No lexical item contributes both an at-issue and a CI-meaning.

(Potts, 2005, 7)

This is a prohibition against what I call *mixed expressives*, following McCready (2010). Just as the prohibition states, mixed expressives are expressions that convey simultaneously descriptive and expressive meaning.

There is even more empirical evidence to find against this claim than for the prohibition against expressive modifiers. Even more so, some of the most prominent classes of expressives are expressions that come with both dimensions of meaning.

On the one hand, there are what could be called *colored expressives* after Frege (1892).⁴ A classical example is provided by Frege himself.

- (27) a. This **dog** howled the whole night.
b. This **cur** howled the whole night.

Utterances of both (27a) and (27b) are true in exactly the same situations, namely in those in which the dog in question howled the whole night. This shows that they have the same descriptive content. But obviously, they do not have the same overall meaning due to the difference between the neutral *dog* and the expressively laden *cur* which conveys a negative attitude of the speaker towards the dog, or dogs in general.

In principle, each expression that has a descriptive denotation but comes with an additional expressive evaluating denotation can be regarded as a mixed expressive. Just like the pair *cur/dog*, many mixed expressives come with a neutral only-descriptive alternative, which is equivalent to the descriptive dimension of the mixed expressive. For instance, consider the following mixed expressives in German and their composition into descriptive and expressive meaning.

- (28) a. *Köter* 'cur' \rightsquigarrow dog + expressing a negative attitude
b. *Bulle* 'cop' \rightsquigarrow policeman + expressing a negative attitude
c. *Tussi* 'bimbo' \rightsquigarrow girl + expressing a negative attitude

⁴For discussions of Frege's notion of *coloring* and how it relates to expressive content, cf. e.g. Horn (2008); Picardi (2006); Neale (1999, 2001); Dummett (1978).

A special case is provided by pronouns in languages like French or German that distinguish between familiar and formal uses of pronouns. For instance, the German pronoun *Sie* – formally the pronoun of the 3rd person plural, except for its capital – directly picks up c_A , that is, the addressee or addressees of the utterance context. Additionally, it expresses a formal relationship between the speaker and addressee. The formal *Sie* contrasts with the “real” second person pronoun *du* which expresses a familiar relationship in addition to referring to the addressee.

- (29) a. *Sie* ‘you’ $\rightsquigarrow c_A$ + expressing a formal relationship between c_S and c_A
 b. *du* ‘you’ $\rightsquigarrow c_A$ + expressing a familiar relationship between c_S and c_A

Such pronouns can be regarded as honorifics. And indeed, honorifics may be analyzed as expressive items as well. However, many honorifics, like the subject orientated honorifics in Japanese (Potts and Kawahara, 2004) are not mixed expressives, since they do not contribute anything to the descriptive content of a sentence.

Beside these kinds of expressions, there are many more cases of mixed expressives that can be found across different languages. For instance, Schwager and McCready (2009) treat German *voll* ‘totally’ as a mixed expressive, while McCready (2010) presents a lot of evidence for mixed expressives in Japanese.

Another class of mixed expressives that has a prominent place in the literature, are racist slurs. During the following discussion, I will stick to the following somewhat outdated swear words for Germans to provide evidence against Potts’ claim 2. However, the argument applies to the other classes of mixed expressives as well.

- (30) **Racist swear words**
 a. Lessing was a **Boche**. (Williamson, 2009, 146)
 b. Hitler was a **Kraut**. (Saka, 2007, 39)

Actually, racist slurs are a subclass of colored expressives, as they have a neutral descriptive meaning beside expressing a negative, derogatory attitude. With respect to truth conditions, (30a+b) are equivalent to the following neutral formulations in which the racist terminology is substituted by its neutral alternative, but express an additional racist attitude towards Germans.

- (31) a. Lessing was a German.
 b. Hitler was a German.

If the racist slur is substituted by a neutral term, the negative attitude is not expressed any longer. The meaning of *Boche* or *Kraut* can therefore be distributed over the two dimensions of meaning.

- (32) Lessing was a Boche.
 a. *Descriptive content:*
 Lessing was a German.
 b. *Expressive content:*
 The speaker has a negative attitude towards Germans.

That mixed expressives cannot be reduced to one or the other dimension of meaning is shown by the various facts about their behavior. First, as we have already seen,

pairs like *German* and *Boche* are truth-conditionally equivalent. Hence, it is hard to see how the negative attitude could be part of the descriptive meaning. A further argument against an one-dimensional descriptive analysis is provided by the fact that expressive meaning is mostly nondisplaceable.⁵ This is noted for instance by Cruse (1986).⁶

“Another characteristic distinguishing expressive meaning from propositional meaning is that it is valid only for the utterer, at the time and place of utterance. This limitation it shares with, for instance, a smile, a frown, a gesture of impatience [...]” (Cruse, 1986, 272)

For instance, the contribution of the past tense in *Lessing was a Boche* applies only to the descriptive component while the expressive component is not shifted to the past. A speaker who utters that sentence has still to be taken as being committed to the negative attitude at the utterance time even if the predication that Lessing is German is interpreted with respect to the past:

(33) Daniel was a Boche. #But today, I like Germans.

However, if the expressive part of a mixed expressive were encoded in the descriptive domain, it should be expected to be shifted to the past as well. The expressive component of mixed expressives shows similar behavior with regards to other truth-conditional operators. Take for instance their behavior in conditionals, as illustrated by the following example:

(34) If Lessing was a Boche, he was an American.

The negative attitudes towards Germans expressed *Boche* is not a proper part of the antecedent of the conditional. Even a speaker who does not bear any negative attitude towards Germans would judge (34) to be false. However, if the expressive attitude would part of the descriptive content, the antecedent would be false for such a speaker and therefore, the entire conditional should be true.

Another test that can be used to show that the expressive component is not part of the descriptive layer is denial in dialogue (cf. e.g. Jayez and Rossari, 2004).⁷ The descriptive content of a mixed expressive can be denied directly as in (35B).

(35) A: Lessing was a Boche.
B: No, he was not a German.

In contrast, denial is not felicitous if only the expressive component should be rejected.

(36) A: Lessing was a Boche.
B': #No, I don't approve this way of speaking.
B'': #No, I like Germans.

However, this should be possible if the negative attitude were active at the same dimension of meaning as the descriptive one. All these facts show that is highly implausible

⁵Exceptions are provided by some attitude predicates in special contexts. Cf. for instance, Harris and Potts (2009a,b).

⁶Also cited by Potts (2007b, 169).

⁷Thanks to Olivier Bonami for reminding me of this test.

to subsume the evaluative component conveyed by mixed expressives under the descriptive dimension.

To shift the descriptive part to the expressive dimension is also not a valid solution to protect Potts' claim 2 against the empirical evidence. If we tried to analyze an expression like *Boche* within \mathcal{L}_{CI} , it makes the wrong predictions, even if the predicate *German* is also plugged into the expressive dimension. Using \mathcal{L}_{CI} , *Boche* has to be translated into a predicate that maps descriptive arguments onto expressive propositions (the negative attitude), that is, as an expression of type $\langle e, \varepsilon \rangle$.



This derivation would predict that the meaning of *Lessing was a Boche* is an entity, which is of course not the case. On the other hand, if we changed the type for **boche** such that it could capture the descriptive meaning component, the expressive part would be lost. With the tools provided by \mathcal{L}_{CI} we thus can only get one dimension of a mixed expressive right. Of course, this is what is to be expected from a system that is built in such a way to implement the claim that there are no mixed expressives in the first place.

In face of the evidence presented in this section, I conclude that Potts' claim that there are no such expressions as mixed expressives is not valid.⁸

5 Extending the system

In this section I will extend the type system of \mathcal{L}_{CI} in order to accommodate mixed expressives as well as expressive modifiers. To allow for expressive modifiers, we need complex types that have an expressive type as their argument. However, I will stick to the prohibition against expressions that map from expressive to descriptive content. Therefore, in addition to the functional types from descriptive to expressive content that are already defined in \mathcal{L}_{CI} , we need a definition for types that have an expressive type both in its range and in its domain. Clause (38e) provides thus just such a definition. I call these types *pure* expressive types to distinguish them from the old ones, that are now called *hybrid* expressive types. I call the new logic \mathcal{L}_{CI+EM} .

- (38) **Types for \mathcal{L}_{CI+EM}**
- a. e and t are descriptive types.
 - b. ε is an expressive type.
 - c. If σ and τ are descriptive types, then $\langle \sigma, \tau \rangle$ is a descriptive type.
 - d. If σ is a descriptive type and τ is a (hybrid or pure) expressive type, then $\langle \sigma, \tau \rangle$ is a hybrid expressive type.

⁸That he makes this claim in the first place, is even more surprising as Potts (2007b) also discusses the German pronoun system and mentions ethnical swear words.

- e. If σ and τ are (hybrid or pure) expressive types, then $\langle \sigma, \tau \rangle$ is a pure expressive type.

Since this type definition is rather complex, it is useful to have a table that shows how the different types can be put together. In table 1, T and E stand for descriptive and pure expressive types respectively, whereas E' denotes hybrid expressive types.⁹

	T	E	E'
T	T	E'	E'
E		E	E
E'		E	E

Table 1: The type system of \mathcal{L}_{CI+EM}

The types in the leftmost column of table 1 give the domain of a complex type, while the types in the first row provide its range. If we have a complex type that has a descriptive type in both its domain and range, the result is a descriptive type (cf. the white cell in the upper left) like in \mathcal{L}_{CI} . If we have a complex type that has a descriptive type in its domain and a pure or hybrid expressive type in its range, the result is a hybrid expressive type (cf. the two light-gray cells). Note, that the construction of hybrid use-conditional types works only in one way: we can have $\langle T, E \rangle$ and $\langle T, E' \rangle$ but neither $\langle E, T \rangle$ nor $\langle E', T \rangle$ (cf. the two black cells). That is, there are functional types mapping descriptive content to hybrid or pure expressive content, but there is nothing mapping from expressive content (neither pure nor hybrid) to ordinary descriptive content. This is the same restriction as the one that Potts (2005) has build into his type system. In \mathcal{L}_{CI} , we find only functional types from descriptive to expressive types but not the other way round. As we have seen in § 3, \mathcal{L}_{CI} has no types with an expressive type in its domain. Accordingly, the type system of \mathcal{L}_{CI} looks like in the following table.

	T	E'
T	T	E'
E		
E'		

Table 2: The type system of \mathcal{L}_{CI}

Now that I have defined new types for expressive modifiers for \mathcal{L}_{CI+EM} , it must be defined how they combine with each other. The combination of descriptive types is plain functional application and hybrid expressive expressions apply to descriptive ones according to CI-application (9) just as in \mathcal{L}_{CI} . For the combination of two expressive types, I define a new tree-admissibility condition.

(39) **Pure expressive application**

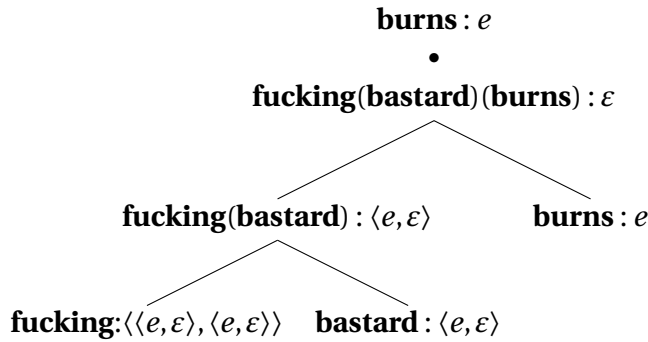
$$\begin{array}{c} \alpha(\beta) : \tau^\varepsilon \\ \swarrow \quad \searrow \\ \alpha : \langle \sigma^\varepsilon, \tau^\varepsilon \rangle \quad \beta : \tau^\varepsilon \end{array}$$

⁹Thanks to Hans-Martin Gärtner for the inspiration to present the type system of \mathcal{L}_{CI+EM} by means of such a table.

Obviously, this is just functional application restricted to expressive types. This rule allows that two expressives can combine with each other without one of them being isolated as would be the case with CI-application.

Equipped with these types and rules, we can provide an intuitive semantic structure as in (18) for expressive modifiers. In \mathcal{L}_{CI+EM} , an expressive modifiers like *fucking* can be treated as being of $\langle\langle e, \varepsilon \rangle, \langle e, \varepsilon \rangle\rangle$ taking the expressive *bastard* as its argument. The complex expressive **fucking(bastard)** : $\langle e, \varepsilon \rangle$ can then be applied to an entity type argument. Only then the entire expressive proposition is isolated by CI-application. The semantic parsetree for the DP *that fucking bastard Burns* may look like this.

(40) that fucking bastard Burns



The descriptive expression **burns** : e could take part in further derivation, for instance, being predicated over to yield a proposition.

To account for mixed expressives, I adopt a type definition from McCready (2010), who deals with different mixed expressives in Japanese. I slightly modify his type definition to better fit into the system already employed here. The new logic is called $\mathcal{L}_{CI+EM+ME}$ and its type definition is given by the following set of construction rules.

(41) **Types for $\mathcal{L}_{CI+EM+ME}$**

- a. e and t are descriptive types.
- b. ε is an expressive type.
- c. If σ and τ are descriptive types, then $\langle\sigma, \tau\rangle$ is a descriptive type.
- d. If σ is a descriptive type and τ is a (hybrid or pure) expressive type, then $\langle\sigma, \tau\rangle$ is a hybrid expressive type.
- e. If σ and τ are (hybrid or pure) expressive types, then $\langle\sigma, \tau\rangle$ is a pure expressive type.
- f. If σ and τ are descriptive type and v is a pure expressive type, then $\langle\sigma, \tau\rangle \diamond \langle\sigma, v\rangle$ is a mixed type.

A type for mixed expressive consists of two independent parts. First, we have a complex type that takes a descriptive type σ as its argument to yield a descriptive type. Secondly, we have a hybrid expressive type taking also the descriptive type σ as its argument and returns an expressive expression of type v . A mixed expressive therefore has two types in some sense, one for each dimension of meaning. It combines with one descriptive argument to convey meaning in both dimension. A corresponding tree-admissibility condition distributes one argument to both parts of a mixed expressive, isolates the expressive content, and passes the descriptive content up the tree.

(42) **Mixed application**

$$\begin{array}{c}
\alpha(\gamma) : \tau \\
\bullet \\
\beta(\gamma) : v \\
\swarrow \quad \searrow \\
\alpha : \langle \sigma, \tau \rangle \diamond \beta : \langle \sigma, v \rangle \quad \gamma : \sigma
\end{array}$$

Equipped with these rules and types, we can provide an adequate semantics for mixed expressives. All that is needed in addition to the new types and tree-admissibility condition, is a translation function for mixed expressives that maps them to appropriate descriptive and expressive components. For instance, *Boche* means *German* in the descriptive dimension, while expressing a negative attitude in the expressive dimension.

$$(43) \quad \textit{Boche} \rightsquigarrow \mathbf{german} : \langle e, t \rangle \diamond \mathbf{neg-att}(c_S) : \langle e, \varepsilon \rangle$$

Given this translation, we can provide the following semantic structure for the sentence *Lessing was a Boche* that I have already discussed in § 4.

$$(44) \quad \text{Lessing was a Boche.}$$

$$\begin{array}{c}
\mathbf{german}(\mathbf{lessing}) : t \\
\bullet \\
\mathbf{neg-att}(c_S)(\mathbf{lessing}) : \varepsilon \\
\swarrow \quad \searrow \\
\mathbf{german} : \langle e, t \rangle \diamond \mathbf{neg-att}(c_S) : \langle e, \varepsilon \rangle \quad \mathbf{lessing} : e
\end{array}$$

With the new types introduced in this section together with the corresponding tree-admissibility conditions, the new logic is able to deal with expressive modifiers and mixed expressives, while keeping intact the core ideas of \mathcal{L}_{CI} .

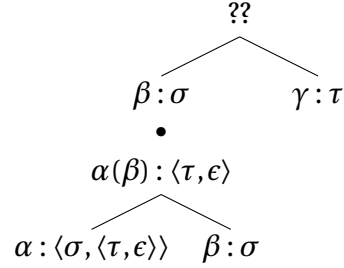
6 Conclusion

In this paper, I have challenged two strong claims that Potts (2005, 2007b) has made in his work on expressives and the logic of conventional implicatures. These claims come down to prohibitions against what I have dubbed expressive modifiers and mixed expressives. I have presented that, contrary to these prohibitions, examples of both kinds of expression can easily be attested in natural languages. To overcome the limitations directly implemented in \mathcal{L}_{CI} , I extended the type system of \mathcal{L}_{CI} and added new tree-admissibility conditions. The new logic $\mathcal{L}_{+CI+EM+ME}$ thereby built is able to assign a prima facie intuitive semantic to sentences involving expressive modifiers or mixed expressives.

Before I end this paper, let me mention a remaining problem for \mathcal{L}_{CI} that also holds for the variant developed here. Neither logic is able to deal with what could be called *two-place expressives*, that is, expressives that need two arguments in order to yield a expressive proposition. Note that such expressions are allowed in \mathcal{L}_{CI} and its extensions, since types like, for instance, $\langle e, \langle e, \varepsilon \rangle \rangle$ are defined by their respective type systems. However, even if they are well formed expressions, they cannot be computed

correctly. The general problem can be illustrated by the following scheme. Let α be a two-place expressive that needs an argument of type σ and one of type τ to yield an expressive proposition of type ϵ . Let β and γ be expressions of the appropriate argument types for α . The following parsetree illustrates why such an expression cannot be computed by \mathcal{L}_{CI} or $\mathcal{L}_{+CI+EM+ME}$.

(45)



The problem is that α is isolated from the parsetree according to expressive application as soon as it is combined with its first argument β , while β is returned unmodified. After that, there is now way to get the second argument γ into $\alpha(\beta)$, since γ has only access to β with which it cannot be combined.

For sake of illustration, let me assume that the German speech report verb *nörgeln* ‘to noodge’ is such two-place expressive, but a mixed one. Assuming that it is truth-conditionally equivalent to *to complain*, it can be used to convey expressively that the speaker regards that the reported subject is not justified with his complain or is too sensitive.

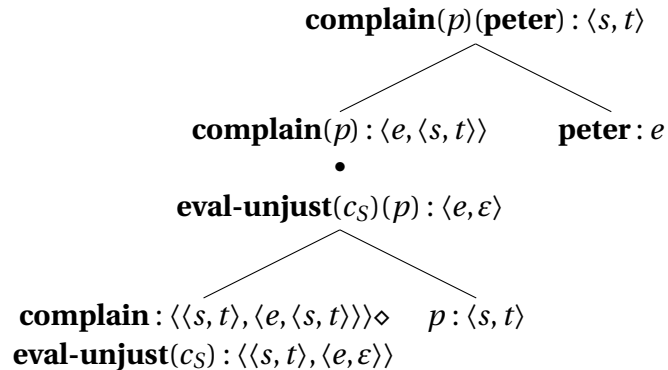
(46) *nörgeln* ‘to gouch’ \rightsquigarrow *to complain* + speaker evaluation of the complaint

Just as its neutral counterpart, *nörgeln* needs an entity-type subject argument and a propositional object to yield a speech report and, in addition, a expressive proposition. Therefore, *nörgeln* is a two-place mixed expressive.

(47) *nörgeln* \rightsquigarrow **complain** : $\langle \langle s, t \rangle, \langle e, \langle s, t \rangle \rangle \rangle \diamond$ **eval-unjust**(c_S) : $\langle \langle s, t \rangle, \langle e, \epsilon \rangle \rangle$

If this expression is combined with an proposition, both its descriptive as well as its expressive content are applied to the propositional argument. But even if the descriptive content can take part in a further derivational step, the expressive content is left behind and can never be applied to its subject argument.

(48)



Another example of a 2-place expressive is provided by Kubota and Uegaki (2010), who

develop a different solution to the problem of mixed expressives by using the continuation based semantics developed by Barker and Shan (2008) instead of a variant of \mathcal{L}_{CI} . They discuss the Japanese benefactive verb *morau* – actually a 3-place mixed expressive – which takes another verb as an argument as well as a dative object and a subject. Its dative object is identified as the logical subject of the embedded verb. A sentence with *morau* than expresses the descriptive proposition that the matrix subject is involved in the action expressed by the embedded verb. In addition, it conveys the CI that that action is in some way beneficial for the matrix subject.

- (49) Taroo-ga Hanako-ni piano-o hii-te **morat**-ta.
Taro-NOM Hanako-DAT piano-ACC play BENEf-PAST
 a. *Descriptive content:*
 “Taro had Hanako play the piano.”
 b. *Expressive content:*
 “Hanako’s playing the piano was for the benefit of Taro.”

The problem posed by *morau* for all variants of \mathcal{L}_{CI} presented here is the same as for *nörgeln*. As soon as *morau* is applied to its first argument (probably the embedded verb), it is isolated from the semantic parsetree and cannot be combined with its other arguments.

To account for such problems, no simple type definition would suffice as the problem goes back to the core of \mathcal{L}_{CI} , namely the idea that expressive items are removed from the parsetree after they have combined with their descriptive argument. In the end, a more extensive revision of \mathcal{L}_{CI} in the direction to logic employing complete, overall multidimensionality may be needed to accommodate such cases.

Even if the new logic \mathcal{L}_{CI} may not be considered as being satisfactory and suffers from some of the main problems of \mathcal{L}_{CI} .¹⁰ I think that it is a first improvement that helps Potts’ logic to cover a broader range of data correctly. At least, I hope to have shown that both expressive modifiers and mixed expressives should be taken seriously as an empirical phenomenon.

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¹⁰To mention just two of them, note that also the new logics predict that expressives have always widest scope. But this does not seem to be the case (cf., e.g. Anand, 2007; Amaral et al., 2007; Bonami and Godard, 2007). Furthermore, as already mentioned in footnote 1, the representational way in which the parsetrees are used in \mathcal{L}_{CI} raises worries about compositionality.

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Daniel Gutzmann
Universität Frankfurt
danielgutzmann@gmail.com

The Dimensions of Verum

Daniel Gutzmann & Elena Castroviejo Miró*

Abstract

In this paper we study the semantics of so-called *verum focus* from the point of view of a multi-dimensional semantic model. As coined by Höhle (1992), *verum focus* is non-contrastive focus on the verb or a complementizer located in C in German, and it is a way of realizing the corresponding operator VERUM. In the small amount of previous literature, VERUM has been treated as a pure semantic operator. In contrast, we show that those one-dimensional treatments make the wrong predictions about the truth-conditions of an utterance involving *verum focus* as well as about its discourse contribution. Equipped with a multidimensional semantic framework, we treat VERUM as an expressive function that operates in the use-conditional dimension. It takes as argument a proposition p and expresses the interpretational instruction to downdate the corresponding question $?p$ from the question under discussion. We show that this approach to VERUM can account for the distribution of *verum focus*, and its discourse contribution.

1 Introduction

This paper examines the semantics of the operator that has been dubbed VERUM by Höhle (1992), who carried out the first study of what he has called *verum focus*. *Verum focus* – which is supposed to realize a corresponding operator VERUM – is the non-contrastive focus on the verb or the complementizer, both located in C in German. According to Höhle (1992, 114), this VERUM operator somehow puts emphasis on the truth of the proposition it takes scopes over. For instance, in a dialog like (1) in which the current status of Carl's book project is brought under discussion by A's question, B can use focal stress on the auxiliary *hat* ('has') to realize VERUM and thereby highlight the truth of the proposition that Carl has finished his book.

- (1) A: I wonder whether Carl has finished his book.
B: Karl HAT sein Buch beendet.
 Carl has.VF his book finished
 "Carl HAS finished his book"

*We would like to thank the audience of the Colloque de Syntaxe et Sémantique à Paris 2009, as well as the audience of the GK-Kolloquium at the Universität Frankfurt and of the colloquium at the Universität Potsdam for their contribution to the improvement of this paper, and an anonymous reviewer for his/her remarks. We ARE responsible for any remaining mistakes.

The working paraphrase that Höhle (1992, 112) uses as the meaning of the *verum* operator in his paper is simply that of a matrix sentence that states that the embedded proposition is true:

- (2) $\llbracket \text{VERUM}(p) \rrbracket \approx \text{“It is the case/true that } p\text{”}$

VERUM is not restricted to German. Cross-linguistically, it can be realized in many different ways. As we have seen, *VERUM* is realized by *verum focus* (henceforth *VF*) in German. In contrast, both in English and in Spanish, we find special kinds of lexical insertions to instantiate the *verum* operator.¹

- (3) A: I wonder whether Carl has finished his book.
 B1: Karl **HAT** sein Buch beendet. (German \Rightarrow *VF* in C)
 B2: Carl **did** finish his book. (English \Rightarrow *do* insertion)
 B3: Carlos **sí** acabó su libro. (Spanish \Rightarrow *sí* insertion)

Our main goals in this paper are the following: First, we want to elaborate on this description of the contribution of *VERUM*. Second, we will show how many of the special features of the linguistic means that instantiate *VERUM* as well as the discourse conditions that license their presence can be derived from our semantics of *VERUM*. These aims raise a set of subquestions we address in the course of this paper. (a) What is the general semantics of *VERUM*? (b) How does *VERUM* interact with different sentence types and what is the compositional semantics for this interaction? (c) How can the discourse conditions that license *VERUM* be accounted for?

Our claims are that (i) *VERUM* is a multidimensional operator that takes truth-conditional content as input and returns use-conditional content as output. (ii) It is not a force operator; in fact, it has narrow scope with respect to any force operators. (iii) It takes as input a proposition *p* and conveys that ?*p* should be downdated from the Question Under Discussion.

This paper is organized as follows: We first present the properties of *VF*. We show in what way it differs from other kinds of focus and highlight its idiosyncratic distribution. Section 3 is devoted to the analysis of the previous accounts to *VERUM*. Section 4 spells out our multidimensional analysis, while section 5 elaborates the analysis by integrating the discourse semantics of *VERUM*. The paper concludes with a section on the remaining issues that need to be addressed in future research.

¹Lenoetti and Escandell-Vidal (2009) analyze examples like (i) and (ii), which involve fronting in Spanish, in terms of *VF*. An exhaustive cross-linguistic study of the realization of *VERUM* is out of the scope of this article. We thus remain silent about the compatibility of our proposal with the phenomenon illustrated in (i) and (ii).

(i) Algo debe saber.
 something must.PRS.3SG know
 “S/he must know something”

(ii) Lo mismo digo (yo)
 the same say.PRS.1SG (I)
 “I say the same”

2 Verum focus in German

In his 1992 paper, Höhle carried out the first detailed investigation of a special kind of focal stress in German that seems to somehow emphasize the truth of the proposition expressed by the sentence. Because of this truth-related function, Höhle (1992, 114) coined the term *verum focus* for this kind of focus and proposed that it is connected with the presence of the verum operator VERUM, which is located in the syntactic C position in German (Höhle, 1992, 130).

In the following discussion, we will establish some properties of VF. First, as we will show in §2.2, it is neither the meaning of the stressed expression nor its form that matters for licensing VF but the meaning of the entire proposition, since it is always the syntactic C position that carries VF, regardless of what expression fills that position. Secondly, VF has no influence on the truth-conditions of the sentence in which it occurs. Furthermore, VF can occur across a wide range of sentence types. These properties will then provide the basis for the semantic analysis of the verum operator that we will carry out in the later parts of this paper.

2.1 What is and what is not verum focus

Stress on phrases has a variety of interpretations. German has at least the following types:

(4) **Information Focus:**

- A: What did Carl write?
B: Carl wrote a BOOK.

(5) **Contrastive Focus:**

- A: Did Carl finished his paper?
B: He finished his BOOK.

(6) **Exclamative Focus:**

How TALL Bill is!

Höhle (1992) shows in his paper that VF cannot be reduced to any of the other kinds of focus and therefore constitutes a genuine object of study. That VF has nothing to do with exclamative focus is obvious from their difference in meaning and position. In the following subsection, we will try to show that VF cannot be reduced to neither information nor contrastive focus.

2.2 Verum applies to the proposition

Beside its special semantics, VF has many particular properties that make it a very interesting phenomenon. The most prominent feature is what gets stressed by VF. In contrast to all the other kinds of focus, the meaning of the stressed element does not matter in the case of VF. Instead, it is rather the position that determines the expression that receives VF. Take for instance the following dialog in which A raises the question of Carl writing a screenplay (Höhle, 1992, 112). In her answer, B can put VF on the finite verb *schreibt* (writes) to emphasize that Carl is indeed writing a screenplay.

- (7) A: Hanna claims that Carl is writing a screenplay.
 B: Karl SCHREIBT ein Drehbuch.
Carl writes.VF a screenplay
 “Carl IS writing a screenplay.”

That it is not the meaning of *schreibt* that is focused by VF can be seen if the topic of the discussion is set into perfect tense. In German, perfect tense is expressed by a finite form of an auxiliary – either *haben* (to have) or *sein* (to be) – and the past participle of the predicate. Since the auxiliary is finite, it has to undergo head movement and ends up in C in the case of a declarative, while the participle remains at the right edge of the sentence (presumably inside the VP). Crucially, in such a case, it is the auxiliary that carries VF, and not the participle, which bears the lexical content of the complex predicate.

- (8) A: Hanna claims that Carl has written a screenplay.
 B: Karl HAT ein Drehbuch geschrieben.
Carl has.VF a screenplay written
 “Carl HAS written a screenplay.”

Except for the tense of the discussed proposition, the dialogs in (7) and (8) are the same. In both scenarios, A (implicitly) raises the question of whether *p*, and B positively answers *p* and uses VF to emphasize the truth of *p*. However, in (7) it is *schreibt* (writes) that is stressed, while in (8), the auxiliary *hat* (has) receives VF. This indicates that it is not the meaning of the stressed expression that gets highlighted by VF. This represents a sharp contrast to other kinds of semantic focus, where it is clearly the content of the stressed expression that gets focused. Take for instance information focus. If we change tense (cf. (9)) such that we shift from a simple predicate to a complex one, it is still the content-carrying participle that has to be stressed, not the auxiliary.

- (9) A: What did Carl do to the book?
 B: He BURNED it.
- (10) A: What will Carl do to the book?
 B: He will BURN it.
 B': #He WILL burn it.
- (11) A: What is Carl doing to the book?
 B: He is BURNING it.
 B': #He IS burning it.

Höhle (1992) brings up particle verbs and idioms as further evidence for the fact that it is not the meaning of the stressed expression that is focused. In particle verbs like *aufhören* (to stop), it is the particle that carries stress if the semantic content of the entire verb should be stressed. This can be seen for instance in the case of contrastive focus.

- (12) A: I am afraid that Peter will keep on smoking forever.
 B: Nein, er hört damit AUF.
no he stops with it PART.CF
 “No, he is going to STOP it.”

In contrast to this stress pattern, it is the finite part of the particle verb (*hört*) that receives main stress if VF is used.

- (13) A: Will Peter stop smoking?
 B: Peter HÖRT mit dem Rauchen auf.
Peter stops.VF with the smoking PART
 “Peter WILL stop smoking.”

Similar considerations apply to idioms. If you want to emphasize the meaning of the idiomatic verb phrase *jemanden den Garaus machen* (to kill, lit. “to cook someone’s goose”), the idiomatic object *Garaus* inside the VP carries the focal stress as shown by the following example of information focus.

- (14) a. What will she do to him?
 B: Sie macht ihm den GARAUS
she makes him the “Garaus”
 “She will cook his GOOSE.”

Again, if VF is used in such a sentence, it is the expression that resides in C, regardless of what that expression means or whether it is full predicate like in (15) or an auxiliary as in (16):

- (15) A: I cannot imagine that she will kill him.
 B: Sie MACHT ihm den Garaus.
she makes him the “Garaus”
 “She WILL cook his goose.”
- (16) A: I cannot imagine that she had killed him.
 B: Sie HAT ihm den Garaus gemacht.
she has him the “Garaus” made
 “She HAD cooked his goose.”

Another case that clearly distinguishes VF from other semantic kinds of focus is that of so-called *C-verum focus* (Höhle, 1992). In all the examples we have discussed so far, VF is on the *finite verb* residing in C. These are instances of what Höhle calls *F-verum focus*. In contrast to this, it is not the finite verb that is stressed in the case of C-verum focus, but the *complementizer* which is also located in C.

- (17) A: Peter talks as if he were a philosopher.
 B: Ich denke, DASS er ein Philosoph ist.
I think that he a philosopher is
 “I think that he IS a philosopher.”

The same distinction between VF on the one hand and the content-related kinds of focus on the other holds in the cases of embeddings, too. New information inside an embedded proposition can be highlighted by information focus in the same way as in matrix contexts.

- (18) A: What do you think about Peter?

- B: Ich denke, dass er ein PHILOSOPH ist.
I think that he a philosopher is
 “I think that he is a PHILOSOPHER.”

Like in the other cases of content related focus, it is the word that contributes the content to be highlighted that gets assigned main stress, namely the meaningful part of the the complex predicate *ein Philosoph sein* (to be a philosopher).

Crucially, a complementizer like *dass* (that) is often said to contribute no semantic meaning at all (cf. e.g. Truckenbrodt, 2006, 396). Hence, in case of embedded VF, the distinction between VF and information focus is even sharper, as it is far from clear what content could be emphasized by stressing the complementizer.²

All these examples show that it is always the expression in C that carries VF, regardless of the meaning of the stressed expression. Therefore, Höhle (1992) concludes that VF is not related to the meaning of the expression by which it is carried. Instead, it correlates with the presence of a semantic operator VERUM that is located in the C position. This operator in turn takes the entire proposition expressed by the sentence as its argument.

2.3 No effect on truth-conditions

Information or contrastive focus at least can have an effect on truth conditions. This is especially obvious in the presence of focus sensitive particles like *only*. Information focus is commonly analyzed as eliciting a set of contextually given alternatives to the focused constituent (e.g. Rooth, 1992). Focus-sensitive particles are then said to operate on this layer of alternative meaning. For instance, *only* states that for all alternatives to the focused expression, if an alternative is true, it is identical to the focused expression (cf. e.g. Beaver and Clark, 2008).³

- (19) Peter only KICKS the dog.
 ~→ “Peter kicked the dog and for all alternative activities he could do to the dog: if Peter does an alternative, it is kicking the dog.”
- (20) Peter only kicks the DOG.
 ~→ “Peter kicked the dog and for all alternative targets of his kicking: if Peter kicked an alternative object, it is the dog.”

Obviously, (19) and (20) have different truth-conditions. (19) is true if Peter does not do anything else to the dog besides kicking the poor animal (even if he kicks other animals as well). (20) requires that Peter does not kick any other animal, even if this is compatible with him doing something different to the dog in addition. Hence, different positions of the information focus lead to different truth-conditions. However, this is only the case if there are focus-sensitive expressions present. But even if there are no

²Of course, you can focus *dass* (that) to contrast it with another complementizer like *ob* (whether). Needless to say, you can stress *dass* if it is the target of a metalinguistic negation (Geurts, 1998; Horn, 1989).

³We simply included the prejacent that Peter kicked the dog into the paraphrase. This, however, is only for convenience since we do not want to delve into the discussion of whether it is entailed, asserted, implied, or presupposed. For discussion, cf. amongst many others Horn (1996); Beaver and Clark (2008).

such expressions, information focus on different expressions leads to a difference in the overall meaning of a sentence insofar as a different set of alternatives is evoked.

This, again, contrasts with VF, which has neither influence on truth-conditions nor does VF on a different expression lead to differences in other dimensions of meaning. However, minimal pairs of sentences that differ only with respect to which expression carries VF are hard to find, since VF is always located at the C position, as we have seen in the last subsection. An almost minimal pair can be construed if we compare a pair of sentences in the past perfect and the simple past, since the meaning of these tenses do not differ substantially in German and we end up with different expressions in C.

- (21) A: Back in the days, Peter always talked as if he had been a philosopher.
 B: Er IST ein Philosoph gewesen.
he is.VF a philosopher been
 “Peter WAS a philosopher.”
- (22) A: Back in the days, Peter always talked as if he had been a philosopher.
 B: Er WAR ein Philosoph.
he is.VF a philosopher been
 “Peter WAS a philosopher.”

Crucially, there is no situation in which (21) is true while (22) is not, or *vice versa*. This is so, because VF does not have any influence on the truth-conditions of either sentence in the first place, and therefore, different positions cannot cause any differences, given that both sentences without VF have the same truth-conditions, to begin with. This can be seen by comparing a sentence with VF to the same sentence without VF.

- (23) a. Peter hat den Hund getreten.
 “Peter kicked the dog.”
 b. Peter HAT den Hund getreten.
 “Peter did kick the dog.”

(23a) and (23b) are true in exactly the same situations, namely in those in which Peter kicked the dog. The presence of VF does not make any difference in this respect. Of course, VF does have meaning, but it has nothing to do with truth-conditions. As we will see in § 5, VERUM raises specific requirements on the discourse context in which VF is used. However, even if the licensing conditions do not apply, using VF nevertheless can never render an otherwise true sentence false, but it can make an utterance infelicitous. In this respect, we can think of the meaning of VERUM and VF as being *use-conditional* (Recanati, 2004, 447) instead of being truth-conditional. This idea will provide the basis for our multidimensional analysis in § 4.

2.4 Verum focus in non-declarative sentence types

To conclude our short overview of the empirical facts about VF in German, let us illustrate the fact that VF can occur in many sentence types other than assertions. We will restrict ourselves to three further sentence types.⁴ First of all, VF can also be used in *yes/no*-questions (“*yn*-questions” henceforth).

⁴Note that for instance, F-verum focus is also possible in finite V2-optatives and V1-conditionals.

(24) **F-verum focus in *yn*-questions** (Höhle, 1992, 112)

A: I have heard that Carl kicked the dog.

B: HAT er den Hund denn getreten?
has he the dog MP kicked?
“HAS he kicked the dog?”

This is important since *yn*-questions, especially negative ones, are what Romero and Han (2004) deal with when they develop a formal semantics for VERUM. In addition to that, VF is also possible in *wh*-interrogatives:

(25) **F-verum focus in *wh*-questions** (Höhle, 1992, 112)

A: I haven't kicked the dog.

B: Wer HAT den Hund denn getreten?
who has.VF the dog MP kicked
“Who HAS kicked the dog?”

Besides declarative and interrogative sentence types, VF is also allowed to occur in imperative sentences. This is interesting, because while assertions and questions deal with the knowledge of the discourse participants, this is not so obvious for imperatives.

(26) **F-verum focus in imperatives** (Höhle, 1992, 119)

A: [hesitating to sit down]

B: NIMM dir endlich den Stuhl!
take.IMP.VF you finally the chair
“Do take the chair!”

Beside these cases of VERUM being realized in matrix contexts, it can also be located inside embedded sentences. Subordinated clauses introduced by the complementizer *dass* (*that*) can also carry VF. As we have seen, VF is then assigned to the complementizer itself, which also resides in C.

(27) **C-verum in embedded *dass*-clauses**

A: David smells like a zombie.

B: Ich denke, DASS er ein zombie ist.
I think that he a zombie is
“I think that he is (indeed) a zombie.”

The complementizer *dass* is a [–*wh*]-marked expression like its English counterpart *that*. In contrast, the complementizer *ob* (*whether*) is [+*wh*]-marked, so it yields embedded questions. Still it can carry focal stress to realize VERUM.

(28) **C-verum in embedded *ob*-clauses**

A: David smells like a zombie.

B: Ich frage mich, OB er ein zombie ist.
I ask myself whether he a zombie is
“I ask myself whether he is (indeed) a zombie.”

Verum focus thus seems to be pretty much independent of the kind of sentence in which it occurs, which suggests that it does not depend on the presence of a particu-

lar kind of sentence mood operator licensing it. However, we will see that there is an interaction between such operators and VERUM, which is what is responsible for the different discourse contributions VF seems to make in different sentence types.

3 Previous approaches to VERUM

In this section, we will discuss two previous approaches to the semantics of VERUM: the first sketch by Höhle (1992) and the more elaborated account by Romero and Han (2004). By pointing out the virtues and problems of the previous literature, we lay out the grounds for our own suggestion in section § 4.

3.1 A first approach to verum focus

Höhle (1992) describes the meaning of VERUM as an emphasis on the truth of the propositional content of the sentence. For different sentence types, he provides the following paraphrases:

- (29) **Paraphrases for VERUM** (cf. Höhle, 1992)
- a. David **IST** ein zombie.
 \rightsquigarrow **It is true**, that David is a zombie.
 - b. **IST** David ein zombie?
 \rightsquigarrow **Is it true** that David is a zombie?
 - c. **NIMM** den Stuhl!
 \rightsquigarrow **Make it true** that you take the chair!

In each case, VERUM refers to the truth of propositions it scopes over. Given these paraphrases, the semantics for VERUM could be formulated as follows:

- (30) $\llbracket \text{VERUM}(p) \rrbracket \approx \text{“It is the case/true that } p\text{”}$

The differences in the paraphrases in (29) can then be traced back to the different sentence mood operators that take scope over VERUM.

This approach to the semantics of VERUM is however not adequate because, we will see, it is far too simple to capture its complex semantics. Höhle (1992, 118), whose aim was not to account for the semantics of VERUM, thinks that the main problem of his paraphrase is that there is not a crucial semantic difference between asserting p and asserting *it is true that* p . Therefore, this approach cannot make real predictions about the conditions under which the presence of VERUM– and therefore VF– are licensed, since asserting *It is true that* p will be felicitous in almost the same contexts as asserting p .

3.2 VERUM as a conversational operator

Romero and Han (2004) (“R&H ” henceforth) present a more sophisticated account for VERUM. They argue that VERUM can also be realized by certain morphemes (e.g. *really*) or by word order variation like negation preposing in English. They concentrate on the role of VERUM in negated *yn*-questions.

(31) **VERUM expressed by negation preposing**

- a. Does John not drink?
Neutral yn-question
- b. Doesn't John drink?
Positive epistemic implicature: The speaker believes or at least expects that John drinks.

(32) **VERUM expressed by *really***

- a. Does John drink?
No epistemic implicature necessary
- b. Does John really drink?
Negative epistemic implicature: The speaker believed or at least expected that John does not drink.

R&H provide a formal definition of VERUM as a *conversational epistemic operator* that is “used not to assert that the speaker is entirely certain about the truth of p , but to assert that the speaker is certain that p should be added to the Common Ground (CG).” (Romero and Han, 2004, 627).

$$(33) \quad \llbracket \text{VERUM}_i \rrbracket^{g^x/i} = \lambda p_{\langle s,t \rangle} \lambda w. \forall w' \in \text{Epi}_x(w) [\forall w'' \in \text{Conv}_x(w') [p \in \text{CG}_{w''}]] \\ = \text{FOR-SURE-CG}_x \\ \rightsquigarrow \text{“I am sure that we should add the proposition } p \text{ to the common ground.”}$$

This operator takes the propositional content of an utterance as its argument. In the case of a declarative we then end up with a new proposition, e.g. that the speaker is sure that the propositional argument of VERUM should be added to the common ground.

(34) **VERUM in declaratives**

Peter does write a book. $\rightsquigarrow \text{VERUM}(p)$
 \rightsquigarrow “I am sure that we should add the proposition that Peter writes a book to the common ground.”

In *yn*-questions in which negation preposing introduces VERUM, there is also the question morpheme “?” which takes scope over the entire verum-proposition to yield a set of propositions as the denotation of the entire interrogative.

(35) **VERUM in *yn*-questions**

Doesn't Peter write a book? $\rightsquigarrow ?(\text{VERUM}(p))$
 $= \{ \text{“I am sure that we should add the proposition that Peter writes a book to the common ground.”}, \text{“I am not sure that we should add the proposition that Peter writes a book to the common ground.”} \}$

We believe that this approach is a big step towards a better understanding of VERUM. Especially, linking VERUM to the discourse structure by including a notion like the CG seems correct. And thanks to the fact that Romero and Han's approach is elaborated, it can be tested against data to check its plausibility. In the next subsection we address some problems which an approach along the lines of (33) faces.

3.3 Problems

Romero and Han's (2004) one-dimensional approach predicts that what is denoted by a verum-declarative is the proposition that $\text{VERUM}(p)$, while the meaning of a polar verum-interrogative is the set containing $\text{VERUM}(p)$ and $\neg\text{VERUM}(p)$. Moving from denotations to the discourse layer, this predicts – provided that no further stipulations be made – that what is asserted by a verum-declarative is that $\text{VERUM}(p)$ and what is asked by a polar verum-interrogative is whether $\text{VERUM}(p)$.

This, however, does not seem to be the case. If we deny the verum-assertion that p , we only deny p , just as if we deny the plain assertion that p . Hence, the denials in (36B) and (37B) below both negate the ordinary truth-conditional content of the previous utterance regardless of the presence of VF. That is, they both reject the proposition that Carl writes a book.

(36) **Denial of the assertion that p**

A: Karl schreibt ein Buch.
“Carl is writing a book.”

B: No, that's not true. (Carl is not writing a book)

(37) **Denial of the verum-assertion that p**

A: Karl SCHREIBT ein Buch.
“Carl IS writing a book.”

B: No, that's not true. (Carl is not writing a book)

Furthermore, it is infelicitous to deny the entire proposition $\text{VERUM}(p)$ if we tried to make it explicit.

(38) A: Karl SCHREIBT ein Buch.
“Carl IS writing a book.”

B: No, that's not true. #You are not sure that he is writing a book.

Note that the infelicity of trying to deny the content of VERUM does not stem from the paraphrase R&H have provided. Any other paraphrase would lead to an infelicitous utterance.⁵

The fact that we can deny the a propositional subpart p of $\text{VERUM}(p)$ in (37) is not a problem for R&H, since it is also possible in the case of other embedded propositions. Take for instance propositions embedded under attitude predicates:

(39) **Inner and outer denial**

A: I believe that John is rich enough to buy a house.

B1: No, that's not true. He can't afford it.

⇒ Denial of the embedded proposition that John is rich enough to buy a house.

B2: No, that's not true. I know that you don't believe that.

⇒ Denial of the outmost proposition that A believes that John is rich enough to buy a house.

⁵Maybe except for a simple one along the lines of (30) that gives a paraphrase like “It is true” to VERUM , since *No that's not true. It is not true that he is writing a book* is felicitous.

In contrast, in the case of VERUM, we can never deny the entire proposition VERUM(*p*).

(40) **No outer denial in the case of VERUM**

A: Karl SCHREIBT ein Buch.

B1: No, that's not true. He writes a personal diary.

⇒ Denial of the inner proposition that Karl writes a book.

B2:#No, that's not true. You are not sure about that.

#⇒ Denial of VERUM (*p*).

The impossibility to deny the proposition that VERUM(*p*) is a major problem for R&H's approach, as it does not follow from their account that it should be impossible to deny the verum-proposition. On the contrary, since VERUM is part of the semantic objects denoted by verum-utterances, their approach predicts that it should be straightforward to deny it just as it is for other semantic operators like, e.g. modals or, as we have seen in (39), propositional attitude predicates.

A parallel problem for R&H's approach applies to VERUM in interrogatives. Recall that, according to their account, what is denoted by a verum-*yn*-question like *Doesn't Peter write a book?* is the set of possible answers to that question, i.e., the set consisting of VERUM(*p*) and ¬VERUM(*p*). Accordingly, what is asked by a verum-*yn*-question is whether VERUM(*p*), that is, whether the addressee is sure that it should be added to the common ground that Peter writes a book. Therefore, an answer to the verum-interrogative should be about VERUM(*p*), too. But contrary to these predictions, in spite of the presence of the verum operator, a verum-interrogative is nevertheless a question about the propositional content *p* instead of VERUM(*p*), and an answer to such a question still concerns *p*.

- (41) A: Isn't Carl writing a book?
 B: No, he is not writing a book.
 B': #No, I am not sure.

That R&H's approach makes the wrong predictions regarding the way verum-questions work in dialog, is also shown by the fact that it predicts different truth or sincerity conditions for answers to verum-questions. This can be illustrated by setting up a context in which being sure that a certain proposition should become common ground can be true while the proposition itself is not.

- (42) CONTEXT: A wants to know whether Lisa was at the party, and B knows that Lisa was at the party. However, B has a special interest in making A believe that Lisa was not at the party.
 A: WAR Lisa auf der Party?
 "WAS Lisa at the party?"
 B: No.
 B': #No, I am not sure whether Lisa was at the party.

According to R&H's proposal, however, B's answer in (42B) would count as sincere as she is sure that the proposition that Lisa was not at the party should be added to the common ground. However, it is obvious that B is lying and not saying the truth because A used VF in her question. Nevertheless, B's denial in (42B) does not even have the

predicted interpretation, since it must be interpreted as negating that Lisa was at the party. This is also shown by the fact that you cannot give an explicit answer to the entire verum-question while using *no* at the same time. Of course, B can felicitously express uncertainty, but this has nothing to do with the presence of VF as this is also possible in plain questions, and is only possible if she does not use a negating element like *no* simultaneously.

- (43) A: WAR Lisa auf der Party?
 "WAS Lisa at the party?"
 B: (#No,) I am not sure whether Lisa was at the party.
- (44) A: War Lisa auf der Party?
 "Was Lisa at the party?"
 B: (#No,) I am not sure whether Lisa was at the party.

That R&H's proposal does not get the discourse behavior of verum-questions right is already noted by Romero (2005, 358f.) herself, who in turn attributes this observation to Lance Nathan. Drawing parallels to expressive items and referring to work by Potts (2002) and Kratzer (1999), Romero suggests that "the answer pattern can be explained if we assume that *really*/VERUM behaves like an expressive item in *yes*- and *no*-answers." (Romero, 2005, 360.) This is, except for some slight modifications, what we will formalize in the next section. Note that Romero (2005) only seems to be willing to allow VERUM to behave like an expressive item in questions and answers. However, as we have shown in (37)–(40), VERUM is not part of the truth-conditional content in an assertion, either. Therefore, we will treat VERUM in general as an expressive or, as we prefer to call it, a *use-conditional item*.

4 A multidimensional analysis of VERUM

By examining the behavior of VF and pointing out the main problems of R&H's approach to the semantics of the verum operator, we have arrived at the thesis that VERUM is best treated as a use-conditional expression that does not have any influence on the truth-conditional content of the utterance it occurs in. For sure, VERUM still expresses conventional semantic content. Its meaning is rather fixed and not up to the diversity that characterizes pragmatic meaning like conversational implicatures. In the following, we will develop a semantic apparatus to give a compositional semantics for VERUM.

4.1 Theoretical claims

As we have already said, we side with Romero (2005) and claim that VERUM is a use-conditional expression. To formalize this idea, we make use of the multidimensional semantics developed in Gutzmann (2008, 2009). These basically constitute modifications and extensions of the influential research carried out by Potts (2005) on the logic of conventional implicatures (LCI). The first major difference between these two semantics is that the additional dimension of meaning is reinterpreted as being use-conditional (with use-values being the denotation of propositional content at this di-

mension), while in Potts' system, the second dimension, though being separated, still receives a truth-conditional interpretation.

The second distinction between LCI and the semantics from Gutzmann (2008) can be found in the type system as laid out in the next subsection. In contrast to LCI, our system allows for expressions that map use-conditional content to use-conditional content. This allows for more interaction between different use-conditional items like e.g. modal particles and sentence mood operators.

Within this multidimensional semantic framework, we analyze *VERUM* as an operator that takes ordinary truth-conditional content as input and yields a use-conditional proposition as output. The argument of *VERUM* is a proposition p corresponding to the truth-conditional propositional content of the sentence in which *VERUM* occurs. The returned use-conditional proposition expresses use-conditions on the utterance of the sentence, leading to infelicity of that utterance if not fulfilled but never being able to render an otherwise true utterance false.

4.2 Use-conditional proposal

The type system of the formal semantics we employ to analyze *VERUM* is given by the following recursive rules:

(45) Use-conditional types

- a. e, t, s and u are basic types.
- b. e and t are truth-conditional types.
- c. u is a use-conditional type.
- d. s is a world type.
- e. If σ and τ are truth-conditional types, then $\langle \sigma, \tau \rangle$ and $\langle s, \tau \rangle$ are truth-conditional types.
- f. If σ is a truth-conditional type and τ is a hybrid or pure use-conditional type, then $\langle \sigma, \tau \rangle$ and $\langle s, \tau \rangle$ are hybrid use-conditional types.
- g. If σ and τ are hybrid or pure use-conditional types, then $\langle \sigma, \tau \rangle, \langle s, \tau \rangle$ are pure use-conditional types.
- h. The set of types is the union of the basic, truth-conditional and all use-conditional types.

We analyze *VERUM* as a hybrid use-conditional function from a truth-conditional propositional argument to propositional use-conditional content.⁶

$$(46) \quad \text{VF} \rightsquigarrow \lambda p_{\langle s, t \rangle}. \text{VERUM}(p) : \langle \langle s, t \rangle, u \rangle$$

The use-conditional proposition should be independent from the ordinary truth-conditional content.

(47) The T-C TIER and the U-C TIER

- a. Karl SCHREIBT ein Buch.
- b. T-C TIER: **write(book)(carl)** : $\langle s, t \rangle$

⁶To avoid world-type overload, we omit the s from all use-conditional types, keeping in mind that u is supposed to stand for propositional use-conditional content and not just use-values.

c. U-C TIER: VERUM(**write(book)(carl)**) : u

This is achieved by the special hybrid use-conditional application which mirrors Potts' (2005) CI-application. The superscribed "U" indicates that the type must be a (hybrid or pure) use-conditional type.

(48) **Hybrid use-conditional application**

$$\begin{array}{c} \beta : \sigma \\ \bullet \\ \alpha(\beta) : \tau^U \\ \swarrow \quad \searrow \\ \alpha : \langle \sigma, \tau^U \rangle \quad \beta : \sigma \end{array}$$

The rule (48) for hybrid use-conditional application ensures that use-conditional content is isolated from the semantic parsetree after it has been applied to its argument, which in turn is passed up the tree unmodified as if there were no use-conditional content at all. Hence, the semantic parsetree for a verum-declarative looks like the this:

(49) Karl SCHREIBT ein Buch

$$\begin{array}{c} \mathbf{write(book)(carl)} : \langle s, t \rangle \\ \bullet \\ \text{VERUM}(\mathbf{write(book)(carl)}) : u \\ \swarrow \quad \searrow \\ \lambda p. \text{VERUM} : \langle \langle s, t \rangle, u \rangle \quad \mathbf{write(book)(carl)} : \langle s, t \rangle \end{array}$$

The outcome of the semantic derivation in (49) is the truth-conditional proposition that Carl is writing a book. However, we still need a way to interpret the use-conditional content $\text{VERUM}(\mathbf{write(book)(carl)}) : u$, that has been isolated by the rule of hybrid use-conditional application. Like Potts (2005), we interpret the entire parsetree in order to achieve this. We do not repeat the formal definition here, as the basic idea is very simple. We split the interpretation of a sentence into two dimensions. The first dimension, corresponds to the descriptive, truth-conditional content of the sentence. Let us call it $TC(S)$. The second dimension hosts the expressive, use-conditional content of the sentence, called $UC(S)$. As usual, we identify the truth-conditional content of a sentence with the root node of the semantic parsetree for that sentence. We get the use-conditional content of a sentence by collecting all the use-conditional expressions that have been isolated during the derivation. The entire interpretation of a sentence is then given by the tuple consisting of the interpretation of its truth-conditional content and the interpretation of its use-conditional content. Schematically, this can be formulated as follows:

(50) $\llbracket S \rrbracket = \langle \llbracket TC(S) \rrbracket, \llbracket UC(S) \rrbracket \rangle$

For our example (49), we thus end up with the tuple consisting of the proposition that Carl is writing a book in the truth-conditional dimension, and the interpretation of the use-conditional expression $\text{VERUM}(\mathbf{write(book)(carl)}) : u$ in the second dimension.

(51) $\llbracket (49) \rrbracket = \langle \llbracket \mathbf{write(book)(carl)} \rrbracket, \llbracket \text{VERUM}(\mathbf{write(book)(carl)}) \rrbracket \rangle$

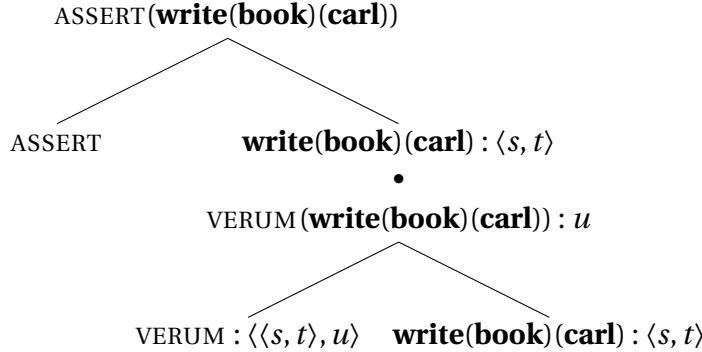
Regarding the semantics, use-conditional propositions denote use-conditions. This is achieved by adding a new denotation domain for the basic type u to the common model-theoretic definitions.

(52) The domain of expression of type u is $D_u = \{\checkmark, \nmid\}$, the set of use-values.⁷

Since **VERUM** denotes an semantic object of type u when applied to its propositional argument, this captures directly that **VERUM** poses use-conditions on an utterance instead of affecting the truth-conditions of the corresponding proposition.

Because our approach is multidimensional and distinguishes the use-conditional content from the truth-conditional one, it can straightforwardly solve the problems for R&H's approach we raised in the last section. Let us first address assertions. Assuming a sentence mood operator for assertions (like, e.g. Gutzmann, 2008; Krifka, 1995, 2001), it can easily be explained why **VERUM** is not part of the assertion. Without going into the details of how to define this operator, it is clear that it cannot take scope over **VERUM**(p). Since **VERUM** is an hybrid expression of type $\langle\langle s, t \rangle, u\rangle$, it combines with its argument according to the rule of hybrid use-conditional application (48) and is therefore isolated from the semantic parsetree returning the truth-conditional content unmodified. Hence, the assertion operator can only take the remaining proposition without **VERUM** as its argument.

(53) Karl **SCHREIBT** ein Buch. "Carl IS writing a book."



That is, what is asserted is the plain truth-conditional content of the sentence and not **VERUM**(p). A parallel reasoning applies to questions as well. We end up with the question whether Carl writes the book and the independent use-conditional proposition **VERUM**(**write**(**book**)(**carl**)).

(54) **VERUM in assertions**

Karl **SCHREIBT** ein Buch. "Carl IS writing a book."

\rightsquigarrow **ASSERT**(p), **VERUM**(p)

(55) **VERUM and questions**

SCHREIBT Karl denn ein Buch? "Is Carl writing a book?"

\rightsquigarrow **QUESTION**(p), **VERUM**(p)

For those who feel uncomfortable having sentence mood operators in the semantics, the multidimensional approach can easily explain the facts if we make the reasonable

⁷ " \checkmark " stands for felicity, while " \nmid " is infelicity.

assumption that what is asserted by a declarative or questioned by an interrogative is solely the root node of the corresponding semantic parsetree. Since VERUM is removed from the semantic derivation, it is not present at the root node.

5 The discourse semantics of VERUM

So far, we have shown that, despite their advantages, the previous proposals run into problems, and we have spelled out our multidimensional analysis. The goal of this section is to elaborate on the use-conditional meaning of VERUM as a “conversational operator”. Does it emphasize the truth of the proposition? Does it bear on the certainty of the speaker who utters the sentence? In what follows, we argue that VERUM is an instruction of the speaker, who wants to downdate $?p$ from the Question Under Discussion (henceforth QUD).

5.1 Downdate $?p$ from QUD

Let us start with the discourse distribution of VF. Richter (1993) observes that sentences with VF cannot be uttered out of the blue, as (56) shows.⁸

- (56) a. He, hast Du es schon gehört? # Karl **SCHREIBT** ein Buch.
hi has you it already heard Carl writes.VF a book
 “Hi, have you already heard it? Carl IS writing a book.”
 b. [Telephone call] # Mit wem **SPRECHE** ich?
with whom talk.VF I
 “Who IS speaking?”

In Richter’s terms, at least part of the lexical material must be given. This is shown by the following examples. Given the question in (57), the answers in (58) are all perfect since they constitute genuine answers to A’s question. In contrast, the same answers become infelicitous if VERUM is added.

- (57) A: What did Carl do on the weekend?
- (58) a. B: He finished his book. (English)
 b. B: Er hat sein Buch beendet. (German)
 c. B: Acabó su libro. (Spanish)
- (59) a. B’: # He did finish his book. (English)
 b. B’: # Er HAT sein Buch beendet. (German)
 c. B’: # Sí acabó su libro. (Spanish)

⁸This is a further difference between VF and information focus. While the latter is possible in out-of-the blue contexts (with maximal focus projection), VF is not:

- | | | | |
|-----|--|------|---|
| (i) | [Karl hat ein BUCH geschrieben.] _F
<i>Karl has a book written.</i>
“Karl wrote a BOOK.” | (ii) | #Karl HAT ein Buch geschrieben.
<i>Karl has a book written</i>
“Karl did write a book.” |
|-----|--|------|---|

This shows that containing new information is too broad a condition to license VERUM. It is only felicitous if the lexical material that constitutes the propositional content of the sentence is already given in the discourse context.

The fact that VF cannot be used out of the blue also poses a problem for R&H's approach. They do not address the discourse behavior of VF, but they define VERUM in terms of "being sure that it should be CG" that p . We can show how this is problematic with the following example, where a goat walking into a room is supposed to become part of the CG without the need of any acknowledgment from the interlocutors.

(60) SCENARIO: A goat walks in. A sees the goat and is pretty sure that it is a goat. B hasn't seen the goat, yet.

A: Da ist/#IST eine Ziege.
there is/is-VF a goat

Since A is sure that it should be CG that there is a goat, R&H predict that VF would be felicitous in such a context, but it is not the case, as (60) illustrates.

To account for these discourse restrictions on the felicity of VF, we relate the semantics of VERUM to the discourse component. We argue that VERUM is an instruction to be interpreted as a separate performative (cf. Portner, 2007). Specifically, the argument of VERUM is a proposition p and the instruction is that the speaker wants to downdate the corresponding question $?p$ from the QUD. This idea is summarized in (61).

(61) $\llbracket \text{VERUM}(p) \rrbracket^c \approx$ The speaker c_S wants to downdate $?p$ from QUD.

The QUD (Ginzburg, 1996; Roberts, 1996) is a partially ordered set of questions that guide the interlocutors' intentions when they engage in a conversation. We can assume that the QUD is never an empty stack of questions. There is always a question in QUD that brings about a conversation. It can be a very general one, such as "What is the state of affairs?", and any of the following questions will be entailed by this very first one. Following Groenendijk and Stokhof (1984, 16) one interrogative Q1 entails another Q2 iff every proposition that answers Q1 answers Q2 as well. As Roberts puts it, if the question at stake is "What do you like?", this entails the question "What food do you like?", because the answers to the second question will all be answers to the first question, too. The cooperative interlocutors in dialog recognize a common goal, and attempt to achieve it by resolving the questions that belong to QUD. We have mentioned that the questions in QUD are partially ordered, because once the questions are resolved, they disappear from the QUD, and this obeys an order. In particular, only if $?p$ is maximal (i.e., on top of the stack) can we resolve it and eliminate it from the QUD. We borrow Engdahl (2006)'s terms *update* and *downdate* to appeal to the move that includes or erases a question $?p$ from the QUD (62).

(62) Question under Discussion (from Engdahl (2006, 95))

- a. QUD: A partially ordered set that specifies the currently discussable issues. If a question q is maximal in QUD, it is permissible to provide any information specific to q using (optionally) a short answer.
- b. QUD update: Put any question that arises from an utterance on QUD.
- c. QUD downdate: When an answer a is uttered, remove all questions resolved by a from QUD.

Let us illustrate the general idea with a few examples:

- (63) A: Is Carl writing a book?
 \rightsquigarrow QUD Update: QUD = $\langle \text{?write}(\text{book})(\text{carl}) \rangle$
 B: Yes. \rightsquigarrow QUD Downdate: QUD = $\langle \rangle$

(63) is an idealized scenario where the QUD only contains a very specific question $?p$, namely *whereas Carl is writing a book*. Once the addressee answers this question, the pair $\langle \text{Carl is writing a book, Carl isn't writing a book} \rangle$ disappears from the QUD (assuming that B's answer is accepted by the discourse interlocutors). (64) is an example with a *wh*-interrogative.

- (64) A: What did Carl do on the weekend?
 \rightsquigarrow QUD Update: QUD = $\langle \text{?}\lambda P.\text{on-the-weekend}(P)(\text{carl}) \rangle$
 a. B: Er hat sein Buch beendet.
 \rightsquigarrow QUD Downdate: QUD = $\langle \rangle$

In such a question, which is treated as denoting a set of properties that apply to Carl, a felicitous answer would be to name one of the properties that Carl has. For instance, B proposes to downdate the QUD by resolving the question with the assertion that Carl has finished a book.

Crucially, our account correctly predicts that the speaker cannot treat this information as already part of the QUD ((65)). We can only downdate $?p$ from the QUD if we assume that $?p$ is already part of the stack of questions under discussion ((66)).

- (65) B': # Er HAT sein Buch beendet.
 \rightsquigarrow The speaker wants to downdate **?finish(book)(carl)**.

- (66) Downdating $?p$ presupposes that $?p$ is maximal in QUD.

This explains straightforwardly – and without the need of any stipulations – that VF cannot be used out of the blue. Recall the goat example, repeated and analyzed in (67).

- (67) SCENARIO: A goat walks in. A sees the goat and is pretty sure that it is a goat. B hasn't seen the goat yet. QUD = $\langle \rangle$
 Da ist/#IST eine Ziege.
 \rightsquigarrow The speaker wants to downdate the question of whether there is a goat.

Even though all the moves in a dialogue are recorded in the CG and so is the appearance of the goat, discussing whether it is true or false that this fact holds is not relevant (Roberts, 1996), because it does not yield a partial answer to $?p$ in QUD. In (67) we assume an – admittedly simplified – scenario, where the QUD is empty before the goat walks in. An assertion is felicitous, because it introduces a new $?p$ in the QUD, i.e., whether it is true or false that a goat just walked in. By contrast, the use of VERUM is infelicitous, because it requires that $?p$ is maximal in the QUD before the utterance that contains VERUM.

The same strategy that we have used to explain VF in assertions holds for the occurrence of VF in *yn*-questions. Consider (68).

- (68) SCENARIO: The pupils A, B, C have to find out the capitals of the German states.

- A: #**IST** Wiesbaden die Hauptstadt von Hessen?
 “Is Wiesbaden the capital of Hessen?”

The answer in (68) is infelicitous because the question **?capital(Hessen)(Wiesbaden)** is not in the QUD prior to the utterance of the interrogative sentence. Compare now (68) with (69).

- (69) A: Peter behauptet, dass Wiesbaden die Hauptstadt von Hessen ist.
 “Peter claims that Wiesbaden is the capital of Hessen.”
 \rightsquigarrow QUD Update: QUD = $\langle \text{?claim}(\text{capital}(\text{Hessen})(\text{Wiesbaden}))(\text{peter}) \rangle$
 \rightsquigarrow QUD Update: QUD = $\langle \text{?capital}(\text{Hessen})(\text{Wiesbaden}),$
 $\text{?claim}(\text{capital}(\text{Hessen})(\text{Wiesbaden}))(\text{peter}) \rangle$
 B: **IST** Wiesbaden denn die Hauptstadt von Hessen?
 “Is then Wiesbaden the capital of Hessen?”
 \rightsquigarrow The speaker wants to downdate the question of whether Wiesbaden is the capital of Hessen.

The assertion that precedes the *yn*-question places **?capital(Hessen)(Wiesbaden)** on top of the QUD. This is what allows the felicitous utterance of the sentence that contains VF.

5.2 VERUM and emphasis on truth

This proposal for VERUM as a conversational operator explains neatly the fact that VF cannot occur felicitously out of the blue. In this subsection we argue that it also explains in a simple way the relationship VERUM bears with the emphasis on truth.

Recall that we have not included in the semantics of VERUM any notion related to the truth of *p* (in contrast to Höhle 1992) or the speaker’s certainty of *p* (in contrast to R&H). This is not to say that these properties are alien to the meaning of VERUM. We can show that the principles of cooperative communication derive them straightforwardly.

First, if the speaker asserts that *p*, and at the same time wants to downdate *?p*, then s/he must be sure that *p* should be added to the CG. This emphasizes that *p* is true, because we have the impression of a double assertion that *p*.

Second, if the speaker asks whether *p*, and at the same time wants to downdate *?p*, the certainty condition applies to the addressee and his answer, since the speaker in a question is by definition not committed to its propositional content (if the speaker were sure about *p*, she would not ask whether *p*).

In other words, the status of the speaker’s commitment in every speech act will determine where we place the certainty toward *p*. The emphasis on truth is the translation of VERUM interpreted as an instruction to downdate *?p* from the QUD.

5.3 Imperatives

We want to conclude by pointing out an additional advantage of this approach, which has to do with VERUM’s interaction with different sentence types. We have shown the effects of VERUM both in assertions and *yn*-questions. What is the contribution of VERUM in imperatives? Consider again the dialog in (70).

- (70) A: [hesitating to sit down]
 B: NIMM dir endlich den Stuhl!
take.IMP.VF you finally the chair
 “Do take the chair!”

An appeal to the QUD does not seem very plausible at first sight, since imperatives do not seem to be connected with question-answer pairs. However, we could argue that uttering an imperatives raises the question of whether the addressee fulfills the order.

- (71) **Imperatives and QUD**
 A: Nimm den Stuhl!
 \rightsquigarrow QUD Update: QUD = $\langle ?\text{take}(\text{the-chair})(c_A) \rangle$
 B: Ja. QUD Downdate: QUD = $\langle \rangle$

Now, if A is hesitating whether or not to sit (as is the case in (70)), then we can update the QUD with the set of propositions “that the addressee takes the chair” and “the addressee does not take the chair”. Another possible context for a VERUM-imperative is one where the order has been issued several times, as in (72).

- (72) A: John, please, take the chair.
 B: (No reaction)
 A: Honey, will you please take the chair?
 B: (No reaction)
 A: NIMM dir endlich den Stuhl!

Clearly, the question of whether or not the addressee complies with the order is now maximal in the QUD. Only when the two possibilities are maximal at the QUD, does the use of VERUM become available. Whenever this restriction is not obeyed, then VERUM-imperatives are not allowed.

- (73) [The speaker opens the door and sees John standing next to a chair]
 # NIMM dir den Stuhl!

In other words, VERUM-imperatives are unavailable out of the blue, as was the case for the other sentence types.

6 Conclusions and prospects

To summarize our main claims and findings, we have treated VF as the realization of a use-conditional operator called VERUM. A multidimensional analysis of VF accounts for the fact that we cannot negate it, and that it has semantic wide scope (i.e., its meaning is always attributed to the speaker). In our analysis, VERUM takes a truth-conditional proposition as its argument and returns an independent use-conditional proposition. Since this proposition is on an independent tier, what is asserted/questioned is still the ordinary propositional truth-conditional content. The use-conditional meaning that we have proposed for VERUM corresponds to the speaker’s wish (i.e., an instruction) to downdate from the QUD the question built from p . We have shown that this can account for many of the discourse conditions under which VF is felicitous. Not only this,

the emphasis on truth the previous literature had taken to be the meaning of VERUM can also be derived from this semantics.

There are various open questions that arise from this work on VERUM and VF that deserve further research. First, there is the technical problem that *wh*-interrogatives with VERUM pose, since in this case we should allow the operator to take as argument the set of propositions denoted by *wh*-questions. Second, we would like to study a wider range of discourse restrictions on the occurrence of VF. For instance, an answer to a *yn*-question such as *Schreibt Karl ein Buch?* (Is Carl writing a book?) cannot be answered with an assertion containing VERUM without the affirmative particle *ja* (yes). Moreover, we would also like to explore the role of the interlocutors' epistemic biases towards one of the answers to the question under discussion (p or $\neg p$), and how these interact with the felicity of VF.

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Daniel Gutzmann & Elena Castroviejo
 Universität Frankfurt & University of Chicago
 danielgutzmann@gmail.com &
 castroviejo@uchicago.edu

Reambiguating: on the non-monotonicity of disambiguation

Fritz Hamm and Torgrim Solstad*

1 Introduction

The relation between lexical ambiguity and disambiguation is mostly approached from an intra-sentential perspective. Thus, when analyzing the ambiguity and disambiguation of a lexical item, one tends to study its variance in interpretation when it is modified by or occurs as an argument of other lexical items. Broadening this perspective, this paper shows that there are important insights into the nature of disambiguation to be gained by studying more closely how ambiguous expressions behave in contexts spanning more than one sentence. More specifically, we introduce new data involving anaphora resolution with the following two characteristics: (i) a potentially ambiguous antecedent which is disambiguated in its local context, and (ii) anaphora which refer to one of the possible readings of the antecedent which was not selected in the local antecedent context. We argue that these data call for a revision of how we conceive of and formalize the process of disambiguation, introducing the notion of *reambigation*, which characterizes the process of reintroducing alternative interpretations which were originally excluded by disambiguation.

The paper is structured as follows. In Section 2, we discuss properties of ambiguity and disambiguation. We also give an informal overview of our approach, including a discussion of the notion of *reambigation*. In Section 3, the formal basis of our analysis is presented. In Section 4, we present the analysis and discuss some consequences of our approach for formal discourse semantics in general. Section 5 concludes the paper.

2 Ambiguity, Disambiguation and Underspecification

Formally, ambiguities are often represented by means of underspecification. In computational linguistics and formal semantics alike, underspecification is thought to be a more efficient way of handling the interpretational variance of expressions in the case of e.g. both scopal and lexical ambiguities. Thus, if no disambiguation can take

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place, as is the case when the information present does not allow an informed decision as to which interpretation to choose, the underspecified representation allows interpretational decisions to be deferred to a later point at which such information may become available. We focus on another aspect of underspecification, however, namely its role in the relation between ambiguous and disambiguated expressions. In general, it is assumed that semantic information included in an underspecified representation is discarded and not retrievable when interpretational decisions resulting in disambiguation are made. Contrary to this, we argue that this view is inadequate for the phenomena of anaphora resolution which we analyze in this paper: Still assuming disambiguation to involve the discarding of information in underspecified representations, we allow the result of disambiguation to be reversed or altered in subsequent discourse under certain conditions.

Underspecified representations of lexical (or scopal) ambiguities typically involve some kind of disjunction (Reyle, 1993) or conjunction (Poesio, 1996). In the Underspecified Discourse Representation Theory approach of Reyle, for instance, underspecification is represented by means of the disjunctive operator $\dot{\vee}$, cf. the simplified representation of the two-way ambiguous deverbal nominalization *delivery* in (1):

$$(1) \quad \left\langle \alpha \left[\begin{array}{l} \alpha = e \dot{\vee} \alpha = y \\ e: \text{deliver}(x, y) \\ \text{AGENT}(e) = x \\ \text{THEME}(e) = y \end{array} \right] \right\rangle$$

More specifically, the representation in (1) shows the semantic representation for *delivery* at NP level, stating that the event of delivering involves an agent and a theme argument. Importantly, α in (1) represents the referential argument of the noun phrase which is assumed to be bound at DP level. As indicated in the first line of the condition part of the representation, the referential argument α of *delivery* may either be an event or an object, the latter corresponding to the theme of the verb *deliver*.

Assuming a disjunct or conjunct representation of such underspecified ambiguous expressions, disambiguation is naturally viewed as a process of disjunct or conjunct deletion. Thus, the disambiguating contexts for *delivery* in (2) are often thought to lead to a deletion of the first or second disjunct in the top-most condition in (1).¹

- (2) a. the damaged delivery (~~$\alpha = e$~~ $\dot{\vee} \alpha = y$)
 b. the quick delivery ($\alpha = e \dot{\vee}$ ~~$\alpha = y$~~)

In (2), *damaged* is assumed to combine only with the object reading of *delivery*, whereas *quick* selects only the event reading. As mentioned briefly above, the status of the deleted disjunct(s) or conjunct(s) will be of main interest in this paper. We also assume that the disambiguation of underspecified expressions leads to disjunct or conjunct deletion. However, we argue that the information contained in the deleted conjunct should be retrievable under certain conditions.

Our data mainly involve German deverbal nominalizations. More specifically, we present a study of nouns derived by means of the suffix *-ung* (comparable both to *-tion*

¹Similar remarks may be made with regard to Poesio's (1996) disambiguation inference mechanism.

and *-ing* nominalizations in English, cf. Ehrich and Rapp, 2000; Rossdeutscher and Kamp, 2010). While all productively derived *-ung* nouns have an event reading, quite a few *-ung* derivations additionally have result state and/or object readings, cf. *Absperrung* (from *absperren* ‘cordon off’, ‘block’) in (3), which is three-way ambiguous:

- (3) a. *Die Absperrung wird morgen abgebaut.*
 the barrier will be tomorrow dismantled
 ‘The barrier will be dismantled tomorrow.’
 b. *Die Absperrung des Gebiets wird noch aufrecht erhalten.*
 the cordoning-off the area is still sustained
 ‘The cordoning-off of the area is still sustained.’
 c. *Die Absperrung des Gebiets wurde von den Demonstranten behindert.*
 the cordoning-off the area was by the protesters hampered
 ‘The cordoning-off of the area was hampered by the protesters.’

All noun phrases headed by *Absperrung* in (3) are disambiguated in context: the predicate *abbauen* (‘dismantle’) (3-a) is assumed to select for object interpretations, *aufrecht erhalten* (‘sustain’) (3-b) for states and *behindern* (‘hamper’) (3-c) for event interpretations (for details see Hamm and Kamp, 2009). A simplified, underspecified semantic representation covering all three readings is provided in (4):

$$(4) \quad \langle \alpha \mid \begin{array}{c} z \\ \hline \alpha = e \vee \alpha = s \vee \alpha = y \\ e \text{ CAUSE } s \\ s: \text{ HAVE}(y, z) \\ \text{FUNCTION_AS_BARRIER}(y) \\ \text{AGENT}(e)=x \end{array} \rangle$$

Briefly stated, *Absperrung* involves an event *e* causing a state *s* in which the (incremental) theme *y* blocks access to some region *z*. Again, the topmost condition of the representation provides information on the possible referential arguments of the noun: it may be an event (*e*), a state (*s*) or an object (*y*). For details on the logic and ontology of disambiguation, the reader is referred to Hamm and Kamp (2009).

Taking the above considerations of Reyle (1993) or Poesio (1996) as a starting point, there is nothing special about how the disambiguating contexts in (3) influence the possible referential arguments of the DPs headed by *Absperrung* (‘cordon-off’, ‘barrier’). However, we present data (the naturalness of which has been confirmed by numerous native speakers) which are highly problematic for a naive disambiguation-as-disjunct-deletion approach as described above. These data involve two-sentence sequences where a potentially ambiguous deverbal nominalization is disambiguated in the first sentence. The second sentence contains a pronoun which is clearly co-referential with the DP headed by the deverbal nominalization. However, due to sortal restrictions in its local context, this pronoun can only pick up a reading which was *not* selected for in the first disambiguating sentence, cf. the sequence in (5):

- (5) *Die Absperrung des Rathauses wurde vorgestern von Demonstranten behindert. Wegen anhaltender Unruhen wird sie auch heute aufrecht erhalten.*
 the cordoning-off the town hall was the day before yesterday by protesters hampered. Due to continuing unrest is it also today sustained.
 'The cordoning-off of the town hall was hampered by protesters the day before yesterday. Due to continuing unrest, it [the state of being cordoned off] is sustained today as well.'

In (5), the anaphora *sie* ('it', literally: 'she') is co-referential with the noun phrase headed by *Absperrung* in the first sentence. As stated in the discussion of example (3-c), the predicate *behindern* ('hamper') restricts the ambiguity of *Die Absperrung des Rathauses* and fixes an event reading of the noun phrase. However, recall that the matrix predicate in the second sentence, *aufrecht erhalten* ('sustain'), only allows the referential argument of the anaphora *sie* ('it') to be a state. But if the fixation of the event reading, i.e. the disambiguation of *Absperrung*, involves the irreversible deletion of its other possible referential arguments, there should be no appropriate discourse referent for *sie* ('it') to pick up, contrary to intuitions. Given the naturalness of the sequence in (5), we contend that the disambiguation-as-deletion view must be revised. The mechanism of *reambiguation* which we propose accounts adequately for data such as (5) by allowing the restricted recovery of information which has been discarded as a result of disambiguation.

Attempting to pre-empt some of the most obvious arguments against granting examples such as (5) any special status, let us discuss briefly (i) a "lazy" approach, and (ii) the option of coercion, which have both been suggested to us in discussion. What we refer to as a "lazy" approach attempts to avoid the problem by assuming that disambiguation does not involve any deletion whatsoever. We contend that this is no option, as it would predict that every possible discourse referent of a noun is always available in subsequent discourse. The following unacceptable example (indicated by the '#' sign), which will be discussed later, shows that this is not the case. It crucially involves a 'physical object antecedent' and an anaphora of event type:

- (6) *#Die Absperrung wurde heute verstärkt. Sie war am Vortag massiv behindert worden.*
 the barrier was today fortified. It had the day before massively hampered been.
 Intended: 'The barrier was fortified today. It [the cordoning-off] had been massively hampered the day before.'

Concerning the second option of *coercion* (or rather *reinterpretation* in the terms of Egg, 2005), this is a more intricate issue, which we can only touch upon in this paper.² Obviously, coercion would in principle always be applicable, as there are basically no restrictions to the mechanism of coercion given a sufficient complexity of types, which

²The notion of *coercion* as introduced by Moens and Steedman (1988) was originally restricted to aspectual phenomena. Later, it has been widened to include a number of other phenomena such as e.g. sortal shifts (Dölling, 2003) in the nominal domain (cf. e.g. the work of Egg, 2005).

is problematic in itself. As we will see below (see the discussion of examples (38-a)-(38-b) in Section 4), establishing proper restrictions for the acceptability of anaphoric relations such as the one in (5) is beyond the scope of simple type conflict resolution generally considered in formalizations of coercion. A more general argument against such an approach is that coercion, also in broader terms of sortal shifts, is taken to be a locally restricted phenomenon involving predicate-argument or modifier-head relations for which a (sortal) type conflict may be observed. In the case of (5) it is not all that clear what should initiate the process of coercion in the first place as there are no local type conflicts involved. Both the semantics of the DP headed by the nominalization and also obviously that of the pronoun satisfy the sortal restrictions of the arguments selecting for them locally. Of course, there is a type conflict involving the anaphora and its antecedent in (5), but we contend that applying coercion is not an appropriate way to deal with such phenomena. Rather, sequences such as (5) provide counter-examples to generally accepted assumptions in formal-semantic theories of anaphora resolution (cf. e.g. van Eijck and Kamp, 1997), which assume type identity between anaphora and their antecedents. Crucially, the solution we propose for dealing with the type conflict in (5) also has interesting, more general consequences for (formal) discourse semantics.

Before turning to the formal details of our analysis, we would like to give its main characteristics in informal terms. To account for the acceptability of examples such as (5), we reconstruct the required result state which the anaphora *sie* ('it') makes reference to. We show that such a reconstruction is possible even under the assumption that *behindern* ('hamper') erases the result state reading of the first sentence in (5). This is achieved in a process of *reambigation*, which involves a three-step procedure of inference, reification (turning a predicate into a term) and unification. This reconstructed result state then serves as a suitable antecedent for the anaphoric pronoun *sie* ('it') of the second sentence in (5). More specifically, the procedure may be described as follows: Although there is no semantically suitable antecedent – in terms of semantic types – for the pronominal anaphora *sie* ('it') in (5), one can certainly assume that the discourse referent of the anaphor is allowed to be identified with the referent of the DP *die Absperrung des Rathauses*, also based on the morpho-syntactic constraints on referential identification for the discourse referent introduced by the singular feminine pronoun *sie* ('it'): Gender features exclude the referential argument of the neuter noun *Rathaus* ('town hall') and number features excludes the referential argument of the plural *Demonstranten* ('protesters'). These constraints trigger a mapping from the event denotation of *die Absperrung des Rathauses* to the result state, involving a non-monotonic inferential process. The following pieces of information are of relevance for this process:

- The semantics of *Absperrung*, which derives from the verb *absperren* ('cordon off'), involves an object (*y*), which is incrementally constructed in order to block access to a region (*z*), i.e. the agent (*x*) of the event (*e*) causes a state (*s*) of inaccessibility of the region (*z*).
- The referential argument of the relevant 'anaphora theme argument' of the predicate *aufrecht erhalten* ('sustain') is of result state type, while the 'antecedent theme argument' of *behindern* ('hamper') is of event type.

- The properties of the pronoun *sie* ('it') – its referent needs to be identified with one which is introduced by a DP – requires a mapping from the event referent of the DP *die Absperrung des Rathauses* ('the cordoning-off of the town hall') to the result state of being cordoned off. This state is accessible via the semantics of the predicate *absperren* ('cordon off'). The mapping from the event to the state consists in an abstraction over the times for which the predicate holds (from *absperren*(*e*, *t*) to the reified *absperren*[*e*, \hat{t}]). This set of times can in principle be both the one for which the process of cordoning-off holds as well as the one for which the result state holds. In our analysis, we only exploit the latter possibility, since we assume that the predicate *aufrecht erhalten* ('sustain') only applies to *result* states.
- Consequently, a non-monotonic inferential process is initiated, in which the coming about of the result state of being cordoned off is inferred from the occurrence of the process of cordoning off.

As mentioned above, the proposed formalization allows us to account adequately for cases where the application of coercion would offer no obvious solution. This is for instance the case with the non-monotonic inference which is triggered by *behindern* ('hamper') and blocked by *verhindern* ('prevent'), respectively (cf. Hamm and Kamp, 2009). Making reference to this inferential variance enables us to explain the difference concerning the possibility of anaphora resolution in (5) versus (7).

- (7) #*Die Absperrung des Rathauses wurde vorgestern von*
 the cordoning-off the town hall was the day before yesterday by
Demonstranten verhindert. Wegen anhaltender Unruhen wird sie auch heute
 protesters prevented. Due to continuing unrest is it also today
aufrecht erhalten.
 sustained.
 'The cordoning-off of the town hall was prevented by protesters the day before yesterday. Due to continuing unrest, it [the state of being cordoned off] is sustained today as well.'

In (7), anaphora resolution fails because the above-mentioned non-monotonic inference that the activity of cordoning-off leads to a result state of being cordoned off is blocked by *verhindern* ('prevent'). Note that from the perspective of coercion, it is hard to differentiate the two cases, since they both involve antecedents with referential arguments of event type.

Finally, the problematic case in (6) discussed in connection with the "lazy approach" is accounted for under the assumption that physical objects are represented by predicates without temporal parameters. In this case, anaphora resolution is blocked correctly, since the above depicted three-step procedure involving inference, reification and unification is not applicable for predicates without temporal parameters.

Concerning the notion of reambiguation, it should be noted that reambiguation may involve a complete recovery of all readings which were deleted in the preceding context, and not just shifting to a different one, as in (5). Consider (8), where *ignorieren* ('ignore') allows *sie* ('it') to have a referential argument of all three possible types

(object, event and result state), whereas the *Absperrung*-DP in the first sentence clearly only has an event reading:

- (8) *Die Absperrung des Rathauses wurde von Demonstranten behindert. Später haben sie alle ignoriert.*
 the cordoning-off the town hall was by protesters hampered. Later have it everyone ignored.
 ‘The cordoning-off of the town hall was hampered by protesters. Later, everyone ignored it.’

In the next section, we present the most important theoretical prerequisites for the formal analysis alluded to in the informal description above. It will involve a coupling of Discourse Representation Theory (DRT; Kamp and Reyle, 1993) with Constraint Logic Programming (CLP; van Lambalgen and Hamm, 2005).

3 Event Calculus

Crucially, our approach is based on Constraint Logic Programming. However, before we start to develop integrity constraints and programs for the examples discussed so far, we will give a short informal introduction to the event calculus. For a much more comprehensive introduction the reader is referred to van Lambalgen and Hamm (2005). The event calculus originated in Artificial Intelligence and was used for high level control of mobile robots (see McCarthy and Hayes, 1969; Kowalski and Sergot, 1986; Shanahan, 1997). In van Lambalgen and Hamm (2005) the event calculus is formalized as a (constraint) logic program with the aim to represent planning. The motivation for logic programming as an adequate tool for planning is as follows: Planning is defined as setting a goal and devising a sequence of actions that will achieve that goal, taking into account events in the world, and properties of the world and the agents. Now consider a typical clause of a propositional logic program, say

$$p_1, \dots, p_n \rightarrow q.$$

In this clause, one may think of q as a goal to be achieved if conditions p_1, \dots, p_n are satisfied. This accounts for the basic intuition concerning planning as well as for the recursive character of planning, since the conditions p_1, \dots, p_n could be given as subgoals as well:

$$r_{i_1}, \dots, r_{i_m} \rightarrow p_i.$$

Moreover, logic programming nicely captures the crucial non-monotonicity of planning. Given a goal G and circumstances C under which G can be achieved, it does not follow in a strict sense that G can be achieved under C plus some additional circumstances D . In this sense a planning system requires a non-monotonic formalism and logic programming is such a formalism.

The connection between planning and linguistic processing is established by assuming that a sentence S is considered as a goal (make S true) to be achieved by updating the discourse model. This means that we can model the understanding of a

sentence in discourse as such a goal. The goal is to make a sentence – as part of a discourse – true by accommodating those facts necessary for establishing the truth of the sentence.³ Let us now consider a specific example.

3.1 Linguistic Motivation

- (9) It was hot. Jean took off his sweater.

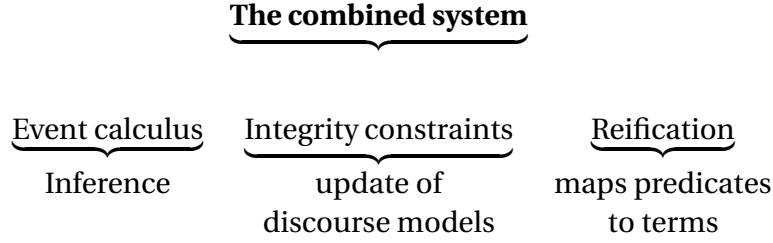
In (9), we naturally understand that the eventuality expressed by the second sentence is included in the temporal profile of the eventuality expressed by the first sentence. In order to establish this temporal overlap one could intuitively argue as follows:

- (10) World knowledge contains no link to the effect that taking off one's sweater changes the temperature. Since it is hot at some time before *now*, the state *hot* must either hold initially or must have been initiated at some time *t*. The latter requires an event, which is however not given by the discourse. Therefore *hot* may be assumed to hold initially. Similarly no terminating event is mentioned. Thus, *hot* extends indefinitely, and it follows that the event described by the second sentence must be positioned inside the temporal profile of *hot*.

The event calculus is meant to formalize this kind of argumentation. Note the following important feature of the above argument. Several steps use a non-monotonic inference scheme. For instance, the conclusion that the state *hot* holds initially is derived from the observation that the discourse does not mention an initiating event. From this observation we conclude that there is no initiating event, leaving only the possibility that *hot* holds initially. A second feature of this reasoning involves the principle of *inertia*. This principle, which is axiomatized by the axioms of the event calculus, states that if a state – *hot* in our example – is not forced to change under the impact of an event, it is assumed to remain unchanged.

Before we proceed to describe the event calculus a bit more formally, we will first outline a kind of roadmap for the formalism as a whole, since this type of formal system is rather unusual in linguistic semantics. We will also indicate which part of the combined system is used for the derivation of anaphora resolution in the examples discussed so far. The combined system consists of the event calculus as a logic program which, however, is confined to provide only universal information. For the introduction of existential information the calculus is therefore combined with a tool from data base theory – integrity constraints, which also allow to give a precise formulation of the above slogan saying that a sentence *S* is to be considered as a goal (make *S* true) to be achieved by updating the discourse model. The last component of the formalism is a theory of reification which allows to turn predicates into terms. This is crucial for the second step of the three-step procedure (inference, reification and unification) of computing the anaphoric link in example (5).

³Van Lambalgen and Hamm (2005) argue for a close connection between planning and tense. The justification of this claim is however beyond the scope of this paper. The interested reader is therefore referred to van Lambalgen and Hamm (2005).



We will now start with the language of the event calculus.

3.2 The language of the event calculus

Formally, the event calculus is a many-sorted first order logic. The sorts include event types, fluents (time-dependent properties, such as activities), real numbers, and individuals.⁴ We also allow terms for fluent-valued and event type-valued functions.

The event calculus was devised to model formally two notions of change, instantaneous change – such as two balls colliding – and continuous change – for instance the acceleration of a body in a gravitational field. A first series of primitive predicates is used for modelling instantaneous change.

- (11) *Initially*(f)
- (12) *Happens*(e, t)
- (13) *Initiates*(e, f, t)
- (14) *Terminates*(e, f, t)

The intended meaning of these predicates is more or less self-explanatory. The predicate *Initially*(f) takes as its argument a fluent (a time-dependent property) and says that f holds at the beginning of a scenario. *Happens*(e, t) holds if event type e happens at time point or interval t . The event calculus allows to interpret t as a point or as an interval. *Initiates*(e, f, t) says that event type e causes f to be true strictly after t ; i.e. f does not hold at t . Finally, *Terminates*(e, f, t) expresses that f holds at t and that e causes f not to hold after t .

The next two predicates are used to formalize continuous change.

- (15) *Trajectory*(f_1, t, f_2, d)
- (16) *Releases*(e, f, t)

The 4-place predicate *Trajectory*(f_1, t, f_2, d) measures the change of f_2 under the force f_1 in the interval from t to $t + d$. Linguistically, it is very close to the notion of incremental theme (see for instance Krifka, 1989; Dowty, 1991). One may think of f_1 as an activity which acts on f_2 . Dowty uses *mowing a lawn* in order to explicate the notion *incremental theme*. In Dowty's example f_1 is the mowing activity and f_2 the changing state of the lawn under this activity. The fluent f_2 should therefore be considered a parameterized partial object; in Dowty's example the state of the lawn after d time

⁴The term *fluent* was coined by Newton for functions with a temporal parameter.

steps of the ongoing activity of *mowing*. The axioms of the event calculus then provide the homomorphism between the ongoing activity and the resulting (partial) state – the partially mowed lawn – as required by Dowty.

The *Releases*(e, f, t) predicate is necessary for reconciling the two notions of change formalized by the event calculus. Without this predicate the axioms would immediately produce an inconsistency. Intuitively, the *Releases* predicate says that after event e happened, f is no longer subject to the principle of inertia. This allows f to change continuously. Consider a scenario of filling a bucket with water. Event type *tap-on* releases the parametrized fluent *height*(x) that measures the continuously changing level of the water in the bucket from the principle of inertia.

The *Clipped*-predicate of the calculus expresses that an event either terminating fluent f or releasing this fluent from the principle of inertia occurred between times t_1 and t_2 .

$$(17) \quad \text{Clipped}(t_1, f, t_2)$$

The last predicate states that fluent f is true at time t .

$$(18) \quad \text{HoldsAt}(f, t)$$

'*HoldsAt*' should be considered a truth predicate although the axioms of the event calculus do not contain the characteristic truth axiom, i.e.

$$\text{HoldsAt}(\bar{\phi}, t) \leftrightarrow \phi(t)$$

where $\bar{\phi}$ is a name for formula ϕ . More formal machinery is necessary to transform *HoldsAt* into a truth predicate satisfying the characteristic truth axiom. We will resume the discussion of this topic in section 3.5.

In the next section we will introduce the axioms of the event calculus in an informal way and motivate their use by way of the above reasoning example (10).

3.3 Axiomatization

In this section we will show how the axioms of the event calculus constrain the meanings of the basic predicates and how they formalize the principle of inertia. Moreover we will illustrate how the concept of the completion of a program helps to implement the intuitive idea that events that are not required to happen by a narrative are assumed not to occur. We will demonstrate that this strategy forces the reasoning to be non-monotonic. Let us start with an informal example.

$$(19) \quad \text{If a fluent } f \text{ holds initially or has been initiated by some event occurring at time } t \text{ and no event terminating } f \text{ has occurred between } t \text{ and some } t' \text{ such that } t < t', \text{ then } f \text{ holds at } t', \text{ (here } < \text{ indicates the temporal precedence relation).}$$

It is clear that this axiom embodies a law of inertia since if no f -related event occurs then f will be true indefinitely. In the reasoning of example (10), this axiom was used when we concluded from the fact that no terminating event for *hot* is mentioned that this state holds indefinitely with regard to the story told so far. But this was not the only reasoning principle we applied. From the fact that no terminating event was

mentioned in the short discourse we concluded that none occurred. The axioms of the calculus per se do not allow such a conclusion. We want a strengthening of the assumptions in which only those events occur which are explicitly mentioned in the discourse. In this sense understanding discourses is closely linked to *closed world reasoning*.⁵ There are many techniques for formalizing this kind of reasoning; one is circumscription (for a good overview see Lifschitz, 1994). In this paper, however, we use the notion of the *completion of a logic program*. The advantage of logic programming is that these techniques allow us to *compute* discourse models via fix point constructions.

Let us be slightly more formal. The informal principle (19) is given by the combination of the following two axioms:

1. $Initially(f) \rightarrow HoldsAt(f, 0)$
2. $Happens(e, t) \wedge Initiates(e, f, t) \wedge t < t' \wedge \neg Clipped(t, f, t') \rightarrow HoldsAt(f, t')$

The most important feature to notice here is that the head – the part to the right of the implication sign – consists of a simple atom, and the body – the part to the left of the implication sign – consists of a conjunction of (negated and non-negated) formulas. This conjunction is composed of predicates of the event calculus and temporal information such as $t < t'$ which are interpreted in the structure of the reals, i.e. in $(\mathbb{R}, 0, 1, +, \cdot, <)$. These are the constraints of the event calculus considered as a constraint logic program. They are used to compute the time profile of the predicates of the event calculus. All variables in the clauses of logic programs are supposed to be universally quantified.

The completion of a program is a strengthening of it which explicitly expresses that the predicates occurring in the program have extensions that are as small as possible. Before we apply the method of completion to the examples on which we focus in this paper, we indicate how it works at the hand of a very simple program taken from Nienhuys-Cheng and de Wolf (1997).

- (20)
- a. $Prof(confucius)$ (Confucius is a professor.)
 - b. $Prof(socrates)$ (Socrates is a professor.)
 - c. $\neg Prof(y) \rightarrow Student(y)$ (Every person who is not a professor is a student.)

The program involves two predicates, *professor* and *student*. The programming formalism is set up in such a way that it is only possible to make positive statements about the extensions of predicates. Thus (20) states about the predicate *professor* that *confucius* belongs to its extension (20-a) and also that *socrates* belongs to its extension (20-b); and these are all the definite claims the program makes about the extension of this predicate. The completion of the program ought to make this intuition concrete by stating explicitly that the extension of *professor* consists just of these two individuals. We accomplish this by forming the disjunction of the formulas $x = confucius$ and $x = socrates$, where x is a new variable, which intuitively plays the role of an arbitrary

⁵A typical example of this kind of *closed world reasoning* is provided by (train) schedules. If the schedule mentions the departure of a train from Stuttgart to Tübingen at 10.15 and the next at 11.01 one assumes that there will be no train leaving Stuttgart between 10.15 and 11.01.

member of the extension of *professor*, and making this disjunction into the antecedent of the following implication:

$$(21) \quad x = \textit{confucius} \vee x = \textit{socrates} \rightarrow \textit{Prof}(x)$$

In the next step we universally quantify over the variable x and strengthen the implication to a bi-implication. The result is:

$$\forall x(x = \textit{confucius} \vee x = \textit{socrates} \leftrightarrow \textit{Prof}(x))$$

This formula now says that the set of professors just consists of Confucius and Socrates. Under the assumption that Confucius and Socrates are the only individuals in the model we get that the set of students is empty. But assume now that the language in which the program is formulated contains an additional individual constant *plato* which is interpreted as an element of the universe of discourse. Assume further that $\textit{socrates} \neq \textit{confucius} \neq \textit{plato}$.⁶ Then (21) implies that *plato* is not a professor. Now consider the third clause of program (20). A similar procedure applied to this clause yields:

$$(22) \quad \forall x(\textit{Student}(x) \leftrightarrow \neg \textit{Prof}(x))$$
⁷

Formula (22) implies that Plato is a student. The conjunction of (21) and (22) is the completion of program (20). This completion implies that Confucius and Socrates are the only professors and that Plato is a student. The program itself does not support such strong conclusions. A similar observation applies to certain extensions of (20) that bring additional entities into play. Suppose for instance that we add to (20) the fact *beard(plato)*, which states that Plato has a beard. A minimal model for the completion of the extended program will have as a universe $\{\textit{confucius}, \textit{socrates}, \textit{plato}\}$. In this model Plato is not a professor, but the only student and the only individual with a beard.

Let us now give a simple example with events. Consider a description of a situation where the light is switched on at 1 in the night and switched off at 7 in the morning given by the following program:

$$(23) \quad \begin{array}{ll} \text{a.} & \textit{Happens}(\textit{switch-on}, 1) \\ \text{b.} & \textit{Happens}(\textit{switch-off}, 7) \end{array}$$

The uncompleted program does not yet imply that the light wasn't switched off at 2 in the night and switched on at 3 in the night and so on. However, these events should not occur in the minimal model of program (23). The completion of the program is given by

$$\forall e(\textit{Happens}(e, t) \leftrightarrow (e = \textit{switch-on} \wedge t = 1) \vee (e = \textit{switch-off} \wedge t = 7))$$

⁶This is an instance of the 'uniqueness of names' assumption.

⁷This is technically not quite correct. The formula produced by the official algorithm for computing the completion of a program is:

$$\forall x(\textit{Student}(x) \leftrightarrow \exists y(x = y \wedge \neg \textit{Prof}(y)))$$

But for the simple example discussed above this difference does not matter. The official formula and (22) are equivalent.

This formula means the same as:

$$\forall e(Happens(e, t) \leftrightarrow (Happens(switch-on, 1) \vee (Happens(switch-off, 7)))$$

Any intervening events are thereby excluded.

This illustrates how the concept of the completion of a program helps to implement the intuitive idea that events that are not required to happen by a narrative are assumed not to occur. Note that this strategy forces the reasoning to be non-monotonic. Program (23) could easily be enriched with the clauses *Happens(switch-off, 2)* and *Happens(switch-on, 3)*. From the modified program the conclusion that there are no events happening between *Happens(switch-on, 1)* and *Happens(switch-off, 7)* is now no longer derivable.

To sum up: Understanding a sentence in a discourse is like computing a minimal model of the discourse in which the sentence is true. This computation is based on the completion of a constraint logic program for the discourse under discussion. In the next section we will see, however, that this aim cannot be achieved by the technical means introduced so far.

3.4 Integrity Constraints

As pointed out above, the variables in the clauses of logic programs are universally quantified. Therefore logic programs are restricted to provide universal information only. This is clearly not sufficient for our purpose. For example, tense requires existential information (see the example below) and DRSs in general introduce existential information. We will use here a device from database theory – integrity constraints – to obtain the required additional information. In database theory integrity constraints are means to ensure that a database stays consistent under updates. In this paper we will use integrity constraints in a slightly different way; we employ them as means to update a discourse model. Let us explain this idea with a simple example, involving an English sentence in the perfect.

(24) I have caught the flu.

This sentence says that I have the flu now and world knowledge tells us that there was an infection event in the past. Let *flu* be the fluent corresponding to *having the flu* and let *e* be the infection event. Our knowledge is thus formalized by the following program clause.

$$Initiates(e, flu, t)$$

As already said, we view a sentence *S* as a goal (make *S* true) to be achieved by updating the discourse model. In general it is not possible, however, to simply add this information to the discourse model without further ado. There are two reasons for this. First, we would like the updated discourse model to include explicitly all the events that must have occurred in order for the total information represented by it to be true. And, second, when the spelling out of what that comes to reveals a conflict, it should mean that the new sentence cannot make a coherent contribution to the discourse as the initial model represents it. It is therefore important that we do not just add the

condition that I have the flu now, but also the event that must have led to this state of affairs. The formalisation of the event calculus given earlier offers a systematic way of doing this. In the present instance what needs to be inferred from $HoldsAt(flu, now)$ is that there was an earlier event e initiating flu , something that is expressed in the present formalism by the clauses $Initiates(e, flu, t)$, $Happens(e, t)$ and $t < now$.

We will now show how this reasoning applies to example (24). For this purpose, assume that a discourse model is given as a collection of facts concerning events and fluents and assume that sentence (24) is formalized as $HoldsAt(flu, now)$. We do not take this formula as a program clause but as an instruction to construct a minimal adaptation of the discourse model in which $HoldsAt(flu, now)$ is true. In order to detect the events that must have occurred for $HoldsAt(flu, now)$ to be true, we apply abductive reasoning using the basic program constituted by the axioms of our formulation of the event calculus, as well as, possibly, additional axioms that capture aspects of world knowledge. To this end, we use $HoldsAt(flu, now)$ as the trigger that sets this reasoning process in motion. Informally, the reasoning is as follows. We know that fluent flu is initiated by some event e . Furthermore, no terminating event has been mentioned. Therefore we conclude by closed world reasoning that no such event occurred. Consider again axiom (19) repeated here as (25).

- (25) If a fluent f holds initially or has been initiated by some event occurring at time t and no event terminating f has occurred between t and some t' such that $t < t'$, then f holds at t'

According to this axiom there is only one fact missing in order to establish the truth of $HoldsAt(flu, now)$. We have to add $Happens(e, t)$, $t < now$ and its logical consequences to the discourse model. This is sufficient to guarantee the truth of $HoldsAt(flu, now)$.

Let us now be a little bit more formal and see how this update is steered by the proof system of logic programming, which is called *resolution*. Resolution can be regarded as a species of abductive reasoning in which a premise is matched with the heads of all clauses with which it can be matched and the abductive inference is then drawn that the matching instantiation of at least one of the bodies of those clauses must hold. Note the obvious connection between this type of inference and the concept of program completion. We start with the query $?HoldsAt(flu, now)$. Applying the axiom in (26), this query reduces to the new query

$$?Initiates(e, flu, t)$$

$$\neg Clipped(t, flu, t')$$

$$Happens(e, t), t < now$$

- (26) $Happens(e, t) \wedge Initiates(e, f, t) \wedge t < t' \wedge \neg Clipped(t, f, t') \rightarrow HoldsAt(f, t')$

The first clause can be resolved, since $Initiates(e, flu, t)$ is given. For the second query we have to use a form of resolution for negated queries. This means that we set up a new derivation with the positive query

$$? Clipped(t, flu, t').$$

Since we have no matching clauses this query fails and therefore the negated query succeeds (This is the proof-theoretic version of negation as failure.). We are left with the last query

$$?Happens(e, t), t < now.$$

Since we do not have a matching clause for this query $?HoldsAt(flu, now)$, interpreted as a query, would fail (finitely). However, $HoldsAt(flu, now)$ interpreted as an integrity constraint leads to an update of the discourse model with the missing clause. In this updated model $HoldsAt(flu, now)$ is clearly satisfied. This integrity constraint is written as

$$?HoldsAt(flu, now)$$

A more general description of this procedure is as follows: Given a program P containing the clauses below and an integrity constraint q we want to conclude that q can only be the case because one of the ϕ_i 's is the case.

$$\phi_1 \rightarrow q$$

$$\phi_2 \rightarrow q$$

$$\vdots$$

$$\phi_n \rightarrow q$$

This is a strengthened form of closed world reasoning.

A second type of integrity constraint occurs when the top query must fail. This is important for sentences about the past.

(27) Max arrived.

This sentence tells us that Max's arrival was situated entirely in the past, and thus is not going on any more at the present. The positive query

$$?Happens(e, t), t < now$$

expresses just the first part. The second part can only be expressed by the negative constraint, which is represented as

$$?Happens(e, now), \text{ fails}$$

Since the resolution process also accepts queries beginning with a negation we can reduce this negative query to the positive query

$$\neg Happens(e, now)$$

Since both positive and negative constraints are admitted and the latter are identified by the term *fails*, it is natural to introduce a similar term to flag the positive queries. We use *succeeds*. So the constraints contributed by (27) can be given as

$$?Happens(e, t), t < now, \neg Happens(e, now), \text{ succeeds}$$

We will say that an integrity constraint IC is *satisfiable* if it can be made to succeed in case it is positive, and can be made to fail in case it is negative.

3.5 Reification

In this section we will extend Constraint Logic Programming (CLP) with a reification component. This component makes it possible to associate a ‘res’ with each condition. In particular, it will enable us to associate with each formula of the form $HoldsAt(f, t)$ an entity that can be regarded as the state of the fluent f obtaining.⁸ The reification procedure is based on a method due to S. Feferman.

We will explain briefly how this works. For this purpose we will enrich the event calculus with a specialization of the theory of truth and abstraction in Feferman (1984).⁹

Consider the predicate $burn(x, y, t)$ where t is a parameter for time. Feferman’s system allows to form terms from this predicate in two different ways. The first possibility is to existentially bind t and construct the term $\exists t.burn[x, y, t]$. The square brackets are used here as a notational device to indicate that $\exists t.burn[x, y, t]$ is a term and not a predicate any more. The second possibility is to abstract over the temporal parameter and form the term $burn[x, y, \hat{t}]$. Informally $burn[x, y, \hat{t}]$ should be understood as the set of times at which $burn(x, y, t)$ is true. But note that $burn[x, y, \hat{t}]$ is a term and therefore denotes an object. Feferman’s system thus provides two different kinds of structured abstract objects. Intuitively we want to think of $\exists t.burn[x, y, t]$ as the event type corresponding to x ’s *burning of* y and of $burn[x, y, \hat{t}]$ as the fluent or state corresponding to x ’s *burning* y .¹⁰ However, nothing in the formal set up so far tells us that $\exists t.burn[x, y, t]$ is an event type and $burn[x, y, \hat{t}]$ is a fluent. In order to make sure that $burn[x, y, \hat{t}]$ behaves as a fluent $HoldsAt$ has to be turned into a real truth predicate. The following theorem from Feferman (1984) provides the necessary technical result.

Theorem 1 *Any system that is consistent – in the sense that it has a model – can be extended to a system with truth axioms.¹¹ The extension is conservative over the original system.*

For the special theory under discussion here we need just one truth axiom, which reads as follows:

$$HoldsAt(\phi[\hat{t}], s) \leftrightarrow \phi(s)$$

The specialization for $burn[x, y, \hat{t}]$ therefore is:

$$HoldsAt(burn[x, y, \hat{t}], s) \leftrightarrow burn(x, y, s)$$

This shows that $burn[x, y, \hat{t}]$ behaves like a fluent. Moreover, $\exists t.burn[x, y, t]$ cannot be substituted as an argument of the $HoldsAt$ -predicate, but it can be substituted as an argument of the $Happens$ -predicate. Hence, with regard to the axioms of the event calculus, abstract terms like $\exists t.burn[x, y, t]$ function as event types and terms like $burn[x, y, \hat{t}]$ as fluents.

To see what this process of reification adds to the representations developed so far, consider again sentence (24), here repeated as (28).

⁸Reification can be put to many other uses as well, but this is the one for which we need it here.

⁹For the most recent version of this theory see Feferman (2008).

¹⁰For an analysis of these different types of English gerunds see van Lambalgen and Hamm (2005), chapter 12.

¹¹A model for the event calculus was constructed in van Lambalgen and Hamm (2005).

(28) I have caught the flu.

The structure of this sentence was represented by the simple fluent *flu* in the derivation of Section 3.4. For the purposes of this section this representation was sufficient. However, we would like to have access to the internal structure of sentence (28) as well. For simplicity, we will assume that the personal pronoun *I* is represented by the individual constant *i*. Under this assumption, sentence (28) can be formalized as the structured fluent *flu*[*i*, *t*]. This representation allows us to have access to the subject of the sentence. We will see in a moment that the possibility to structure fluent and event type objects is an indispensable prerequisite for the transformation of DRSs to integrity constraints.

3.6 Event Calculus and DRT

In this section we will outline the connection between Discourse Representation Theory and the Event Calculus with the simplest example from Hamm et al. (2006). Consider again sentence (29).

(29) Max arrived.

The DRS for this sentence is given in (30):

(30)	$m \ t \ e$
	$t < n$
	$e \subseteq t$
	$e: \text{arrive}(m)$

Since DRSs introduce existential presuppositions which have to be accommodated, integrity constraints are the appropriate means to represent their inferential potential. First we assume that the constant *m* and the predicate *arrive*(*x*, *t*) are given. This predicate will be used in its reified form. We use the first possibility for reification and derive the event type $\exists s. \text{arrive}[x, s]$.

It has often been observed that the simple past uttered out of the blue is infelicitous. This tense requires that the context provides additional information something like a ‘reference time’. We will represent the context here with a new fluent constant *f* and the clause *HoldsAt*(*f*, *t*). This constant can then be unified with further contextually given information.

The discourse referent *e* corresponds to $\exists s. \text{arrive}[x, s]$ and the condition $e: \text{arrive}(m)$ to the clause *Happens*($\exists s. \text{arrive}[m, s]$, *t*); *n* is set to *now* and *t* correspond to the context fluent *f*. In this way, the DRS for sentence (29) is turned into integrity constraint (31).

(31) $?HoldsAt((f, t), t), Happens(\exists s. \text{arrive}[m, s], t), t < now,$
 $\neg Happens(\exists s. \text{arrive}[m, s], now), \text{ succeeds}$

Since in the rest of this paper we will not be concerned with tense, we will simplify integrity constraints as much as possible. First we will drop the clause for the context fluent and the negative integrity constraint. Moreover, we will ignore the internal structure of fluent and events whenever this does not lead to confusion. For instance,

we will simply write e for $\exists s. arrive[m, s]$. Given these assumptions, integrity constraint (31) now reads:

(32) $?Happens(e, t), t < now, \text{ succeeds}$

This is certainly not completely adequate, but the topics to be discussed in the rest of this paper will not be affected by this simplification.

3.7 Scenarios and Hierarchical Planning

In this section we will start our discussion of more complex examples. The first one is the verb *absperren* ('cordon off') and the derived *ung*-nominal *Absperrung* ('cordon-off', 'barrier') respectively the NP *die Absperrung des Rathauses* ('the cordoning-off of the town hall'). Let us start with the accomplishment verb *absperren* ('cordon off'). According to van Lambalgen and Hamm (2005), every Aktionsart determines a specific 'scenario'. A scenario should be considered as a local program in contrast to the global program given by the axioms of the event calculus. These local programs provide the additional information for the Aktionsarten in question, in this case the information specific to accomplishments. In order to formulate this local program we need the following terms in the language of the event calculus.

- *construct* is an activity fluent.
- *barrier(x)* is a parameterized fluent indicating the construction state x of the barrier.
- m a real constant indicating the construction stage at which the barrier is considered finished. Thus *barrier(m)* may be considered the completed object.
- 0 is a real constant indicating the state at which the construction of the barrier starts.
- *start* is an event initiating constructing.
- *finish* is the event terminating the constructing activity when the barrier is finished.
- a fluent *accessible(r)* representing the state in which the town hall is accessible, where r is a constant denoting the town hall.
- g is a function relating the constructing activity to the construction stage of the barrier. To keep things simple we assume that g is monotone increasing.

These terms allow us to write the following set of clauses as one possible scenario for the accomplishment verb *absperren* ('cordon off').

- (33) a. *Initially(barrier(0))*
 b. *Initially(accessible(r))*
 c. $HoldsAt(barrier(m), t) \wedge HoldsAt(construct, t) \rightarrow Happens(finish, t)$

- d. *Initiates*(*start*, *construct*, *t*)
- e. *Initiates*(*finish*, *barrier*(*m*), *t*)
- f. *Terminates*(*finish*, *accessible*(*r*), *t*)
- g. *Terminates*(*finish*, *construct*, *t*)
- h. *HoldsAt*(*barrier*(*x*), *t*) \rightarrow
 Trajectory(*construct*, *t*, *barrier*(*x* + *g*(*d*)), *d*)
- i. *Releases*(*start*, *barrier*(0), *t*)

The scenarios for the Aktionsarten are not determined uniquely, but every scenario is required to include information specific to the Aktionsart of the verb under consideration. For the example above, this means that every scenario has to include clauses about the starting and finishing events, about the activity *constructing*, the state *accessible*(*r*), and clauses relating this activity to the state of the partial object *barrier*(*x*). Together with the axioms of the event calculus these clauses determine inferences triggered by the Aktionsart of *absperren* ('cordon off') and the lexical content of this verb.

We are primarily interested in the NP *Absperrung des Rathauses* ('cordonning-off of the town hall'). We will first concentrate on the event reading; the result state reading will be discussed later.

The first step consists in establishing an event type corresponding to the event reading of *Absperrung des Rathauses*. Using Feferman coding we can transform the predicate *absperren*(*x*, *r*, *t*) into the abstract event type $a = \exists t. \text{absperre}[x, r, t]$, in which *r* is an individual constant representing the town hall. This is a possible denotation for *Absperrung des Rathauses* ('cordonning-off of the town hall'), but so far this event type is not related to the verb from which *Absperrung* is derived.

In order to link the nominal to the semantics of the base verb given by its scenario, we introduce an *event definition* by hierarchical planning. The intuitive idea is that hierarchical planning allows to abstract from certain details of the verb's eventuality while maintaining the most important features of the verb's time profile. Formally hierarchical planning is given by program clauses defining an event occurring in the head atom of a clause. We will use the following definition.

Definition 1 Suppose a scenario for the fluent *f* is given. In the context of this scenario, the event *e* is defined by hierarchical planning using *f* if the following holds:

$$\text{Happens}(\text{start}_f, s) \wedge s < w \wedge \text{HoldsAt}(f, w) \rightarrow \text{Happens}(e, w)$$

In the special case considered here Definition 1 gives:

$$\text{Happens}(\text{start}_{\text{construct}}, s) \wedge s < w \wedge \text{HoldsAt}(\text{construct}, w) \rightarrow \text{Happens}(\exists t. \text{absperre}[x, r, t], w)$$

We will simply write *a* for the event type $\exists t. \text{absperre}[x, r, t]$ defined in this way. We thus have a denotation for the event reading of the NP *die Absperrung des Rathauses* ('the cordonning-off of the town hall'). Next, we have to consider the verbal contexts of this NP. The first verb is *behindern* ('hamper') in (34).

- (34) *Die Absperrung des Rathauses wurde behindert.*
 'The cordonning-off of the town hall was hampered.'

Let us assume that an event type valued function *behindern* ('hamper') is given. Then we arrive at the following integrity constraint:¹²

- (35) ? – *Happens(a, t), Happens(behindern(a), t), t < now, succeeds*

This is certainly too simple. An event type like *behindern* ('hamper') requires its own scenario. We think that for *behindern* ('hamper') to be applied successfully, the activity of cordoning-off must have been initiated and *behindern* ('hamper') supplies the additional information that this activity does not proceed in a smooth way. However, we think that although the activity of cordoning-off is hampered in more or less serious ways, nevertheless the goal – the sealing off of the town hall – will eventually be achieved (non-monotonically).

This changes when one considers our next verb, *verhindern* ('prevent'). In (36) the result state – the town hall being cordoned off – is clearly not achieved.

- (36) *Die Absperrung des Rathauses wurde verhindert.*
'The cordoning-off of-the town hall was prevented.'

This is adequately represented by integrity constraint (37). Since according to (37) *finish* is not allowed to happen, we cannot derive *HoldsAt(barrier(m), s)* and $\neg \text{HoldsAt}(\text{accessible}(r), s)$ for some time *s*.

- (37) ? – *Happens(a, t), Happens(finish, t), t < now, fails*

4 Anaphora resolution

In this Section, we first show how the above theoretical considerations apply to the crucial example (5) in Section 2 (to be repeated below). Next, we go on to point at some consequences of our approach for formal discourse semantics in general.

4.1 Reconstructing anaphoric relations

In this section, we will show why anaphora resolution is possible in (38-a) and explain why it is blocked in (38-b) in a slightly more formal way.

- (38) a. *Die Absperrung des Rathauses wurde vorgestern von Demonstranten behindert. Wegen anhaltender Unruhen wird sie auch heute aufrecht erhalten.*
'The cordoning-off of the town hall was hampered by protesters the day before yesterday. Due to continuing unrest, it is maintained today as well.'
- b. *#Die Absperrung des Rathauses wurde vorgestern von Demonstranten verhindert. Wegen anhaltender Unruhen wird sie auch heute aufrecht erhalten.*
'The cordoning-off of the town hall was prevented by protesters the day before yesterday. Due to continuing unrest, it is maintained today as well.'

¹²This is a simplification: The scenario for *behindern* ('hamper') plus hierarchical planning triggered by past tense introduces an event type *e* which has to be unified with *a*.

Clearly, in (38-a) the pronoun *sie* ('it') in the second sentence refers to the target state of being cordoned-off which may be inferred from the first sentence. The impossibility of such an interpretation – this is what “#” is meant to signal – suggests that due to the meaning of the verb *verhindern* ('prevent'), such a target state is not available in (38-b).

We will simplify the formalisation as far as possible, concentrating only on what is essential for anaphora resolution. The first sentence of (38-a) is represented by integrity constraint (35), i.e. by

? – *Happens(a, t), Happens(behindern(a), t), t < now, succeeds*

The important part of the second sentence is the one containing the verb *aufrecht erhalten* ('sustain') and the pronoun *sie* ('it'). Choosing a fluent variable *s* – *s* being mnemonic for state – and a fluent-valued function *aufrecht-erhalten* we formalise this part as:

? – *HoldsAt(aufrecht-erhalten(s), s), s < now, succeeds*

The whole little discourse in (38) is thus represented by the integrity constraint in (39).

(39) ? – *Happens(a, t), Happens(behindern(a), t), HoldsAt(aufrecht-erhalten(s), t), t < now, succeeds*

Since *aufrecht-erhalten* requires a state – a special type of fluent – as an argument, *s* cannot be unified with event type *a*. This is the formal version of the already explained type mismatch. Therefore it seems that anaphora resolution is blocked in this case.

We will now show that it is nevertheless possible to reconstruct an anaphoric relation by using information contained in the scenario for the verb *absperren* ('cordon off'). Since *aufrecht-erhalten* selects the (result) state reading of the NP *die Absperrung der Botschaft* ('the cordoning-off of the town hall') we first have to introduce a denotation for this NP that represents this reading. Note that we assume that *behindern* ('hamper') allows – perhaps later than planned – *finish* to happen (non-monotonically). From this we can derive via resolution $\neg \text{HoldsAt}(\text{accessible}(r), w)$ for some time *w*. Using Ferferman coding we can reify this formula and obtain the fluent object $\neg \text{HoldsAt}[\text{accessible}(r), \hat{w}]$. We take this object as the denotation of the (result) state reading of the NP *die Absperrung des Rathauses*.¹³ Now we can compute the anaphoric relation between the pronoun *sie* ('it') and its antecedent *die Absperrung des Rathauses* ('the cordoning-off of the town hall') by unifying *s* – representing *sie* ('it') – with $\neg \text{HoldsAt}[\text{accessible}(r), \hat{w}]$. Writing *inaccessible* for $\neg \text{HoldsAt}[\text{accessible}(r), \hat{w}]$ we arrive at the following representation for discourse (38-a):

¹³This is justified in Hamm and Kamp (2009).

- (40) ? – *Happens(a, t), Happens(behindern(a), t),*
*HoldsAt(aufrecht-erhalten(inaccessible), t), t < now, succeeds*¹⁴

Summing up, we reconstructed the anaphoric relationship between the pronoun *sie* and the antecedent NP *die Absperrung des Rathauses* in three steps. First, we derived the formula $\neg \text{HoldsAt}(\text{accessible}(r), w)$ by resolution using information from the scenarios of the verbs *absperren* and *behindern*. Second, we transformed this formula into the term $\neg \text{HoldsAt}[\text{accessible}(r), \hat{w}] = \text{inaccessible}$ and third, we unified *s* with this term. In the minimal model this is the only possibility because there are no other result states, but in richer models there may very well be more than just one result state. In this case, *s* could be freely unified with these other states, but this would result in a deictic reading for the second sentence of example (38-a).

Consider now the mini-discourse in (38-b), where the only difference from (38-a) is that *behindern* ('hamper') in (38-a) has been replaced by *verhindern* ('prevent'). Combining integrity constraint (37) with the representation of the second sentence of example (38-b), we get integrity constraint (41) for (38-b).

- (41) ? – *Happens(a, t), Happens(finish, t), t < now, fails,*
HoldsAt(aufrecht-erhalten(s), t), t < now, succeeds

Since this integrity constraint forbids *finish* to happen for any time *t* we are no longer in a position to derive $\neg \text{HoldsAt}(\text{accessible}(r), t)$. But then we cannot unify *s* with the reified version of $\neg \text{HoldsAt}(\text{accessible}(r), t)$ and thus the resolution of the pronoun *sie* ('it') with the NP *die Absperrung des Rathauses* is correctly blocked. As mentioned in Section 2, is it hard to see how applying coercion could account for the difference between (38-a) and (38-b), given that *behindern* ('hamper') and *verhindern* ('prevent') both select for arguments of the same (event) type.

Note that the possibility to reconstruct the anaphoric relation in (38-a) depends on the fact that $\neg \text{HoldsAt}(\text{accessible}(r), t)$ contains a temporal parameter. This is crucial for our next example involving the object reading of *die Absperrung des Rathauses* – repeated here as (42).

- (42) #*Die Absperrung wurde heute verstärkt. Sie war am Vortag massiv behindert worden.*
 'The barrier was fortified today. It [the cordoning-off] had been massively hampered the day before.'

In example (42), the pronoun *sie* ('it') cannot refer back to *Absperrung* ('barrier'). As mentioned in Section 2, this is somewhat surprising for a "lazy" approach, in which disambiguation does not involve conjunct or disjunct deletion of underspecified representations. We will only briefly indicate how we can account for the inacceptability

¹⁴A more realistic constraint would be:

$$\begin{aligned} &? - \text{Happens}(a, t), \text{Happens}(\text{behindern}(a), t), \\ &\text{HoldsAt}(\text{aufrecht-erhalten}(\text{inaccessible}), t'), t < t' < \text{now}, \text{succeeds} \end{aligned}$$

which requires that the state *inaccessible* temporally succeeds the *disturb* event. The derivation of the temporal ordering of eventualities is however beyond the scope of this paper. The interested reader is advised to consult van Lambalgen and Hamm (2005), in particular chapter 9.

of the sequence in (42).

To fortify a barrier presupposes that a barrier already existed. Let us represent this state of the material object which is established by the cordoning-off activity by means of the fluent *barrier(m)* which is contained in the scenario of the verb *absperren* ('cordon off'). This fluent holds after the *finish* event happened. It corresponds to a completed barrier. The denotation for the object reading of the noun *Absperrung* ('barrier') can now be given by (43).

(43) *Absperrung(barrier(m))*

Note that this formula does not contain a temporal parameter. Therefore, the three step procedure for reconstructing anaphoric relations introduced above cannot be applied in such cases. This explains why the result state pronoun *sie* ('it') in example (42) cannot refer back to the DP *die Absperrung* ('the barrier').

4.2 Formal Discourse Semantics

In all classical theories of formal discourse semantics it was assumed that certain logical operators like negation, disjunction and universal quantification – in contrast to existential quantification and conjunction – block anaphora resolution.¹⁵ These operators were considered as static. For instance, in early DRT the accessibility relation – a geometrical relation on the DRS level – caused discourse referents contained in a negated DRS to be inaccessible. In Dynamic Predicate Logic, the semantics of negation as a test did not allow scope extension of the existential quantifier as it did in non-negated sentences. This accounted for the grammaticality distribution in (44).

- (44) a. A man walked in the park. He whistled.
b. #No man walked in the park. He whistled.

However, there are cases for which this prediction is too strong:

- (45) It is not the case that John does not own a car. It is red and it is parked in front of the house.

For this reason, Groenendijk and Stokhof (1990) introduce a dynamic negation which restores the binding potential of the double negated sentence (44). This kind of negation was improved among others by Dekker (1993).

The following examples due to Rainer Bäuerle (1988), however, show that the presence or absence of negation is not the only factor determining anaphora resolution. Rather, the interaction of negation with certain types of verbs is crucial. Consider first the examples in (46), which are coherent with the predictions of the early formal discourse theories.

- (46) a. *Hans schrieb einen Brief. Das dauerte zwei Stunden.*
Hans wrote a letter. It lasted two hours.
'Hans wrote a letter. This took him two hours.'

¹⁵In this section we will only consider negation.

- b. #*Hans schrieb keinen Brief. Das dauerte zwei Stunden*
 Hans wrote no letter. It lasted two hours.
 ‘Hans did not write a letter. This took him two hours.’

A variation of the second sentence, however, shows that this is in general not correct.

- (47) a. *Hans schrieb einen Brief. Das überraschte uns alle.*
 Hans wrote a letter. It surprised us all.
 ‘Hans wrote a letter. We were all surprised by that.’
 b. *Hans schrieb keinen Brief. Das überraschte uns alle.*
 Hans wrote no letter. It surprised us all.
 ‘Hans did not write a letter. We were all surprised by that.’

We will now show that the proposed formalism allows us to account for this grammaticality distribution as well. Again, we will only give those formal details which are essential for anaphora resolution. Let us first consider the examples in (46). Let e be the event type representing *Hans writing a letter*. The first sentence of (46-a) is then formalised as

$$? - \text{Happens}(e, t), t < \text{now}, \text{succeeds}$$

and the second as (with e' as a variable representing the pronoun *das* (‘it’)).

$$?\text{Happens}(\text{dauern}(e'), t), t < \text{now}, t = 2 \text{ hours}, \text{succeeds}$$

Together they represent the discourse in (46-a).

- (48) $? - \text{Happens}(e, t), t < \text{now}, \text{Happens}(\text{dauern}(e'), t),$
 $t = 2 \text{ hours}, \text{succeeds}$ ¹⁶

In the minimal model computed by integrity constraint (48), e' and e will be unified. Thus, *das* (‘it’) refers to the event of *Hans writing a letter*. In non-minimal models, e' may be unified with other event types. This will give the deictic reading again.

The integrity constraint for the first sentence of example (46-b) is given as in (49):

- (49) $?\text{Happens}(e, t), t < \text{now}, \text{fails}$

The integrity constraint for the second sentence is the same as the one for (46-a). Integrity constraint (49) computes a model in which there is no event type with the required property, i.e. of Hans writing a letter. Therefore, *das* (‘it’) cannot be unified with such an event type. This explains the grammaticality distribution in (46).

We will now consider the examples in (47-a). First we have to determine the sort of arguments *überraschen* (‘surprise’) requires. We will assume here that this verb takes only facts as arguments. In case that *überraschen* (‘surprise’) turns out to be ambiguous between an event and a fact reading, a slightly more involved argument will explain the facts in (47-a) too.

The first parts of the sentences in (47-a) are of course formalised as above. The second part gives rise to the following integrity constraint:

¹⁶The same proviso as in footnote 14 concerning the derivation of the temporal ordering of eventualities applies here as well.

(50) $? - \text{HoldsAt}(\text{surprise}(f), t), t < \text{now}, \text{succeeds}$

Here, we are facing a type mismatch again. The variable f cannot be unified with event e provided by the first sentence since e and f belong to different sorts.

However, we can reify the predicate $\text{Happens}(e, t)$ occurring in the integrity constraint for the first sentence and thereby get: $\text{Happens}[e, \hat{t}]$. Intuitively one can consider this term as denoting the fact that event e occurred. Unifying f with this term results in:

(51) $? - \text{HoldsAt}(\text{surprise}(\text{Happens}[e, \hat{t}]), t), t < \text{now}, \text{succeeds}$

This means that the fact that Hans wrote a letter surprised us. Let us now consider example (47-b). The integrity constraint for the first sentence is:

$$? - \text{Happens}(e, t), t < \text{now}, \text{fails}$$

An integrity constraint fails if and only if its negation succeeds. Therefore, we get the following equivalent constraint

$$? - \neg \text{Happens}(e, t) \ t < \text{now}, \text{succeeds}$$

Applying reification to the Happens -part of this constraint we can derive the term $\neg \text{Happens}[e, \hat{t}]$. Since this is a term of the same sort as f , it is possible to unify f with $\neg \text{Happens}[e, \hat{t}]$. The result is:

$$? \text{HoldsAt}(\text{surprise}(\neg \text{Happens}[e, \hat{t}]), t), t < \text{now}, \text{succeeds}$$

The formula says that the fact that Hans didn't write a letter surprised us. This shows that we get the correct results for the Bäuerle examples in a completely systematic way too.

5 Conclusion and Outlook

We argued that disambiguation may be non-monotonic in nature. We discussed examples of anaphora resolution involving a type conflict between anaphora and disambiguated antecedents. Since the anaphora picks up a reading which was discarded for the antecedent, we apply a process of reconstruction to the antecedent to resolve the type mismatch. We refer to this process as *reambiguation*.

Future work needs to address the generality and complexity of such reconstruction processes. For instance, we argued that the resolution of the anaphora in example (38) is achieved by a more complex computations than those involved in the analysis of the examples in Section 4.2. However, (38) is certainly not the most complicated case one has to face. Although the reconstruction process for the following example is beyond the scope of this paper, we will nevertheless sketch a possible analysis in an informal way.

- (52) *Auf Gemarkung Schönau bei Heidelberg wurde ein toter Fuchs gefunden, in district Schönau at Heidelberg was a dead fox found, der Tollwut hatte. Deswegen wurde der Bereich nördlich des Neckars which rabies had. For this reason was the area north of the Neckar östlich der Bundesstraße zum wildtollwutgefährdeten Bezirk erklärt. east of the federal highway to the wild-rabies-endangered area declared. 'In the district of Schönau a fox was found which had died from canine madness. For this reason, the territory which is north of the Neckar and to the east of the federal highway was declared a wildlife rabies high-risk area.'*

The discourse particle *deswegen* (for this reason) introduces a causal¹⁷ anaphoric relation between the first and the second sentence. Example (52) is informative about the effect of the cause – namely the declaration of the territory north of the Neckar and east of the federal highway as a wildlife rabies high-risk area – but is rather vague concerning the reason for this effect.

Let us now assume that *deswegen* introduces a causal relation $cause(\phi, \psi)$ where ψ (the effect) is given. Then an appropriate integrity constraint should trigger an abductive reasoning process which reconstructs the cause of the given effect. This is similar to the examples considered in the body of the text. But in the case of sentence (52) an additional complication is involved. Given only (52), the cause and therefore the anaphoric relation to be reconstructed is not unique. Many facts are possible causes for ψ in this case; for instance *that a dead fox was found* or *that a dead fox which had rabies was found* or *that a dead fox which had rabies was found in the district of Schönau*. Of course further context may rule out some of these possibilities but sentence (52) is rather uninformative in this regard. Therefore, a formally precise analysis of such examples requires techniques which are beyond those introduced in this paper.

A further generalization of the approach to anaphora resolution argued for in this paper necessitates maps which correspond to dot objects discussed by Pustejovsky (1995):

- (53) *Jonathan Strout hat das Buch geschrieben, es hat 539 Seiten und ist 2004 im Jonathan Strout has the book written, it has 539 pages and is 2004 in the Bertelsmann Verlag erschienen. Bertelsmann publishing house appeared 'Jonathan Strout wrote the book, it has 539 pages and was published by Bertelsmann.'*

In order to resolve the anaphora *es* ('it') in example (53) a function mapping the content denotation of *Buch* ('book') to the physical manifestation reading of this noun is required.

¹⁷ *Deswegen* is composed of the anaphoric element *des-* and the (factively) causal preposition *wegen*. For an extensive investigation of causality expressed by means of prepositional phrases (exemplified by the German preposition *durch*) the reader is referred to Solstad (2007). In Solstad (2010) a DRT analysis of the factively causal *because of* is presented, which is by and large equivalent to its German counterpart *wegen*.

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Fritz Hamm and Torgrim Solstad
 Institute for Natural Language Processing,
 University of Stuttgart
 {fritz,torgrim}@ims.uni-stuttgart.de

The Complementation of Raising and Control Verbs in Mauritian

Fabiola Henri & Frédéric Laurens*

1 Introduction

This paper reviews the categorial status of the complement of raising and control predicates and provides another line of argument in favor of a phrasal analysis (Bresnan, 1982) based on data from Mauritian, a French-based Creole. In particular, we show that clauses and complements of raising and control predicates can be distinguished based on morphological and syntactic properties available in the language. Mauritian shows three patterns of complementation occurring with raising and control predicates. The first two involve complements with an unexpressed subject whose interpretation is made possible by the properties of the raising or control predicate (1-a). These types of complements constitute the most widespread pattern of complementation associated with raising and control predicates in Mauritian (1-b)-(1-c). Interestingly, these complements do not show clausal properties.

- (1) a. John wants [to go].
b. Zan le [ale].
John want.SF [go]
John wants to go.
c. Zan inn kontign [aprann].
John PERF continue.SF study
John has continued to study.

The second pattern of complementation is found with modal verbs, a particular type of raising verb (2). Unlike other raising and control predicates, they allow for complements marked by TMA markers.

- (2) Zan paret inn vini.
John seem.SF PERF come.LF
John seems to have come.

The third pattern of complementation is found with a small class of control verbs expressing intentions (3). These verbs select for complements marked by the comple-

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mentizer *pou*. The complement itself can have an optional pronominal subject. Control with overt pronouns has been observed in several languages like for example in Serbo-Croatian (Zec, 1987), Halkomelem Salish (Hukari and Levine, 1995) or Persian (Karimi, 2008) to name but a few. This is expected given the anaphoric nature of controlled arguments.

- (3) *Zan_i pans pou (li_i) vini.*
 John think.SF COMP 3SG come.LF
 John thinks about coming.

From a theoretical point of view, Mauritian data provide a strong support for a categorical distinction between clauses on one side and complements of raising and control predicates on the other, in particular complements which have often been analyzed as clauses (§(3)). The distinction is motivated both syntactically and morphologically (§2). And because Mauritian allows for both verbless clauses and subjectless clauses, neither a small clause analysis nor an analysis based on the presence or absence of a subject constituent will be sufficient to capture the difference between clauses and non-clauses (especially so-called open complements (Bresnan, 1982)). Instead, we show that the difference between clausal complements and the complements of raising and control verbs can elegantly be captured within a constructional-based view (Sag, 2010) and a theory of marking (Tseng, 2001).

section Raising and control in a cross-linguistic perspective

In languages such as English or French, raising and control verbs can be distinguished from other verb types on the basis of the form of their complement. Control verbs have an infinitival complement while raising verbs have either an infinitival complement or a non-verbal predicative complement.

Several analyses of the complementation of raising and control verbs have been proposed. They roughly fall into three categories. Complements of raising and control verbs have been either analyzed as clauses (Chomsky, 1981), small clauses (Stowell, 1981, 1983) or non-clausal open complements (Bresnan, 1982; Pollard and Sag, 1994). The arguments for each of these analyses rely on the relative importance and form given to (I) a theory of the syntax-semantics interface, (II) a theory of locality of subcategorization, and (III) a theory of constituency.

The desire for a strict isomorphism between syntactic and semantic representations is the main claim behind the clausal analysis. Since complements of control and raising verbs convey sorts of meanings which are otherwise conveyed by clauses (i.e. propositions, questions or outcomes), they should be analyzed as clauses whenever possible. The small clause analysis is concerned with locality of subcategorization and tries to maintain a strict isomorphism at the same time. It successfully accounts for grammaticality contrasts such as (4) which can only be modeled successfully if the subcategorizing verb has access to the category of its complement (here a NP/DP).

- (4) a. I expect that island *(to be) a good vacation spot.
 b. I consider that island (to be) a good vacation spot.

The open complement analysis is concerned with constituency and locality of subcategorization and explicitly rejects strict isomorphism as a result. One of the arguments of Bresnan (1982) was the fact that a sequence of two complements in the case

of object raising and control predicates doesn't form a constituent as can be shown with heavy NP shift in English (5).

- (5) I will consider [to be fools] in the weeks ahead [all those who drop this course] .

We will show that while Mauritian data can be brought in accordance with the open complement analysis, both morphological data on the control or raising verb and the existence of genuine verbless clauses put up a big challenge for both the clause and small clause analysis.

2 Constraints on verb forms

Mauritian verbs exhibit a paradigm with two cells, the short form and the long form respectively (henceforth SF and LF), with 30% showing a syncretic form. These two forms have been described as expressing a rather complex inflectional system (Henri, 2010; Bonami and Henri, 2010).

SHORT FORM	LONG FORM	TRANSLATION
pans	panse	<i>to think</i>
kontign	kontigne	<i>to continue</i>
vinn	vini	<i>to come</i>
konn	kone	<i>to know</i>
briye	briy	<i>to glow</i>
frize	friz	<i>to curl</i>
vande	vann	<i>to sell</i>
fane	fann	<i>to spread</i>

Table 1: Alternating verbs

SYNCRETIC FORM	TRANSLATION
le	<i>to want</i>
expekt	<i>to expect</i>
fer	<i>to make</i>
paret	<i>to seem</i>
briye	<i>to mix</i>
friz	<i>to freeze</i>
fann	<i>to chop/split</i>

Table 2: Non-alternating verbs

Obviously, phonology alone is not sufficient to explain the alternation facts since verbs like *briye* 'to glow' vs *briye* 'to mix' or *fann* 'to split' vs *fann* 'to spread' differ morphologically with respect to alternation although they show an identical phonological LF or SF respectively. But more interestingly, verb form alternation is an exponent of a systematic morphosyntactic distinction in the language. Unlike French, its superstrate, Mauritian verbs neither inflect for tense, mood and aspect nor for person, number and

gender. Thus the finiteness distinction available in languages such as French or English is non-existent in Mauritian. As a result, there is no variation in form associated to the function of the verb, as exemplified by the verb *sante* in (6).

- (6) a. [Zan sante]. (Root clause)
 John sing.LF
 ‘*John sings.*’
 b. Zan kontign [sante]. (Complement of a raising verb)
 John continue.SF sing.LF
 ‘*John continues to sing.*’
 c. Zan le [sante]. (Complement of a control verb)
 John want.SF sing.LF
 ‘*John wants to sing.*’
 d. Zan kapav [sante]. (Complement of a modal verb)
 Zan can.SF sing.LF
 ‘*John can sing.*’

However, verb form is sensitive to phrase-structural contexts: As shown in the following examples, the SF appears when the verb is followed by a canonical non-clausal complement.

- (7) a. Mari inn {trouv | *trouve} so mama.
 Mari PERF {find.SF | find.LF} 3SG.POSS mother
 ‘*Mary has found her mother.*’
 b. Mari pe {asiz | *asize} lor sez.
 Mary PROG {sit.SF | sit.LF} on chair
 ‘*Mary is sitting on a chair.*’
 c. Mari ti {res | *reste} malad.
 Mary PST {remain.SF | remain.LF} sick
 ‘*Mary remained sick.*’

Note also that Mauritian, like Italian or Chichewa, is a surface unaccusativity language in that the argument of an intransitive verb like *arive* can appear overtly in the object position in surface constituent structure (Bresnan and Zaenen, 1990). Interestingly, these arguments trigger the SF, thus arguing that they are analyzed as complements (8-a). Adjuncts on the other hand do not trigger the SF (8-b).

- (8) a. Inn {ariv | *arive} enn aksidan.
 PERF {happen.SF | happen.LF} IND accident
 ‘*An accident has happened.*’
 b. Mari ti {*vinn | vini} yer.
 Mary PST {come.SF | come.LF} yesterday
 ‘*Mary came yesterday.*’

The LF appears when the verb has zero (9-a) or an extracted complement (9-b) or when it is immediately followed by a clausal complement (9-c).

- (9) a. Mari ti {*vinn | vini} .
 Mary PST {come.SF | come.LF}

- 'Mary came.'*
- b. Ki Mari inn { *trouv | *trouve }?
 What Mary PERF { see.SF | see.LF }
'What did Mary see?'
- c. Mari { *trouv | trouve } ki so mama pa bien.
 Mari { find.SF | find.LF } that 3SG.POSS mother not well
'Mary finds that her mother does not look well.'

The relative order of non-clausal and clausal complements is crucial. For instance, if a verb has both a phrasal and a clausal complement, adjacency of the phrasal complement to the verb triggers the SF. On the other hand, when the phrasal complement is not adjacent to the verb, the LF surfaces (10-b).

- (10) a. Mari ti { demann | *demande } ar tou dimounn kiler la.
 Mary PST { ask.SF | ask.LF } to every people what_time now
'Mary asked everybody what time it was.'
- b. Mari ti { *demann | demande } kiler la ar tou dimounn.
 Mary PST { ask.SF | ask.LF } what_time now to every people
'Mary asked everybody what time it was.'

Finally, verb form alternation is also sensitive to a specific discourse phenomenon. If the verb carries Verum Focus, it has to be a LF, irrespective of whether it is followed by a complement or not (11-b).

- (11) a. Mo pe al kwi kari poul parski Zan kontan manz kari
 1SG PROG go.LF cook.SF curry chicken because John love eat.SF curry
 poul.
 chicken
'I am going to cook chicken curry because John likes to eat chicken curry.'
- b. Be non. Zan pa MANZE kari poul.
 Well no. John not eat.LF curry chicken
'Well no. John doesn't EAT chicken curry.'

The morphological property of Mauritian verbs provides a diagnostic for the categorial distinction between clauses and non-clauses. Interestingly, this diagnostic is not internal to the complement but directly involves the subcategorizing verb.

3 Raising and control verbs

Typical raising and control structures can be distinguished at least on the basis of semantic properties (Bresnan, 1982; Jackendoff and Culicover, 2003): unlike control verbs, raising verbs take one complement or subject which is not a semantic argument of this verb. Raising verbs differ from control verbs in that they allow for non-referential external arguments. Moreover, with raising verbs, the complement can be passivized without a change in meaning of the resulting clause.

From a syntactic point of view, raising and control verbs are not always distinguished but their complementation pattern can be divided into two classes: subject

raising or control verbs and object raising or control verbs (Pollard and Sag, 1994), a difference which is exemplified in (12) and (13) respectively.

- (12) a. Zan kontign sante. (Subject raising verb)
 John continue.SF sing.LF
'John continues to sing.'
- b. Zan pe get Mari dormi. (Object raising verb)
 John PROG watch.SF Mary sleep.LF
'John is watching Mary sleep.'
- (13) a. Zan le sante. (Subject control verb)
 John want.SF sing.LF
'John wants to sing.'
- b. Zan pe anpes Mari dormi. (Object raising verb)
 John PROG prevent.SF Mary sleep.LF
'John is preventing Mary from sleeping.'

Based on Pollard and Sag (1991) who provide a semantic classification of control verbs explaining their complementation patterns, we provide a similar classification for Mauritian for both raising and control verbs.

Perception verbs	santi, gete, tande, trouve, remarke ... <i>feel, see/look, hear, see, notice ...</i>
Aspectual verbs	kontigne, komanse, arete, ... <i>continue, start, stop, ...</i>
Attributive verbs	res, vinn, ... <i>remain, become, ...</i>
influence verbs	lese, ... <i>let, ...</i>
Modal verbs	paret, kapav, oredi, bizin, devet, dwatet. <i>seem, can, should have, must, must, must</i>

Table 3: Raising verb classes in Mauritian

influence verbs	forse, fer, demande, ankouraze, anpese, ... <i>force, do/make, ask, encourage, prevent, ...</i>
commitment verbs	promet, aksepte, seye, refize, swazir, deside, propoze, ... <i>promise, accept, try, refuse, choose, decide, propose, ...</i>
orientation verbs	le, anvi, kontan, expekt, espere, ale, ... <i>want, wish, love, expect, hope, go, ...</i>
cognitive verbs	krwar, panse, bliye, kone, ... <i>believe, think, forget, know, ...</i>

Table 4: Control verb classes

Some verbs which function as raising or control predicates can also take a clausal complement. In that case, the difference is directly seen on the form of the verb. When the verb has an open complement (14), the SF shows up. Alternatively, when the verb has a clausal complement, the LF appears (15).

- (14) a. Zan { res | *reste } { dormi | malad | enn bon profeser | dan
John { remain.SF | remain.LF } { sleep.LF | sick | a good teacher | in
lalinn }.
moon }
John keeps {sleeping|on being sick|on being a good teacher|being in the
moon}.
- b. Zan inn { sey | *seye } { dormi | malad }.
John PERF { try.SF | try.LF } { sleep.LF|sick }
John has tried {to sleep|to be sick}.
- (15) a. { Trouve | *trouv }(ki) to pa fer zefor.
{ see.LF | see.SF } COMP 2SG NEG do.SF sports
It feels that you don't make any efforts.
- b. Zan {panse | *pans } (ki) mo malad.
John { think.LF | think.SF } 1SG sick
John thinks that I am sick}.

3.1 Clausal versus VP complements in Mauritian

The main diagnostic for clauses is that they do not trigger the SF. Since open complements do not trigger the LF, we argue in favor of a non-clausal analysis. In addition, clauses show other properties which discriminate them from non-clauses. Open complements never have a subject constituent (16-c) while clauses can (16-a)-(16-b).

- (16) a. Zan ti pe manze.
John PST PROG eat.LF
'John was eating.'
- b. Mo le (ki) to 'nn ale demin sa ler la.
1SG want.LF COMP 2SG PERF go.LF tomorrow DEM hour DET
'I want you to have left tomorrow at that time.'
- c. *Mo konn Mari danse.
1SG know.SF Mary PERF dance.LF

Clauses can have pro-drop subjects, both referential and nonreferential ones. However, the presence or absence of the complementizer *ki* has no impact on the grammaticality of subject drop. Structurally, *ki* clauses with subject-drop might look like raising and control constructions, specially when the complementizer *ki* is dropped. But they show a crucial difference: the main verb is LF when followed by a clause (17-b) and SF when followed by a VP (17-c).

- (17) a. Vann mang dan bazar.
sell.SF mango in market
'Mangoes are sold at the market.'
- b. Mo kone (ki) vann mang dan bazar.
1SG know.LF COMP sell.SF mango in market
'I know that mangoes are sold at the market.'
- c. Mo konn vann mang dan bazar.
1SG know.SF sell.SF mango in market
'I know how to sell mangoes at the market.'

Clauses can also host TMA markers, whether in root or in complement clauses and can be introduced by the sometimes optional complementizer *ki* (18-a)-(18-b).

- (18) a. Mo kone (ki) Zan inn ale.
 1SG know.LF COMP John PERF go.LF
'I know that John has gone.'
 b. Mo kone (ki) ti vann mang dan bazar.
 1SG know.LF COMP PST sell.SF mango in market
'I know that mangoes were sold at the market.'

Pou-marked complements are special in this respect. They can have a pronominal subject constituent but they pattern with open complements with respect to verb forms and TMA marking. While the complementizer *ki* is restricted to clauses ((19-a) versus (19-b)), this not true of the complementizer *pou* which is only found in VP complements ((20-a) versus (20-b)).

- (19) a. Mo kone (ki) Zan inn ale.
 1SG know.LF COMP John PERF go.LF
'I know that John has gone.'
 b. Zan_i pans (*ki) li_i vini.
 John think.SF COMP 3SG come.LF
'John thinks about coming.'
 (20) a. Mo kone (*pou) Zan inn ale.
 1SG know.LF COMP John PERF go.LF
'I know that John has gone.'
 b. Zan_i pans pou li_i vini.
 John think.SF COMP 3SG come.LF
'John thinks about coming.'

Henri and Abeillé (2007) show that there are constructions where the copula does not appear in Mauritian. In fact, the copula appears only in extracted contexts. Based on the behavior of TMA markers and negation, they show that these constructions are better accounted for as verbless constructions instead of resorting to an empty copula. These verbless clauses provide an additional cue to our argument. The main verb taking an embedded clause is insensitive to the category of its complement contrary to control and raising which constrain the type of category of their complement.

- (21) a. Mo kone (ki) Zan inn tonbe.
 1SG know.LF COMP John PERF fall.LF
'I know that John has fallen.'
 b. Mo kone (ki) Zan deor.
 1SG know.LF COMP John outside
'I know that John is outside.'
 (22) a. Mo'nn anpes Zan tonbe.
 1SG' PERF prevent.SF John fall.LF
'I prevented John from falling.'
 b. *Mo'nn anpes Zan deor.
 1SG' PERF prevent.SF John outside

3.2 Bare VP complements vs *Pou* complements

So far, we have examined bare VP complements of raising and control verbs. They differ from clauses in that they can neither host TMA markers, nor can they have a subject phrase nor be introduced by the complementizer *ki*. There is a particular class of control verbs, which we have dubbed intention verbs that select a VP complement introduced by the complementizer *pou*.

- (23) a. Zan { pans | *panse } pou vini.
 John { think.SF | think.LF } COMP come.
 ‘John thinks about coming.’
 b. *Zan { pans | panse } ti pou vini.
 John { think.SF | think.LF } PST COMP come.
 c. *Zan { pans | panse } pou pe vini.
 John { think.SF | think.LF } COMP PROG come.

Like bare VP complements, they trigger the SF of the verb and do not allow for TMA marking. But more interestingly, they allow for an optional controlled pronominal subject. The fact that it needs to be coreferent to the subject of the main verb supports a control analysis. *Pou* here is truly a complementizer rather than a preposition or the irrealis marker. Unlike the irrealis marker (25-a), the complementizer is linearized before the subject and negation (24-a).

- (24) a. Zan pans pou (li) pa vini.
 John think.SF COMP (3sg) NEG come.LF
 ‘John thinks that he will not come.’
 b. *Zan pans pa pou (li) vini.
 John think.SF NEG COMP (3sg) come.LF
 ‘John thinks that he will not come.’
 (25) a. Zan panse ki li pa pou vini.
 John think.LF COMP 3SG NEG IRR come.LF
 ‘John thinks about not coming.’
 b. *Zan panse ki li pou pa vini.
 John think.LF COMP 3SG IRR NEG come.LF
 ‘John thinks about not coming.’

It is not a preposition either since the VP cannot be pronominalized as *pou sa* (26).

- (26) Zan pans (*pou) sa.
 Zan think.SF PREP DEM
 John thinks so (=that he will come).

Note also that *pou* shares with the complementizer *ki* the ability of being sometimes optional (27-a). For instance, it seems that when the VP is negated, *pou* is obligatory (27-b). It is important to note that the presence of a subject constituent is only possible if the complementizer *pou* is present too (27-c).

- (27) a. Mo’nn pans (pou) vinn pran to nouvel.
 1SG’PERF think.SF come.SF take.SF 3SG.POSS news

- I thought about coming to catch up with you.
- b. Zan pans *(pou) pa vini.
John think.SF COMP (3sg) NEG come.LF
'John thinks that he will not come.'
- c. Zan pans *(pou) li vini.
John think.SF COMP (3sg) come.LF
'John thinks that he will come.'

4 Modal verbs

Modal verbs form a peculiar class of raising verbs and constitute a closed class of morphologically non-alternating verbs. Their distributional properties argue in favor of modals as verbs.

bizin	must (deontic, epistemic)
devet	must (deontic, epistemic)
dwatet	must (deontic, epistemic)
kapav	can (deontic, epistemic)
oredi	should (deontic, epistemic) - always used with TMA marker <i>ti</i>
paret	seem

Table 5: Modals

Since they show a syncretic LF, there is no way of distinguishing them from their adverbial homonyms. In Mauritian, root clauses cannot be marked by the complementizer *ki*. If modals were adverbs, the grammaticality of examples (28) could not be explained. With forms which are unambiguously adverbs like *kapavet* (28-c), they are ungrammatical. The only analysis available then is an analysis in which the modals are heads. Since modals can also appear alone with subject constituents, we analyze them as modal verbs rather than modal adverbs.

- (28) a. Bizin ki sakenn zwe so rol.
need.LF COMP each_one play.SF 3SG.POSS part
Lit. '(We) need that each one does his own job.'
- b. Paret ki to pa pe bien.
seem.LF COMP 2SG NEG PROG well
'It seems that you are not well.'
- c. { Kapav | *kapavet } ki Zan malad.
{ can.LF | perhaps } COMP John sick
'John may be sick.'

Moreover, they can be coordinated with other modals but not with adverbs (compare (29-a) with (29-b)). They also form a clause together with a subject (34) and can also appear as complements of control and raising verbs (31). Like other verbs they can host negation and so does the sequence following them (32).

- (29) a. Zan kapav e bizin travay.
John can.SF and must.SF work.LF

- 'John can and must work.'*
- b. *Zan kapavet e bizin travay.
John perhaps and must.SF work.LF
- (30) a. Speaker A: To pou kapav vini? (You can come?)
b. Speaker B: Mo panse (ki) mo kapav.
1SG think.LF COMP 1SG can.LF
'I think that I can.'
- (31) Mo le [kapav vini demin]_{VP}.
1SG want.SF [can.SF come.LF tomorrow]
'I want to be able to come tomorrow.'
- (32) Mo bizin pa paret malad.
1SG must.SF NEG seem.SF sick
'I need to not seem sick.'

Modals show properties of subject raising verbs but they differ from other subject raising verbs in that they allow TMA markers to appear after them (33-b). Only the TMA marker *ti* can never follow a modal. Note that insertion of modals or preverbal adverbs do not alterate the strict ordering shown by TMA marking and different orderings are correlated with different scope relations. Modals form a single clause with the TMA markers which precede and follow them (33-b).

- (33) a. Zan ti les (*pe) zot bwar.
John PST let.SF PROG 1SG.STF drink.LF
'John let them drink.'
- b. Zan paret (pe) les zot bwar.
John seem.SF PROG can.SF PROG sleep.LF
'John seemed to let them drink.'

Although such property could argue in favor of a clausal analysis of complements of modal verbs, their inability to take a *ki*-clause or a subject phrase in such a setting argues against such a position (34).

- (34) a. *Zan ti pe paret ki malad.
John PST PROG seem.SF COMP sick
- b. *Zan ti pe paret ki li malad.
John PST PROG seem.SF COMP 3SG sick

Table 6 summarizes the main properties of complement types described above.

TYPE	VERB FORM	TMA	SUBJECT	COMPLEMENTIZER
clause	LF	yes	yes	ki
open-complements				
- pou-marked VP	SF	no	yes	pou
- bare VP	SF	no	no	no
complement of modal	SF	yes	no	no

Table 6: Basic properties of complement types

5 TMA markers

Mauritian TMA markers form a closed class of five items with specific syntactic properties. They are listed in table (35).

(35)

Tense	Mood		Aspect	
PST	IRR	IND.IRR	PERF	PROG
ti	pou	ava / va / a	inn / finn	pe

TMA markers express tense, aspect and mood properties of events. Mood markers *ava* and *pou* are in complementary distribution as are aspect markers *inn* and *pe*. The absence of a TMA marker is meaningful. For instance, the absence of the tense marker *ti* will generally be associated with a non-past interpretation and the absence of mood markers with the realis interpretation (36-a)-(36-b). On the other hand, a progressive interpretation can be obtained without the progressive marker *pe* (36-a).

- (36)
- a. Mo vini.
1SG come.LF
I am coming/I (usually) come (habitual/progressive)
 - b. Zan sante.
Jean sing.LF
John (usually) sings (habitual/*progressive).

A clause can simultaneously contain TMA markers of all three classes. The relative order between TMA marker is strict. Recall that non-clauses do not allow for TMA marking (see section §3.1 above).

- (37) ti (tense) < pou/ava (mood) < pe/inn (aspect)

- (38)
- a. Mo mama ti pou pe travay sa ler la sili ti la
1SG.POSS mother PST IRR PROG work.LF DEM hour DEF if 3SG PST there
My mother would be working at this time if she was there.
 - b. Mo mama ti ava pe travay sipa ti met li deor
1SG.POSS mother PST IND.IRR PROG work.LF if NEG PST put.SF 3SG out
My mother would have been working if she hadn't been fired.
 - c. Li ti pou'nn fini manze si to ti fini kwi.
3SG PST IRR'PERF finish.SF eat.LF if 2SG PST finish.SF cook.LF
He/She would have finished eating if you had already cooked.
 - d. Mo ti ava'nn sorti si mo ti anvi
1SG PST IND.IRR'PERF go_out.LF if 1SG PST want.LF
I would have gone out if I wanted to.

We analyze TMA markers as markers. Markers have two defining properties. (I) They select the phrase they combine with. (II) The distributional properties of a phrase combined with a marker may be different from those of the same phrase without the marker. Thus they resemble heads but they also differ from them in one aspect. Subcategorization properties of heads need to access information about what a marker combines with while they do not need to access information about what the complement of a head is.

Markers such as the French complementizer *que* can introduce a clause whose head is an indicative or subjunctive verb form. When it introduces the clausal complement of a verb such as *vouloir*, it can only be followed by a subjunctive form (39-a)-(39-b). If it is analyzed as a head, this means that a verb subcategorizes for a property of the complement of its complement. This is never the case with non-markers. There is no verb *vouloir*₂ in French which subcategorizes for a verb which has a NP complement as opposed to a clausal complement (40-a)-(40-b).

- (39) a. Je veux [qu' il vienne].
1SG want.IND [COMP 3SG come.SUBJ]
'I want him to come.'
b. *Je veux [qu' il vient].
1SG want.IND [COMP 3SG come.IND]
'I want him to come.'
- (40) a. Je veux₂ [voir le film].
1SG want₂.IND [see.INF DEF movie]
'I want to see the movie.'
b. *Je veux₂ [voir où on va dormir].
1SG want₂.IND [see.INF where one go.IND sleep.INF]
'I want to see where we will sleep.'

Markers differ from adjuncts in that they never change the distribution of the phrase they combine with.

TMA markers are not affixes on verbs: TMA markers are not affixes on the word which follows them (Zwicky and Pullum, 1983). As affixes on verbs, they would be *unselective*. TMA markers can be followed by words of almost any category (nouns, verbs, adverbs, adjectives, determiners, other TMA markers) and almost any function (heads, modifiers, specifiers - but not subjects or complements because of their linearization properties).

- (41) Ti pou enn bon koumansman.
PST IRR IND good start
'It would have been a good start.'

Phonological evidence shows that TMA markers are clitics on the preceding word.

- (42) a. Mo pa'nn vini.
1SG NEG'PERF come.LF
'I haven't come.'
b. Mo'nn vini.
1SG'PERF come.LF
'I have come.'

Moreover, adverbs such as *fek* can appear between TMA markers and the head verb (43). TMA markers are not affixes on verbs: TMA markers are not affixes on verbs. As affixes, they would be unselective.

- (43) Mo ti fek vini.
 1SG PST just come.LF
'I had just come.'

TMA markers are not (raising) verbs: In Mauritian, the properties of TMA markers are very different from those of verbs and there is no syntactic generalization in support of an analysis of TMA markers as verbs.

First, Mauritian verbs may function as the head of a clause or as the head of an open complement with the same set of forms (see (6) above). TMA markers, however, may only appear in clauses. This is reminiscent of markers such as *that* but also of auxiliaries such as *can* or *will* in English. However, while there is independent reason to treat *can* or *will* as heads in English such as the non-finite form of their complement, there is none in Mauritian.

Second, TMA markers must precede the head of the clause (50) or the head of the complement of a modal verb (50). We call that element the host of the TMA markers. The strict ordering of TMA markers and their optionality from a syntactic point of view is hard to explain if TMA markers are verbs. Expressing the strict ordering in the complementation is not a problem *per se* if the ordering is accounted for by rule similar to English *will* having a base form as its complement while *have* having a past participle as its complement. Neither is the optionality if the form of the complement is underspecified in the right way. However, it is quite unusual to encounter such cases of underspecification in the complementation of heads while it is much more frequent in the selection properties of adjuncts such as adverbs.

Third, TMA markers show none of the morphosyntactic properties of Mauritian verbs. They do not show any morphological alternation between a long or short form. They do not allow for ellipsis of the constituent which follows them. This can be illustrated with short answers and elliptical imperative clauses (45). They cannot be coordinated (47-b). In this respect, they contrast with modals (44).

- (44) a. Zan pou/kapav manz poul? (Will/Can John eat chicken?)
 b. *Non, Zan ti
 no John PST
 Intended. No, John did.
 c. Wi, Zan kapav
 yes John can.LF
 Yes, John can.
- (45) a. To ti/kapav amenn sa? (Did/Can you bring this?)
 b. *Non, pa ti
 no NEG PST
 Intended: No, I didn't.
 c. Non, pa kapav
 No NEG can.LF
 No, I can't.
- (46) a. To ti pe ekrir let la, be kontigne!
 2SG PST PROG write.SF letter DEF so continue.LF
 You were writing the letter, so continue!

- b. To le ekrir let la, be pou demin!
 2SG want.SF write.SF letter DEF so IRR tomorrow
 You want to write the letter, so you will do it tomorrow.
- (47) a. To pou kontign ou aret to kour?
 2SG IRR continue.SF or stop.SF 2SG.POSS course
 You will continue or stop your course.
- b. *To'nn ou pou aret to kour?
 2SG'PERF or IRR stop.SF 2SG.POSS course
 You have or will stop your course.

Fourth, the behavior of the TMA marker *pe*, which can be iterated is hard to account for within an analysis in which it is analyzed as a verb. We here account for the strict ordering of TMA markers in syntax. However, strict ordering could also receive a semantic account. For instance, tense has been analyzed as taking scope over aspect (Bonami, 2002). This is indeed true for Mauritian since tense marker *ti* systematically appears on the left of irrealis and aspectual markers.

- (48) a. Mo'nn kapav (*inn) manze
 1SG.PERF can.SF PERF eat.LF
 I have been able to eat.
- b. Li pe kapav pe vini
 3SG PROG can.SF PROG come.LF
 He/she may be coming.
- c. Li pe ankor pe vini
 3SG PROG still PROG come.LF
 He/she is still coming.

	Mauritian TMA	French AUX	English AUX
VP ellipsis	no	no	yes
Dependent form	no	yes	yes
Coordination	no	-	yes
Only in clauses	yes	no	yes

Table 7: Comparison between TMA markers and French and English auxiliaries

TMA markers as markers: The analysis of TMA markers as markers accounts for their distributional properties but not for the strict ordering and the placement of adverbs. The linearization properties of TMA markers are as follows:

- First, TMA markers must follow the subject and sentential negation.

(49) (subject) < (negation) < TMA*

- Second, TMA markers must precede the head of the clause or the head of the complement of a modal verb. We call that element the host of the TMA markers.

(50) TMA* < head

(51) modal < TMA* < head-of-the-complement

- Third, only a few adverbs may be inserted between TMA markers or between TMA markers and their host.

(52) a. Mo (ti) byen/ankor (*ti) manz krep.
 1 SG (PST) well/again (PST) eat.SF pancake
 I ate pancakes ?well/again.

Linearization properties are not directly accounted for by the analysis as marker. Rather they must be explained by additional constraints on word order.

6 SBCG Analysis

We propose an SBCG analysis of Mauritian control and raising verbs. A SBCG grammar is a combination of descriptions of signs (lexemes, words and phrases) and descriptions of relations between signs (called constructs). These descriptions make use of a specific feature geometry which is described in Sag (2010). Sign descriptions are enclosed in double brackets while constructs are enclosed in single brackets.

Constructs are required to describe local relations. This means that while it is possible to express relations between a phrase and its direct constituents, it is not possible to recursively express relations between a phrase and the constituents of its constituents. As a result, SBCG incorporates a theory of constructional locality. Note that there is a clear distinction between a phrase as a distributional unit (which is a type of sign) and the relations which must exist between a phrase and its direct constituents for it to be well-formed (which is a type of construct).

Although we are primarily interested in analyzing the complementation of Mauritian control and raising verbs, the grammar fragment we present here will have a slightly larger scope since it is necessary in order to successfully account for the ungrammaticality of some structures involving these verbs.

The subcategorization properties of lexemes are represented as properties of individual lexical signs (feature ARG-ST). Generalization over the subcategorization properties of several lexical items can be accounted for by using a type hierarchy of subcategorization properties. A theory of grammatical marking (feature MRKG) is used to account for ordering of TMA markers and distribution of marked constituents¹. A theory of constituent weight (feature WEIGHT) is used to account for the restricted mobility of preverbal adverbs and TMA markers (see Abeillé and Godard (2000) for a use of weight features in conjunction with rules of linear precedence).

6.1 Clauses, verb forms, TMA-markers and complementizers

We first account for clauses. They have two properties: they have an empty valence list and clausal marking, that is either the *ki-comp* or the *TMA-mrk* value (53).

¹see Tseng (2001) on the link between verbal forms and complementizer marking on one hand and case marking and prepositional marking on the other.

$$(53) \quad \text{clause} \Rightarrow \left[\left[\left[\begin{array}{ll} \text{VAL} & \langle \rangle \\ \text{SYN} & \left[\begin{array}{ll} \text{EXTRA} & \langle \rangle \\ \text{MRKG} & ki\text{-}comp \vee TMA\text{-}mrk \end{array} \right] \end{array} \right] \right] \right]$$

There are two implicational constraints on the form of verbs in Mauritian. If a verb has a short form then it must have at least one non clausal element on its valence list other than the external argument (54). If a verb has an empty its valence list besides the external argument then it must have a long form (55). Since clausal complements do not trigger the SF they are not accounted for on the valence list but on the extraposed list (10-b)². These two constraints leave open cases where a verb has a long form despite having non-clausal element on its valence list other than the external argument. This is exactly what happens in cases of *verum focus*. See Henri et al. (2008); Henri (2010) for an in-depth description and constraint-based analysis of Mauritian verb forms.

$$(54) \quad \left[\begin{array}{l} \text{verb} \\ \text{CAT} \left[\begin{array}{ll} \text{VFORM} & short \end{array} \right] \end{array} \right] \Rightarrow \left[\begin{array}{ll} \text{XARG} & \boxed{1} \\ \text{VAL} & \boxed{1} \oplus \text{nelist} \end{array} \right]$$

$$(55) \quad \left[\begin{array}{ll} \text{verb} & \\ \text{XARG} & \boxed{1} \\ \text{VAL} & \boxed{1} \end{array} \right] \Rightarrow \left[\text{CAT} \left[\begin{array}{ll} \text{VFORM} & long \end{array} \right] \right]$$

A TMA marker is a marker. It selects a phrase which is *lite* and marked as *TMA-mrk* or a subtype of it. TMA markers are *lite* and contribute a marking value which is a subtype of *TMA-mrk* (56).

$$(56) \quad \text{TMA-marker} \Rightarrow \left[\left[\left[\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{SELECT} & \left[\begin{array}{ll} \text{SYN} & \left[\begin{array}{ll} \text{MRKG} & TMA\text{-}mrk \\ \text{WEIGHT} & lite \end{array} \right] \end{array} \right] \end{array} \right] \right] \right] \right] \right] \right]$$

The following hierarchy of marking values is needed to account for the strict ordering of TMA markers (57).

²See Kay and Sag (2009) for an analysis of extraposed elements in English and Henri (2010) for arguments in favor of clausal complements as extraposed complements.

$$\left[\begin{array}{l} \text{word} \\ \text{SYN} \left[\begin{array}{l} \text{ST-ARG} \quad \langle \rangle \\ \text{CAT} \quad \left[\text{SELECT} \quad \left[\text{SYN} \left[\begin{array}{l} \text{MRKG} \quad TMA-unmrk \\ \text{WEIGHT} \quad weight \end{array} \right] \right] \right] \\ \text{MRKG} \quad pou-comp \\ \text{WEIGHT} \quad non-lite \end{array} \right] \end{array} \right] \end{array} \right]$$

6.2 Raising and control verbs

Subcategorization properties of lexemes are represented as properties of individual lexical signs (feature ARG-ST). Generalization over the subcategorization properties of several lexical items can be accounted for by using a type hierarchy of lexemes.

Subject raising verb lexemes place the following constraint on their argumental structure (feature ARG-ST): If their TMA-unmarked complement has an external argument then it should not be realized inside the complement and be shared with the external argument of the raising verb (60). If their complement has no external argument, as is the case with impersonal expressions such as *ena lapli* ‘to rain’ then the raising verb itself has no external argument (61).

(60) subject-raising-verb-lexeme \Rightarrow

$$\left[\begin{array}{l} \text{ARG-ST} \quad [1] \oplus \left\langle \left[\text{SYN} \left[\begin{array}{l} \text{CAT} \quad [XARG \quad [1]] \\ \text{MRKG} \quad TMA-unmrk \\ \text{VAL} \quad [1] \end{array} \right] \right] \right\rangle \right. \\ \left. \text{SYN} \quad \left[\text{CAT} \quad \left[\begin{array}{l} verb \\ XARG \quad [1] \end{array} \right] \right] \right. \end{array} \right]$$

(61) Kontign ena lapli.
continue.SF have.SF rain
‘It continued to rain.’

Object raising verb lexemes have a TMA-unmarked complement whose external argument is shared with another argument which is not the external argument (62). Unlike subject raising verbs, the shared element cannot be the empty list (63).

(62) object-raising-verb-lexeme \Rightarrow

$$\left[\begin{array}{l} \text{ARG-ST} \quad \left\langle sign, [2] \right\rangle \left[\text{SYN} \left[\begin{array}{l} \text{CAT} \quad [XARG \quad \langle [2] \rangle] \\ \text{MRKG} \quad TMA-unmrk \\ \text{VAL} \quad \langle [2] \rangle \end{array} \right] \right] \right. \\ \left. \text{SYN} \quad \left[\text{CAT} \quad verb \right] \right. \end{array} \right]$$

- (63) *Mo 'nn get ena lapli
 1 SG PERF see.SF have.SF rain
'I have seen that it rains.'

Subject control verb lexemes must be divided into two different classes: those that take bare VP complements (64) illustrated in (65) and those that take *pou*-marked complements (66) illustrated in (67). Only the value of the INDEX feature of the signs is shared.

- (64) subject-control-verb-bare-vp-lexeme \Rightarrow

$$\left[\left[\begin{array}{c} \text{ARG-ST} \left\langle \left[\text{SEM} \left[\text{IND} \begin{array}{|c|} \hline 2 \\ \hline \end{array} \right] \right] \right\rangle, \text{SYN} \left[\begin{array}{c} \text{CAT} \left[\begin{array}{c} \text{verb} \\ \text{XARG} \left\langle \begin{array}{|c|} \hline 3 \\ \hline \end{array} \left[\text{SEM} \left[\text{IND} \begin{array}{|c|} \hline 2 \\ \hline \end{array} \right] \right] \right\rangle \right] \\ \text{MRKG} \text{ TMA-unmrk} \\ \text{VAL} \left\langle \begin{array}{|c|} \hline 3 \\ \hline \end{array} \right\rangle \end{array} \right] \right] \right] \right] \right]$$

- (65) Zan inn sey vini.
 John PERF try.SF come.LF
'John has tried to come.'

- (66) subject-control-verb-pou-vp-lexeme \Rightarrow

$$\left[\left[\begin{array}{c} \text{ARG-ST} \left\langle \left[\text{SEM} \left[\text{IND} \begin{array}{|c|} \hline 2 \\ \hline \end{array} \right] \right] \right\rangle, \text{SYN} \left[\begin{array}{c} \text{CAT} \left[\begin{array}{c} \text{verb} \\ \text{XARG} \left[\text{SEM} \left[\text{IND} \begin{array}{|c|} \hline 2 \\ \hline \end{array} \right] \right] \right] \\ \text{MRKG} \text{ pou-comp} \end{array} \right] \right] \right] \right] \right]$$

- (67) Zan pans pou vini.
 John think.SF COMP come.LF
'John thinks of coming.'

Object control verb lexemes impose index sharing between the external argument of their open complement and one of their complement. Thus, their open complement must have an external argument. As is the case with other bare VP complements, TMA marking is not allowed (68). An example of object control verb is given in (69)

- (68) object-control-verb-bare-vp-lexeme \Rightarrow

$$\left[\left[\begin{array}{c} \text{ARG-ST} \left\langle \text{sign}, \left[\text{SEM} \left[\text{IND} \begin{array}{|c|} \hline 3 \\ \hline \end{array} \right] \right] \right\rangle, \text{SYN} \left[\begin{array}{c} \text{CAT} \left[\begin{array}{c} \text{verb} \\ \text{XARG} \left\langle \begin{array}{|c|} \hline 4 \\ \hline \end{array} \left[\text{SEM} \left[\text{IND} \begin{array}{|c|} \hline 3 \\ \hline \end{array} \right] \right] \right\rangle \right] \\ \text{MRKG} \text{ TMA-unmrk} \\ \text{VAL} \left\langle \begin{array}{|c|} \hline 4 \\ \hline \end{array} \right\rangle \end{array} \right] \right] \right] \right] \right]$$

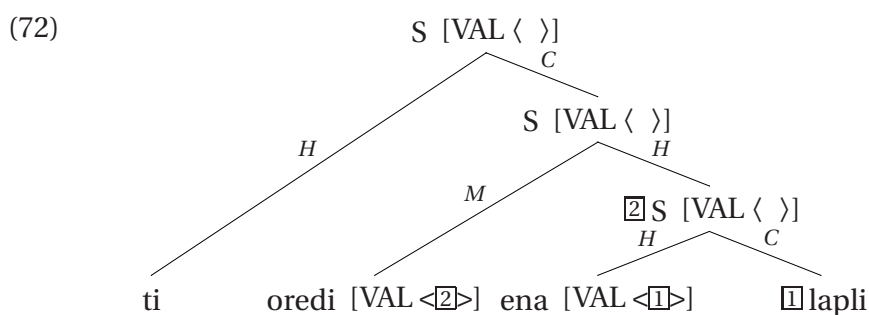
- (69) Mari inn ankouraz so kamarad vini.
 Mary PERF encourage.SF 3SG.POSS friend come.LF
'Mary has encouraged her/his friend to come.'

Modals are subject raising verbs but they do not have the same type of complement as other raising verbs since some TMA-markers can appear in the complement of modals. As other subject raising verbs, modals require identity between the XARG and the VAL list of their complement (70). This ensures (1) that the external argument of the complement is not realized within the complement and (2) that the complements of the complement's head are realized within the complement. When the XARG list of the complement is the empty list, the VAL list must be the empty list as well, as is the case in (71) for which a tree representation is given in (72). This allows one to dispense positing empty non-referential element on the VAL list. Modals also both inherit and constrain the marking features of their complement. This account for the fact that modals and their complements share one and the same TMA marker sequence.

- (70) modal-verb \Rightarrow

$$\left[\begin{array}{c} \left[\begin{array}{c} \text{ARG-ST} \quad [1] \oplus \left\langle \begin{array}{c} \text{SYN} \left[\begin{array}{c} \text{CAT} \quad [\text{XARG} \quad [1]] \\ \text{VAL} \quad [1] \\ \text{MRKG} \quad [2] \end{array} \right] \right\rangle \end{array} \right] \\ \text{SYN} \quad \left[\begin{array}{c} \text{CAT} \quad \textit{verb} \\ \text{MRKG} \quad [2] \textit{ma2-mrk} \end{array} \right] \end{array} \right] \end{array} \right]$$

- (71) {kapav | bizin | paret | ti oredi} ena lapli.
 {can.SF | must.SF | seem.SF | PST should.SF} have.SF rain
'It {{can | must | seems to} rain | should have rained}.'



6.3 Constructs

The grammar fragment makes use of three constructs to combine words and phrases together. The *head-subject-construct* realizes syntactically the external argument of a phrase as the subject. The non-head-daughter of the construct corresponds to the external argument of the head-daughter as well as to the unique element on the VAL list of the head-daughter. The mother of the construct has an empty VAL list. It has same marking feature as the head-daughter. It has a non-lite WEIGHT as well, which prevents lite functors from preceding the subject (73).

$$(73) \quad \text{head-subject-construct} \Rightarrow \left[\begin{array}{c} \text{MTR} \\ \text{DTRS} \\ \text{HD-DTR} \end{array} \left[\begin{array}{c} \text{sign} \\ \langle \boxed{2}, \boxed{3} \rangle \\ \boxed{3} \end{array} \left[\begin{array}{c} \text{SYN} \\ \text{SYN} \end{array} \left[\begin{array}{c} \text{VAL} \quad \langle \rangle \\ \text{MRKG} \quad \boxed{1} \\ \text{WEIGHT} \quad \textit{non-lite} \end{array} \right] \left[\begin{array}{c} \text{CAT} \quad \left[\text{XARG} \quad \langle \boxed{2} \rangle \right] \\ \text{VAL} \quad \langle \boxed{2} \rangle \\ \text{MRKG} \quad \boxed{1} \end{array} \right] \right] \right] \right]$$

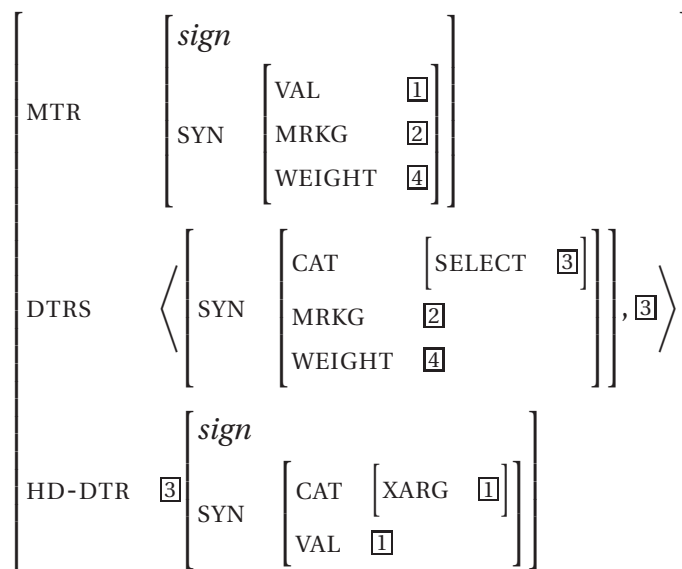
The *head-complements-construct* realizes syntactically the complements of a word. Each non-head-daughter of the construct correspond to one element of the VAL list of the head-daughter. If there is an external argument on the VAL list, it will not appear as a complement of the head-daughter and remain on the VAL list of the mother of the construct. If there is no external argument, the mother of the construct has an empty VAL list. The mother has same marking feature as the head-daughter. It has a lite WEIGHT, which allows lite functors to combine with it (74).

$$(74) \quad \text{head-complements-construct} \Rightarrow \left[\begin{array}{c} \text{MTR} \\ \text{DTRS} \\ \text{HD-DTR} \end{array} \left[\begin{array}{c} \text{sign} \\ \langle \boxed{3} \rangle \oplus \boxed{4} \textit{nelist} \\ \boxed{3} \end{array} \left[\begin{array}{c} \text{SYN} \\ \text{SYN} \end{array} \left[\begin{array}{c} \text{VAL} \quad \boxed{1} \\ \text{MRKG} \quad \boxed{2} \\ \text{WEIGHT} \quad \textit{lite} \end{array} \right] \left[\begin{array}{c} \text{CAT} \quad \left[\text{XARG} \quad \boxed{1} \right] \\ \text{MRKG} \quad \boxed{2} \\ \text{VAL} \quad \boxed{1} \oplus \boxed{4} \end{array} \right] \right] \right] \right]$$

The *head-functor-construct* realizes syntactically the functor of a phrase. The non-head-daughter of the construct is not a valent of the head-daughter but rather selects it via the SELECT feature. The mother has the same VAL list, the same marking and the same weight as the non-head-daughter³ (75).

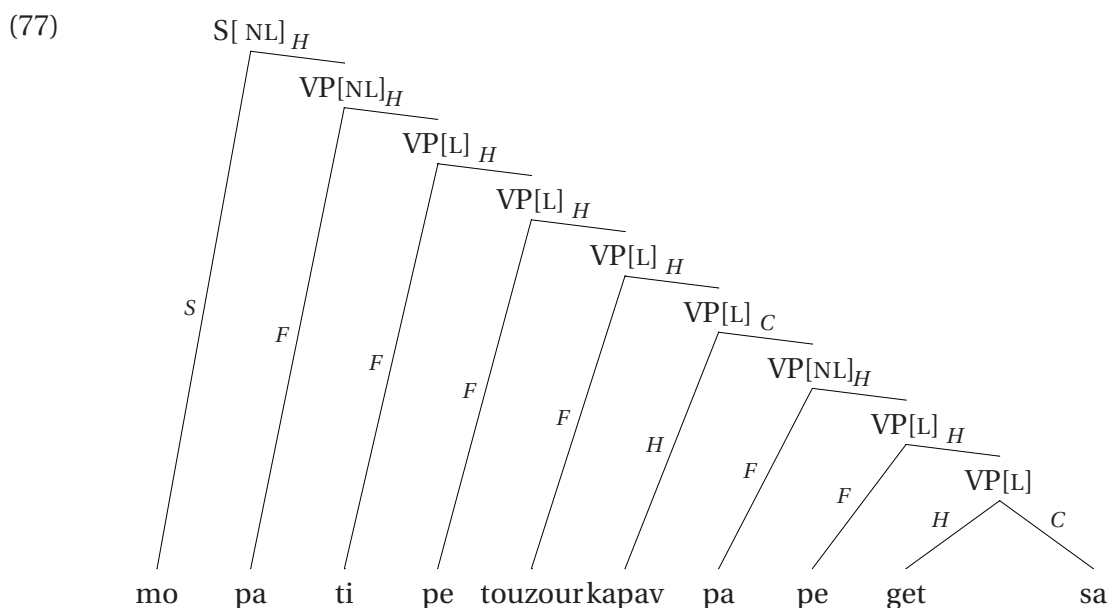
$$(75) \quad \text{head-functor-construct} \Rightarrow$$

³Some adverbs will be underspecified for weight and inherit their weight from the head-daughter in which case they will be transparent with respect to the weight algebra.



A tree representation for the sentence in (76) is given in (77) ⁴.

- (76) Mo pa ti pe touzour kapav pa pe get sa.
 1SG NEG PST PROG always can.SF NEG PROG see.SF this
'I could not always not be looking at this.'



7 Conclusion

The paper provides a detailed analysis of the complementation patterns found with raising and control predicates in Mauritian. It addresses the question of the category of raising and control complements. The complementation of raising and control verbs has been studied in many languages. In particular, they have been analyzed as clauses or small clauses in an attempt to preserve a strict homomorphism between syntac-

⁴NL stands for non-lite, L for lite.

tic and semantic representations. Such analyses have been shown to be problematic even for languages such as English for which they had originally been proposed. We show that they are not adequate for Mauritian either. In particular, morphological facts which can be observed on the subcategorizing verb allows one to distinguish between clausal and non-clausal complements. Complements of raising and control verbs systematically pattern with non-clausal phrases such as NPs or PPs. This kind of evidence is seldom available in world's languages because heads are not usually sensitive to the properties of their complements. The analysis as clause or small clauses is also problematic because of the existence of genuine verbless clauses in Mauritian which pattern with verbal clauses and not with complements of raising and control verbs.

The analysis is couched in a constructional constraint-based grammar (SBCG). We mainly provide a classification of raising and control predicates as well as a classification of their complementation patterns. Most properties of the complementation of these predicates may be expected from a cross-linguistic point of view. However, many features of the grammar are quite unusual. A first example is the complementation of modal verbs and their interaction with the TMA marker system. These markers do not have verbal properties and are best viewed as markers (i.e. as elements which select a phrase and can modify its distribution) rather than heads. A second example is the existence of complements of control verbs marked by the complementizer *pou* which license a pronominal subject constituent which is obligatorily controlled by the subject of the control verb.

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Syntax and Semantics of Bare NPs: Objects of Intensive Reflexive Verbs in Russian

Olga Kagan & Asya Pereltsvaig*

Since the adoption of Abney's (1987) influential proposal that noun phrases are (at most) DPs, the hypothesis that not all noun phrases in all languages are DPs has been widely debated. A particularly interesting case in this respect is presented by Slavic languages lacking overt articles such as Russian or Serbo-Croatian: are noun phrases in such languages ever DPs, always DPs, or sometimes DPs and sometimes not? For instance, Pereltsvaig (2006) argued that although some noun phrases in Russian are to be analyzed as DPs, others are not projected fully and only reach the level of QP or even remain bare NPs (the assumption that QP, which hosts numerals and quantifiers such as *mnogo* 'many, much', is projected below DP is supported most robustly by word order facts).¹ Pesetsky (2007) considers a further range of noun phrases in Russian which he claims to be bare NPs. However, neither Pereltsvaig nor Pesetsky address the question of the semantics of such bare NPs, in particular, how they combine with elements in the verbal predicate to create the correct range of meanings. The present paper is aimed at filling this gap. More generally, it further contributes to the investigation of bare NPs and the interaction of their syntactic and semantic properties.

The empirical coverage of the present paper is focused on the objects of the so-called *intensive reflexive* verbs in Russian, illustrated in (1) (the internal structure of these verbs is discussed in Section 1 below). The goal of the present paper is to provide a syntactic and a semantic account of the noun phrases that appear to complement intensive reflexives. Such noun phrases can appear in one of two case markings: genitive or instrumental:

- (1) a. Lena najelas' kotlet.
Lena *na-ate-sja* burgers.GEN
'Lena ate her fill of burgers.'
- b. Lena najelas' kotletami.
Lena *na-ate-sja* burgers.INSTR

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¹The alternative approach, that all noun phrases in Russian or Serbo-Croatian are bare NPs, is defended most strenuously in Bošković (2005, 2008, 2009). However, contrasts between genitive and instrumental phrases described in this paper, as well as the range of facts discussed in Pereltsvaig (2006, 2007) cannot be explained under the "all-bare-NP" approach.

‘Lena stuffed herself with burgers.’

In this paper we are particularly concerned with the genitive complements of intensive reflexives, as in (1a); we argue that these noun phrases (but not their instrumental counterparts in (1b)) are deficient both syntactically and semantically. We argue that, from the syntactic point of view, these genitive complements of intensive reflexives (henceforth, GCIRs) are bare NPs, lacking functional projections of DP and QP. From the semantic point of view, their interpretation is not achieved through the usual function-application, but via Semantic Incorporation. The goal of this paper is to consider how the syntactic and semantic properties of such deficient nominals interact.

In addition to contributing to the investigation of bare NPs, this paper makes a contribution to the study of genitive objects in Slavic languages. The non-canonical assignment of genitive, rather than accusative, case to objects has received much attention in the literature on Slavic linguistics (cf. Pereltsvaig 1998, 1999, Kagan 2005, 2007, Partee and Borschev 2004, Borschev et al. 2008, and references therein). Phenomena that exhibit this pattern of case-assignment include Genitive of Negation, Partitive Genitive, and Intensional Genitive. The present paper extends the investigation of non-canonical genitive case by considering an additional type of genitive complements, GCIRs, which, as will be shown below, share some properties with other types of genitive nominals, but also differ from them in important respects.

1 Intensive Reflexive Verbs: Descriptive Facts

Let us begin by considering in more detail the descriptive properties of Russian intensive reflexives. Morphologically, these verbs contain an intransitivizing suffix *-sja* and the accumulative prefix *na-*. The suffix *-sja*, often referred to as the reflexive suffix, is found in reflexive verbs, as well as in reciprocals and middles. It is thus associated with an intransitivizing function. However, the range of its uses is not restricted to the ones specified above; a more exhaustive list of uses with appropriate examples can be found in Timberlake (2004).

In turn, *na-* is a verbal prefix that can appear independently of the suffix *-sja*, in transitive verbs. The use of this prefix is illustrated in (2)²:

- (2) Maša nakupila knig.
Masha *na*-bought books.GEN
‘Masha bought many books.’

In (2), the prefix contributes an entailment that the number of books bought by Masha is relatively high. Thus, the prefix seems to quantify over the object. It should be noted that it does not have such a function in (1): neither (1a) nor (1b) entails that Lena ate **many** burgers. Despite this superficial contrast, we are going to propose that the prefix *na-* does make the same semantic contribution in (1) and (2); the difference in interpretation is determined by the material to which it applies.

²For detailed analyses of transitive verbs that contain the prefix *na-*, see Filip (2000, 2005), Romanova (2004), Tatevosov (2006) and Pereltsvaig (2006).

2 Genitive Complements of Intensive Reflexives are Small Nominals

The goal of this section is to show that from the syntactic point of view, GCIRs are much more restricted than their instrumental counterparts in terms of their internal structure. The peculiar properties of GCIRs fit the description of what Pereltsvaig (2006) calls Small Nominals. In particular, as we show immediately below, GCIRs are bare NPs, lacking the functional projections of DP and QP.

First of all, GCIRs lack the projection of DP; this can be seen from the impossibility of DP-level elements, such as demonstratives:³

- (3) *Ja najelas' tex kotlet.
 I *na-ate-sja* those burgers.GEN
 intended: 'I ate my fill of those burgers.'

Furthermore, GCIRs cannot contain DP-level adjectives, such as the ones illustrated in (4). Babby (1987) discusses the morphosyntax of such adjectives in great detail (he refers to them as *poslednie*-type adjectives); for more recent analyses that associate different types of adjectives with different levels in the decomposition of DP, see Pereltsvaig (2007), Svenonius (2008), among others.

- (4) *Ja naelas' {ostal'nyx / sledujuščix / pervyx / dannyx} kotlet.
 I *na-ate-sja* {remaining / following / first / given} burgers

One must note that instrumental phrases appearing with intensive reflexives are not so restricted: they can contain both demonstratives and DP-level adjectives.

- (5) Ja naelas' {ètimi / ostal'nymi} kotletami.
 I *na-ate-sja* {these / remaining} burgers.INSTR
 'I stuffed myself with these/remaining burgers.'

Second, GCIRs cannot contain any expression of quantity, such as a numeral in (6a), a quantity noun in (6b) or a measure noun in (6c).⁴

- (6) a. *Ja najelas' pjati kotlet.
 I *na-ate-sja* five.GEN burgers.GEN
 intended: 'I ate my fill of five burgers.'
 b. *Ja najelas' džužiny kotlet.
 I *na-ate-sja* dozen.GEN burgers.GEN
 intended: 'I ate my fill of a dozen burgers.'
 c. *Ja napilas' stakana vody.
 I *na-drink-sja* glass.GEN water.GEN
 intended: 'I drank my fill of a glass of water.'

³Examples such as (3) may be considered acceptable with the "kind" interpretation, e.g., 'I ate my fill of **such** burgers'. We assume that noun phrases with the "kind" interpretation are smaller than DP (cf. Zamparelli 2000, Svenonius 2008, among others) and that the demonstrative in such phrases has the syntax of a regular adjective (i.e., it is part of the NP rather than occupies a functional projection).

⁴Measure nouns in Russian are similar in meaning to numeral classifiers in other languages, but unlike numeral classifiers, measure nouns are not required in Russian.

Once again, instrumental counterparts of GCIRs are not so restricted:

- (7) a. Ja najelas' pjatju kotletami.
I *na*-ate-*sja* five.INSTR burgers.INSTR
'I stuffed myself with five burgers.'
b. Ja najelas' djužinoj kotlet.
I *na*-ate-*sja* dozen.INSTR burgers
'I stuffed myself with a dozen burgers.'
c. Ja napilas' stakanom vody.
I *na*-drank-*sja* glass.INSTR water
'I satisfied my thirst with a glass of water.'

It must be noted here that GCIRs differ in this respect from complements of transitive *na*-verbs (that is, verbs containing the accumulative *na*-, but not the reflexive *-sja*). As shown in Pereltsvaig (2006), such complements are projected as phrases smaller than DP, but they **must** contain an expression of quantity, at least a null one. This null quantifier is said to assign the genitive case to its NP complement, similarly to overt expressions of quantity in Russian, illustrated in (8b).

- (8) a. Povar navaril [_{QP} ∅ ovoščej].
cook *na*-cooked vegetables.GEN
'The cook cooked a lot of vegetables.'
b. Povar navaril [_{QP} kastrjulju ovoščej].
cook *na*-cooked pot.ACC vegetables.GEN
'The cook cooked a pot of vegetables.'

Thus, complements of verbs with *na*- are QPs either with an overt expression of quantity (which is itself marked accusative) assigning genitive to its NP complement, as in (8b), or with a null quantifier similarly assigning genitive to its NP complement, as in (8a).⁵

To recap, GCIRs contain none of the functional projections typically associated with a noun phrase – DP or QP – and are therefore the smallest type of Small Nominals, a bare NP.

Finally, GCIRs can occur only when selected as direct objects by the corresponding transitive verb (without the accumulative *na*-); and once more, their instrumental counterparts are not so restricted:

- (9) a. *Deti igrali novye igruški.
children played new toys.ACC
b. *Deti naigralis' novyx igrušek.
children *na*-played-*sja* new toys.GEN
c. Deti naigralis' novymi igruškami.
children *na*-played-*sja* new toys.INSTR

⁵An alternative is to analyze examples like (8a) as containing a bare NP complement (which is genitive in virtue of being a bare NP, à la Pesetsky 2007, as discussed in the main text below). Which of these two alternatives is adopted is, however, unimportant for the purposes of the present paper. What is important is that transitive verbs with *na*- **can** take overt expressions of quantity as complements, while intensive reflexives with both *na*- and *-sja* **cannot**.

'The kids have had enough of playing with new toys.'

If we consider (9a), we can see that the transitive verb *igrat* 'to play' cannot take an accusative object *novye igruški* 'new toys'. Nor can the intensive reflexive *naigralsi* 'had enough playing' take 'new toys' in the genitive, as in (9b). We can conclude that GCIRs obligatorily correspond to accusative objects of the corresponding transitive verbs. This requirement is not imposed on the instrumental counterparts of GCIRs, as in (9c). From this, we conclude that GCIRs are complements of the verb, whereas instrumental phrases are adjuncts.

One additional issue that has to be addressed before we turn to the semantics of GCIRs is the source of their genitive case-marking. Pereltsvaig (2006) proposes that genitive complements of transitive *na*-verbs receive genitive Case from a phonologically null Q. However, GCIRs have been argued above to be bare NPs that do not complement a phonologically null quantifier. Here, we follow recent work on the Russian Case system by David Pesetsky, who argues that genitive is the default case of Russian bare NPs. According to Pesetsky (2007), bare NPs in Russian receive genitive Case-marking by default, whereas "other case forms represent the morphological effect of other merged elements on N." For instance, nominative Case signals that the D head has been merged. Within this framework, "[t]he presence of genitive morphology on a N may thus represent the effect of not assigning another case to it, rather than the presence of a specific genitive assigner."

3 Semantic properties of GCIRs

The special, restricted syntax of GCIRs is interrelated with their semantics. Here, we propose that GCIRs (like other bare NPs in Russian; cf. Pereltsvaig 2008) denote properties and are of the semantic type $\langle e, t \rangle$, which we take to be the default semantic interpretation of bare NPs. Furthermore, we propose that GCIRs combine with the verb by means of Semantic Incorporation. An analysis along these lines has also been proposed by Filip (2005) for genitive objects of verbs that contain the prefix *na*-. It should be pointed out that Filip (2005) concentrates primarily on transitive *na*-verbs and does not introduce a distinction between complements of these verbs and those of intensive reflexives. At the same time, the two types of complements clearly differ in some of their properties, as pointed out above. The analysis argued for in this section is developed specifically for GCIRs; here, we remain agnostic regarding the semantics of objects of transitive *na*-verbs (but see Pereltsvaig 2006, Tatevosov 2006 for a detailed discussion and a different analysis of the latter.)

3.1 GCIRs Denote Properties

The evidence that GCIRs are bare NPs, presented in the previous section, also constitutes evidence of their non-referential and non-quantificational semantics. The incompatibility of GCIRs with DP-level elements (cf. (3)-(5)) points to their non-referential nature; and their incompatibility with quantity expressions (cf. (6)) points to their non-quantificational nature. Moreover, GCIRs are discourse opaque with respect to pronouns that require a discourse referent as anchor (they are grammatical only with

kind anaphora). For instance, the pronoun *oni* ‘they’ is acceptable in (10), but it is interpreted as referring back to the **kind** ‘English novels’. The speaker is understood to be asserting that English novels in general are long, rather than that specifically those novels that she accidentally happened to read are long.

- (10) Ja načitalas’ anglijskix romanov_i. Oni_i očen’ dlinnye.
 I *na*-read-*sja* [English novels].GEN they very long
 ‘I’ve read English novels to the
 limit. They are very long.’

Further evidence in favor of the property type approach to GCIRs comes from the fact that these phrases consistently receive *de dicto*, narrow scope interpretations. For example, consider the sentence in (11):

- (11) Lena nasmotrelas’ černo-belyx fil’mov.
 Lena *na*-watched-*sja* black-and-white movies.GEN
 ‘Lena has watched black-and-white movies to the limit.’

This sentence means that Lena has seen an eyeful of black-and-white movies in general. Crucially, it cannot mean that there is a specific set of black-and-white movies such that Lena has watched these movies to the limit. Thus, the genitive NP cannot refer to a specific set of movies which the speaker has in mind or which have been previously mentioned in the context. Suppose that a person wants to show Lena a black-and-white movie which she has never seen. The sentence in (11) can be uttered felicitously in such a context, suggesting that Lena will not be willing to watch the movie, independently from whether she has ever seen it or not, merely by virtue of it instantiating the property ‘black-and-white movie’.

Finally, it should be noted that the property analysis of GCIRs makes it possible to relate them to other types of genitive complements in Russian – in particular, the ones that appear in Genitive of Negation and Intensional Genitive. Objects of the latter types have been argued to denote properties (e.g. Partee and Borshev 2004, Kagan 2005, 2007, Borshev et al. 2008). It is important to note that objects that appear in Genitive of Negation or Intensional Genitive are not bare NPs, as they may contain quantifiers and even demonstratives:

- (12) a. Maša ždala etoj vstreči.
 Masha waited [thi smeeing].GEN
 ‘Masha was waiting for this meeting.’
 b. On ne napisal i pjati pisem.
 he NEG wrote and [five letters].GEN
 ‘He hasn’t written even five letters.’

We propose that this contrast results from the fact that while GCIRs are indeed bare NPs, the other types of genitive objects mentioned here are not. These objects are similar to GCIRs in terms of their semantics (they, too, denote properties and, as a result, share with GCIRs such characteristics as restricted scope); however, syntactically, they involve a more extended functional structure.

3.2 Semantic Incorporation

According to Zimmermann (2003), intensional verbs, such as *seek* and *want*, take property-type complements. However, GCIRs definitely can combine with extensional verbs (see Section 4 for details), whose complement is supposed to be of the individual type. How is a type mismatch avoided here?

A number of mechanisms that allow a combination of an extensional predicate and a property-denoting NP have been introduced in the literature. For instance, Chung & Ladusaw (2004) introduce an operation Restrict. When it applies, the object does not saturate the verb's argument, but only narrows its interpretative domain. However, GCIRs do saturate the verb's argument. This is demonstrated in (9) above, which shows the complement status of GCIRs, as well as by the unacceptability of (13) below:

- (13) *Lena najelas' fruktov jablok / jabloki.
 Lena *na*-ate-*sja* fruit.GEN apples.GEN/ACC
 'Lena ate her fill of fruit, specifically apples.'

If Restrict were involved in (13), then the attachment of *fruktov* to the verb would narrow its interpretative domain, creating, roughly, the predicate 'to fruit-eat' (this is essentially the view that we will accept below). Further, the genitive NP would not saturate the verb's argument, which means that it would still be possible to realize overtly the theme of the eating event. The unacceptability of (13) demonstrates that this is not the case. The GCIR saturates the verb's internal argument, and it is therefore impossible to express the latter with an additional nominal.

Alternatively, we can assume that, in order to avoid a type mismatch, the verb undergoes a type-shift whereby it comes to denote a relation between an individual and a property (and, thus receives the semantic type of an intensional predicate). The type-shift is represented in (14):

- (14) before type-shift: $\lambda x \lambda y. V(x)(y)$
 after type-shift: $\lambda P \lambda y. V(P)(y)$

Finally, the genitive NP may be analyzed as undergoing semantic incorporation, along the line of van Geenhoven (1998), Dayal (2003), Farkas & de Swart (2003) or Dobrovie-Sorin et al. (2006) among others. A considerable number of approaches to semantic incorporation have been proposed, some of which differ quite considerably from one another. A detailed discussion of these approaches falls beyond the scope of this paper; the reader is referred to Espinal and McNally (2009) for a review and comparison of some of them. As far as we can tell, properties of GCIRs seem to be compatible with a range of different analyses. For the sake of simplicity, in this paper we will assume an approach based on Dayal's (2003) analysis, under which the verb undergoes a type-shift to become an incorporating verb, in the way represented in (15)⁶:

⁶As stated above, for the purposes of our analysis, the choice of this particular approach to semantic incorporation is not crucial. The choice is dictated mainly by considerations of simplicity of the presentation in the following section. It should also be noted that the approach in (15) is based on Dayal's (2003) analysis but not identical to it. (15) differs from Dayal's original analysis in two ways. First, under Dayal's approach, the external argument is introduced by the verb, whereas we follow Kratzer (1994) in assuming that the agent is introduced by a voice head. Second, our approach does not involve the restriction that the event be *appropriately classificatory*, a restriction that Dayal imposes on pseudo in-

- (15) before type-shift: $\lambda x \lambda y. V(x)(y)$
 after type-shift: $\lambda P \lambda y. P - V(y)$ (based on Dayal 2003)

Each of the latter two approaches could be applied to GCIRs. We believe, however, that the semantic incorporation analysis is preferable, since it accounts for the restricted morphosyntax of the genitive phrases. As discussed by Farkas & de Swart (2003), semantically incorporated nominals cross-linguistically exhibit a combination of restricted morphosyntax with such semantic properties as being scopally inert and discourse opaque. Given that GCIRs pattern with semantically incorporated nominals both semantically and grammatically, in the sense of being Small Nominals, we conclude that the investigated NPs undergo semantic incorporation⁷.

4 Contribution to the Semantics of the Clause

It has been demonstrated in the previous sections that, despite the superficial similarity between the two sentences in (1), GCIRs differ substantially from their instrumental counterparts in terms of their syntactic as well as semantic properties. Another curious contrast has to do with the fact that the two types of phrases affect the compositional meaning of the clause in different ways. The two constructions in (1) – repeated below – also differ in their patterns of entailment: the structure with the instrumental phrase entails the one without a post-verbal nominal, while the structure with a GCIR does not entail one without a genitive phrase. Thus, while (1b) entails (16) below, (1a) does not:

- (1) a. Lena najelas' kotlet.
 Lena *na-ate-sja* burgers.**GEN**
 'Lena ate her fill of burgers.'
 b. Lena najelas' kotletami.
 Lena *na-ate-sja* burgers.**INSTR**
 'Lena stuffed herself with burgers.'
- (16) Lena najelas'.
 Lena *na-ate-sja*
 'Lena ate her fill / Lena had a bellyful / Lena is stuffed full.'

While both (1b) and (16) entail that the subject is replete, this is not entailed by (1a). The latter sentence asserts that the subject has had enough of eating burgers, and is unwilling to eat any more of them, but is semantically compatible with the subject being still hungry and wanting to eat something else. In contrast, (1b) entails that Lena is no longer hungry, and further asserts that she has reached this state with the help of burgers. In this section, we propose an analysis of (1a), (1b) and (16) that accounts for

corporation in Hindi, since this restriction does not seem to affect the intensive reflexive construction (see Dayal 2003, Section 4.2 for details.)

⁷It should be noted that while semantically incorporated nominals in different languages typically exhibit restricted morphosyntax, not all of them have been argued to constitute bare NPs. For instance, Dobrovie-Sorin et al. (2006) argue that bare plurals in Romanian and Spanish are NumPs (an analog to Russian QPs), which undergo semantic incorporation. In this respect, GCIRs in Russian apparently differ from certain types of semantically incorporated nominals.

this entailment pattern.

Before we proceed, it should be noted that, following Pereltsvaig (2006), we assume that the accumulative *na-* is a superlexical prefix, which attaches at a relatively high position, crucially, above the VP projection (at least as high as AspP); cf. (17) below.

We assume that intensive reflexive verbs are accomplishment event predicates. Their denotation constitutes a set of complex events each of which includes a process denoted by the VP and a result state brought about by this process. Crucially, an event denoted by a sentence with an intensive reflexive is not measured out by the genitive object (which is, in fact, predicted to be impossible, given that the object is property-denoting and semantically incorporated.) Rather, the event is measured out by the internal state of the subject. The event is considered to be instantiated in the world (and to reach completion) only if the subject has reached a certain state, in particular, only if she comes to feel that she has had enough of the process denoted by the VP. In the case of a VP like *eat apples*, the result state is achieved not when a certain quantity of apples has been consumed, but rather when the subject reaches a state of having had enough of apple-eating (and, plausibly, of being unwilling to eat any more apples.)

We will refer to this result state as a certain degree of *satiation* with the process denoted by the VP. The subject may experience a low degree of satiation (which means that she has not had enough of the process in question), a relatively high, or satisfactory, degree of satiation, when she feels that she has had exactly the right amount of this process, or a very high degree of satiation (an “overdose”), which means that she has had too much of the process. To illustrate, for the VP *jel* (ate), and the corresponding process of eating performed by the subject, a low degree of satiation means feeling hungry, a satisfactory degree corresponds to not being hungry, while a very high degree of satiation means that the person has overeaten. Crucially, the process with which the subject experiences satiation is determined at the level of the VP projection, which contains the verb and its complement, if the latter is present in the structure.

The functional material applies above the VP projection. Here we will assume that the state of satiation (and the experiencer of this state) is introduced by a phonologically empty head (cf. APPL(icative) head below). This assumption is due to the fact that neither *na-* nor *-sja* make the same semantic contribution in their other uses. In other words, the state of satiation is not introduced into the semantics of a predicate by any of these morphemes in other constructions.

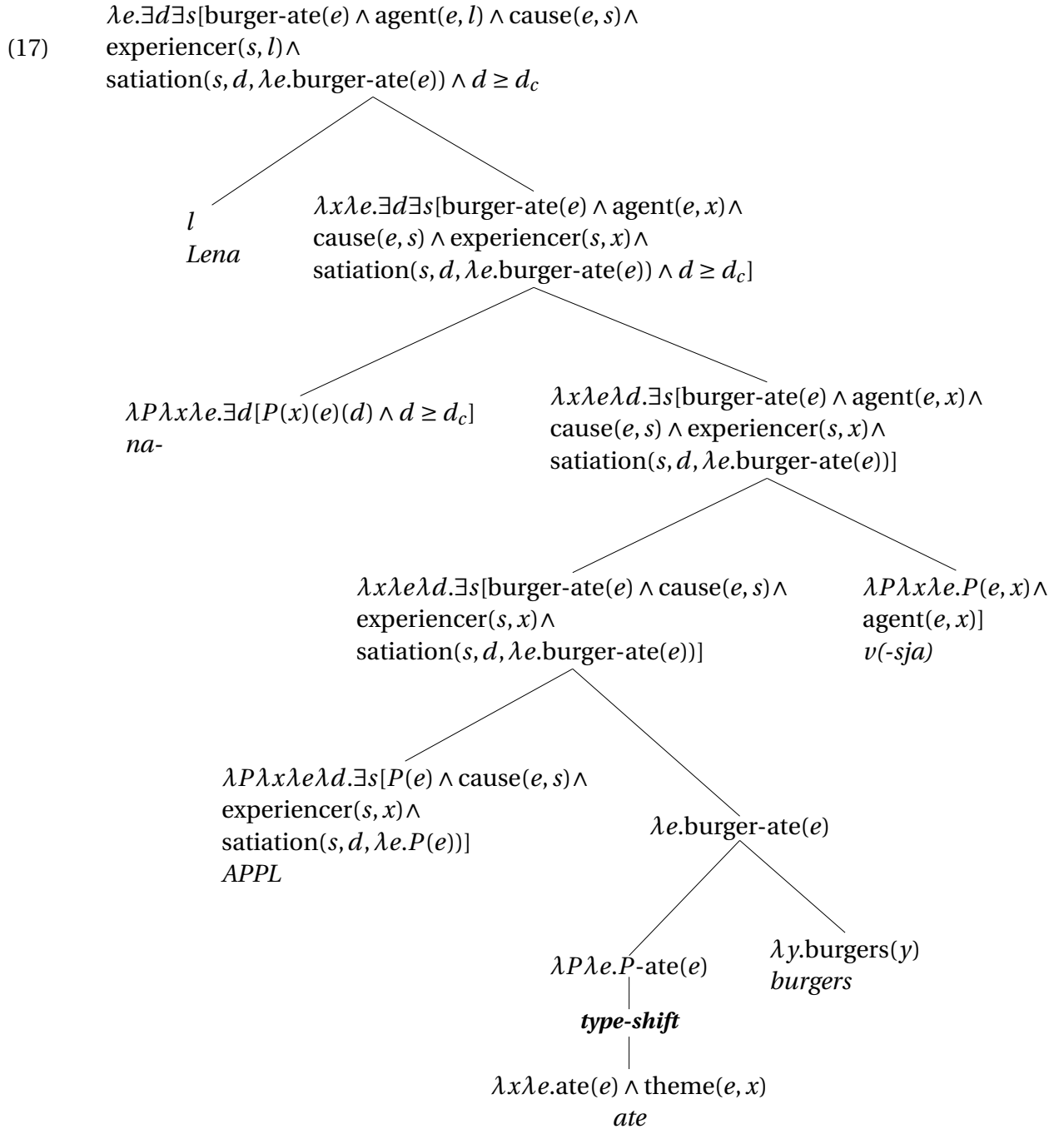
Note that the proposed explanation of the entailment pattern exhibited by (1) and (16) does not depend in any crucial way on the precise division of labor between the different functional elements. The crucial point is that the functional material applies above the VP projection, and that it is the semantics of the VP that determines the nature of the process with which satiation is experienced. For an alternative analysis of the compositional semantics of intensive reflexive predicates, see Tatevosov (2010). Tatevosov, too, analyzes intensive reflexives as accomplishment event predicates; however, under his approach, the result state is introduced by the accumulative prefix *na-*. Despite the advantages of Tatevosov’s analysis, we believe that it fails to account for the entailment pattern whose explanation constitutes the main goal of this section. According to Tatevosov, *na-* introduces a result state with underspecified descriptive properties, and the precise nature of the state is determined by the context. Under this approach, it remains unclear why the nature of the result state reported in sentences

with GCIRs differs in a consistent and systematic way from the result state denoted by sentences with instrumental phrases or with no post-verbal nominal. We propose instead that the nature of the result state is a function of the semantics of the VP and is thus semantically determined. At the same time, it should be noted that the notion of a high degree of satiation, or “overdose”, is relatively vague. This allows us to capture the fact that with some predicates, the precise nature of the result state may be relatively flexible and, to a certain degree, context-dependent.

In turn, the prefix *na-* imposes a restriction on the degree of satiation. According to Filip (2000), this prefix contributes an extensive measure function which yields a value that meets or exceeds some contextually determined expectation value. We propose that in the case of the investigated phenomenon, this prefix imposes a restriction on the degree of satiation. It specifies that this degree is not low, i.e. it meets or exceeds a contextually determined expectation value. In our case, this contextually specified degree is the medium/satisfactory degree. Namely, it corresponds to the state when the subject feels that she has had enough of the process denoted by the VP. As a result, sentences with intensive reflexives report that the subject has had enough or more than enough of this process, according to her own personal feeling.

Finally, a brief note is needed on the semantics of *-sja*. Following Doron (2003) and Labelle (2008), we assume that reflexive morphology is a realization of a voice head. In the classical reflexive construction, its function is to assign the role of an agent to an internal argument of the verb (Doron 2003, Labelle 2008). As a result, the latter receives two thematic roles. We propose that with intensive reflexives, the suffix makes an analogous semantic contribution. It assigns the role Agent to an internal argument contained in the constituent it combines with. This way, it makes sure that the agent of the process denoted by the VP is identified with the experiencer of the result state of satiation. (In the formulae below, we adopt for *-sja* an analysis used by Labelle (2008) in her discussion of the French *se*.)

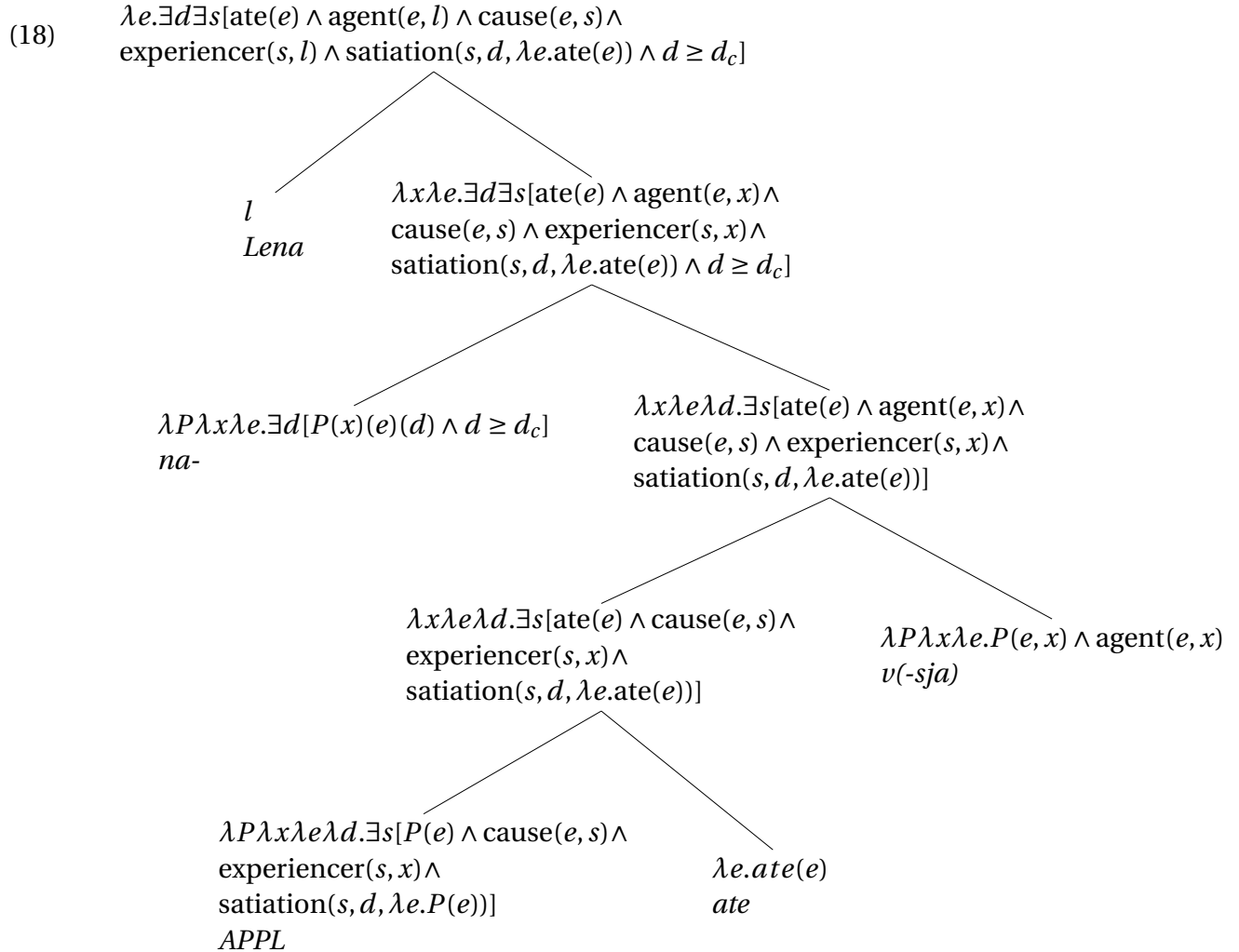
The diagram in (17) below represents the compositional semantics we are proposing for (1a), which contains a genitive NP. The verb undergoes an incorporation type-shift and combines with its property-denoting complement. The resulting VP denotes a process of burger-eating. The resulting sentence entails that the subject has been engaged in burger-eating, and this event brought about the result state of a high degree of satiation with burger-eating on the part of the subject. According to this sentence, the subject feels that she has had enough of burger-eating.



It should be noted here that our analysis differs crucially from the one proposed by Filip (2005) in that she combines the accumulative *na-* directly with the complement, such as ‘burgers’ here. However, alternative recent analyses have treated the accumulative *na-* as being merged outside the VP, as an outer aspect prefix (cf. Romanova 2004, Pereltsvaig 2006, Tatevosov 2006). As argued in the references cited above, at least three pieces of evidence involving derivational morphology show that the accumulative prefix *na-* is merged outside the VP: first, the accumulative *na-* always appears outside of the lexical prefixes (which are merged low, possibly within VP); second, the accumulative prefix *na-* attaches outside of the secondary imperfective suffix *-yva-* (itself merged relatively high, in AspP); and third, it must attach outside the nominalizing

suffix *-nie/-tie*. The intensive reflexives, examined in this paper, provide an additional argument for high attachment of the accumulative *na-*: it must attach above the VP projection, which contains both the complement and the verbal stem. It is not possible to merge the accumulative *na-* directly with the complement, as proposed by Filip (2005). Otherwise, the prefix would measure the quantity of burgers and not the degree of satiation. In other words, while we share with Filip (2005) the idea that the accumulative *na-* provides a measure function, we do not analyze it as being attached directly to the complement.

The diagram in (18) below represents the semantics of (16), which is identical to (1a) except for the fact that it does not contain a genitive NP. This sentence contains an intransitive version of the verb *jest* ‘eat’ (Fodor and Fodor 1980). Here, the verb does not take a complement, and the VP contains only the V head. As a result, the sentence entails that the subject has been engaged in, and has had enough of, the process of eating.

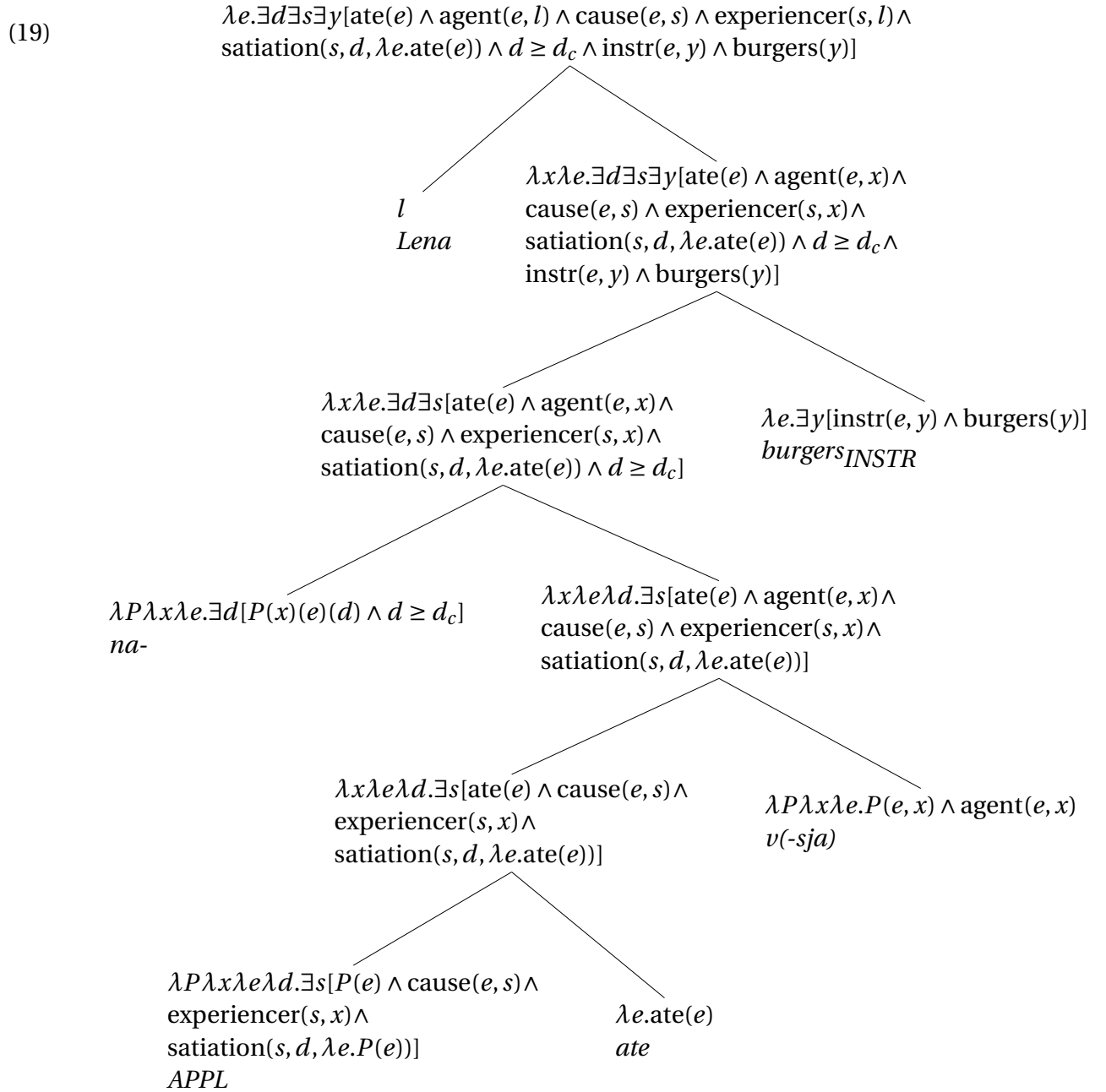


Given that having had enough of burger-eating does not entail having had enough of eating in general, we predict correctly that (1a) does not entail (16). At the same time, being engaged in process of burger-eating means being engaged in the process of eating (since burger-eating is treated within the framework we are assuming as a subtype

of eating). And indeed, (1a) does entail that the subject has been engaged in the process of eating.

Finally, the structure we are proposing for (1b) is provided in (19) below. It can be seen that the VP in (19) contains only the intransitive V head, just as is the case in (16). Once the functional material is attached, the resulting predicate denotes an accomplishment whereby an eating process causes a result state of a high degree of satiation with eating. Up to this point the structure is identical to that of (16). And it is only at this point that the predicate combines with the instrumental phrase. As suggested at the end of Section 2, the instrumental phrase is an adjunct: it is not selected by the verb the way a complement is (cf. (16)), and its occurrence is optional. We propose that this instrumental phrase should be analyzed as an adjunct of instrument / means, which specifies the way in which the result state denoted by the predicate has been achieved.⁸

⁸Alternatively, the phrase could be analyzed as a theme which appears in the instrumental case by virtue of being demoted, by analogy with demoted agents in the passive construction, which, too, are assigned the instrumental. The choice between the two analyses depends on the approach to the instrumental Case that one assumes. For details of the demotion approach, see e.g. Channon (1980).



Crucially for our purposes, the instrumental phrase attaches relatively high in the structure and, as a result, does not affect the nature of the process with which the subject experiences satiation. It only specifies in what way this state is achieved.

The analysis proposed above accounts successfully for the entailment relations puzzle introduced at the beginning of this section. Only the material that appears below the VP projection determines the nature of the process with which satiation is entailed to be experienced. Since GCIRs, but not their instrumental counterparts, are merged below the VP, it is only the former that can affect the nature of the result state brought about by the reported event.

5 Conclusion

To summarize, in this paper, we have discussed the properties of GCIRs and compared these nominals to their instrumental counterparts. We argued that GCIRs are bare NPs which lack the DP and QP projections, and that they denote properties and are of the semantic type $\langle e, t \rangle$. Further, we proposed that these phrases function as syntactic complements of the verb and are semantically incorporated. In contrast, the instrumental phrases are full DPs of the quantificational type $\langle \langle e, t \rangle, t \rangle$, which syntactically function as adjuncts. The difference in the hierarchical position occupied by the two types of nominals in the syntactic structure affects their contribution to the compositional semantics of the sentence.

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Olga Kagan
Hebrew University of Jerusalem

Asya Pereltsvaig
Stanford University

DP external epistemic ‘determiner’s in Japanese

Makoto Kaneko*

1 Introduction

In Japanese, a sequence formed by a WH word¹, like *dare* (‘who’), *nani* (‘what’), *doko* (‘where’), etc., and a disjunctive particle *ka*, may serve as an indefinite pronoun when it is case-marked, as in (1a). It may also be disjoined with other noun phrases, as in (1b)²:

- (1) a. **dare-ka-ga** kita (Watanabe 2006: 292)
 who -or-NOM came
 ‘Someone came.’
 b. koohii-**ka** kootya-**ka nani-ka-o** nomu. (adapted from Okutsu 1996: 152)
 coffee-**or** tea-**or what-or-ACC** drink
 ‘(I) drink coffee, tea or something else.’

A sequence *WH-ka* has another use: it may be accompanied by a host NP³ marked by nominative or accusative markers, while occupying a post-nominal position, as in (2a), or a distant position, as in (2b)⁴. In these cases, a WH word should semantically agree with the host NP: in (2a,b), the host NP, *nomimono* (‘drink’), requires a WH word *nani* (‘what’) specified for [-human] feature rather than [+human] *dare* (‘who’). These two

*I thank an anonymous reviewer for his helpful comments. I am only responsible for all the remaining problems.

¹WH words in Japanese lack their own quantificational force and are licensed normally by being associated with the particles *mo* or *ka* (Kratzer & Shimoyama 2002, among others.). As for the semantics of these particles, see below.

²The abbreviation used in the glosses are the following: ACC: accusative; CL: classifier; COMP: complementizer; COP: copular; DAT: dative; GEN: genitive; LOC: locative; NEG: negation; NOM: nominative; NUM: number; PAS: passive; PROG: progressive; PST: past; Q: question marker; TOP: topic; WH: WH word.

³In this paper, a WH word and the particle *ka* are put into bold characters, while the host NP is underlined.

⁴A *WH-ka* may occupy a pre-nominal position, excluding identification reading, as in (i). This construction will not be discussed for lack of space:

- (i) textbfnani-ka nomimono-o watasi-ni kudasai. #Coola-o onegaisimasu / nan-demo ii desu.
 what-or drink-ACC me-DAT give Coke-ACC please / what-even good COP
 ‘Give me some drink. {Coke, please. / Anything is ok.} (adapted from Kamio 1973: 82)

uses (henceforth, post-nominal and floating uses), have attracted much less attention than its pronominal use in an argument position, as in (1a):

- (2) a. nomimono-o **nani-ka** watasi-ni kudasai. #Coola-o onegaisimasu /
drink-ACC **what-or** me-DAT give Coke-ACC please /
 nan-demo ii desu.
 what-even good COP
 ‘Give me some drink. Coke please. / Anything is ok.’ (adapted from Kamio 1973: 82)
- b. nomimono-o watasi-ni **nani-ka** kudasai. #Coola-o onegaisimasu /
drink-ACC me-DAT **what-or** give Coke-ACC please /
 nan-demo ii desu.
 what-even good COP
- c. nomimono-o watasi-ni kudasai. Coola-o onegaisimasu / nan-demo
drink-ACC me-DAT give Coke-ACC please / what-even
 ii desu.
 good COP
 ‘Give me a drink. Coke please. / Anything is ok.’

A semantic effect of post-nominal and floating *WH-ka*, as in (2a,b), is to convey the speaker’s ignorance about the referent of the host NP, while a bare NP may convey either ignorance or identification meaning, as in (2c). This contrast between a bare NP and a host NP accompanied by post-nominal or floating *WH-ka* may be compared in Spanish with that between an indefinite article, as in (3a), and an epistemic determiner, *algún*, as in (3b) which requires the speaker’s ignorance⁵:

- (3) a. María se casó con **un** estudiante del departamento de lingüística,
 María self married with a student of the department of Linguistics,
 en concreto con Pedro. (Alonso-Ovalle & Menéndez-Benito 2009)
 namely with Pedro
 ‘Mary married a Linguistic student, namely Pedro.’
- b. María se casó con **algún** estudiante del departamento de lingüística,
 María self married with ALGUN student of the department of Linguistics,
 (#en concreto con Pedro) (ibid.)
 (namely with Pedro)
 ‘Mary married some Linguistic student or other (#namely Pedro).’

Syntactically, Mikami (1972) and Kamio (1973) compare post-nominal and floating *WH-ka* with post-nominal and floating numeral+classifier (henceforth *Num+CL*), as in (4a,b). It has been much discussed i) whether a floating *Num+CL* is derived from a

⁵The same is true for French *quelque* in (iia) and Italian *un qualche* in (iib)

- (i) a. Yoronda a dû rencontrer **quelque** amie (#je sais bien qui c’était). [Fr]
 ‘Yoronda must have met some girl friend or other (“#I know well who it was”).’ (adapted from Jayez & Tovenia 2008: 272)
- b. Hai incontrato **un qualche** compagno di scuola (??cioè Vito) ? [It]
 ‘Did you meet any schoolmate (??namely Vito)?’ (Zamparelli 2007: 303)

post-nominal one, and ii) whether a case-marked host NP and a post-nominal *Num+CL* are in the same nominal projection:

- (4) a. nomimono-o **ip-pai** watasi-ni kudasai.
 drink-ACC **one**-CL me-DAT give
 b. nomimono-o watasi-ni **ip-pai** kudasai.
 drink-ACC me-DAT **one**-CL give
 'Give me a cup of drink.'

Similarly, it may be asked i) whether a floating *WH-ka* is derived from a post-nominal one, and ii) whether a case-marked host NP and a post-nominal *WH-ka* are in the same nominal projection. These questions are interesting in view of a recent discussion on syntax and semantics of quantifiers and determiners in East Asian languages. Gil & Tsoulas (2009) argue that nominal quantification in these languages may be achieved in the verbal domain. Cheng (2009) observes that a Chinese adverb *dōu* in (5), although being outside coordinated quantifier phrases, restricts the denotations of the underlined two NPs ('student' and 'teacher'), and claims, assuming that the essential function of definite determiners is to restrict the alternative domain, that *dōu* semantically acts as a DP-external definite determiner:

- (5) [Dàpùfèn de xuéshēng hé měi-ge lǎoshī] **dōu** zǎo dào. (Cheng 2009: 68)
 most of student and every-CL teacher **DOU** early arrive
 'Most of **the** students and all **the** teachers arrived early.'

This paper will argue i) that syntactically, some cases of floating *WH-ka* are analyzed as parenthetical sluiced indirect questions, paraphrased in English by 'I don't know WH', while other cases are derivationally related to a post-nominal *WH-ka*, which in turn is an appositive of the case-marked host NP; and ii) that semantically, the ignorance meaning of the former is due to the implicit main clause corresponding to 'I don't know', while the ignorance meaning of the latter is only pragmatically derived from the fact that the alternative domain it induces should include at least two members, just as in the cases of epistemic determiners.

In what follows, I will first examine the syntax of post-nominal and floating *WH-ka*, by comparing them with post-nominal and floating *Num+CL* (Section 2). Next after having shown that two recent semantic analyses about *WH-ka* cannot make sense of distributions of post-nominal and floating *WH-ka*, and based on their common distributions with Romance epistemic determiners, I will apply one of the previous analyses advanced for epistemic determiners to post-nominal *WH-ka* (Section 3); I will finally recapitulate the results of this study (Section 4).

2 Syntax of floating and post-nominal *WH-ka*

2.1 Analysis of floating *WH-ka* in terms of parenthetical sluiced indirect question

The syntax of floating *Num+CL* has attracted much attention in the literature and two competing views have been proposed: i) Miyagawa (1989), Miyagawa & Arikawa (2007),

among others, argue that a floating *Num+CL* is adjacent to the host NP in the underlying structure, and is left behind after the movement of the latter, as in (6a) (henceforth ‘stranding view’); ii) Nakanishi (2008), among others, claims that a floating *Num+CL* is, just as its surface position indicates, base-generated as a VP adjunct, as in (6b) (henceforth ‘adjunct view’):

- (6) a. [nomimono-o]_k watasi-ni [t_k] [**ip-pai**] kureru. [stranding view]
 [drink-ACC me-DAT **one-CL** give
 b. [nomimono-o] watasi-ni [_{VP} **ip-pai** [_{VP} kureru]]. [adjunct view]
 [drink-ACC me-DAT **one-CL** give
 ‘(one will) give me a cup of drink.’

In favor of the adjunct view, it is observed that a floating *Num+CL* can be related to the host NP within another NP, as in (7a), or within a postpositional phrase, as in (7b): it is widely accepted that a movement across a complex NP is prohibited and that, contrary to nominative and accusative markers which are cliticized onto the NP, the postposition *kara* ‘from’ is disposed with its own projection, and should disturb an association across its boundary. The acceptability of (7a,b) indicates that at least some cases of floating *Num+CL* are generated separately from the host NP since the underlying structure. The VP adjunct view is further supported by the fact that a floating *Num+CL* semantically quantifies not only over the referents denoted by the host NP, but also over the events denoted by the VP (Nakanishi 2008):

- (7) a. ano isya-wa [_{NP}[_{NP} zidoo]-no me]-o **sanzyuu-nin** sirabeta.
 that doctor-TOP pupil-GEN eye-ACC **thirty-CL** examined
 ‘That doctor examined thirty pupils’ eyes.’ [√/host NP in complex NP] (Nakanishi 2008: 294)
 b. [_{PP}[_{NP} gakusee]-kara] **nizyuu-mei-izyoo** okane-o
 student-from **twenty-CL-or more** money-ACC
 atume-nakerebanaranai.
 collect-must
 ‘(We) must collect money from twenty students or more.’ [√/host NP in PP]
 (Takami 2001: 129)

Two similar views may be proposed for floating *WH-ka*: i) it is adjacent to a host NP in the underlying structure, and is left behind after the movement of the latter, as in (8a); ii) a floating *WH-ka* is derivationally independent from the host NP, as in (8b):

- (8) a. [nomimono-o]_k watasi-ni [t_k] [**nani-ka**] kureru yooda [stranding view]
 drink-ACC me-DAT **what-or** give likely
 b. [nomimono-o] watasi-ni [**nani ka**] kureru yooda [adjunct view]
 drink-ACC me-DAT **what or** give likely
 ‘It is likely that one gives me some drink or other’

But differently from a floating *Num+CL*, a floating *WH-ka* cannot be analyzed as a VP adverb quantifying over the events denoted by the VP. Based on the observation that a sequence *WH-ka* is obtained by sluicing an indirect question, as in (9a) (Takahashi 1994), a possible approach is to analyze floating *WH-ka* as a parenthetical sluiced indi-

rect question whose interrupting nominative or accusative markers and matrix clause are phonologically omitted. According to this analysis, the particle *ka* is a complementizer occupying the head of CP, and the ignorance reading is due to an elliptical matrix clause paraphrased by 'I don't know', as in (9b):

- (9) a. Mary-ga hon-o katta rasii ga, boku-wa [_{CP} **nani(-o)** [_{IP}] [_C **ka**]]
 Mary-NOM book-ACC bought likely but, me-TOP **what-ACC** Q
 wakara-nai.
 know-NEG
 'It is likely Mary bought a book, but I don't know what.' (Takahashi 1994: 266)
- b. Mary-ga hon-o [(watasi-ni-wa) [_{CP} **nani(-o)** [_{IP}] [_C **ka**]] (wakara-nai
 Mary- NOM book-ACC (me-DAT-TOP) **what-ACC** **or** know-NEG
 ga)] katta-rassii
 but bought-likely
 'It is likely Mary bought a book – I don't know what.'

This analysis is supported by the following parallel distribution between sluiced indirect questions and some cases of floating *WH-ka*. When sluiced indirect question is related to genitive- or ablative-marked NP, the interrupting case-markers cannot be omitted, as in (10a) and (11a). The same is true for floating *WH-ka* related to genitive- or ablative-marked host NP, and requiring the interruption of a case marker, as in (10b) and (11b):

- (10) a. ano kantoku-wa sensyu-no kao-o nagutta rasii ga, boku-wa
 that trainer-TOP player-GEN face-ACC beat likely but, I-TOP
 {??**dare-ka/dare-no-ka**} wakara-nai.
who-or/who-GEN-or know-NEG
 'It is likely that trainer beat the face of a payer - I don't know {who / whose}.'
- b. ano kantoku-wa [[sensyu]-no kao-o] {??**dare-ka/dare-no-ka**
 that trainer-TOP player-GEN face-ACC **who-or/who-GEN-or**
 (wakara-nai ga)} nagutta rasii. [host NP inside complex NP]
 know-NEG but beat likely
 'It is likely that trainer beat the face of some player - I don't know {who / whose}.'
- (11) a. gakusee-kara denwa-ga atta rasii ga, boku-wa {??**dare-ka / dare-kara**
student-from call-NOM was likely but, I-TOP **who-or/who-from**
ka} wakara-nai.
or know-NEG
 'It is likely that there was a call from a student, but I don't know {who / from whom}.'
- b. gakusee-kara {??**dare-ka/dare-kara ka** (wakara-nai ga)} denwa-ga atta
student-from **who-or/who-from** **or** know-NEG but call-NOM was
 rasii.
 likely

'It is likely that there was a call from some student - I don't know {who /from whom}.' [host NP inside a PP adjunct]

But the adjunct view cannot apply to all cases of floating *WH-ka*. As will be discussed in Section 3, floating *WH-ka* typically occur in modal contexts, like imperatives, as in (12a), where a Free Choice reading is induced. In these contexts, it is redundant and pragmatically even inappropriate to say, by means of parenthetical indirect question, that the speaker cannot identify the referent, as in (12b):

- (12) a. nomimono-o watasi-ni **nani-ka** kudasai. nan-demo ii desu. (=2b))
drink-ACC me-DAT **what-or** give what-even good COP
 'Give me some drink or other. Anything is ok.'
 b. ??nomimono-o watasi-ni [**nani-ka** wakara-nai ga] kudasai. nan-demo
drink-ACC me-DAT **what-or** know-NEG but} give what-even
 ii desu.
 good COP
 'Give me some drink- I don't know what. Anything is ok.'

Furthermore, some cases of floating *WH-ka* manifest scope variability as well as post-nominal *WH-ka*, and differently from parenthetical sluiced indirect questions: in (13a), floating *dare-ka* ('who-or') c-commanded by a quantifying adverb *mai-kai* ('every time') prefers narrow scope. The same is true for post-nominal *WH-ka*, as in (13b). On the other hand, *dare-ka* c-commanding *mai-kai* prefers wide scope, as in (13c). A parenthetical sluiced indirect question always takes wide scope over *mai-kai*, as shown in (14a,b,c):

- (13) a. gakusee-ga *mai-kai* **dare-ka** situmon-o suru.
student-NOM *every time* **who-or** question-ACC ask
 [√every > some / ??some > every]
 'Every time, there is some student who asks a question.'
 b. *mai-kai* gakusee-ga **dare-ka** situmon-o suru.
every time student-NOM **who-or** question-ACC ask
 [√every > some / ??some > every]
 'Every time, there is some student who asks a question.'
 c. gakusee-ga **dare-ka** *mai-kai* situmon-o suru.
student-NOM **who-or** *every time* question-ACC ask
 [??every > some / √some > every]
 'There is some student or other who asks a question every time.'
- (14) a. gakusee-ga *mai-kai* [**dare ka** wakara-nai ga] situmon-o suru.
student-NOM *every time* **who or** know-NEG but question-ACC ask
 [*every > some]
 'Every time, there is some student who asks a question – I don't know who.'
 b. *mai-kai* gakusee-ga [**dare ka** wakara-nai ga] situmon-o suru.
every time student-NOM **who or** know-NEG but question-ACC ask
 [*every > some]
 'Every time, there is some student who asks a question - I don't know who.'

- c. gakusee-ga [**dare ka** wakara-nai ga] *mai-kai* situmon-o suru.
 student-NOM **who or** know-NEG but *every time* question-ACC ask
 [*every > some]

'There is some student who asks a question every time – I don't know who.'

These observations rather support the stranding view according to which a floating *WH-ka* is derivationally associated with a post-nominal *WH-ka*. I will examine in next section the syntax of post-nominal *WH-ka*, by comparing it with that of post-nominal *Num+CL*.

2.2 DP internal analysis of post-nominal *WH-ka*

Miyagawa (1989) argues that a post nominal *Num+CL* is a secondary predicate of a case-marked host NP and does not form a constituent with it⁶. Kamio (1973) however observes that a sequence $\langle NP+Case+Num+CL \rangle$ may be coordinated with another noun phrase, as in (15a), which suggests that this sequence forms a constituent categorically equivalent to a noun phrase⁷. This author points out that the same is true for a sequence $\langle NP+Case+WH-ka \rangle$, as in (15b).

- (15) a. [gakusee-ga **go-nin**] to Yoshida san-ga tukamatta.
 student-NOM 5-CL and Yoshida Mr.-NOM were arrested
 (Kamio 1973: 72)
 'Five students and Mr. Yoshida were arrested.'
- b. [otokonoko-ga **dare-ka**] to Yoshida san-ga kita hazuda. (idem.83)
 boy-NOM **who-or** and Yoshida Mr.-NOM came must
 'Some boy or other and Mr. Yoshida must have come.'

⁶Miyagawa himself rejects this analysis in a later work (Miyagawa & Arikawa 2007: 650) for a theoretical reason (i.e. a secondary predicate analysis amounts to a violation of the principle of binary branching), and identifies the projection formed by a case-marked host NP and post-nominal *Num+CL* as NumberP.

⁷Koizumi (2000) suggests that a coordination with a DP may not argue for the existence of a nominal projection, by claiming a possibility of across the board verb raising, represented as in (i): according to this analysis, the sequence $\langle NP-Case+Num+CL \rangle$ may instantiate an elliptical VP. Kawazoe (2002) refutes this analysis by pointing out that, when the sequence is naturally be interpreted as an elliptical VP (ex. when it involves a temporal adjunct, as in (ii-a), or when a *Num+CL* is replaced by a measure phrase counting events, as in (ii-b)), it cannot be coordinated with a DP.

- (i) [_{VP} gakusee-ga **go-nin** *t_v*] to [_{VP} Yoshida san-ga *t_v*] tukamatta,
 student-NOM 5-CL and Yoshida Mr.-NOM were arrested
 'Five students and Mr. Yoshida were arrested.'
- (ii) a. * [gakusee-ga kinoo **hura-ri**] to [_{sensee-ga}] kita. (Kawazoe 2002: 169)
 student-NOM yesterday 2-CL and teacher-NOM came
 '(lit) Two students yesterday and a teacher came.'
- b. * [Taroo-ga **ni-kai**] to [_{Ziroo-ga}] keisatu-ni hodoos-are-ta (idem.170)
 Taro-NOM two times and Ziro-NOM police-by arrest-PAS-PST
 '(lit) Taro two times and Ziro were arrested by the police.'

- (16) sono purojekuto-wa seika-o **nani-mo** age-nakat-ta.
 that project-TOP achievement-ACC what-MO raise-NEG-PST
 (Watanabe 2006: 281)
 ‘That project didn’t produce any results.’

In the same vein, discussing a sequence formed by a WH word and another particle *mo*, as in (16), which induces a NPI effect in negative sentences, Watanabe (2006) claims i) that it is in the same nominal projection as the host NP, as well as in the cases of post-nominal *Num+CL*, although their positions are different, and ii) that the particle *-ka* occupies the same position as the particle *-mo*. According to this analysis, a post-nominal *WH-ka* would be in the same nominal projection as the host NP. I will show below, after having presented the details of Watanabe’s analysis, that this analysis encounters an empirical problem.

2.2.1 Watanabe (2006)

Watanabe observes that: i) a *Num+CL* may directly follow a host NP, as in (17a); ii) it may be accompanied by the genitive marker, *no*, in a pre-nominal position, as in (17b); iii) it may follow the case-marked host NP, as in (17c):

- (17) a. gakusee **hito-ri**-ga kuru
 student one-CL-NOM come
 b. **hito-ri**- no gakusee-ga kuru
 one-CL GEN student-NOM come
 c. gakusee-ga **hito-ri** kuru
 student-NOM one-CL come
 ‘One student came.’

To account for these word orders, this author first assumes an articulated structure for DP in Japanese, consisting of DP, QuantifierP, CaseP, #P (for numeral quantifiers), and NP, as in (18), where a numeral and a classifier are respectively merged in Spec-#P and head #:

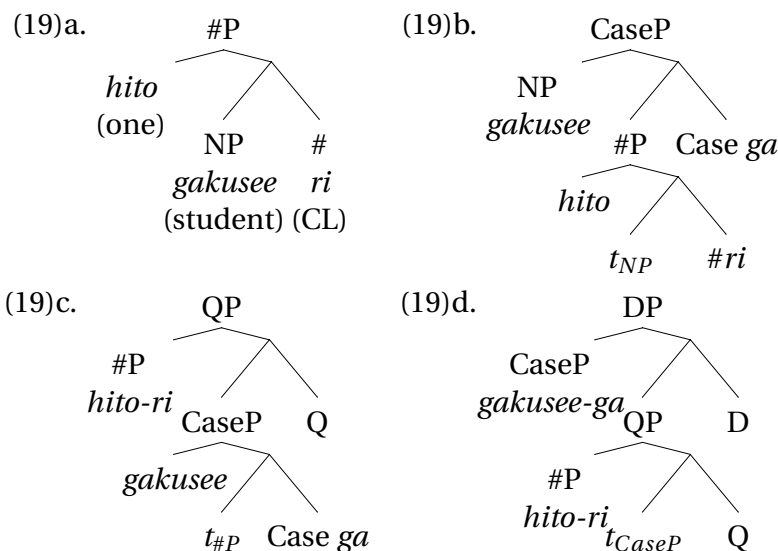
- (18) [DP [QP [CaseP [#P [NP] #] Case] Quantifier] Determiner] (Watanabe 2006: 252)

He then proposes the following iterated remnant movements⁸:

- i) *gakuse hito-ri-ga* (‘student one-CL-Nom’) in (17a) is derived from an initial input in (19a) by a movement of NP to Spec-CaseP, as in (19b)
 ii) *hito-ri no gakusee-ga* (‘one-CL-Gen student-Nom’) in (17b) is derived from (19b) by a movement of #P to Spec-QP, as in (19c), and by the insertion of the genitive *no*⁹;
 iii) *gakusee-ga-hito-ri* (‘student-Nom one-CL’) in (17c) is derived from (19c) by a movement of CaseP to Spec-DP, as in (19d);

⁸Watanabe (2006) assumes that Japanese is head final since the beginning of the derivational history.

⁹According to Watanabe (2006: 256), the genitive marker, *no*, “is inserted after the derivation is handed over to the PF branch”, and therefore “is not represented structurally”.



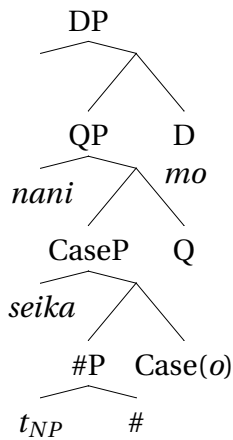
Next, Watanabe observes that: i) *WH-mo* cannot directly follow a NP, as in (20a), which indicates that the position of *WH-mo* is different from that of *Num+CL*; ii) in pre-nominal position, only a WH word is genitive-marked, while the particle *mo* follows a NP, as in (20b); iii) *WH-mo* may follow a case-marked NP, as in (20c); iv) in a post-nominal position, a WH word may precede *Num+CL*, which may be followed by the particle *mo*, as in (20d):

- (20) a. *sono purojekuto-wa seika **nani-mo** age-nakat-ta.
that project-TOP achievement what-MO raise-NEG-PST
(Watanabe 2006: 281)
- b. sono purojekuto-wa **nani-no** seika(-o)-**mo** age-nakat-ta.
that project-TOP what-GEN achievement-ACC-MO raise-NEG-PST
(ibid.)
- c. sono purojekuto-wa seika-o **nani-mo** age-nakat-ta.
that project- TOP achievement-ACC what-MO raise-NEG-PST
(ibid.)
- d. sono purojekuto-wa seika-o **nani-hito-tu(-mo)** age-nakat-ta.
that project- TOP achievement-ACC what-one-CL(-MO) raise-NEG-PST
(ibid.)
'That project didn't achieve any result.'

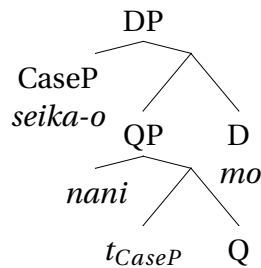
To make sense of these word orders, Watanabe assumes the following steps:

- i *nani-no seika-mo* ('what-Gen-result-MO') in (20b) is derived from (19b) by merging *nani* ('what') in Spec-QP, and the particle *mo* in the head D, and by the morphological insertion of the genitive *no*, as in (21a);
- ii *seika-o nani-mo* ('result-Acc-what-MO') in (20c) is derived from (21a) by a movement of CaseP to Spec-DP, as in (21b);
- iii *seika-o nani-hitotu-mo* in (20d) is derived from (19b) first by merging *nani* ('what') and the particle *mo* respectively in Spec-QP and in the head D, second by moving #P to inner Spec-QP, and third by moving CaseP to Spec-DP, as in (21c):

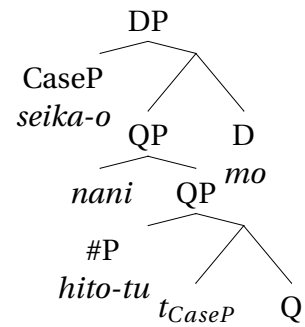
(21)a.



(21)b.



(21)c.



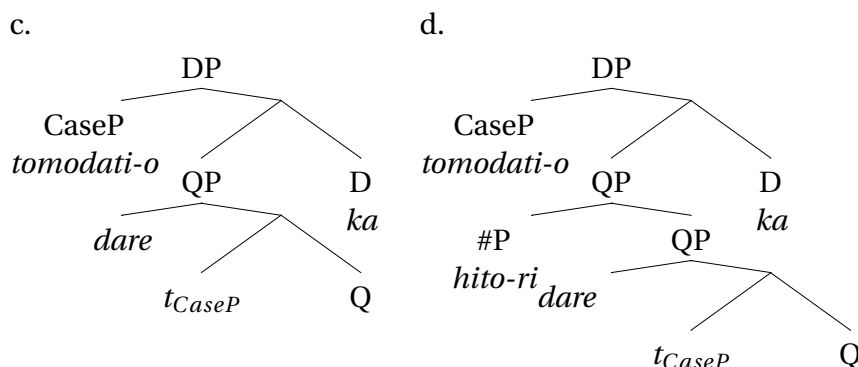
Crucially, Watanabe (2006: 288) assumes that “when a movement operation creates a second Spec, it must always be the inner-most Spec, because a shorter movement can achieve that.”

2.2.2 Counter-examples to DP internal analysis

According to Watanabe (2006), the particle *-ka* occupies, as well as the particle *mo*, the head D. The sequence, *tomodati-o dare-ka* (‘friend- ACC who-or’), would thus be represented by (22c). This approach however does not account for the order, *tomodati-o hito-ri dare-ka* (‘friend-ACC one-CL who-or’) in (22a). This sequence may be coordinated with another DP, as in (22b), and therefore forms a constituent with the host NP followed by *Num+CL*¹⁰:

- (22) a. aru zyuku-de-wa seeto-ga tomodati-o **hito-ri** **dare-ka**
 certain private-school-LOC-TOP pupil-NOM friend-ACC **one-CL** **who-or**
 tureteki tara, okozukai-o ageru.
 bring together if pocket money-ACC give
 ‘A certain private school gives pocket money to a pupil if (s)he brings together some friend.’ (<http://strongpie.btblog.jp/cm/kulSc1a7W48DA71CF/1/>)
- b. [tomodati-o **hito-ri** **dare-ka**] to [sono okaasan-o] turetekuru
friend-ACC **one-CL** **who-or** and that mother-ACC bring together
 ‘bring together some one friend and his (her) mother

¹⁰The analysis in terms of a parenthetical sluiced indirect question is inappropriate here since *dare-ka* (‘who-or’) occurs in the antecedent of conditional which induces a free-choice like reading, and where it is redundant to say that the speaker cannot identify the referent in question.



If the relevant sequence in (22a) were derived by a movement of #P, *hito-ri* ('one-CL'), to Spec-QP, we should assume that #P moves to outer Spec-QP over inner Spec-QP occupied by a previously merged WH word, as in (22d). But this derivation should be excluded by Watanabe's above principle that "when a movement operation creates a second Spec, it must always be the inner-most Spec". Thus, there is no place to put a post-nominal *WH-ka* inside a DP under Watanabe's (2006) framework, and we are led to conclude that, although a post-nominal *WH-ka* (when it cannot be analyzed as a parenthetical sluiced indirect question) forms a constituent with the case-marked host NP, it should be outside the DP including the latter. Where is such a post-nominal *WH-ka*?

2.3 Appositive analysis

Okutsu (1996) and Eguchi (1998) analyze a *WH-ka* associated with another NP as an appositive expression. They first point out that a use of *WH-ka* presupposes a set of contextually selected alternative members, and that *WH-ka* may be disjoined with some of such alternative members, as in (23a). In these cases, a *WH-ka* denotes a non-specified one of the alternatives. According to these authors, when it is preceded by the host NP, as in (23b), the sequence, *koohii-ka kootya-ka nani-ka* ('coffee, tea or something else'), is an appositive, and serves to describe the object in question extensionally, while the host NP represents it intensionally:

- (23) a. *koohii-ka kootya-ka nani-ka-o* nomu. (=1b)
 coffee-or tea-or what-or-ACC drink
 '(I) drink coffee, tea or something else.'
- b. [*nomimono-o*] [(*koohii-ka kootya-ka*) *nani-ka*] *watasi-ni kudasai*.
drink-ACC coffee-or tea-or what-or me-DAT give
 'Give me some drink, coffee, tea, or something else.'

According to this analysis, post-nominal *WH-ka* is obtained when the contextually selected alternatives members (ex. *coffee* and *tea* in (23b)) are not explicitly mentioned. This analysis is supported by the fact that a disjunction of alternatives following the case-marked host NP behaves in the same way as a post-nominal *WH-ka* with respect to the three tests discussed in Section 2.2: i) a sequence [NP-Case *X-ka Y-ka WH-ka*] may be coordinated with another DP, as in (24); ii) when the host NP is situated inside a PP adjunct, a post-nominal disjunction of alternatives is not acceptable, as in (25); iii) a post-nominal disjunction of alternatives manifests scope variability with respect to a clause-mate quantifier, as in (26a,b)

- (24) [[otokonoko-ga] [John-**ka** Paul-**ka dare-ka**]] to Yoshida san-ga kita
 boy-NOM John-**or** Paul-**or who-or** and Yoshida Mr.NOM came
 hazuda.
 must
 'A boy, John, Paul or someone else, and Mr. Yoshida must have come.'
- (25) ??[_{PP} gakusee-kara] John-**ka** Paul-**ka dare-ka** denwa-ga atta rasii.
student-from John-**or** Paul-**or who-or** call-NOM was likely
 'It is likely that there was a call from a student, John, Paul or someone else.'
- (26) a. *mai-kai* gakusee-ga John-**ka** Paul-**ka dare-ka** situmon-o suru.
every time student-NOM John-**or** Paul-**or who-or** question-ACC ask
 'Every time, there is a student, John, Paul or someone else, who asks a ques-
 tion.' [√every >or / ??or > every]
- b. gakusee-ga John-**ka** Paul-**ka dare-ka** *mai-kai* situmon-o suru
student-NOM John-**or** Paul-**or who-or** *every time* question-ACC ask
 'There is a student, John or Paul or someone else, who asks a question ev-
 ery time.' [??every >or / √or > every]

One might contest the appositive analysis for the following morphological, syntactic or semantic reasons, referring to Potts's (2005) influential analysis of appositives. First, according to Potts (2005: 107), the host NP and the appositive should 'share case'. But, in (23b), the host NP is marked by the accusative, while the post-nominal *WH-ka* is not case-marked.

Syntactically, Potts (2005: 106-107) argues that the right adjunction of an appositive is forbidden in languages without syntactically, morphologically or intonationally distinguished non-restrictive relative clauses, like Turkish and Japanese. But, in (23b), the disjunction of alternatives is obliged to be right adjoined to the case-marked host NP.

Semantically, Potts (2005) claims that appositives are "scoleless" and truth conditionally independent from the rest of the sentence, and convey conventional implicature computed separately from the truth value. But in (26a,b), the post-nominal disjunction may take narrow scope under a clause-mate quantifier. How can I resolve these problems?

For the morphological problem, it is to be noticed that iterated nominatives or accusatives are seriously restricted in Japanese. Double nominative is admitted in matrix clauses only when the first nominative DP is interpreted as a subject of predication (called 'major subject') and is focused, as in (27a)¹¹, which is not the case for the nominative host NP followed by *WH-ka*; double accusative is in principle excluded in Japanese (this restriction is called 'double -o constraint'), as illustrated in (27b). I therefore claim that post-nominal disjunction and post-nominal *WH-ka* are not case-marked because of language specific morphological restrictions:

¹¹The object of psychological verbs may be marked by the nominative, which gives rise to double nominative, as in (i). This phenomena is not relevant for the post-nominal *WH-ka*:

- (i) boku-ga Hanako-ga sukida. (Kuno 1973 49)
 I-NOM Hanako-NOM love
 'It is me that love Hanako.'

- (27) a. kono kurasu-ga dansee-ga yokudekiru. (Kuno 1973: 39)
 this class-NOM man-NOM good
 'It is this class whose male students are good.' [double nominatives]
 b. *watasi-wa Taro-o hon-o yama-seta¹². [double -o constraint]
 me- TOP Taro-ACC book-ACC read-made
 'I made Taro read a book.'

Next, to account for the syntactic and semantic problems against the appositive analysis, I propose with De Vries (2009) to distinguish i) predicational appositive whose host NP is referential, as in *Joop, a nice guy*, and ii) specificational type which specifies the value of the host NP, as in *my roommate, Joop*. A disjunction of alternatives following the host NP may be classified among specificational appositives¹³. The syntactic and semantic constraints noted by Potts (2005) surely apply to the predicational type but not to the specificational type.

Syntactically, while a predicational appositive is situated to the left of the host NP and is marked by the genitive *no*, like *isya* ('doctor') in (28a), Heringa (2009) points out that a specificational type (which may be accompanied by an adverb, *sunawati* ('namely')) follows the host NP, as in (28b)¹⁴:

¹²In causative constructions in Japanese, the causee and the object of embedded verb may be accusative-marked if the accusative is used only once:

- (i) a. watasi-wa Taro-o ika-seta.
 me- TOP Taro-ACC go-made
 'I made Taro go.'
 b. watasi-wa hon-o yoma-seta.
 me- TOP book-ACC read-made
 'I made (someone) read a book.'

¹³De Vries (2009) observes that an appositive often includes a kind of coordinator, illustrated by *namely* in (i-a) and proposes that the host and the appositive form "specifying coordination" relation, which is expressed syntactically by specifying Coordination Phrase (noted by &P), as in (i-b), where the host and the appositive are respectively situated in Spec and Complement:

- (i) a. In 1973, Skylab tool two animals, *namely* the spiders Arabella and Anita, into space.
 b. [&P *Spec two animals* [_{Head} & *namely*] [_{Complement} Arabella and Anita]]

But the coordination analysis gives a wrong result in terms of category projection: the category of the whole phrase is in fact a NP which is the category of the specifier or of the complement, and not of the head (this remark is owed to the anonymous reviewer). Furthermore, in Japanese, a head final language, the coordination analysis predicts that a coordinator, like *sunawati* ('namely'), might be situated to the right of the appositive, which is not true as shown by (28b). And crucially, my hypothesis that a floating *WH-ka* is derived from a post-nominal *WH-ka* by the movement of the case-marked host NP should suppose an extraction of one of two coordinated elements, and would violate the coordination constraint. I then do not adopt the coordination analysis for post-nominal *WH-ka*.

¹⁴The case, as in (i), discussed by Furuya (2004), may be analyzed as another case of right-adjoined appositive in Japanese. But this sequence also may be analyzed as parallel to English "us linguists" where *us* and *linguist* are situated respectively in DP and NP projections, as in (i):

- (i) [_{DP} [watasi-tati] [_{NP} gengogakusya]]
 us linguist

- (28) a. Isya-no Yooko-ni soodansi-yoo. (Nishiyama 2007: 9)
 doctor-GEN Yooko-DAT consult-I will
 'I will consult Yooko, (who is) a doctor.'
 b. 1973 nen-ni Skylab-wa ni-hiki-no doobutu, (sunawati) kumo-no
 1973 year-LOC Skylab-TOP 2-CL-GEN animal (namely) spider-GEN
 Arabella to Anita-o utyuu-ni tureteitta. (Heringa 2009)
 Arabella and Anita-ACC space-LOC took
 'In 1973, Skylab took two animals, namely the spiders Arabella and Anita,
 into space.'

Semantically, Wang, McReady & Reese (2004) show that "[specificational type of] appositives and main clauses interact in complex ways, often affecting each other's interpretation". Thus, while an indefinite NP, like *a car* in (29a) or *one man* in (30a), takes either wide or narrow scope with respect to other operator (ex. intensional verb in (29a) or universal quantifier in (30a)), the referential specificational appositive, *the red BMV*, forces wide scope, as in (29b). Inversely, the bound-variable specificational one, *himself*, requires narrow scope reading, as in (30b):

- (29) a. John wants a car. (Wang, McReady & Reese 2004) [want > a / a > want]
 b. John wants a car, the red BMW. (ibid.) [*want > a / a > want]
 (30) a. Everyone admires exactly one man. (ibid.) [every > some / some > every]
 b. Everyone admires exactly one man, himself. (ibid.) [every > some / *some > every]

I then claim that a disjunction of the alternatives (and a post-nominal *WH-ka*) is not a predicational appositive (situated to the left of the host NP), but a specificational one (right adjoined to the case-marked host NP). This hypothesis is supported by the following data. Potts (2005: 129) points out that a predicational appositive inducing conventional implicature can only be adjoined to a referential expression, and not to an expression which "contain(s) a pronoun that is bound from outside of [host NP]", as in (31a). On the other hand, post-nominal *WH-ka* allows, without any problem, the host NP to include a quantified variable, as in (31b):

- (31) a. *Every student_k spoke with [a psychiatrist of hers_k], [a caring individual who welcomes house calls]. (Potts 2005: 129)
 b. dono kyooiin_k-mo [zibun_k-ga sidoosuru gakusee]-o [**dare-ka**]
 which teacher-∀ self-NOM supervise student-ACC **who-or**
 suisen dekiru.
 recommend can
 'Each teacher can recommend some student that (s)he supervises.'

2.4 Summary of Section 2

In Section 2, I have argued that floating *WH-ka* is classified into the two subtypes: i) a type analyzed as a parenthetical sluiced indirect question, as in (32a); ii) another one where a *WH-ka* (which may be disjoined with some of the alternatives) is an appositive right adjoined to the case-marked host NP, and is stranded after the movement of the

latter, as in (32b). In both cases, a *WH-ka* is outside of the DP including the case-marked host NP:

- (32) a. *parenthetical sluiced indirect question accompanied by elliptical matrix*
 Mary-ga [hon-o] kinoo [_{CP} **nani**(-o) [_{IP}] [_C **ka**]] (wakara-nai
 Mary-NOM book-ACC yesterday **what**-ACC **or** know-NEG
 ga)] [katta-rasii].
 though bought-likely
 'It is likely Mary bought a book yesterday – I don't know what.'
 b. *specificational appostive right-adjoined to the case-marked host NP*
 [nomimono-o]_k watasi-ni [[t_k] [(koohii-**ka** kootya-**ka**) **nani-ka**]] kudasai.
drink-ACC me-DAT coffee-**or** tea-**or** **what-or** give
 'Give me some drink, coffee, tea, or something else.'

The first type is recognized by the fact that the host NP is inside another NP or inside a post-positional phrase and *WH-ka* is interrupted by a genitive marker or a post-position. The second type is identified by a possibility of coordination with another NP or by scope variability.

In the former case, the ignorance reading is due to an elliptical matrix clause corresponding to 'I don't know'. The derivation of the ignorance reading is not so direct in the latter case. Furthermore, although basically defined as specificational type of appostive, post-nominal *WH-ka* is informationally different from post-nominal disjunction of alternatives: the explicit disjunction of alternatives clearly adds stronger information to the meaning of the host NP, while a simple *WH-ka* is less informative than that of the host NP. The way of its semantic contribution should be different from that of post-nominal disjunction of alternatives. In Section 3, I will examine the semantics of the appostive type of post-nominal *WH-ka*.

3 Semantics of appostive type of post-nominal *WH-ka*

In this section, I will first show that two recent semantic analyses of *WH-ka* cannot account for the semantics of post-nominal *WH-ka* (3.1). After having shown that post-nominal *WH-ka* manifests the same distributions as epistemic determiners in Romance languages, I will present Alonso-Ovalle & Menéndez-Benito's (2009) analysis of the latter (3.2). I will then propose to apply their analysis to Japanese post-nominal *WH-ka*, slightly modifying it (3.3).

3.1 Previous semantic analyses

3.1.1 Hagstrom (1998)

Hagstrom (1998) observes that a case-marked *WH-ka*, as *nani-ka* in (33a), doesn't allow a donkey-type pronoun (bound by an external quantifier, like *taitei* ('in general') in (33a)), contrary to *something* in English in (33b). Based on this observation and assuming that a *WH* word, like *dare* ('who'), only provides a variable and restriction, as in (34a), Hagstrom (1998: 134) claims that "existential quantification must be an inherent part of the semantic value of *-ka*", and formalizes this idea by analyzing the particle *ka*

in *WH-ka* as an existential quantifier over choice function variable. The choice function takes a set of alternative members (denoted by a *WH*-word) and returns a contextually relevant singleton member, as in (34b):

- (33) a. MIT Press-ga {***nani-ka**_k-o/**nani-ka**_k} syuppansur-eba, John-ga
 MIT Press-NOM {**what-or**-ACC/**what-or**} publish-if John-NOM
 taitei sore_k-o yomu.
 in general it-ACC read
 ‘If MIT press publishes something, in general John reads it.’ (Hagstrom 1998: 132)
- b. If something_k is published in LI, John usually reads it_k.
- (34) a. $[[dare]] = \{x \in D_e : \text{person}'(x)\}$
 b. $[[dare-ka]] = \lambda P_{\langle e, t \rangle} \exists f^{choice} [P(f^{choice}(\text{person}'))]$ (Hagstrom 1998)
- (35) MIT Press-ga toogoron-no hon-o **nani-ka** syuppansur-eba, John-ga
 MIT Press-NOM syntax-GEN book-ACC **what-or** publish-if John-NOM
 taitei sore-o yomu.
 in general it-ACC read
 ‘If MIT press publishes some book or other about syntax, in general John reads it.’

Hagstrom however admits that a donkey-type pronoun can retain a *WH-ka* without a case-marking, as in (33a). Moreover, a post-nominal *WH-ka* perfectly allows a donkey-type pronoun, as in (35). I then conclude that Hagstrom’s (1998) analysis cannot be directly applied to a post-nominal *WH-ka*.

3.1.2 Yatsushiro (2009)

Yatsushiro (2009), although equally making use of the idea of choice function, advances a different hypothesis. This author first observes that a genitive-marked *WH-ka* embedded in a universally quantified noun phrase, as in (36a), only admits wide scope, as shown by (36b,c). Analyzing wide scope of indefinites in terms of choice function, she claims that an existential quantifier over choice function variable should be situated higher than the surface position of *ka*. She also observes that, when a *WH-ka* is situated in a relative clause whose head noun is universally quantified, as in (37a), the *WH-ka* takes either narrow or wide scope, as in (37b,c):

- (36) a. $[[dare-ka]$ -no dono kaban-mo] tukue-no ue-ni aru.
who-or-GEN **which** bag- \forall desk-GEN above-LOC exist
 (Yatsushiro 2009: 148)
- b. Someone’s every bag is on the desk (ex. there are several bags, and there is one bag owner. All the bags belonging to this bag owner are on the desk.)
 [some > every]
- c. *Every bag of someone is on the desk (ex. there are several bags, and there are several bag owners. There are potentially as many owners as there are bags) [every > some]
- (37) a. $[[dare-ka-o]$ hihansita] dono gakusee-mo] zinmons-are-ta.
who-or-ACC criticized **which** student- \forall interrogate-PAS-PST

(adapted from idem.156)

- b. Every student that criticized a specific person was interrogated [some > every]
- c. Every student that criticized someone was interrogated (ex. A student A criticized X. A student B criticized Y. Both A and B were interrogated. [every > some])

In order to account for these observations, Yatsushiro (2009: 152) claims i) that the particle "*ka* is an open choice function variable selecting one element of the Alternative-set of its sister constituent", and ii) that the choice function variable is existentially quantified by the tense. In (36a), there is only one tense which necessarily takes wide scope over the universal quantifier introduced by *mo*, as in (38). On the other hand, in (37a), if the matrix tense binds the choice function variable, we get wide scope of *dare-ka*, as in (39a), while if it is the tense of the relative clause, we get narrow scope of *dare-ka*, as in (39b):

- (38) $\exists f^{choice} [\forall x [f^{choice}(\text{person}') \text{'s bag}(x)] [\text{be-on-the-desk}'(x)]$ (for (36b))
- (39) a. $\exists f^{choice} [\forall x [\text{student}'(x) \& \text{criticize}'(x) (f^{choice}(\text{person}'))]] [\text{be-interrogated}'(x)]$ (for (37b))
- b. $\forall x [\text{student}'(x) \& \exists f^{choice} [\text{criticize}'(x) (f^{choice}(\text{person}'))]] [\text{be-interrogated}'(x)]$ (for (37c))

But the analysis of *ka* as a choice function variable does not seem to account for the fact that, if *WH-ka* is in a post-nominal position, as in (40a), the narrow scope reading is strongly preferred, as in (40b,c).

- (40) a. [[seezika-o **dare-ka** hihansita] **dono** gakusee-**mo**]
politician-ACC **who-or** criticized **which** student- \forall
zinmons-are-ta.
interrogate-PAS-PST
- b. ??Every student that criticized a specific politician was interrogated [some > every]
- c. Every student that criticized some politician was interrogated [every > some]

The observation that a post-nominal *WH-ka* embedded in a complex NP cannot take wide scope over an operator quantifying the latter rather suggests that the particle *ka* itself introduces an existential quantifier.

3.2 Semantics of epistemic determiners

Having shown in Section 3.1 that the two recent analyses of a case-marked *WH-ka* cannot be applied to a post-nominal one, I will now try to elucidate its semantics by comparing it with epistemic determiners in Romance languages.

3.2.1 Parallel distributions with epistemic determiners

We observe at least four parallel distributions between a post-nominal *WH-ka* and epistemic determiners in Romance language.

Requirement of epistemic / modal contexts Corblin (2004: 100) observes that French epistemic determiner *quelque* “requires the presence of a marker of modality” and “is incompatible with genuine assertion”. Zamparelli (2007) in the same vein points out that Italian *qualche* in its use of epistemic determiner is “acceptable in intentional contexts such as the antecedent of conditionals, future, optative and interrogative clauses, and declaratives with an epistemic *must*”. The same is true for Spanish epistemic determiner *algún*. Some typical epistemic or modal contexts (i.e. antecedent of conditional, question and necessity auxiliary) are illustrated by the following French and Spanish examples:

- (41) a. S’il n’a pas rencontré **quelque** collègue [...], il sera là bientôt. (Corblin 2004:102) [Fr]
 ‘If he has not met some colleague, he will be there soon.’ [antecedent of conditional]
 b. Avez-vous rencontré **quelque** coquille [...] dans ce devoir? (idem.100) [Fr]
 ‘Have you found any typo in this homework?’ [question]
 c. Juan tiene que estar en **alguna** habitación de la casa. [Sp] [necessity]
 ‘Juan must be in some room inside the house.’ (Alonso-Ovalle & Menéndez-Benito 2009)
 d. María se casó con **algún** estudiante del departamento de lingüística. [Sp]
 (#en concreto con Pero) (=3b)) [ignorance]
 ‘Mary married some Linguistic student or other (#namely Pedro).’

Kawaguchi (1982) points out that a Japanese *WH-ka* associated with the host NP¹⁵ requires similar epistemic / modal contexts to be licensed, as shown in (42a-d)¹⁶:

- (42) a. aru zyuku-de-wa seeto-ga tomodati-o hito-ri **dare-ka**
 certain private-school-LOC-TOP pupil-NOM friend-ACC one-CL **who-or**
 tureteki -tara, okozukai-o ageru.
 bring together if, pocket money-ACC give
 (=17a)) [antecedent of conditional]
 ‘A certain private school gives pocket money to a pupil if (s)he brings to-

¹⁵All of Kawaguchi’s (1982) examples involve a pre-nominal *WH-ka*, as in *dare-ka otokonoko* (‘who-or boy’). But his remarks are also relevant for the analysis of post-nominal *WH-ka*:

¹⁶Other intensional contexts noted by Kawaguchi (1982) are the following

- (i) a. otokonoko-ga **dare-ka** inakunatta sooda.
 boy-NOM **who-or** disappeared reportedly
 (Kamio 1973: 83) [hear-say / supposition]
 ‘It is reported that some boy or other disappeared.’
 b. nomimono-o **nani-ka** kudasai.
 drink-ACC **what-or** give
 (=2a)) [optative]
 ‘Give (me) some drink, please!’
 c. Michiko-wa [yasasiku nagusametekureru] nito-o **dare-ka** motome-tei-ta.
 Michiko-Top kindly encourage person-Acc **who-or** seek-Prog-Pst
 [Intensional verb]
 ‘Michiko was seeking someone who might encourage her kindly.’ (adapted from Kawaguchi 1982:180)

- gether some friend.'
- b. otokonoko-ga **dare-ka** imase-n-ka? (Kamio 1973: 83) [question]
 boy-NOM **who-or** be-NEG-Q
 'Isn't there some boy or other?'
- c. otoko-ga **dare-ka** goei-no yaku-o hatasa-nakerebanaranai.
 man-NOM **who-or** guard-GEN service-ACC accomplish-must
 [necessity]
 'Some man or other must accomplish a service as guard.' (adapted from Kawaguchi 1982: 182)
- d. okyaku-ga **dare-ka** sikirini zyotyuu-o karakat-teiru.
 client-NOM **who-or** repeatedly waitress-ACC tease-PROG
 [ignorance]
 'Some client or other is repeatedly teasing a waitress.' (ibid.)

Incompatibility with clause-mate negation Corblin (2004) and Alonso-Ovalle & Menéndez-Benito (2009, note 13) observe that French *quelque* and Spanish *algún* are incompatible with a clause-mate negation, as in (43a). The same is true for post-nominal *WH-ka* in Japanese, as in (43b) (Yamamori 2006):

- (43) a. *Je n'ai pas mangé **quelque** pomme. (Corblin 2004: 101) [Fr]
 'I did not eat some apple or other.'
- b. *?oisii mono-o **nani-ka** tabe-nai (Yamamori 2006: 39) [Jp]
 delicious thing-ACC **what-or** eat-NEG
 'We don't eat something delicious.'

Possibility of domain narrowing Epistemic determiners allow narrowing of the alternative domain: in (44a), the scenario serves to exclude *the bathroom* from the alternative set. (44b), where the relative clause excludes *Taro* from the alternative set, shows that, for this respect, Japanese post-nominal *WH-ka* behaves in the same way as epistemic determiners:

- (44) a. [scenario: we are playing hide-and-seek. I'm sure that Juan is not in the bathroom, but for all I know, he could be in any of other rooms inside the house]
 Juan tiene que estar en **alguna** habitación de la casa. [Sp]
 'Juan must be in some room inside the house.'
- b. [Taro-de-wa nai gakusee]-ga **dare-ka** kita sooda [Jp]
 Taro-COP-TOP NEG student-NOM **who-or** came likely
 'It is likely that some student who is not Taro came.'

Anti-singleton constraint Alonso-Ovalle & Menéndez-Benito (2009) observe that Spanish *algún* is subject to an 'anti-singleton constraint': it is not acceptable when the alternative set is singleton, for example, when the NP is modified by a superlative, as in (45a). A similar anti-singleton constraint is observed with Japanese post-nominal *WH-ka*, as in (45b):

- (45) a. #Juan compró **algún** libro que resultó ser el más caro de la librería. [Sp]

‘Juan bought some book that happened to be the most expensive one in the bookstore.’ (Alonso-Ovalle & Menéndez-Benito 2009)

- b. #Taro-wa [kono mise de itiban takai hon]-o **nani-ka** katta
 Taro-TOP this store-LOC the most expensive book-ACC **what-or** bought
 rasii. [Jp]
 likely
 ‘It is likely that Taro bought some book that was the most expensive in this store.’

3.2.2 Alonso-Ovalle & Menéndez-Benito (2009)’s analysis

Alonso-Ovalle & Menéndez-Benito (2009) claim that it is the anti-singleton constraint that defines the semantics of Spanish *algún*. To model this constraint, they make use of “subset selection function”, which takes a set of individuals denoted by a NP, and returns its contextually relevant subset. The subset selection function variable is, as a free variable, contextually bound.

According to these authors, indefinite articles, like *un*, also introduce a subset selection function. The difference between *un* and *algún* is that *algún* is endowed with a lexical presupposition that the subset-selection function cannot be singleton, while the indefinite article is underspecified for this respect. Thus, both the indefinite article and *algún* are analyzed as existential quantifiers (over an individual variable) which take, as one of their arguments, a subset-selection function, as in (46a,b). The semantics of (47a) is, for instance, represented by the assertion in (47b) and by the anti-singleton presupposition in (47c):

- (46) a. $[[un]] = \lambda f^{\text{subset}}_{\langle\langle et, \rangle \langle et \rangle \rangle} \lambda P_{\langle et \rangle} \lambda Q_{\langle et \rangle} \exists x [f^{\text{subset}}(P)(x) \ \& \ Q(x)] \ (|f^{\text{subset}}(P)| \geq 1)$
 (Alonso-Ovalle & Menéndez-Benito 2009)
 b. $[[algún]] = \lambda f^{\text{subset}}_{\langle\langle et, \rangle \langle et \rangle \rangle} \lambda P_{\langle et \rangle} \lambda Q_{\langle et \rangle} \exists x f^{\text{subset}} P(x) \ \& \ Q(x) \ (|f^{\text{subset}}(P)| > 1)$ (ibid.)
 (47) a. María se casó con **algún** estudiante. [Sp] (= (3b))
 ‘Mary married some student or other.’
 b. assertion: $\exists x [f^{\text{subset}}(\text{student}')(x) \ \& \ \text{married}'(m)(x)]$
 c. presupposition: $|f^{\text{subset}}(\text{student}')| > 1$

The idea of subset selection function also captures the fact that a post-nominal *WH-ka* may be disjoined with contextually selective members of the alternative set, as in (48a). Moreover, the anti-singleton constraint corresponds to the fact that a disjunction induced by the particle *-ka* in principle require at least two alternative members:

- (48) a. gakusee-ga [(John-**ka** Mary-**ka**) **dare-ka**] kita rasii.
student-NOM John-or Mary-or **who-or** came likely
 $(|f^{\text{subset}}(\text{student}')| > 1)$
 ‘It is likely that a student, John, Mary or someone else, came’
 b. **dare-ka-ga** kita (= (1a)) $(|f^{\text{subset}}(\text{student}')| \geq 1)$
who-or-NOM came
 ‘Someone came.’

But if Alonso-Ovalle & Menéndez-Benito’s (2009) hypotheses were directly applied to

Japanese, a case-marked *WH-ka*, as in (48b), which admits either specific (due to singleton alternative domain) or non-specific (due to anti-singleton domain) readings, would be analyzed as parallel to *un+NP* in (46a), while post-nominal *WH-ka* would be analyzed as lexically presupposed for the anti-singleton domain, as well as *algún* in (46b). Such lexical distinction however seems to be ad hoc in view of the same morphology of case-marked *WH-ka* and post-nominal *WH-ka*.

3.3 Proposals for the semantics of post-nominal *WH-ka*

I now advance, slightly modifying Alonso-Ovalle & Menéndez-Benito's (2009) analysis of *algún*, my hypotheses for the semantics of post-nominal *WH-ka*, and present some arguments.

3.3.1 Proposals

I first adopt the traditional view that a WH word introduces an individual variable and a restriction over it, and assume that, in cases of post-nominal *WH-ka*, the restriction of the host NP is percolated onto that of a WH word, through a semantic agreement (ex. [+human] for *dare*) and the specificational appositive relation (equivalence relation) between them. The restriction of a post-nominal WH word thus boils down to that of the host NP (which is more informative than the WH word), as in (49a)¹⁷. Next, I follow Alonso-Ovalle & Menéndez-Benito (2009) by assuming, as in (49b), i) that *-ka* is an existential quantifier over an individual variable, which takes, as its argument, a subset selection function (taking a set of members denoted by the host NP, and returning a contextually selected subset of it), and ii) that the subset selection function variable is bound contextually:

- (49) a. $[[dare^{appositive}]] = \lambda x \lambda P_{\langle et \rangle} [P(x)]$ (where *P* is a property denoted by the host NP)
 b. $[[dare-ka^{appositive}]] = \lambda f^{subset} \lambda P_{\langle et \rangle} \lambda Q_{\langle et \rangle} \exists x [f^{subset}(P)(x) \& Q(x)] (|f^{subset}(P)| > 1)$
 c. $[[dare-ka^{argument}]] = \lambda f^{subset} \lambda Q_{\langle et \rangle} \exists x [f^{subset}(\text{'person'})(x) \& Q(x)] (|f^{subset}(\text{'person'})| \geq 1)$
- (50) $[[gakusee-ga dare-ka kita \text{'student-NOM who-or came'}]]$
 $= \lambda f^{subset} \exists x [f^{subset}(\text{'student'})(x) \& \text{'came'}(x)] (|f^{subset}(\text{'student'})| > 1)$

I further assume that the anti-singleton constraint is not a lexical presupposition of post-nominal *WH-ka*, but is a default pragmatic condition: it is due to the fact that an appropriate use of a disjunction requires at least two alternatives. This condition is imposed when the use of *WH-ka* is optional, as in its post-nominal use, and the specific reading (due to the singleton alternative) is expressed by the bare host NP. It may be neutralized when *WH-ka* is directly case-marked and the specific reading cannot be

¹⁷ According to this analysis, a post-nominal *dare-ka* in (50) is semantically equivalent to *dono gakusee ka* ('which student-or') in (I), which is however not preferred because of its morphological redundancy:

- (i) *gakusee-ga dono gakusee-ka kita yooda.*
 student-Nom **which** student-or came likely
 'It is likely that some student or other came.'

expressed otherwise. The semantics of (48a) is thus represented by (50), putting aside the modal meaning.

3.3.2 Arguments

At least four arguments come in favor of these hypotheses.

(a) Kawaguchi (1982) points out that, as a host NP, *koziki* ('beggar') in (51a) is less acceptable than *zyoyuu* ('actress') in (51b). In order to account for this lexical restriction, this author claims that "the host NP should denote members which are easily individualized in view of encyclopedic knowledge." (Kawaguchi 1982: 176): the contrast between (51a) and (51b) is reduced to the fact that beggars are by default less easily individualized than actresses:

- (51) a. ?Taro-wa [koziki-o] [**dare-ka**] mikaketa.
 Taro-TOP beggar-ACC **who-or** saw
 (adapted from Kawaguchi 1982: 176)
 'Taro saw some beggar or other.'
 b. Taro-wa [zyoyuu-o] [**dare-ka**] mikaketa. (ibid.)
 Taro-TOP actress-ACC **who-or** saw
 'Taro saw some actress or other.'

This restriction is nicely paraphrased, in view of my semantic hypotheses, by saying that the host NP must denote sufficiently individualized alternative members such that the subset selection function can easily select a subset of it.

(b) As shown in Section 2.1, post-nominal or floating *WH-ka* c-commanded by a clause-mate quantifier preferentially takes narrow scope, as in (52a,b), while *WH-ka* c-commanding a clause-mate quantifier prefers wide scope, as in (52c):

- (52) a. gakusee-ga *mai-kai* **dare-ka** situmon-o suru.
 student-NOM *every time* **who-or** question-ACC ask
 [$\sqrt{\text{every}} > \text{some}$ / $??\text{some} > \text{every}$]
 'Every time, there is some student who asks a question.'
 b. *mai-kai* gakusee-ga **dare-ka** situmon-o suru.
 every time student-NOM **who-or** question-ACC ask
 [$\sqrt{\text{every}} > \text{some}$ / $??\text{some} > \text{every}$]
 'Every time, there is some student who asks a question.'
 c. gakusee-ga **dare-ka** *mai-kai* situmon-o suru
 student-NOM **who-or** *every time* question-ACC ask
 [$??\text{every} > \text{some}$ / $\sqrt{\text{some}} > \text{every}$]
 'There is some student or other who asks a question every time.'

According to the hypothesis in (49b) and if the moved host NP in (52a) is interpreted in its base-position adjacent to the post-nominal *WH-ka* (see Section 2), the semantics of (52a,b) and (52c) are respectively represented by (53a) and (53b), where the position of the existential quantifier over an individual variable corresponds to the surface position of the particle *ka*. These representations nicely capture scope differences observed between (52a,b) and (52c):

- (53) a. $[[(52a, b)]] = \lambda f^{\text{subset}} \forall e \exists x [f^{\text{subset}}(\text{student}') (x) \& \text{ask-a-question}' (x)(e)]$
 b. $[[(52c)]] = \lambda f^{\text{subset}} \exists x [f^{\text{subset}}(\text{student}') (x) \& \forall e [\text{ask-a-question}' (x)(e)]]$

(c) As discussed in Section 3.1.2, Yatsushiro (2009) observes that, when a case-marked *WH-ka* is situated in a relative clause whose head noun is universally quantified, as in (54a), the *WH-ka* takes either narrow or wide scope, and accounts for this scope ambiguity by assuming that the choice function variable introduced by *-ka* may be bound either by matrix or subordinate tense. But this analysis cannot account for the fact that, if *WH-ka* is in a post-nominal position, as in (54b), the narrow scope reading is strongly preferred:

- (54) a. $[[\text{dare-ka-o hihansita}] \text{ dono gakusee-mo}] \text{ zinmons-are-ta.} \quad (= (37a))$
who-or-ACC criticized **which** student- \forall interrogate-PAS-PST
 'Every student that criticized someone was interrogated.'
 $[\sqrt{\text{every}} > \text{some} / \sqrt{\text{some}} > \text{every}]$
 b. $[[\text{seezika-o dare-ka hihansita}] \text{ dono gakusee-mo}]$
 politician-ACC **who-or** criticized **which** student- \forall
 zinmons-are-ta. (= (40a))
 interrogate-PAS-PST
 'Every student that criticized some politician was interrogated.'
 $[\sqrt{\text{every}} > \text{some} / ??\text{some} > \text{every}]$

The semantic hypothesis in (49b) explains both (54a) and (54b) as follows. Narrow and wide scope readings of *dare-ka* in (54a) are represented by (55a) and (55b), in both of which the contextual binder of the subset selection function takes the widest scope. It is to be reminded that a case-marked *WH-ka*, as that of (54a), allows either singleton or anti-singleton domain. (55a) represents a case where the alternative domain is anti-singleton. Since *dare-ka* is inside a complex NP, the existential quantifier introduced by *ka* is obliged to take narrow scope under the universal quantifier outside the complex NP. On the other hand, (55b) represents a case where the alternative domain is singleton. In this case, the subset selection function boils down to the choice function selecting a unique alternative, and as its binder takes the widest scope, (55b) gives rise to a wide scope configuration:

- (55) a. $\lambda f^{\text{subset}} [\forall x [\text{student}' (x) \& \exists y [f^{\text{subset}}(\text{person}') (y) \& \text{criticize}' (x)(y)]$
 $[\text{be-interrogated}' (x)] (\lvert f^{\text{subset}}(\text{student}') \rvert > 1) [\text{every} > \text{some}]$
 b. $\lambda f^{\text{subset}} [\forall x [\text{student}' (x) \& \exists y [f^{\text{subset}}(\text{person}') (y) \& \text{criticize}' (x)(y)]$
 $[\text{be-interrogated}' (x)] (\lvert f^{\text{subset}}(\text{student}') \rvert = 1)$
 $= \lambda f^{\text{choice}} [\forall x [\text{student}' (x) \& \text{criticize}' (x) (f^{\text{choice}}(\text{person}'))]$
 $[\text{be-interrogated}' (x)] [\text{some} > \text{every}]$
 (56) $\lambda f^{\text{subset}} [\forall x [\text{student}' (x) \& \exists y [f^{\text{subset}}(\text{politician}') (y) \& \text{criticize}' (x)(y)]$
 $[\text{be-interrogated}' (x)] (\lvert f^{\text{subset}}(\text{student}') \rvert > 1) [\text{every} > \text{some}]$

On the other hand, in (54b) involving post-nominal *WH-ka*, the alternative domain should be anti-singleton because of a concurrence with the bare host NP allowing the singleton alternative domain, and only narrow scope configuration is allowed, as in (56).

By the way, Yatsushiro (2009) equally observes that a genitive-marked *dare-ka* em-

bedded in a universally quantified noun phrase only admits wide scope, as in (57a). On the other hand, my analysis seems to predict that both of narrow and wide scope *dare-ka* are possible as in (57b,c). How can I account for the unavailability of the narrow scope in (57a)?

- (57) a. [[**dare-ka**]-no **dono** kaban-**mo**] tukue-no ue-ni aru. (= (36a))
 who-or-GEN **which** bag- \forall desk-GEN above-LOC exist
 ‘Someone’s every bag is on the desk.’ [$\sqrt{\text{some}} > \text{every} / * \text{every} > \text{some}$]
 b. $\lambda f^{\text{subset}} [\forall x [\text{bag}'(x) \text{ of } \exists y [f^{\text{subset}}(\text{person}')(y)] [\text{be-on-the desk}'(x)]]$
 [$\text{every} > \text{some}$]
 ($|f^{\text{subset}}(\text{person}')| > 1$: anti-singleton alternative domain)
 c. $\lambda f^{\text{choice}} [\forall x [f^{\text{choice}}(\text{person}')\text{'s-bag}(x)] [\text{be-on-the desk}'(x)]]$
 [$\text{some} > \text{every}$]
 ($|f^{\text{subset}}(\text{student}')| = 1$: singleton alternative domain)
- (58) a. [[**dare**]-no **dono** kaban-**mo**] tukue-no ue-ni aru.
 who-GEN **which** bag- \forall desk-GEN above-LOC exist
 ‘Every bag of anyone is on the desk.’ [$* \text{some} > \text{every} / \sqrt{\text{every}} > \text{some}$]
 b. $\forall x, y [\text{bag}'(x) \text{ of } \text{person}'(y)] [\text{be-on-the desk}'(x)]$

I assume that, since there is normally only one owner of a bag, the narrow scope reading of (57a) is truth conditionally equivalent to the reading conveyed by (58a) where *dare* is bare, and is bound unselectively by the distant universal quantifier, as in (58b). Moreover, (58a) is preferred to (57a) to express narrow scope of *dare* (‘who’), because of its morphological simplicity.

Then, why does (54a) remain ambiguous between narrow and wide scope readings, in spite of a possibility of (59a) where *dare* is bare? It is to be noticed that the narrow scope reading of (54a), represented by (55a), is distinguished from the semantics of (59a), represented by (59b): a default reading of (54a) is that each student criticized one person, while such an existential meaning is totally lacking in (59a). Therefore, (54a) and (59a) do not enter into concurrence to express narrow scope of *dare*:

- (59) a. [[**dare-o** hihansita] **dono** gakusee-**mo**] zinmons-are-ta.
 who-ACC criticized **which** student- \forall interrogate-PAS-PST
 ‘Every student that criticized anyone was interrogated.’
 b. $\forall x, y [\text{student}'(x) \& \text{person}'(y) \& \text{criticize}'(x)(y)] [\text{be-interrogated}'(x)]$

(d) The hypothesis in (49b) also accounts for the distributional facts of post-nominal *WH-ka* discussed in Section 3.2.1. First, as regards the requirement of epistemic / modal contexts, Alonso-Ovalle & Menéndez-Benito (2009) suggest that a use of an expression requiring anti-singleton domain (which involves at least two different members) is pragmatically motivated, in terms of possible world semantics, only if it is not the case that in every accessible world, the referent is the same, that is, only if there are at least two accessible worlds where the referent of the host NP is different, as represented by (60). Such modal variation is satisfied only when the existential quantifier due to *-ka* takes narrow scope under a modal operator:

- (60) $\exists w, w' \in W [\lambda x. P(x)(w) \& Q(x)(w) \neq \lambda x. P(x)(w') \& Q(x)(w')] \text{ (where } W \text{ is a set of accessible worlds, and } P \text{ and } Q \text{ are two properties) [modal variation compo-}$

nent]

Second, concerning the incompatibility with clause-mate negation, the anti-singleton subset selection function evoked by epistemic determiners and post-nominal *WH-ka*¹⁸ only minimally widens the alternative domain. The unique domain necessarily narrower is the singleton domain, which always takes wide scope over negation. Therefore, a negation scoping over anti-singleton domain does not implicate negation of narrower domain. In other words, a use of post-nominal *WH-ka* does not serve to strengthen negation, and their use is not motivated in negative sentences.

Third, the domain narrowing is possible since the alternative domain of epistemic determiners and of the post-nominal *WH-ka* (i.e. anti-singleton domain) may be as narrow as a set consisting of only two members.

4 Summary

In this study, I first claimed that syntactically, floating *WH-ka* is divided into the two sub-types: i) one type analyzed as a parenthetical sluiced indirect question, as in (61a); ii) another type where a *WH-ka* (which may be disjoined with some explicitly mentioned alternatives) is an appositive right adjoined to the case-marked host NP, and is stranded after the movement of the latter, as in (61b). In both cases, a *WH-ka* is outside of the DP including the case-marked host NP:

- (61) a. *parenthetical sluiced indirect question accompanied by elliptical matrix*
 Mary-ga [hon-o] kinoo [_{CP} **nani**(-o) [_{IP}] [_C **ka**]] (wakara-nai
 Mary-NOM book-ACC yesterday **what**-ACC **or** know-NEG
 ga)] [katta-rasii].
 though bought-likely
 'It is likely Mary bought a book yesterday – I don't know what.'
 b. *specificational appositive right-adjoined to the case-marked host NP*
 [nomimono-o]_k watasi-ni [[t_k] [(koohii-**ka** kootya-**ka**) **nani-ka**]] kudasai.
drink-ACC me-DAT coffee-**or** tea-**or** **what-or** give
 'Give me some drink, coffee, tea, or something else.'

Often, these two types are difficult to distinguish, but the first type is identified when the host NP is inside another NP or inside a post-positional phrase and the *WH-ka* is interrupted by a genitive marker or a post-position. The second type is identified by a possibility of coordination with another NP or by scope variability with respect to a clause-mate quantifier.

¹⁸A free choice determiner, like French *un N quelconque*, is compatible with clause-mate negation, as in (i-a), since it induces the maximal widening of the alternative set, which serves to strengthen the negation: if a negation scopes over the maximal domain, it necessarily applies to ordinary narrower domain, as represented in (i-b):

- (i) a. Marie n'a pas lu **un** livre **quelconque**. (Jaye & Toven 2006: 220) [Fr]
 'Mary didn't read any book.'
 b. $\neg \exists x_{\in D} \text{ Marie read } \textbf{un quelconque}_D \text{ book}(x)$ [*D*: maximal alternative domain]
 $\rightarrow \forall D' \in D [\neg \exists x_{\in D'} . \text{ Marie read } \textbf{un}_{D'} \text{ book}(x)]$ [*D'*: ordinal alternative domain]

Semantically, the ignorance reading of the first type is due to an elliptical matrix clause corresponding to ‘I don’t know’, as in (62a). In the second type, the ignorance reading is only pragmatically derived: since a use of the post-nominal *WH-ka* is optional, it is only motivated when it conveys the meaning which cannot be expressed otherwise, that is, the meaning that the alternative domain is not singleton (which is due to an appropriateness condition imposed on a use of a disjunction marked by *-ka*):

- (62) a. *parenthetical sluiced indirect question accompanied by elliptical matrix*
 The ignorance reading is due to the elliptical matrix, ‘I don’t know WH’
 b. *specificational appostive right-adjoined to the case-marked host NP*
 $\lambda f^{\text{subset}} \exists x [f^{\text{subset}}(\text{drink})(x) \ \& \ \text{give-me}'(x)] \ (|f^{\text{subset}}(\text{drink})| > 1)$

The ignorance reading is derived through Grician Quantity principle from a disjunction: if the speaker affirms a disjunction, “A or B”, the hearer can assume that the speaker does not know the truth of a more informative proposition “A”, nor that of “B”.

This study thus shows the existence in Japanese of a new type of DP external determiner-like expression, whose semantics may be analyzed in the same way as epistemic determiners in Romance languages.

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Makoto Kaneko
Okayama University
kanekoo6@cc.okayama-u.ac.jp

Phrasal comparatives in Japanese: A measure function-based analysis

Yusuke Kubota*

1 Introduction

There has recently been much discussion about the proper analysis of Japanese comparatives (cf., e.g., Beck et al. 2004; Oda 2008; Hayashishita 2009; Kawahara 2009; Kennedy 2009). Most of the discussion in the previous literature centers around the question of whether the semantics of Japanese comparatives should be modelled on the analysis of English comparatives. Beck et al. (2004) have argued against assimilating Japanese comparatives with English ones based on the observation that Japanese does not have overt comparative morphology and have proposed an analysis of Japanese comparatives in which the standard of comparison is determined contextually. Kennedy (2009) and Kawahara (2009), on the other hand, propose analyses of comparatives in Japanese in which the standard of comparison is explicitly provided by the *yor*i phrase in the semantics along the lines of the *direct analysis* of comparatives (Heim, 1985).

A fully adequate analysis of comparatives should interact with other phenomena pertaining to gradable predicates such as measure phrases and degree modifiers. It turns out, however, that none of the previous analyses address this question explicitly. In this paper, I propose an analysis of phrasal comparatives in Japanese in terms of ‘*derived*’ *measure functions*, an idea informally sketched by Kennedy and McNally (2005) and more explicitly worked out by Kennedy and Levin (2008) (see also Rotstein and Winter (2003) for a similar idea). It will be shown that the proposed analysis retains the advantages of the direct analysis by Kennedy (2009) and Kawahara (2009) over Beck et al.’s (2004) original proposal regarding the basic semantic properties of phrasal comparatives in Japanese, while at the same time enabling a more straightforward analysis of cases in which comparatives interact with other phenomena.

The paper is organized as follows. Section 2 presents the relevant data to be accounted for, where it will be shown that phrasal comparatives in Japanese behave like minimum standard predicates (i.e. predicates whose meanings are determined with reference to scales with minimum endpoints) in all relevant respects. Section 3 spells out

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the proposal, namely, an analysis of phrasal comparatives in Japanese in terms of derived measure functions; we will see that the proposed analysis straightforwardly captures the fact that comparatives behave *like* minimum standard predicates by treating them *as* (derived) minimum standard predicates. Section 4 compares the proposed analysis with two alternatives in the previous literature: the direct analysis along the lines of Kennedy (2009) and Kawahara (2009) and the so-called ‘contextual analysis’ along the lines of Beck et al. (2004) and Oda (2008). Section 5 concludes the paper.

2 Data

As in English (cf., e.g., Kennedy and McNally 2005), Japanese relative (or open-scale) gradable adjectives exhibit context-dependent interpretations pervasively (contrasting sharply with absolute (or closed-scale) adjectives, whose interpretations are context-independent). The data in (1)–(3) exemplify this point. First, in the positive form (1), the standard is vague; second, as shown in (2), degree modifiers that target fixed standards are incompatible with them; and finally, as can be seen in (3), a measure phrase measures the degree against some contextually understood standard:¹

- (1) Kono tana-wa takai.
this shelf-TOP tall
‘This shelf is tall.’
- (2) #Kono tana-wa **wazukani** takai.
this shelf-TOP slightly tall
intended: ‘This shelf is slightly tall.’
- (3) Kono tana-wa **20-senti-meetoru** takai.
This shelf-TOP 20-centimeter tall
‘This shelf is 20 centimeters taller (than some contextually salient shelf).’

Japanese is one of those languages that do not have overt comparative morphemes on adjectives. Thus, phrasal comparatives in Japanese syntactically differ from the positive form seen above only in that there is an overt *yor*i (‘than’) phrase. However, semantically (just as in English) they exhibit a sharp contrast with the positive form in that the context-dependence of relative adjectives in (1)–(3) systematically disappear. Specifically, with an overt *yor*i phrase, the bare adjective in (4) is no longer vague; degree modifiers targeting a fixed standard can occur as in (5); and finally, the measure phrase construction in (6) induces a context-independent interpretation with the standard identified by the *yor*i phrase.

- (4) Kono tana-wa **ano tana-yor**i takai.
this shelf-TOP that shelf-than tall
‘This shelf is taller than that shelf.’
- (5) Kono tana-wa ano tana-yor **wazukani** takai.
this shelf-TOP that shelf-than slightly tall
‘This shelf is slightly taller than that shelf.’

¹In this respect, Japanese measure phrases differ from their counterparts in English (Kikuchi, 2002; Nakanishi, 2007).

- (6) Kono tana-wa ano tana-yori **20-senti-meetoru** takai.
 This shelf-TOP that shelf-than 20-centimeter tall
 ‘This shelf is 20 centimeters taller than that shelf.’

The above facts provide solid evidence that the phrasal comparative in Japanese with *yor*i phrases is a case of *explicit comparison*, with the standard of comparison explicitly provided by the *yor*i phrase, rather than a case of *implicit comparison*, contra an idea suggested by Beck et al. (2004) (see also Kennedy (2009), who arrives at the same conclusion based on a similar set of data).

3 A measure function-based analysis of Japanese comparatives

The data observed above suggest that when there is an overt *yor*i phrase, relative adjectives lose their context-dependent interpretations and behave like absolute adjectives in uniformly exhibiting context-independent interpretations. (See, e.g., Kennedy and McNally (2005) for the distinction between relative and absolute adjectives.) More specifically, the behaviors of comparatives are similar to those of minimum standard predicates (rather than maximum standard predicates) in that they are compatible with minimum endpoint-oriented degree modifiers such as *wazukani* ‘slightly’ and measure phrases. The relevant data of minimum standard predicates are shown in (7)–(9):²

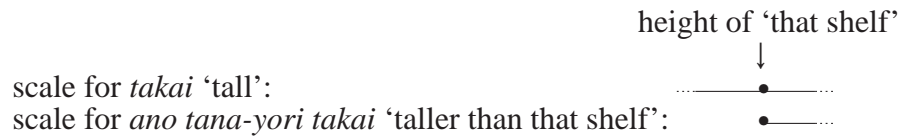
- (7) Kono sao-wa magat-te iru.
 this rod-TOP bent IRU
 ‘This rod is bent.’
- (8) Kono sao-wa **wazukani** magat-te iru.
 this rod-TOP slightly bent IRU
 ‘This rod is slightly bent.’
- (9) Kono sao-wa **5-do** magat-te iru.
 this rod-TOP 5-degree bent IRU
 ‘This rod is 5 degrees bent.’

As in (7), minimum standard adjectives induce context-independent interpretations in the positive form; (8) show that they are compatible with degree modifiers such as *wazukani* ‘slightly’ that target minimum endpoints; finally, (9) shows that the interpretation of a measure phrase is not context-dependent but rather is against a fixed standard (specifically the minimum endpoint).

The measure function-based analysis that I propose below builds on the analytic intuition outlined above that there is a close parallel between comparatives and minimum standard predicates. Specifically, I take it that the essential function of the *yor*i phrase is to derive a minimum standard (absolute) predicate from a potentially open scale (relative) predicate, along the lines informally sketched in the following picture:

²For a reason that is not clear to me, most of the minimum standard predicates in Japanese are (morpho-syntactically) stative verbs of the form *X-te iru* or the so-called ‘adjectival verbs’ of the form *X-da*, rather than having the paradigmatic adjectival morphology ending in the suffix *-i* in the base form.

(10)



The *yori* phrase takes a (potentially open-ended) scale and returns a derived *minimally closed* scale, where the minimum endpoint of this derived scale is defined by the degree that the object denoted by the *yori* phrase possesses on the original scale. In this view, comparatives behave like (lexically) minimum standard predicates because they *are* (derived) minimum standard predicates.

3.1 Spelling out the basic analysis

In the standard analysis of gradable adjectives, adjectives are analyzed as denoting relations between entities and degrees (of semantic type $\langle e, \langle d, t \rangle \rangle$); for example, the adjective *tall* is taken to denote a relation between individuals and degrees where, for each pair of individual and degree for which the relation holds, the degree represents the height that the individual has on the scale that measures vertical length. However, in this paper I follow Kennedy (2007) in adopting a slightly different alternative analysis in which adjectives are taken to denote functions (rather than relations) of type $\langle e, d \rangle$, called *measure functions*, which map individuals to degrees that they possess on the relevant scale. In this setup, the adjective *tall* takes an individual x and returns a degree d which represents x 's height on the scale that measures vertical length. The choice of this alternative is not crucial for my analysis of comparatives but it has the advantage that it simplifies the formulation of certain aspects of compositional semantics. (See Kennedy (2007) for a comparison between these approaches and further references.)

In this measure function-based analysis, the semantics of the positive form of adjectives is determined by supplying the measure function denoted by the adjective as an argument to the following *pos(itive)* operator, which is a morphologically empty operator that introduces the standard of comparison and thereby converts a measure function of type $\langle e, d \rangle$ to a predicate of individuals of type $\langle e, t \rangle$:

$$(11) \quad [[pos]] = \lambda g \lambda x. g(x) \geq \mathbf{stnd}(g)$$

Importantly, in the scale-based analysis of gradable predicates advocated by Kennedy and McNally (2005) and Kennedy (2007), the positive forms of gradable adjectives are given a unified analysis with this definition of the positive operator. Recall from above that relative adjectives exhibit context-dependent interpretations whereas absolute adjectives exhibit context-independent interpretations in the positive form. The crucial assumption for accounting properly for this difference in context dependence in the two kinds of adjectives is that the **stnd** function encoded in the meaning of the *pos* operator is defined in a way that is sensitive to the scale structure of the measure function that it takes as its argument: the **stnd** function returns a context-dependent vague standard for relative adjectives with open scales whereas it returns a context-independent fixed standard for absolute adjectives with closed scales. The fixed standards of absolute adjectives are determined with reference to the endpoint(s) of the scale: for maximum standard predicates such as *full*, the standard value is set to the degree corresponding to the maximum endpoint, whereas for minimum standard predicates such as *bent*, the standard is set to the degree which is

just above the minimum endpoint (relative to the degree of imprecision tolerated in the context of evaluation).³

With the definition of the *pos* operator in (11), the denotation for (1) and (7) (the positive forms of relative and absolute adjectives, respectively) end up being calculated as in (12).

- (12) a. $[[(1)]]$ = **tall**(**this shelf**) \geq **stnd**(**tall**)
 b. $[[(7)]]$ = **bent**(**this rod**) \geq **stnd**(**bent**)

In both cases, the sentence asserts that the object in question has a degree on the relevant scale that is on or above the standard. Given the way in which the standard is determined for predicates having different scale structures, it follows that (12a) is true just in case the height of the shelf meets the contextually determined vague standard of tallness and that (12b) is true just in case the rod has at least some degree of bend.

In this setup, *yori* comparatives in Japanese can be analyzed as *derived* minimum standard predicates whose (derived) minimum endpoints correspond to degrees that the object denoted by the *yori* phrase possesses on the original scale. For this purpose, I employ a measure function conversion function (of type $\langle\langle e, d \rangle, \langle e, d \rangle\rangle \rightarrow \langle e, d \rangle$) $\lambda g \lambda x. g_d^\uparrow(x)$, mostly following the proposal by Kennedy and Levin (2008), which is a function that takes a measure function and produces out of it a derived measure function which preserves the ordering of degrees on the original scale but whose minimum endpoint corresponds to the degree d on the original scale. Assuming that degrees are modelled as real numbers between 0 and 1 and scales are sets of degrees in the $[0, 1]$ section, (where open and closed scales are distinguished in terms of whether they include the endpoints, that is, the degrees 0 and 1), this function can be formally defined as follows:⁴

$$(13) \quad g_d^\uparrow(x) = \begin{cases} 0 & \text{if } g(x) \leq d \\ \frac{g(x) - d}{1 - d} & \text{if } d < g(x) \leq 1 \end{cases}$$

With this definition of the measure function conversion function, the meaning of *yori* can be defined as follows:

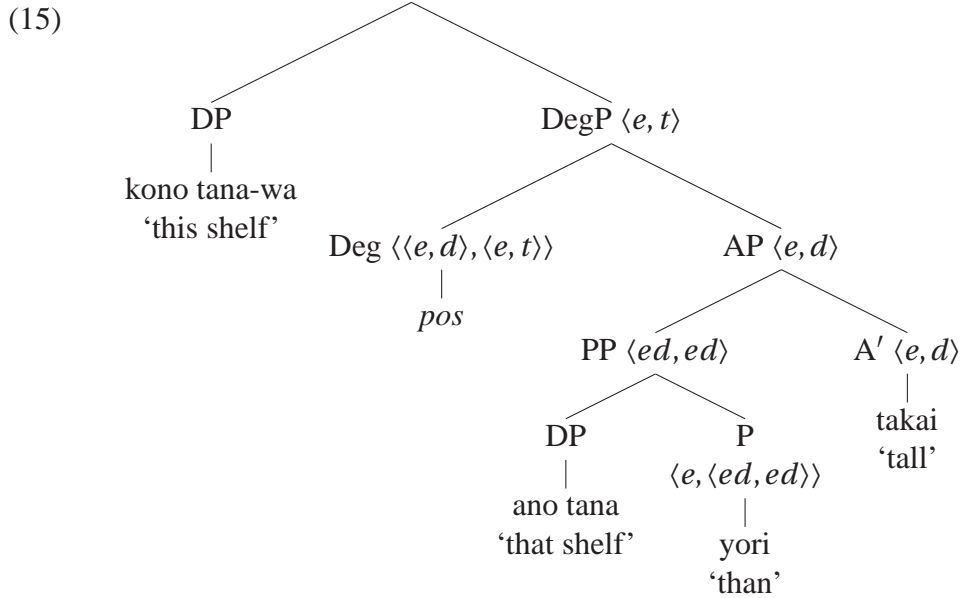
$$(14) \quad [[yori]] = \lambda y \lambda g \lambda x. g_{g(y)}^\uparrow(x)$$

³Intuitively, the standard is determined this way because, for any gradable predicate, the standard is that degree which defines the ‘cut off’ point for whether or not the object in question stands out on the relevant scale. See Kennedy and McNally (2005) for empirical justification for this assumption of standard setting. This pattern of standard setting is cross-linguistically justified as well (cf., e.g., Kubota (2009) and Sawada and Grano (2009) for analyses of degree modifiers and measure phrases in Japanese that crucially make use of this assumption). Kennedy (2007) seeks to explain this standard setting by means of a processing-oriented constraint which he dubs the ‘Principle of Interpretive Economy’.

⁴The definition of the measure function conversion function given here is slightly different from the formulation in Kennedy and Levin (2008). Kennedy and Levin (2008) simply assume that the derived measure function maps objects to degrees that are proper subsets of the degrees on the original scale, whereas my formulation involves remapping of degrees so that the derived scale is also a set of degrees from the $[0, 1]$ section of real numbers. The reason for my choice of this implementation is that it keeps the formal structure of scales—whether they are derived or not—uniform. However, given that degrees are abstract objects that do not directly correspond to values on actual physical scales of measurement (such as meter and inch) and given that there is a one-to-one correspondence between degrees on the original scale and those on the derived scale in both formulations, I do not see any empirical difference between the two alternatives.

(14) says that *yor*i takes an entity y and an adjective g (of type $\langle e, d \rangle$) as arguments and returns a measure function $\lambda x. g^{\uparrow}_{g(y)}(x)$ of type $\langle e, d \rangle$. The derived measure function $g^{\uparrow}_{g(y)}$ is a function that maps entities to a derived scale which preserves the ordering of the degrees on the scale associated with the original adjective g except that it is a minimally closed scale (which is indicated by the superscript uparrow \uparrow) whose minimum endpoint (indicated by the subscript) corresponds to $g(y)$ on the original scale, that is, the degree of g -ness that y possesses. Note here that this measure function is semantically of the same type as a bare adjective. Thus, an adjective modified by a *yor*i phrase can be thought of as a derived (minimum standard) adjective.

This analysis requires the *yor*i phrase to directly combine with the adjective at the level pertaining to semantic interpretation (i.e., LF, within the Heim and Kratzer-style (Heim and Kratzer, 1998) semantics). Thus, I assume the following structure for sentences containing *yor*i phrases:⁵



With this, the following meaning is assigned to the phrase *ano tana-yori takai* ‘tall(er) than that shelf’ (the AP node in the above tree):

$$\begin{aligned}
 (16) \quad & [[\text{ano tana-yori takai}]] = [[\text{yori}]]([[\text{ano tana}]])([[\text{takai}]])) \\
 & = \lambda y \lambda g \lambda x. [g^{\uparrow}_{g(y)}(x)](\text{that shelf})(\text{tall}) = \lambda x. \text{tall}^{\uparrow}_{\text{tall}(\text{that shelf})}(x)
 \end{aligned}$$

This is a measure function of type $\langle e, d \rangle$, which measures the vertical height of objects in the same way as the original adjective *takai* ‘tall’ except that it maps everything that has an equal height as ‘that shelf’ or shorter to the endpoint of the scale. The denotation of the whole sentence is then calculated in the same way as the simple sentence (1) involving the positive form. Specifically, this derived measure function and the subject NP are given as arguments to the *pos* operator to yield the following logical translation for the whole sentence:

⁵ *Yori* phrases do not necessarily appear adjacent to the adjective in the surface string (see, for example, (5) and (6)). I assume that the surface word order results from scrambling; in Japanese, the relative order among arguments and adjuncts of the main predicate is generally free and scrambling does not have any semantic effect (at least not on the basic predicate-argument relationship among the elements involved).

$$(17) \quad [[(4)]] = \text{tall}^{\uparrow}_{\text{tall}(\text{that shelf})}(\text{this shelf}) \geq \text{stnd}(\text{tall}^{\uparrow}_{\text{tall}(\text{that shelf})})$$

(17) asserts that the degree that ‘this shelf’ possesses on the derived scale of tallness (whose minimum endpoint is identified with the height of ‘that shelf’) exceeds the standard of that scale. Since the scale is minimally closed, the standard is set to that degree which is just above the minimum endpoint. Thus, the sentence correctly ends up entailing that the height of ‘this shelf’ exceeds the height of ‘that shelf’. Note in particular that the present analysis correctly predicts that (4) is false when the height of ‘this shelf’ is equal to or smaller than the height of ‘that shelf’. Given the way the derived measure function is defined (cf. (13)), all the degrees on the original scale that are equal to or smaller than the degree designating the height of ‘that shelf’ are mapped to the minimum endpoint of the scale. Crucially, since the minimum endpoint of the derived scale does not satisfy its standard (see above), all of these degrees simply make (17) false, in other words, (4) is correctly predicted to be false in all cases in which ‘this shelf’ is not taller than ‘that shelf’.

One might wonder at this point what prediction the present analysis makes when the height of ‘this shelf’ is lower than the height of ‘that shelf’ for sentences like (4). Intuitively, the sentence is false (rather than infelicitous) in such situations. This is correctly accounted for in the present analysis. Recall from above that, when a derived measure function is created out of another measure function, all degrees on the original scale below the derived zero point are mapped to the zero point on the derived scale. With this assumption, it is correctly predicted that (4) is false in the above situation.

3.2 Accounting for the properties of phrasal comparatives

The measure function-based analysis of phrasal comparatives spelled out above predicts that adjectives with *yor*i phrases will function exactly like lexically minimum standard adjectives. We will see below that this prediction is indeed correct. In particular, it automatically accounts for the parallels between comparatives and (lexically) minimum standard adjectives in that they both induce context-independent, fixed-standard interpretations with respect to the data considered in section 2.

3.2.1 Cooccurrence with *wazukani* (‘slightly’)

First, the cooccurrence restrictions with the degree modifier *wazukani* (‘slightly’) receives an immediate account. As shown in (2) and (5), repeated here as in (18), relative adjectives become compatible with *wazukani* in the presence of a *yor*i phrase:

- (18) a. #Kono tana-wa wazukani takai.
 this shelf-TOP slightly tall
 intended: ‘This shelf is slightly tall.’
 b. Kono tana-wa **ano tana-yor**i wazukani takai.
 this shelf-TOP that shelf-than slightly tall
 ‘This shelf is slightly taller than that shelf.’

This fact follows from the proposed analysis where a relative adjective is converted to a derived, minimum standard predicate, assuming that the degree modifier *wazukani* yields

a well-defined meaning only when it combines with predicates whose scales have minimum endpoints (which is an independently motivated assumption given the distributional properties and meaning of this word):

$$(19) \quad [[\text{wazukani}]] = \lambda g \lambda x. g(x) \gtrsim \mathbf{min}(g)$$

(18a) results in infelicity since the open scale for *takai* ‘tall’ has no minimum endpoint associated with it. (18b), on the other hand, yields a perfectly coherent interpretation where it asserts that the degree that ‘this shelf’ possesses on the derived scale is slightly above the minimum endpoint of that scale, in other words, that the height difference between the two shelves is slight. This is indeed the correct meaning for (18b).

3.2.2 Interaction of measure phrases and *yor*i phrases

Second, the proposed analysis of phrasal comparatives interacts nicely with a simple analysis of measure phrases. I assume that the measure phrase construction involves the following null degree head which takes a gradable adjective and a degree phrase as arguments and returns a property of individuals:

$$(20) \quad [[\delta]] = \lambda g \lambda d \lambda x. g(x) - \mathbf{stnd}(g) \geq d$$

Then, (3) and (6), repeated here as in (21), are analyzed as in (22).

- (21) a. Kono tana-wa **20-senti-meetoru** takai.
 this shelf-TOP **20-centimeter** tall
 ‘This shelf is 20 centimeters taller (than some contextually salient shelf).’
 b. Kono tana-wa ano tana-yori **20-senti-meetoru** takai.
 this shelf-TOP that shelf-than **20-centimeter** tall
 ‘This shelf is 20 centimeters taller than that shelf.’
- (22) a. $[[(21a)]] = \mathbf{tall}(\mathbf{this\ shelf}) - \mathbf{stnd}(\mathbf{tall}) \geq \mathbf{20cm}$
 b. $[[(21b)]] = \mathbf{tall}_{\mathbf{tall}(\mathbf{that\ shelf})}^{\dagger}(\mathbf{this\ shelf}) - \mathbf{stnd}(\mathbf{tall}_{\mathbf{tall}(\mathbf{that\ shelf})}^{\dagger}) \geq \mathbf{20cm}$

The translation for (21a) in (22a) can be paraphrased as ‘this shelf is 20 cm taller than the contextually determined standard’. Thus, the context-dependent interpretation of the sentence is correctly accounted for. The translation for (21b) in (22b), on the other hand, asserts that the height difference between ‘this shelf’ and the standard of the derived scale (which is effectively identical to the height of the other shelf) is 20cm. This does not refer to any contextually determined standard and simply measures the height difference between the two shelves involved, correctly accounting for the context-independent interpretation of the comparative sentence.

A remark is in order here regarding the nature of context dependence in measure phrase constructions. In the analysis of measure phrases sketched above, the context dependence of relative adjectives with measure phrases is attributed to the same **stnd** function as is used in the definition of the *pos* operator in (11). One might find this proposal objectionable, on the grounds that the nature of context dependence in the positive form and in the measure phrase construction is somewhat different. That is, in the positive form (at least in most typical contexts; but see the discussion below), the truth conditions for the sentence is determined with reference to a vague and generic standard, whereas

sentences with measure phrases like (21a) seem to always refer to some standard that is local to the specific context of utterance (such as the height of some specific, previously mentioned shelf).⁶ However, I think that the different nature of context dependence in the measure phrase construction and in the positive form can be explained pragmatically. The account goes roughly as follows.⁷ Reference to a vague, generic standard is unavailable for the measure phrase construction since it is inherently incompatible with the semantic and pragmatic function of measure phrases: if the precise value of the standard is indeterminate, it simply doesn't make much sense to specify the exact amount by which the object in question exceeds that standard. I thus take it that the analysis of measure phrases given above, which encodes in itself the same **stnd** function as is used in the *pos* operator, is essentially correct.

Support for the assumption that the choice between a generic standard and a specific standard is determined by pragmatic factors rather than being directly correlated with the presence and absence of *yor*i phrases comes from the fact that the positive form in Japanese can generally refer to a specific standard as long as an appropriate context is given (Hayashishita (2009) makes the same point, using a similar example):

- (23) **A:** Kono seimitu-antenna-o tukuru-niwa kikkari 10 meetoru-no
 this high.precision-antenna-ACC make-for just 10 meter-GEN
 doosen-ga hituyoo-da.
 copper.wire-NOM necessary-COP
 'To make this high-precision antenna, we need a copper wire that is exactly
 10 meters long.'
- B:** Kono doosen-wa doo-desu?
 this copper-wire how.about
 'How about this copper wire?'
- [A measures the copper wire with a high-precision ruler carefully. The length turns out to be 10 meters and 2 millimeters.]
- A:** Iya, kore-wa nagai-kara dame-da!
 no this-TOP long-because useless-COP
 'No, this one won't work since it's too long!'
 (lit. 'No, this one won't work since it's long!')
- [Saying this, A throws away the copper wire in the trash bin.]

This suggests that, at least for Japanese, the **stnd** function needs to be able to refer to specific standards, as well as to vague and generic standards.

⁶In fact, this is what motivates Sawada and Grano (2009) to posit a degree head distinct from the one in (20) for relative adjectives with measure phrases (but without *yor*i phrases).

⁷The problem discussed here relates to a much larger theoretical issue of how the notion of standard (and its context-dependent nature) is to be understood and how it is affected by the truth conditional content of sentence and general pragmatic factors. My account here is admittedly sketchy and more needs to be said to fully defend it. However, expanding this discussion in full detail is beyond the scope of this paper and I will leave this task for future research.

4 Comparison with other approaches

As we have seen above, the proposed measure function-based analysis straightforwardly accounts for the basic properties of phrasal comparatives in Japanese. In this approach, the context dependence of relative adjectives disappears in comparatives since comparatives involve resetting of the scale: an open-scale predicate with a contextually determined standard is converted to a minimum standard predicate whose interpretation is context-independent. While this approach is intuitively natural and appealing, it is not the only option for accounting for the context-independence of the interpretations of comparatives. Specifically, there are two alternatives in the previous literature: the ‘direct’ analysis, according to which the function of the comparative phrase is simply to specify the standard of comparison without changing the scale structure (cf., e.g., Heim 1985; Kennedy 1999, 2009) and the ‘contextual’ analysis of Japanese comparatives (Beck et al., 2004; Oda, 2008), according to which the *yori* phrase does not directly make any truth-conditional contributions but the identification of the standard and the degree provided by the *yori* phrase is done by means of a purely pragmatic process.⁸

The question that naturally arises at this point is: are there any empirical/theoretical advantages for the proposed, measure function-based analysis over these alternatives? To answer this question, below I will compare the present analysis with these alternatives. To preview the conclusion, I will argue that the present analysis turns out to be the most uniform and simple analysis of phrasal comparatives which builds on a fully general analysis of relative and absolute predicates open-scale and closed-scale predicates and which straightforwardly accounts for cases in which comparatives interact with other phenomena pertaining to the semantics of gradable predicates (specifically, degree modifiers, measure phrases and resultatives); the main difficulty for the direct analysis comes from cases in which comparatives interact with other phenomena while the contextual analysis runs into problems in formulating a unified analysis of relative and absolute predicates in the positive and comparative forms.

4.1 The direct analysis

4.1.1 Implementing the direct analysis

The direct analysis of comparatives can be implemented in the present setup where adjectives are taken to denote measure functions of type $\langle e, d \rangle$ by positing the following null degree head, which combines with a gradable adjective, a *yori* phrase and a measure

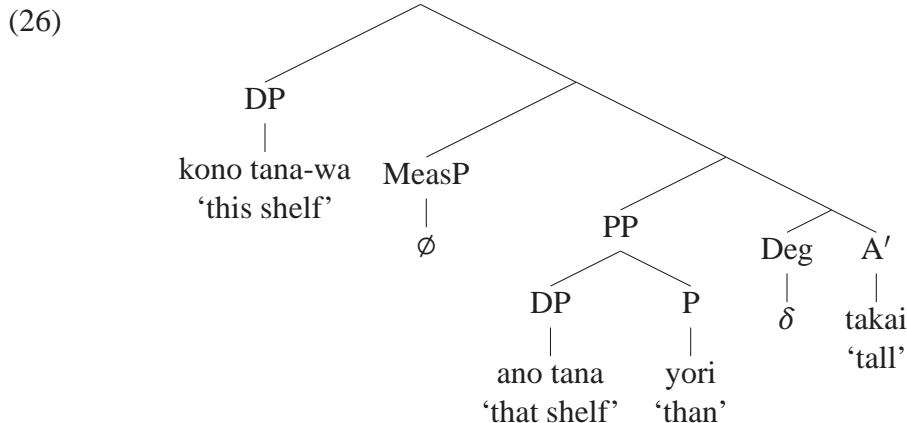
⁸Yet another (also widely-entertained) approach to comparatives is one involving quantification over degrees (cf., e.g., Heim (2000)). Beck et al. (2004) point out that the kind of scope interactions with other operators that most strongly motivate the quantificational approach are not found in Japanese comparatives. I will not discuss the quantificational approach in what follows since, as far as the phenomena considered below are concerned, the quantificational approach essentially shares the same property as the direct analysis that the function of the comparative phrase is to set the standard without modifying the scale structure. Thus, it is most likely that the same kind of difficulty would arise in the quantificational analysis as in the direct analysis with respect to the data discussed in section 4.1.

phrase (if there is one) to return a truth value:^{9,10}

$$(24) \quad [[\delta]] = \lambda g \lambda y \lambda d \lambda x. g(x) - g(y) > d$$

With this assumption, the simple comparative sentence (4), repeated here as (25), can be analyzed as in (27), with a syntactic structure along the lines of (26) (here $d = 0$ since there is no overt measure phrase).

- (25) Kono tana-wa **ano tana-yori** takai.
 this shelf-TOP **that shelf-than** tall
 ‘This shelf is taller than that shelf.’



$$(27) \quad [[(25)]] = \text{tall}(\text{this shelf}) - \text{tall}(\text{that shelf}) > 0$$

As should be clear from this exposition, the direct analysis produces the correct truth conditions for this simplest case. It should be easy to see that it produces the right result for cases involving overt measure phrases such as (6) as well.

4.1.2 Compatibility with degree modifiers

The measure function-based analysis of comparatives enables a straightforward analysis of cases in which comparatives interact with degree modifiers. As shown in the following examples, two degree modifiers *wazukani* ‘slightly’ and *maamaa* ‘more or less’ in Japanese exhibit a complementary distribution in that the former is compatible with minimum standard predicates only while the latter is *incompatible* with minimum standard predicates only:

- (28) a. #Kono tana-wa **wazukani** takai.
 this shelf-TOP slightly tall
 intended: ‘This shelf is slightly tall.’
 b. Kono sao-wa **wazukani** magat-te iru.
 this rod-TOP slightly bent IRU
 ‘This rod is slightly bent.’

⁹Here, d is the degree provided by the measure phrase (if there is one); I assume that, when left implicit, the value of this variable defaults to 0.

¹⁰Again, the assumption here that adjectives denote measure functions rather than relations between individuals and degrees is not crucial for the ensuing discussion. If anything, it simplifies, rather than complicates, the analysis of the relevant phenomena in the direct analysis.

- c. #Kono koppu-wa **wazukani** manpai-da.
 this glass-TOP slightly full-COP
 intended: ‘This glass is slightly full.’
- (29) a. Kono tana-wa **maamaa** takai.
 this shelf-TOP more or less tall
 ‘This shelf is more or less tall.’
- b. #Kono sao-wa **maamaa** magat-te iru.
 this rod-TOP more or less bent IRU
 ‘This rod is more or less bent.’
- c. Kono koppu-wa **maamaa** manpai-da.
 This glass-TOP more or less full-COP
 intended: ‘This glass is more or less full.’

Comparative sentences with *yor*i phrases behave like minimum standard predicates in that they are compatible with *wazukani* but incompatible with *maamaa*:

- (30) Kono tana-wa ano tana-yori **wazukani** takai.
 this shelf-TOP that shelf-than slightly tall
 ‘This shelf is slightly taller than that shelf.’
- (31) #Kono tana-wa ano tana-yori **maamaa** takai.
 This shelf-TOP that shelf-than more or less tall
 intended: ‘This shelf is more or less taller than that shelf.’

This pattern is completely expected in the measure function-based analysis. We have already seen the analysis of *wazukani* in section 3.2.1. The distribution and meaning of *maamaa* can be accounted for by positing the following lexical entry for *maamaa*:

- (32) $[[maamaa]] = \lambda g \lambda x. g(x) \lesssim \mathbf{stnd}(g)$

This says that the degree in question is slightly less than the standard, which adequately captures the meaning of this degree modifier when it occurs with relative adjectives and maximum standard predicates. Crucially, with minimum standard predicates, (32) leads to anomaly since when the standard is the minimum endpoint, nothing can have a degree that is slightly *below* that standard. Thus, in the measure function-based analysis, where the comparative form involves a minimum standard predicate, the unacceptability of (31) is accounted for in exactly the same way that the unacceptability of *maamaa* with lexically minimum standard predicate as in (29b) is accounted for.

Things are not so straightforward with the direct analysis. First of all, if scale resetting is not involved, it is not clear why attaching a *yor*i phrase makes a relative adjective behave like minimum standard predicates. For the case of *wazukani*, however, one might entertain the following possibility. Instead of giving the minimum endpoint-oriented denotation along the lines of (19), one might say that *wazukani* is a measure phrase that denotes a small amount:

- (33) $[[wazukani]] = d_{small}$

This analysis will assign the following truth conditions for (30), which is equivalent to the result obtained in the measure function-based analysis spelled out in section 3.2.1:

$$(34) \quad [[(5)]] = \text{tall}(\text{this shelf}) - \text{tall}(\text{that shelf}) > d_{\text{small}}$$

Thus, by adopting this alternative analysis, the interaction between comparatives and *wazukani* can be captured adequately in the direct analysis. However, as it stands, this analysis leaves unexplained one fact: the unacceptability of *wazukani* with relative adjectives without the *yoru* phrase exemplified by (28a).¹¹ (Note that the lexical entry for *wazukani* in (33) does not make reference to the minimum endpoint of the scale.)

Even if the problem with *wazukani* can be overcome along the lines sketched in footnote 11, the case of *maamaa* remains problematic. Within the direct analysis of comparatives, modelling on the analysis of *wazukani* in (33), *maamaa* might be analyzed as a measure phrase that denotes a negative small amount:

$$(35) \quad [[\text{maamaa}]] = -d_{\text{small}}$$

This accounts for the distribution of *maamaa* in (29) (that is, the non-comparative cases) in a way analogous to the measure function-based analysis in (32). However, the infelicity of *maamaa* in the comparative in (31) remains unaccounted for. That is, if scale resetting (which effectively ‘throws away’ all the degrees below the minimum endpoint) is not involved, there should be no reason why (31) cannot mean something along the lines of ‘this shelf is *almost* as tall as that shelf’ (i.e. slightly below the standard specified by the *yoru* phrase).

4.1.3 Measure phrases

Measure phrases can occur both with and without *yoru* phrases. In particular, as can be seen in the following example repeated from above, with absolute adjectives, they induce context independent, direct measurement interpretations:

- (36) Kono sao-wa **5-do** magat-te iru.
 this rod-TOP **5-degree** bent IRU
 ‘This rod is 5 degrees bent.’

The measure function-based analysis of comparatives enables a simple and straightforward analysis of measure phrases in which a single entry for the degree head defined as in (37) (= (20)) accounts uniformly for the semantic contribution of the measure phrase both in comparative and non-comparative sentences:

$$(37) \quad [[\delta]] = \lambda g \lambda d \lambda x. g(x) - \text{stnd}(g) \geq d$$

¹¹ A possible explanation for this fact might come from attributing the unacceptability of such examples to pragmatic infelicity. That is, in the analysis of *wazukani* that we are considering here, what (28a) literally means is that the height of the shelf is slightly above the context-dependent vague standard. But if the precise value of the standard on the scale cannot be pinpointed, it hardly makes sense to talk about a slight difference from it. While this approach is indeed attractive, and it might ultimately turn out to be a better analysis of the meaning of expressions like *wazukani* (and ‘slightly’) than an analysis along the lines of (19) which simply stipulates that the degree expression refers to the minimum endpoint, it remains to see whether such an analysis can be defended fully against the more explicit and standardly assumed analysis (cf., e.g., Kennedy and McNally (2005) and Kennedy and Levin (2008)) along the lines of (19).

With (37), the truth conditions for (36) are calculated as follows:

$$(38) \quad [[(36)]] = \mathbf{bent}(\mathbf{this\ rod}) - \mathbf{std}(\mathbf{bent}) \geq 5^\circ$$

This says that the rod is 5 degrees bent from the zero point, which is the correct result. Note crucially here that the standard function targets the minimum endpoint of the scale since the scale for **bent** is minimally closed.

We have already seen in section 3.2.2 that the degree head in (37) assigns the correct truth conditions for sentences involving a *yor*i phrase. Essentially, cases involving *yor*i phrases are just special cases of minimum standard predicates and the degree head in (37) measures the amount from the derived endpoint, which corresponds to the degree possessed by the complement of *yor*i.

Such a unified analysis of measure phrases for comparatives and non-comparatives seems difficult to achieve in the direct analysis. The degree head in (39) (= (24)) that we have introduced above in the direct analysis is for cases involving an overt *yor*i phrase (note that it explicitly subcategorizes for an individual argument *y* corresponding to the complement of *yor*i):

$$(39) \quad [[\delta]] = \lambda g \lambda y \lambda d \lambda x. g(x) - g(y) > d$$

Thus, for cases without *yor*i phrases, in particular, to derive the direct measurement interpretations of absolute adjectives with measure phrases in sentences like (36), one needs an additional entry for the degree head, which, following Sawada and Grano (2009), can be defined as follows:

$$(40) \quad [[\delta_{DIR}]] = \lambda g \lambda d \lambda x. g(x) \geq d \quad (\text{where } g \text{ has a well-defined endpoint})$$

It does not seem to be possible to unify the two degree heads in (39) and (40), since, in the direct analysis, the measure phrase needs to measure the degree from different points on the scale in cases involving *yor*i phrases (for which the degree is measured from the degree possessed by the complement of *yor*i) and cases that do not involve *yor*i phrases (for which the degree is measured from the standard; more specifically, in the case of minimum standard predicates, the minimum endpoint).

4.1.4 Resultatives

Finally, the measure function-based analysis and the direct analysis make different predictions regarding the interactions between comparatives and the resultative construction. In Japanese, resultative sentences are formed by modifying a change of state predicate by a gradable adverbial expression, as in (41):

- (41) Ken-wa gom-u-o **nagaku** nobasi-ta.
 Ken-TOP rubber-ACC long stretch-PAST
 lit: ‘Ken stretched the rubber long.’
 ‘Ken stretched the rubber and made it long.’

The resultative phrase can be comparative:

- (42) Ken-wa kono gomu-o [ano gomu-yori nagaku] nobasi-ta.
 Ken-TOP this rubber-ACC that rubber-than long stretch-PAST
 lit: ‘Ken stretched this rubber longer than that rubber.’
 ‘Ken stretched this rubber and made it longer than that rubber.’

For the purpose of exploring the relevant interactions between resultatives and comparatives, I adopt a recent analysis of Japanese resultatives by Uegaki (2009) in which an explicit compositional semantics of resultatives in Japanese is worked out within the scale-based approach. Building on the measure function-based analysis of degree achievements in English by Kennedy and Levin (2008), Uegaki analyzes Japanese resultatives as verbal modifiers that change the scale structure associated with the verbal predicate. More specifically, in his analysis, a resultative phrase produced out of a gradable predicate is a verbal modifier that converts measure functions (denoted by the original verbs) into ones with *derived upper thresholds* corresponding to the standard point on the scale associated with the resultative phrase. The following picture illustrates the analysis in intuitive terms:

- (43) **stretched:** $\begin{array}{c} \text{init}(e) \quad \text{fin}(e) \\ \cdots \bullet \quad \bullet \cdots \\ \uparrow \text{MAP} \\ \text{long:} \quad \cdots \bullet \cdots \\ \text{stnd}(\text{long}) \end{array}$

The resultative phrase in (41), when combined with the verbal predicate, does the following two things: (i) it maps the standard degree of length on the scale associated with the adjective *nagai* ‘long’ (i.e. the context-dependent standard for objects to count as ‘long’) to the scale of stretchedness associated with the verbal predicate along which the change of state denoted by the verb is measured and (ii) it imposes a restriction on the meaning of the whole predicate such that the sentence is made true if and only if the degree that the object in question possesses at the final stage of the relevant change of state exceeds the ‘threshold’ introduced by the resultative phrase.

Uegaki formalizes this analysis by positing the following empty adverbializer that takes a gradable predicate and turns it into a modifier of measure of change functions denoted by change of state verbal predicates:

- (44) **adv** ([[nagaku]]) = $\lambda g \lambda x \lambda e. g(x)(e) \geq \text{MAP}_{\langle \text{long}, g \rangle}(\text{stnd}(\text{long}))$

Combining this verbal modifier with the verb *nobasi-ta* ‘stretched’, which denotes a measure of change function, the following meaning is assigned to the whole predicate:

- (45) [[nagaku nobasi-ta]] = $\lambda x \lambda e. \text{stretched}_{\Delta}(x)(e) \geq \text{MAP}_{\langle \text{long}, \text{stretched}_{\Delta} \rangle}(\text{stnd}(\text{long}))$

Roughly speaking, (45) says that the sentence is true just in case the object in question ends up possessing a degree of stretchedness corresponding to the degree of length which, if mapped back onto the scale of length associated with the resultative phrase, exceeds the standard point of that scale. This correctly accounts for the entailment of (41) that the rubber is long after being stretched.

An interesting consequence of the measure function-based analysis of comparatives proposed above is that it interacts straightforwardly with this analysis of resultatives proposed by Uegaki (2009) to yield the correct truth conditions for sentences like (42). That

comparatives. In what follows, I will briefly summarize the most recent variant of the contextual analysis, namely, Oda's (2008) proposal, and then point out what I take to be the most problematic aspect of this kind of approach as compared to the proposed measure function-based analysis (which takes the contribution of the *yor*i phrase to have a truth conditional effect).¹²

Oda (2008) advocates a variant of the contextual analysis in which all adjectives in Japanese are assigned 'comparative' meanings in the lexicon. In Oda's analysis, the lexical entry for *takai* 'tall' is formulated as in (48):¹³

$$(48) \quad [[\text{takai}]] = \lambda x. \text{tall}(x) > c$$

That is, the predicate *takai* is true of an individual *x* just in case the degree that *x* possesses on the scale of vertical length exceeds some standard whose value is specified by the free variable *c*. In this analysis, the vague interpretation of sentences like (1) is obtained by leaving the value of *c* to be determined entirely contextually so that it picks up the vague, context-dependent standard. On the other hand, in sentences like (4) with overt *yor*i phrases, the value of *c* is identified with the degree specified by the *yor*i phrase through some contextual mechanism. (This identification of the value of *c* and the degree invoked by the *yor*i phrase is crucial for the contextual analysis to yield the right predications for comparative sentences. However, neither Oda (2008) nor its precursor Beck et al. (2004) spell out fully how this pragmatic identification works and the exact details are somewhat unclear.)

This kind of analysis runs into problems when one attempts to extend it to absolute predicates. Just as in English, absolute predicates in Japanese exhibit context-independent interpretations both in the positive form and in the comparative form, as exemplified by the following examples:

- (49) a. Kono sao-wa magat-te iru.
 this rod-TOP bent IRU
 'This rod is bent.'
- b. Kono sao-wa ano sao-yori magat-te iru.
 this rod-TOP that rod-than bent IRU
 'This rod is more bent than that one.'
- (50) a. Kono ita-wa taira-da.
 this board-TOP flat-COP
 'This board is flat.'
- b. Kono ita-wa ano ita-yori taira-da.
 This board-TOP that board-than flat-COP
 'This board is more flat than that one.'

Both with the minimum standard predicate *magat-te iru* 'bent' and *taira-da* 'flat', the comparative form exhibits a differential interpretation in which the degree that the subject

¹²Note also that, just like the direct analysis, the contextual analysis does not involve scale resetting. Given this, the kinds of problems that I have discussed in the previous section for the direct analysis will most likely carry over to the contextual analysis as well.

¹³The notation is slightly adapted from the original to make it consistent with the one assumed in this paper. Nothing crucially hinges on this change of notation.

of the sentence possesses is measured against the fixed standard provided by the *yor*i phrase. However, in the positive form, absolute predicates do not exhibit differential interpretations. (49a) is true just in case the rod has at least some degree of bend and (50a) is true just in case the board is completely flat. In other words, the standard is fixed to the endpoint of the scale rather than being identified with some contextually determined vague value. This means that the template for adjective meanings given in (48), which builds in itself a comparative (or differential) meaning, cannot be used for the positive form of absolute predicates. Thus, under the contextual analysis, one will either have to say that the semantics of the positive form and the comparative form are different (at least for absolute predicates) or that the semantics of relative and absolute predicates are different (at least for the positive form).¹⁴ In either case, one has to give up a uniform analysis of relative and absolute predicates in the positive and comparative forms. Given that such an analysis is straightforwardly available in the derived measure function-based analysis that I have proposed in this paper, I take it that the data with absolute predicates favor the present proposal over the contextual analysis of comparatives.

5 Conclusion

Despite the simplicity and intuitive appeal of the basic idea, the derived measure function-based analysis of comparatives has not gained great popularity in the literature of comparatives; so far, it has only been alluded to occasionally in relation to the analyses of other phenomena (cf., e.g., Rotstein and Winter (2003); Kennedy and McNally (2005); Kennedy and Levin (2008)). In particular, to the best of my knowledge, there has not yet been any serious attempt in the previous literature that investigates the consequences of such an analysis for any kind of comparative construction in any language. This paper has undertaken precisely that task by taking the phrasal comparative construction in Japanese as a test case and by formulating an explicit compositional semantics of this construction in terms of the measure function-based approach. As I have argued above, the main advantage of this analysis is that it fully retains the insights of the more standard, direct analysis of comparatives (in treating the Japanese comparatives with *yor*i phrases as a case of explicit comparison) while at the same time enabling a straightforward treatment of cases in which comparatives interact with other phenomena pertaining to gradable predicates. Given that the measure function-based analysis automatically yields the correct predictions in such cases which are not available in other approaches, I take these results to favor the measure function-based analysis of phrasal comparatives in Japanese over these alternatives.

Since the semantics of comparatives is a complex issue, there are many questions that are left for future study. I will list here two most important ones. First, in this paper I have focused on phrasal comparatives but Japanese also has what looks like clausal comparatives:

¹⁴It should be noted here that this problem is not restricted to the lexical variant of the contextual analysis by Oda (2008). As long as the meanings of comparatives are analyzed by fixing the value of a contextual variable *c* with a degree associated with the *yor*i phrase (which is the distinguishing property of the contextual analysis), a unified analysis of relative and absolute predicates is difficult.

- (51) John-wa [Mary-ga kat-ta]-yori takusan-no kasa-o kat-ta.
 John-TOP Mary-NOM buy-PAST-than many-GEN umbrella-ACC buy-PAST
 'John bought more umbrellas than Mary did.'

It remains to see whether the measure function-based analysis can be extended to clausal comparatives as well and whether there is any advantage in such an analysis over alternative analyses.

Second, even as an analysis of phrasal comparatives, the present proposal is somewhat simplified in that I have only provided explicit analyses of cases in which the *yori* phrase correlates with the subject of the sentence. However, as the ambiguity of the following sentence shows, generally, that is not the only option:

- (52) Watasi-wa Ken-yori Robin-o aisi-te iru.
 I-TOP Ken-than Robin-ACC love IRU
 'I love Robin more than Ken does.'
 'I love Robin more than I love Ken.'

Matsui and Kubota (2010) propose an analysis of the ambiguity of sentences like (52) in terms of the direct analysis of comparatives, together with the technique of *parasitic scope* (Barker, 2007; Kennedy and Stanley, 2008) to get the compositional semantics right. It seems that, whether one adopts the direct analysis or the measure function-based analysis, something like parasitic scope is called for to account properly for all of the range of interpretations generally available for comparative sentences. However, working out the full details of the compositional semantics of comparatives is beyond the scope of this paper and I leave this task for future study.

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Yusuke Kubota
 The University of Tokyo
 kubota@ling.ohio-state.edu

The Korean evidential *-te*: A modal analysis

Jungmee Lee*

1 Introduction

Evidentiality is a linguistic category that specifies the source of information conveyed in an utterance (Aikhenvald and Dixon 2003), such as direct observation, inference, or hearsay. According to Aikhenvald's (2004) cross-linguistic study of over 500 languages, a typologically common pattern is to specify distinct sources of information with distinct morphemes, such as Quechua's three evidentials: *-mi* (for direct observation), *-chá* (for inferential evidence), and *-si* (for hearsay evidence). Previous formal analyses of evidentiality have focused on such typologically common evidential systems (e.g. Quechua in Faller 2002, St'át'imcets in Matthewson et al. 2008).

The Korean evidential system provides a novel perspective for cross-linguistic studies on evidentiality. There are no independent markers specifying distinct sources of information in Korean. But the Korean evidential *-te* appears to give rise to various evidential readings depending on which tense it occurs with. This is illustrated in (1). The evidential readings are represented in square brackets:¹

- (1) a. Context: Yesterday, the speaker was looking outside through a window. Now, he says:
Ecey pi-ka o- \emptyset -te-la.
Yesterday rain-NOM fall-PRES-TE-DECL
‘[I saw that] it was raining yesterday.’
- b. Context: Yesterday, the speaker saw that the ground was wet. Now, he says:
Kucekkey pi-ka o-ass-te-la.
The.day.before.yesterday rain-NOM fall-PAST-TE-DECL
‘[I inferred that] it rained the day before yesterday.’

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¹The following glosses are used in this paper: ACC = accusative case, COMP = complementizer, DECL = declarative mood, ESSESS = *-essess*, FUT = future tense, GEN = genitive case, LOC = locative, NEG = negation particle, NOM = nominative case, PAST = past tense, PL = plural, PRES = present tense, PROG = progressive aspect, REL = relativizer, TE = *-te*, TOP = topic marker.

In (1a), *-te* occurs with the present tense, and it gives rise to the direct evidential reading, according to which the speaker directly observed that it was raining. By contrast, if *-te* occurs with past tense as in (1b), it gives rise to the indirect inferential evidential reading, i.e. the speaker did not observe raining, but he inferred it based on his observation of the wet ground.

Given this availability of an evidential reading, this paper argues that the morpheme *-te* is an evidential marker (contra Chung 2005, 2007). The evidential *-te* differs from typologically more common evidential markers in other languages (e.g. Quechua, St'át'imcets). The presence of *-te* in a sentence does not indicate a specific source of information, but its interaction with tenses determines the source of information conveyed. This paper discusses how the evidential *-te* gives rise to various evidential readings by means of interacting with tenses. This will lead us to look at the larger picture of evidential systems cross-linguistically and further our understanding of the nature of evidentiality.

This paper also addresses theoretical questions about the relationship between evidentiality and modality. By definition, evidentiality and epistemic modality are distinct notions. The former specifies source of information, and the latter specifies degree of a speaker's certainty about a proposition in question. de Haan (1999) distinguishes the two notions as follows:

- (2) While epistemic modality and evidentiality both deal with evidence, they differ in what they do with that evidence. Epistemic modality EVALUATES evidence and on the basis of this evaluation assigns a confidence measure to the speaker's utterance. This utterance can be high, diminished, or low. An epistemic modality will be used to effect this degree of confidence. An evidential ASSERTS that there is evidence for the speaker's utterance but does not interpret the evidence in any way. (de Haan, 1999, 85)

However, the literature (Izvorski 1997, McCready and Ogata 2007, Matthewson et al. 2007 among others) has noted that evidentiality and modality are closely related. The speaker's degree of certainty is significantly dependent on the source of information conveyed. In my analysis of the Korean evidential *-te*, I present empirical evidence for its modal meaning. I show how the 'evaluation' process in the sense of de Haan is involved when we acquire evidence and make a claim on the basis of it. The evidential meaning is formalized in terms of Kratzer's (1977, 1981) modal theory. This paper also discusses Chung's (2005, 2007) analysis of *-te* as a spatio-temporal operator in detail. I spell out its methodological and empirical problems, and point out that her assumptions about evidentiality is not supported by cross-linguistic studies.

This paper is organized as follows: In §2 and §3, I explore the temporal and evidential readings of *-te* sentences, respectively, and show that different evidential readings arise depending on which tense *-te* occurs with. §4 presents supporting evidence for a modal approach to the Korean evidential *-te*, and then develops a compositional analysis in terms of Kratzer's modal theory. The analysis proposed in this paper is compared with Chung's (2005, 2007) analysis in §5. The main claims of this paper are summarized in §6.

2 Temporal readings of *-te* sentences

2.1 Background: Korean tenses

There are three tenses in Korean; (i) past *-ess*, (ii) present *-ø*, and (iii) future *-kyess*.^{2,3} Korean tenses relate the eventuality time to an evaluation time, which is the utterance time in matrix clauses as illustrated in (3), but some other time interval in embedded clauses as illustrated in (4).⁴

- (3) a. #Ecey/cikum/#nayil pi-ka o- \emptyset -a.
Yesterday/now/tomorrow rain-NOM fall-PRES-DECL
'It is raining #yesterday/now/#tomorrow.'
- b. Ecey/#cikum/#nayil pi-ka o-**ass**-e.
Yesterday/now/tomorrow rain-NOM fall-PAST-DECL
'It rained yesterday/#now/#tomorrow.'
- c. #Ecey/#cikum/nayil pi-ka o-**kyess**-e.
Yesterday/now/tomorrow rain-NOM fall-FUT-DECL
'It will rain #yesterday/#now/tomorrow.'

In (3), the eventuality time of the raining eventuality is constrained with respect to the utterance time; e.g. (i) *present* tense locates the eventuality time of the raining eventuality in the present relative to the utterance time as in (3a), (ii) *past* tense locates the eventuality time of the raining eventuality in the past relative to the utterance time as in (3b), and (iii) *future* tense locates the eventuality time of the raining eventuality in the future relative to the utterance time as in (3c). However, the evaluation time of Korean tenses in embedding constructions is *not* the utterance time, but some other time interval (Yoon 1996, Song 1999 among others). For example, the embedded tense of a verbal complement clauses is interpreted with respect to the eventuality time of the matrix clause eventuality.

- (4) a. Chelswu-nun pi-ka o-**n**-ta-ko malha-yess-ta.
Chelswu-TOP rain-NOM fall-PRES-DECL-COMP say-PAST-DECL
'Chelswu said that it was raining.'
- b. Chelswu-nun pi-ka o-**ass**-ta-ko malha-yess-ta.
Chelswu-TOP rain-NOM fall-PAST-DECL-COMP say-PAST-DECL
'Chelswu said that it had rained.'

²The Korean past and present tenses have phonologically conditioned allomorphs: *-ess*, *-ass*, *-ss*, *-yess* for past, and *-nun*, *-n*, *-ø* for present.

³The expression *-kyess* has been analyzed as a future tense (e.g. Song 1967, Kim 1992) or a future-oriented modal element (e.g. Yoo 1993, An 1980). This paper does not discuss the two approaches in detail, but notice that in either analysis, a futurate temporal meaning is encoded in the denotation of *-kyess*. For the sake of simplicity, I gloss *-kyess* as FUT in this paper without further discussion.

⁴Since this paper does not address issues regarding aspect, I develop a compositional analysis according to this temporal meaning of tense (as relating an eventuality time to an evaluation time). However, in a fuller analysis that deals with aspect as well as tense, Reichenbach's (1947) notion of a reference time should be introduced. In the fuller analysis, tense should be defined as relating a reference time and an evaluation time, and aspect as relating a reference time and an eventuality time. The analysis proposed in this paper can be easily converted to the reference time-based system described above.

- c. Chelswu-nun pi-ka o-**kyess**-ta-ko malha-yess-ta.
 Chelswu-TOP rain-NOM fall-FUT-DECL-COMP say-PAST-DECL
 ‘Chelswu said that it would rain.’

The embedded tenses in (4) are responsible for the temporal relation between the eventuality time of the raining eventuality and that of the saying eventuality: (i) With the embedded present tense, the eventuality time of the raining eventuality overlaps with that of the saying eventuality as in (4a), (ii) with the embedded past tense, the eventuality time of the raining eventuality is located prior to that of the saying eventuality as in (4b), and (iii) with the embedded future tense, the eventuality time of the raining eventuality is located after that of the saying eventuality as in (4c).

2.2 Temporal meanings of *-te* and its cooccurring tenses

The temporal interpretation of evidential sentences realized with *-te* exhibits the same pattern as that of embedding constructions with a past tensed matrix verb. As exemplified in (1), an evidential sentence in the morphosyntactic makeup ϕ -TENSE-*te*-DECL involves the eventuality of the speaker acquiring evidence for the existence of an eventuality denoted by ϕ (Sohn 1975, Lee and Ramsey 2000, Chung 2007 among others). I call the former eventuality *an evidence acquisition eventuality*, e.g. the eventuality of the speaker acquiring visual evidence (seeing the wet ground) in (1b). As discussed in detail below, the evidential *-te* itself makes a temporal contribution: it locates the eventuality time of an evidence acquisition eventuality (henceforth, an evidence acquisition time) prior to the utterance time.⁵ The evidence acquisition time plays the role of the evaluation time for tenses occurring with *-te* (Lee and Ramsey 2000). Consider the following *-te* sentences that involve different tenses.

- (5) Pi-ka o-**ass-te**-la.
 Rain-NOM fall-PAST-TE-DECL
 ‘[I inferred that] it had rained.’
- (6) Pi-ka o- \emptyset -**te**-la.
 Rain-NOM fall-PRES-TE-DECL
 ‘[I saw that] it was raining.’
- (7) Pi-ka o-**kyess-te**-la.
 Rain-NOM fall-FUT-TE-DECL
 ‘[I inferred that] it would rain.’

The examples in (5)–(7) describe a raining eventuality. Henceforth, I refer to such an eventuality denoted by ϕ (in the morphosyntactic makeup ϕ -TENSE-*te*-DECL) as *a described eventuality*. Assuming the normal course of a raining eventuality (according to our world knowledge), e.g. the sky being overcast (as its pre-state), raining (as its ongoing-state), the ground being wet (as its post-state), there are 9 possible temporal relations between (i) an evidence acquisition time and the utterance time, and (ii) an

⁵This temporal meaning has been noted by previous authors in various ways, e.g. a ‘retrospective’ tense (Choi 1983), a ‘retrospective’ mood (‘inherently carrying the past feature (p. 359)’ (Sohn 1999 among others), a ‘past’ sensory observation (Song 2002), or a spatial deictic ‘past’ tense (Chung 2005, 2007).

evidence acquisition time and the eventuality time of a raining eventuality. They are summarized in Table 1. (EVI, DES, and UTT stand for an evidence acquisition time, an eventuality time of a described eventuality and an utterance time, respectively. $<$ and \circ represent a temporally sequential relation and a temporal overlap, respectively.)

	DES $<$ EVI	DES \circ EVI	EVI $<$ DES
EVI $<$ UTT	Context 1	Context 2	Context 3
EVI \circ UTT	Context 4	Context 5	Context 6
UTT $<$ EVI	Context 7	Context 8	Context 9

Table 1: Temporal relations

Each utterance context in Table 1 is exemplified in (8). The temporal relation between the utterance time and the evidence acquisition time is specified by time adverbials. The temporal relation between the evidence acquisition time and the eventuality time of a described eventuality is specified by which evidence the speaker acquires. For example, if what the speaker saw is the wet ground, then the eventuality time of the described eventuality (here, a raining eventuality) is located *prior to* the evidence acquisition time. By contrast, if the speaker saw the overcast sky, then the eventuality time of a described eventuality is located *after* the evidence acquisition time.

- (8) a. Context 1: The speaker saw the wet ground yesterday.
b. Context 2: The speaker saw it raining yesterday.
c. Context 3: The speaker saw the overcast sky yesterday.
d. Context 4: The speaker is seeing the wet ground now.
e. Context 5: The speaker is seeing it raining now.
f. Context 6: The speaker is seeing the overcast sky now.
g. Context 7: The speaker will be seeing the wet ground tomorrow.
h. Context 8: The speaker will be seeing that it will be raining tomorrow.
i. Context 9: The speaker will be seeing the overcast sky tomorrow.

Crucially, there is only one context where each of the examples in (5), (6) and (7) can be uttered felicitously; (i) the past tensed *-te* sentence (5) is felicitous in context 1, (ii) the present tensed *-te* sentence (6) is felicitous in context 2, and (iii) the future tensed *-te* sentence (7) is felicitous in context 3, respectively.

Notice that contexts 1, 2, and 3 have in common in that an evidence acquisition time is located prior to the utterance time, i.e. yesterday. This temporal meaning is attributed to the temporal element that the examples have in common, i.e. the evidential *-te*. However, contexts 1, 2, and 3 require a different temporal relation between the eventuality time of a described eventuality and an evidence acquisition time. This different temporal meaning is due to the distinct tenses occurring in the examples in (5)–(7). That is, tenses occurring with *-te* constrain the temporal location of the eventuality time of a described eventuality with respect to an evidence acquisition time; (i) with *past* tense, the eventuality time of a described eventuality is located in the past of an evidence acquisition time, (ii) with *present* tense, the eventuality time of a described eventuality overlaps an evidence acquisition time, and (iii) with *future* tense, the eventuality time of a described eventuality is located in the future of an evidence

acquisition time. This shows that in the Korean *-te* sentences, the evidence acquisition time is the evaluation time relative to which the eventuality time of a described eventuality is located. This is parallel to other embedding constructions, such as verb complement sentences because their embedded tenses are not interpreted with respect to the utterance time, but with respect to some other time; (i) the tense embedded in an evidential sentence is interpreted relative to the evidence acquisition time (induced by the evidential *-te*), and (ii) the tense embedded in a verb complement clause is interpreted relative to the eventuality time of the matrix clause eventuality.

In sum, a Korean evidential sentence realized with *-te* receives a temporal reading as follows: (i) *-te* constrains an evidence acquisition time to be temporally located prior to the utterance time, and (ii) the tense occurring with *-te* locates the eventuality time of a described eventuality relative to an evidence acquisition time (not relative to the utterance time). The temporal relation constrained by the embedded tenses affect the evidential reading of a *-te* sentence. This will be addressed in the next section.

3 Evidential readings of *-te* sentences

3.1 *-Te* is an evidential marker.

A Korean sentence in the morphosyntactic makeup ϕ -TENSE-*te*-DECL receives an evidential reading such that the speaker had *direct* or *inferential* evidence for the existence of the described eventuality denoted by ϕ .⁶ Contra typologically common evidential systems, the Korean evidential *-te* itself does not indicate which type of evidence the speaker acquired. But if the speaker does not have appropriate evidence for a described eventuality, an evidential utterance is infelicitous as illustrated in (9).

- (9) a. Context: The speaker is blind.

#Cihasil-i nemwu etwup- \emptyset -**te**-la.

Basement-NOM very dark-PRES-TE-DECL

Intended: '[I had visual evidence that] it was very dark in the basement.'

⁶If the evidential *-te* occurs in the morphosyntactic makeup ϕ -TENSE-DECL-*te*-DECL, then it receives a *reportative* evidential reading. In this morphosyntactic makeup, there is a declarative mood marker between the tense and the evidential *-te*. Irrespective of which tense *-te* occurs with, the following sentences receive a reportative evidential reading.

- (i) a. Pi-ka o-n-ta-te-la.
Rain-NOM fall-PRES-DECL-TE-DECL
'[The speaker was told that] it was raining.'
- b. Pi-ka o-ass-ta-te-la.
Rain-NOM fall-PAST-DECL-TE-DECL
'[The speaker was told that] it had rained.'
- c. Pi-ka o-kyess-ta-te-la.
Rain-NOM fall-FUT-DECL-TE-DECL
'[The speaker was told that] it would rain.'

This reportative evidential meaning lends further support to my analysis of *-te* as an evidential (contra Chung 2005, 2007). This paper does not provide an analysis of the evidential *-te* occurring in this morphosyntactic makeup, but it will be addressed in Lee (forthcoming).

- b. Context: The speaker is deaf.
 #Tosekwan-i nemwu coyongha- \emptyset -**te**-la.
 Library-NOM very quiet-PRES-TE-DECL
 Intended: '[I had auditory evidence that] the library was very quiet.'
- c. Context: The speaker had never eaten kimchi. Now, he says:
 #Kimchi-ka mayp- \emptyset -**te**-la.
 Kimchi-NOM taste.spicy-PRES-TE-DECL
 Intended: '[I had gustatory evidence that] kimchi tasted spicy.'
- d. Context: The speaker had surgery on his nose yesterday. His nose was stuffed with cotton balls. Now, he says:
 #Ecey edise tha-nu-n namsay-ka na- \emptyset -**te**-la.
 Yesterday somewhere burn-PROG-REL smell-NOM exist-PRES-TE-DECL
 Intended: '[I had olfactory evidence that] yesterday there was a burning smell coming from somewhere.'

Each described eventuality in (9) requires a specific evidence type: visual evidence in (9a), auditory evidence in (9b), gustatory evidence in (9c), olfactory evidence in (9d). But the required evidence is not available in each context. This results in infelicitous utterances.

Given this evidential reading with *-te*, I argue that *-te* is an evidential marker (Song 2002, contra Chung 2005, 2007). It differs from evidentials in other languages that employ distinct morphemes for specifying distinct evidence types. In Korean evidential sentences realized with *-te*, a distinct evidence type is not expressed by a distinct morpheme. But it is determined by interactions of *-te* and tenses as discussed in the following section.

3.2 Tenses and evidence types

As discussed in §2.2, tenses occurring with *-te* locate an eventuality time of a described eventuality relative to an evidence acquisition time. Whether the two times overlap or not affects the availability of direct evidence for the existence of a *described* eventuality.⁷

With past or future tenses, two time intervals cannot temporally overlap. This temporal relation prevents a speaker from acquiring direct evidence for a described eventuality. Based on some evidence available at the evidence acquisition time, the speaker infers that a described eventuality occurred or will occur in the past or future of the evidence acquisition time. For example, consider the evidential readings for felicitous utterances of the following past tensed *-te* sentences:

⁷Note that the discussion on evidence types here regards a described eventuality, not an eventuality causing or caused by a described eventuality. For example, in (5), if the speaker saw the wet ground, then he/she acquired direct evidence for the existence of the eventuality of the ground being wet. But the speaker did not acquire direct evidence for the existence of a raining eventuality. In this utterance, the raining eventuality is a described eventuality. So direct evidence is *not* available for the described eventuality.

- (10) a. Context: The speaker saw a pile of snow on the street this morning. Now, he says:
 Nwun-i o-**ass-te**-la.
 Snow-NOM fall-PAST-TE-DECL
 '[I inferred that] it had snowed.'
- b. Context: The speaker works in a library. He regularly checks a noise decibel reader, and takes a note of it. Yesterday he read the previous record of a noise decibel level. Now, he says:⁸
 Tosekwan-i nemwu sikkule-**ess-te**-la.
 Library-NOM very noisy-PAST-TE-DECL
 '[I inferred that] the library had been very noisy.'
- c. Context: The speaker saw leftover curry in Yenghi's kitchen this morning. Now, he says:
 Yenghi-ka khaley-lul mantul-**ess-te**-la.
 Yenghi-NOM curry-ACC make-PAST-TE-DECL
 '[I inferred that] Yenghi had made curry.'

In (10a), the past tense locates the eventuality time of the snowing eventuality in the past of the evidence acquisition time, i.e. the time at which the speaker saw a pile of snow. This means that the speaker cannot make a direct observation of the snowing eventuality, but he/she can only infer about its existence on the basis of the available evidence at the evidence acquisition time. The previous record of a noise decibel level in (10b) and the leftover curry in (10c) were also taken as indicating the results of an eventuality of a library being noisy and an eventuality of Yenghi cooking curry, respectively. The temporal relation constrained by the past tense allows for inferential evidence, but not a direct observation.

The occurrence of a future tense with *-te* also gives rise to an inferential evidential reading. Future tense constrains the eventuality time of a described eventuality to be located after an evidence acquisition time. Given this temporal relation, it is impossible for the speaker to acquire direct evidence for the existence of a described eventuality (unless he/she has a super power to make sensory observations of what happens in the future). Consider the evidential readings of the following future tensed *-te* sentences:

- (11) a. Context: It was very cloudy this morning.
 Onul pam-ey pi-ka o-**kyess-te**-la.
 Today night-at rain-NOM fall-FUT-TE-DECL
 '[I inferred that] it would rain tonight.'
- b. Context: The exam week was over, and many students left campus.
 Tosekwan-i coyongha-**kyess-te**-la.
 Library-NOM quiet-FUT-TE-DECL
 '[I inferred that] the library would be quiet.'

⁸This contextual information was suggested by Carl Pollard (p.c).

- c. Context: The speaker found curry powder with sliced vegetables and meat in Yenghi's kitchen yesterday. Now, he says:

Yenghi-ka khaley-lul mantul-**kyess-te**-la.

Yenghi-NOM curry-ACC make-FUT-TE-DECL

‘[I inferred that] Yenghi would make curry.’

In (11a), the speaker saw the overcast sky. On the basis of this evidence, the speaker inferred that it would be raining later. The examples in (11b) and (11c) also show that the speaker made inferences about the existence of the described eventualities. Given the fact that the exam week was over in (11b), the speaker inferred that the library would be very quiet. After seeing that the curry powder, vegetables and meat were ready, the speaker inferred that Yenghi would make curry even though the speaker did not see Yenghi actually cooking. In such situations where the eventuality time of a described eventuality and an evidence acquisition time do not temporally overlap, the speaker cannot make a direct observation of the ongoing state of a described eventuality. In a future tensed *–te* sentence, the speaker inferred the existence of a described eventuality on the basis of the evidence that he/she took as indicating the causing eventuality (or pre-state) of a described eventuality. That is, inference evidence for a described eventuality is available, but direct evidence for a described eventuality is not.

Unlike past or future tensed *–te* sentences, if *–te* occurs with present tense, the eventuality time of a described eventuality and an evidence acquisition time temporally overlap. This temporal relation affects the evidential reading of a present tensed *–te* sentence. The relevant examples are given below:

- (12) a. Context: The speaker drove home. Now, he says:

Nwun-i o- \emptyset -**te**-la.

Snow-NOM fall-PRES-TE-DECL

‘[I saw that] it was snowing.’

- b. Context: The speaker was at the library yesterday. Now, he says:

Tosekwan-i nemwu coyongha- \emptyset -**te**-la.

Library-NOM very quiet-PRES-TE-DECL

‘[I made an auditory observation that] the library was very quiet.’

- c. Context: When the speaker woke up, he smelled something from the kitchen.

Now, he says:

Yenghi-ka khaley-lul mantul- \emptyset -**te**-la.

Yenghi-NOM curry-ACC make-PRES-TE-DECL

‘[I smelled that] Yenghi was making curry.’

The examples in (12) are felicitous in given contexts where the speaker made a sensory observation of the ongoing state of the described eventualities; visual observation in (12a), auditory observation in (12b), olfactory observation in (12c).

To summarize, tenses constrain the temporal relation of the eventuality time of a described eventuality and an evidence acquisition time. This affects the evidential reading of a *–te* sentence. The following table summarizes the empirical pattern under discussion.

Tense	PAST	PRESENT	FUTURE
Temporal relation between EVI and DES	DES < EVI	DES ◦ EVI	EVI < DES
Evidential reading	inferential	direct	inferential

Table 2: Tenses and evidence types

4 Analysis

This section develops a formal account of the Korean evidential *-te*. I analyze the evidential implication of *-te* in terms of its modal meaning. §4.1 first discusses why a modal analysis is required for the evidential meaning of *-te*, and §4.2 presents a compositional analysis of a *-te* sentence in terms of Kratzer's (1977, 1981) modal theory.

4.1 Evidence for a modal analysis of the Korean evidential *-te*

As discussed in §3.2, the morpheme *-te* gives rise to various evidential readings depending on which tense it occurs with. Despite this availability of various evidential readings, crucially, the meaning of *-te* is *not* ambiguous in my analysis. I analyze *-te* as encoding a necessity modal meaning in a possible worlds semantic framework. This section presents evidence that motivates such a modal analysis. Each piece of evidence shows that Korean evidential utterances behave like epistemically modalized utterances.

First, a modalized utterance of the form *must* ϕ asserts that the prejacent ϕ is necessarily true. So if it is followed by assertion of the negation of ϕ , it is infelicitous as illustrated below:⁹

- (13) It must have been raining. #It did not rain.

The Korean evidential utterances exhibit the same pattern as modalized utterances; an evidential sentence of the form ϕ -TENSE-*te*-DECL is infelicitous if the prejacent ϕ is asserted to be false.

- (14) a. Pi-ka o- \emptyset -te-la. #Pi-ka an-o-ess-e.
Rain-NOM fall-PRES-TE-DECL Rain-NOM NEG-fall-PAST-DECL
'[I made a sensory observation that] it was raining. #It didn't rain.'
- b. Pi-ka o-ess-te-la. #Pi-ka an-o-ess-e.
Rain-NOM fall-PAST-TE-DECL Rain-NOM NEG-fall-PAST-DECL
'[I inferred that] it had rained. #It didn't rain.'
- c. Pi-ka o-kyess-te-la. #Pi-ka an-o-kyess-e.
Rain-NOM fall-FUT-TE-DECL Rain-NOM NEG-fall-FUT-DECL
'[I inferred that] it would rain. #It won't rain.'

I take the parallels between (13) and (14) as suggesting that the Korean evidential *-te* has a modal meaning.

⁹Faller (2002) utilizes this test to show an epistemic modal meaning of the Quechua conjectural evidential *-chá*. It is also presented as one piece of evidence for Matthewson et al.'s (2008) modal analysis of St'át'imcets evidentials.

The next piece of evidence comes from the so-called ‘Non-equi subject constraint’ on *–te* sentences noted in the literature (e.g. Yang 1972, Song 2002, Chung 2005). The constraint specifies that the subject of a *–te* sentence with the present tense $-\emptyset$ cannot be the speaker as exemplified in (15).

- (15) a. Mary/#nay-ka hakkyo-ey ka- \emptyset -te-la
 Mary/I-NOM school-LOC go-PRES-TE-DECL
 ‘[I made a sensory observation that] Mary/#I was going to school.’
 b. Mary/#nay-ka theynis-lul chi- \emptyset -te-la
 Mary/I-NOM tennis-ACC play-PRES-TE-DECL
 ‘[I made a sensory observation that] Mary/#I was playing tennis.’

Notice that this constraint is also imposed on English modal sentences.

- (16) a. Mary/#I must be going to school.
 b. Mary/#I must be playing tennis.

Based on the above parallels, I propose that the ‘Non-equi subject constraint’ arises from the modal meaning of *–te*. Then, the question arises as to how the modal approach can account for this constraint. I argue that it is because an epistemically modalized utterance expresses a weaker claim than an unmodalized utterance as noted in the literature (e.g. Karttunen 1972, Groenendijk and Stokhof 1975, Kratzer 1991). The following example illustrates this point.

- (17) a. John must have left.
 b. John has left. (Karttunen, 1972, 12)

With a *must* statement like (17a), the speaker expresses less certainty than an unmodalized statement like (17b). That is, a *must* statement makes a weaker claim. In most situations, if the target of the speaker’s perception is what he/she is doing or what is happening to himself/herself at the perception time, then its truth value is known to himself/herself. For instance, whether it’s true or false that the speaker is playing tennis at the evidence acquisition time (in (15)) or at the utterance time (in (16)) is already known to himself in most situations. So the speaker doesn’t need to weaken its assertive strength with a modalized utterance. Rather, the speaker would just assert it. This explains why the weakened statements with evidentials in (15) and modals in (16) are infelicitous. I take the parallels in (15) and (16) as indicating that the evidential *–te* makes a weak statement due to its modal meaning.

This does not exclude the possibility that the speaker can make a weak statement about himself/herself. There are possibly some natural situations in which the speaker would prefer a weak statement about himself/herself. One of such possible situations is illustrated in the following Korean evidential sentence (modified from the example in Gim 1980) and English modal sentence.

- (18) a. Context: Yesterday night the speaker was drunken and fell asleep. When he woke up, he realized that he was in front of his ex-girlfriend Yenghi's house. Now, he says:
 Cam-ul kkay-ni nay-ka Yenghi cip aph-ey
 sleep-ACC wake.up-and.then I-NOM Yenghi home front-at
 iss- \emptyset -te-la.
 be-PRES-TE-DECL
 'When I woke up, [I could see that] I was in front of Yenghi's house.'
- b. Context: The speaker was drunken and fell asleep. When he woke up, he realized that he was in his wife's car. He said, looking at his wife:
 I must be on the way home now.

The subject of both (18a) and (18b) is the speaker, but they are felicitous in the given context. Note that the speaker is not capable of full control of himself in the above context. So, in such a context the speaker would prefer uttering a weak statement about himself. This explains why the counterexample to the 'Non-equi subject constraint' in (18a) is felicitous in the above context.¹⁰

Furthermore, this modal approach to the 'Non-equi subject constraint' can account for the following sentences that the literature (e.g. Sohn 1975, Chung 2007) has considered as counterexamples to the 'Non-equi subject constraint'.

- (19) a. Na-honca-man hakkyo-ey ka- \emptyset -te-la
 I-alone-only school-LOC go-PRES-TE-DECL
 '[I noticed] only I was going to school.' (Sohn, 1975, 93)
- b. Nay-ka ceyil yeppu- \emptyset -te-la
 I-NOM the.most pretty-PRES-TE-DECL
 '[I noticed] I was the prettiest.' (Chung, 2007, 193)

In (19), the subject is the speaker, but both sentences are felicitous (contra the prediction of the 'Non-equi subject constraint'). These examples, however, do not pose any problems in a modal approach. Notice that (19) differs from (15) because what the speaker perceived in (19) is not just what he/she was doing or what happened to him/her at the perception time. The speaker perceived that (i) no one else was going to school at the perception time in (19a), and (ii) the speaker seems to be the prettiest among the contextually salient people in (19b). There is no reason why the speaker cannot make a weaker claim about (19a) and (19b), as the following English modal sentences do not sound odd at all.

¹⁰Lisa Matthewson (p.c) points out that my account of the 'Non-equi subject constraint' is intuitively similar to Chung's explanation. Chung (2005, 2007) accounts for the constraint as follows:

- (i) Perception Condition on *-te*
 The speaker of a *-te* sentence cannot be an active participant but should be a passive perceiver of a given situation. (Chung, 2007, 200)

The notion of 'active participants' in (i) is defined as 'participants that engage in the situation consciously and voluntarily' (Chung 2007, 200). Chung argues that the above Perception Condition is imposed because the process by which we perceive things with our senses is 'more of a passive cognitive behavior than a voluntary action'. However, Chung does not account for the constraint in terms of the modal meaning of *-te* and its assertive strength.

- (20) a. No one else must be going to school now.
b. I must be the prettiest among the people around me now.

The above parallels between evidential sentences and modalized sentences suggest that the ‘Non-equi subject constraint’ is not a constraint on the subject, but rather it’s a constraint on making a weak claim with modals and evidentials. This also lends support for a modal analysis of *–te*.

The last piece of evidence for the modal meaning of *–te* is that modal subordination phenomena (Roberts 1987, 1989) arise with *–te* (See McCready and Ogata 2007 for modal subordination with Japanese inferential evidentials). The relevant data for modal subordination (Roberts, 1989, 697) is given below:

- (21) A thief might break into the house. He would/#will take the silver.

With a modal sentence, the speaker makes a hypothetical supposition, not committing himself/herself to the truth of the prejacent in the actual world. This prevents the anaphor *he* in the unmodalized sentence, which is asserted to be true in the actual world, from referring back to the preceding nominal expression *a thief* in the modalized sentence. But such an anaphoric dependency is possible if the following sentence is modalized so that it is asserted relative to the truth of the modal sentence. The following examples illustrate that the evidential *–te* behaves like a modal.

- (22) Context: When the speaker got home yesterday, he found his room messy with his belongings scattered on the floor. He found a small window in the room left open. Now, he says:
- a. Totwuk-i tul-ess-te-la. #Ku-nun khi-ka cak-ø-ta.
Thief-NOM break.in-PAST-TE-DECL he-TOP height-NOM short-PRES-DECL
‘[I inferred that] a thief broke in. #He is short.’
- b. Totwuk-i tul-ess-te-la. Ku-nun khi-ka
Thief-NOM break.in-PAST-TE-DECL he-TOP height-NOM
cak-um.ey.thullimep-ta.
short-must-DECL
‘[I inferred that] a thief broke in. He must be short.’

The contrast between (22a) and (22b) is exactly the same as found in modal sentences. In (22), the speaker found his room messy and the window open. From this observation, he hypothesized that a thief had broken in. That is, by uttering an evidential sentence, the speaker does not commit himself/herself to the truth of the prejacent in the actual world. This uncertainty on the part of the speaker blocks anaphoric dependency unless the following sentence is modalized. I take this modal subordination phenomenon from *–te* to strongly indicate its modal meaning, and thus to require a modal analysis.

4.2 Compositional analysis

My formal analysis of Korean evidential sentences with *–te* follows the Montagovian tradition, i.e. natural language expressions are first translated into a formal translation language, and then each translation receives a model-theoretic interpretation. The

basic types of the formal language are e (entities), i (time intervals), s (worlds), and t (truth values). I use the following variables for each type: x, y, z (for entities), t, t', t'' (for time intervals), and w, w', w'' (for worlds).

The interpretation of Korean evidential sentences in the morphosyntactic makeup ϕ -TENSE-*te*-DECL is obtained by applying the denotation of tense to that of the untensed sentence ϕ (henceforth, a sentence radical), and then by applying the denotation of *-te* to that of the tensed sentence, and finally applying the denotation of the declarative marker to that of the evidential sentence.

A sentence radical denotes a function from a world to a set of time intervals at which the eventuality described by the sentence holds. Thus, it is of type $\langle s, \langle i, t \rangle \rangle$. The translation of the sentence radical *pi-ka o* 'rain' is given below. (\Rightarrow stands for 'translates as').

$$(23) \text{ pi-ka o 'rain'} \Rightarrow \lambda w \lambda t [rain'(w)(t)]$$

Following Stump (1985), I assume that tenses are modifiers of a sentence radical, i.e. of type $\langle \langle s, \langle i, t \rangle \rangle, \langle s, \langle i, t \rangle \rangle \rangle$. Tenses add a temporal specification as shown below. (\circ and $<$ stand for a temporal overlap and a temporal precedence, respectively.)

$$(24) \begin{array}{ll} \text{a. } -\emptyset \text{ 'PRES'} & \Rightarrow \lambda P_{\langle s, \langle i, t \rangle \rangle} \lambda w \lambda t \exists t' [t' \circ t \wedge P(w)(t')] \\ \text{b. } -ess \text{ 'PAST'} & \Rightarrow \lambda P_{\langle s, \langle i, t \rangle \rangle} \lambda w \lambda t \exists t' [t' < t \wedge P(w)(t')] \\ \text{c. } -kyess \text{ 'FUT'} & \Rightarrow \lambda P_{\langle s, \langle i, t \rangle \rangle} \lambda w \lambda t \exists t' [t < t' \wedge P(w)(t')] \end{array}$$

A tensed clause is derived by applying the denotation of tense to that of the sentence radical in (23).

$$(25) \begin{array}{ll} \text{a. } \text{pi-ka o-}\emptyset \text{ 'it rain-PRES'} & \Rightarrow \lambda w \lambda t \exists t' [t' \circ t \wedge rain'(w)(t')] \\ \text{b. } \text{pi-ka o-ass} \text{ 'it rain-PAST'} & \Rightarrow \lambda w \lambda t \exists t' [t' < t \wedge rain'(w)(t')] \\ \text{c. } \text{pi-ka o-kyess} \text{ 'it rain-FUT'} & \Rightarrow \lambda w \lambda t \exists t' [t < t' \wedge rain'(w)(t')] \end{array}$$

The above tensed sentences combine with *-te*. As discussed in the preceding sections, the meaning of *-te* consists of two parts: (i) a temporal meaning (such that it locates an evidence acquisition time prior to the utterance time), and (ii) an evidential meaning (such that the speaker makes a sensory observation, and takes it as evidence for his/her inference of the existence of a described eventuality).

I analyze the evidential meaning of *-te* as a necessity modal in Kratzer's theory. In a possible worlds semantic framework, modals are analyzed as quantifying over sets of accessible worlds. Kratzer (1977, 1981) defines such accessible relations in terms of the two *conversational backgrounds*; (i) a modal base and (ii) an ordering source. The conversational backgrounds map the evaluation world w onto the set of possible worlds that are accessible from w . I analyze *-te* as encoding a universal quantificational force over accessible worlds. I propose that the relevant conversational backgrounds for Korean evidential utterances are the modal base SO (Sensory observation) and the ordering source ST/DX (Stereotypical/Doxastic). Both SO and ST/DX are functions from world-time pairs to sets of worlds (cf. Condoravdi 2002). The modal base SO (w, t) determines a set of accessible worlds that are *compatible with the speaker's sensory observation in w at t* . The translation of *-te* in terms of the modal base SO is given in (26). (This will be revised later in this section.) The temporal meaning of *-te* is specified as a temporal sequence between two time intervals. Its evidential meaning is represented in terms of the modal base SO.

$$(26) \quad -te \Rightarrow \lambda P_{\langle s, \langle i, t \rangle \rangle} \lambda w \lambda t \exists t'' [t'' < t \wedge \forall w' [w' \in SO(w, t'') \rightarrow P(w')(t'')]]$$

The translation says that given a sentence radical P , a world w and a time interval t , there's a time interval t'' that precedes t , and for all worlds w' that are in the set of worlds given by $SO(w, t'')$, the sentence radical P holds at t'' in w' . However, notice that the modal base SO by itself does not guarantee the truth of a *-te* sentence. Consider the context in (27).

- (27) The speaker woke up from the sound of water dripping outside. It was still dark outside. He was still in bed, but saw through the small window that water was falling to the ground.

If we assume the modal base SO alone, then some irrelevant worlds like w_2 and w_3 in (28) are also included in the accessible worlds because they are compatible with the speaker's (visual and auditory) evidence.

- (28) a. w_1 in which it was raining outside.
b. w_2 in which someone upstairs was pouring water out the window.
c. w_3 in which the water pipe in the apartment was leaking.

Thus, we need to assume a more restricted set of accessible worlds. I restrict the set of accessible worlds by means of the Stereotypical/Doxastic (ST/DX) ordering source. $ST/DX(w, t)$ imposes a ranking on the worlds in the modal base according to *the speaker's expectation/beliefs about what the world w is like at, prior to, or after t in terms of the acquired evidence*. The ordering source is contextually determined. Any contextual information that the speaker takes as relevant to his/her expectation about the development of the world in terms of the acquired evidence can impose an ordering on the set of accessible worlds. For example, consider what kinds of contextual information are included in the ordering source for (27). The modal base for (27) is also reproduced below.

- (29) Two conversational backgrounds for (27)
a. modal base $SO(w, t) = \{\text{Water is falling to the ground at } t, \text{ There's the sound of water dripping outside at } t.\}$
b. ordering source $ST/DX(w, t) = \{\text{It's a rainy season at } t, \text{ The guy who lives upstairs is on vacation at } t, \text{ The water pipe of the speaker's apartment was recently repaired prior to } t.\}$

In (27), the speaker heard the sound of water dripping and saw in his bed that water was falling to the ground. Based on the evidence, the speaker would make a hypothesis about what is happening at the evidence acquisition time. It would give the speaker various possible scenarios, e.g. w_1, w_2, w_3 in (28). The speaker would rank them according to his expectations and beliefs about how the world develops at the evidence acquisition time under various contextual considerations. If the speaker knows that the guy who lives upstairs is on vacation at the evidence acquisition time t , then he/she would infer that it's implausible that the guy is pouring water out the window at t . If the speaker knows that it's a rainy season at t , then he/she would infer that it's plausible that it is raining at t . In the same way, the speaker's knowledge about whether the water pipe of his apartment was recently fixed would also affect ordering the accessible worlds. Considering all the possible scenarios, he/she would conclude that the most

plausible scenario among w_1, w_2, w_3 is that it was raining at the evidence acquisition time t .

Now, reconsider the translation of $-te$ in (30). I adopt a BEST function from Portner (1998). The function $BEST(SO, ST/DX, w, t)$ maps world-time pairs (w, t) to sets of worlds which are the most highly ranked according to $ST/DX(w, t)$ among the worlds determined by $SO(w, t)$.

$$(30) \quad -te \Rightarrow \lambda P_{\langle s, \langle i, t \rangle \rangle} \lambda w \lambda t \exists t'' [t'' < t \wedge \forall w' [w' \in BEST(SO, ST/DX, w, t'') \rightarrow P(w')(t'')]]$$

The translation of $-te$ in (30) combines with that of a tensed clause in (25), and it results in (31).

- (31) a. *pi-ka o-ø-te* ‘(I made a sensory observation that) it was raining’ \Rightarrow
 $\lambda w \lambda t \exists t'' [t'' < t \wedge \forall w' [w' \in BEST(SO, ST/DX, w, t'') \rightarrow \exists t' (t' \circ t'' \wedge rain'(w')(t'))]]$
 b. *pi-ka o-ass-te* ‘(I inferred) it had rained’ \Rightarrow
 $\lambda w \lambda t \exists t'' [t'' < t \wedge \forall w' [w' \in BEST(SO, ST/DX, w, t'') \rightarrow \exists t' (t' < t'' \wedge rain'(w')(t'))]]$
 c. *pi-ka o-kyess-te* ‘(I inferred) it would rain’ \Rightarrow
 $\lambda w \lambda t \exists t'' [t'' < t \wedge \forall w' [w' \in BEST(SO, ST/DX, w, t'') \rightarrow \exists t' (t'' < t' \wedge rain'(w')(t'))]]$

Finally, the translation of a declarative marker in (32) is applied to (31). The declarative marker $-la$ combines with an expression of type $\langle s, \langle i, t \rangle \rangle$, and produces an expression of type t . In (32), w^* stands for the actual world and NOW stands for the utterance time.

$$(32) \quad -la \text{ ‘DECL’} \Rightarrow \lambda P_{\langle s, \langle i, t \rangle \rangle} [P(w^*, NOW)]$$

The final representation of a $-te$ sentence realized with a distinct tense is given in (33).

- (33) a. *pi-ka o-ø-te-la* ‘(I made a sensory observation that) it was raining’ \Rightarrow
 $\exists t'' [t'' < NOW \wedge \forall w' [w' \in BEST(SO, ST/DX, w^*, t'') \rightarrow \exists t' (\underline{t' \circ t''} \wedge rain'(w')(t'))]]$
 b. *pi-ka o-ass-te-la* ‘(I inferred) it had rained’ \Rightarrow
 $\exists t'' [t'' < NOW \wedge \forall w' [w' \in BEST(SO, ST/DX, w^*, t'') \rightarrow \exists t' (\underline{t' < t''} \wedge rain'(w')(t'))]]$
 c. *pi-ka o-kyess-te-la* ‘(I inferred) it would rain’ \Rightarrow
 $\exists t'' [t'' < NOW \wedge \forall w' [w' \in BEST(SO, ST/DX, w^*, t'') \rightarrow \exists t' (\underline{t'' < t'} \wedge rain'(w')(t'))]]$

The final translation, for example, of the past tensed $-te$ sentence in (33b) is as follows: there’s a time interval t'' (the evidence acquisition time) prior to NOW (the utterance time) such that for all accessible worlds w' determined by the BEST function at t'' in w^* (the actual world), there’s a time interval t' which is prior to t'' and at which the sentence radical $rain'$ holds in the world w' . Namely, among the worlds in which all of the facts given by the modal base SO hold, the worlds most highly ranked by the ordering source ST/DX are the ones in which it was raining. Note that the speaker does not assert that it was raining in the actual world. He/she asserts that the proposition ‘it was raining’ is true in the most highly ranked relevant worlds, e.g. w_1 in (28). It remains unasserted whether the actual world is one of the most highly ranked ! worlds, e.g. w' in (33).

The three translations in (33) are the same except for the temporal relations between the evidence acquisition time t'' and the eventuality time of the described eventuality t' . (The relevant temporal relation is underlined in (33)). As already discussed, unlike languages like Quechua, Korean does not employ distinct markers for direct evidence vs. inferential evidence. However, the evidential meaning about evidence types

(direct vs. inferential) follows from the temporal relation between the two relevant eventualities. If the evidence acquisition time and the time of a described eventuality overlap, then the speaker could make a sensory observation of the ongoing state of a described eventuality (by world knowledge). This gives rise to a direct evidential reading according to which the speaker acquired direct evidence for a described eventuality (e.g. water dripping sound for a raining eventuality). If the two time intervals are sequentially ordered, then it is impossible for the speaker to make a sensory observation of the ongoing state of a described eventuality (by world knowledge). That is, a sequential temporal relation does not allow the speaker to acquire direct evidence for a described eventuality, but the speaker makes inferences on the existence of a described eventuality with evidence available at the evidence acquisition time. This results in an inferential evidential reading (e.g. the speaker saw the wet ground, and inferred on the existence of a raining eventuality).

In sum, I argue that *–te* is an evidential. It encodes that the speaker made a sensory observation at some past time, and on the basis of the evidence he/she inferred what the best ranked worlds look like. The evidential reading is determined by the interaction with tense. Tenses do not encode any evidential meaning, but constrain the temporal relation between an evidence acquisition time and the eventuality time of a described eventuality. Availability of direct evidence for a described eventuality in each temporal relation (sequential vs. overlapping) follows from world knowledge; a sequential temporal relation gives rise to an inferential evidential reading, and a temporal overlap gives rise to a direct evidential reading.

5 Comparison with Chung's (2005, 2007) analysis

Chung (2005, 2007) argues that *–te* is not itself an evidential marker, but it triggers an environment for evidentials. In her analysis, what have been analyzed as tenses in the literature, *–ø*, *–ess* and *–kyess*, are analyzed as evidentials if they occur with *–te*. She analyzes (i) *ø* as a direct evidential, (ii) *–ess* as a (result-states based) indirect evidential, and (iii) *–kyess* as a (reasoning based) indirect evidential. However, due to absence of evidential readings without *–te*, Chung assumes that *–ø*, *–ess*, and *–kyess* are ambiguous; (i) evidentials with *–te*, and (ii) temporal markers without *–te*. By contrast, my analysis does not assume this ambiguity. As tenses, they relate an eventuality time to an evaluation time irrespective of presence of *–te* as given in (24). I argue that my analysis is conceptually superior to Chung's analysis, appealing to Occam's razor.

Chung's ambiguity analysis is motivated by her typological assumption that one evidential marker gives rise to one evidential meaning as given in (34).

- (34) ... *–te* itself is not an evidential. The very purpose of an evidential system is to distinguish direct and indirect evidence, and thus it is unlikely that both direct evidence and indirect evidence are expressed by the same morpheme.

(Chung, 2007, 195)

But this assumption is not supported by cross-linguistic studies. According to Aikhenvald (2004), one of the widespread evidential systems is an A3-system that involves two evidentials: (i) a reportative evidential, and (ii) an evidential that covers every other evidence type. This evidential system is found in Tibeto-Burman languages, languages

of South America, South Arawak languages (Ignaciano, Waurá, Pareci, Piro), North Arawak languages (Resígaro) etc. (See Aikhenvald 2004 for more details.) In such a two-fold evidential system, the distinction between direct evidence vs. inferential evidence is not marked by distinct morphemes. Under Chung's assumption on 'the very purpose of an evidential system', there is no way to account for the existence of numerous languages attesting the A3-system (and also other evidential systems in which direct vs. inferential evidence type is not marked by distinct morphemes). There is one language, to my knowledge, that exhibit! s the same kind of interactions of temporal categories and evidential markers as the Korean evidential *-te*: This is Sherpa with evidential markers *-nok* and *-sun*. (Sherpa is a Sino-Tibetan language spoken in Tibet and Nepal.) According to Woodbury (1986), the two expressions *-nok* and *-sun* are evidentials although they do not indicate a specific source of information conveyed. The relevant evidence types, i.e. experiential vs. nonexperiential (inferential), are determined by temporal categories. This paper does not discuss Sherpa evidentials in detail, but Woodbury's work demonstrates that evidence types are not necessarily encoded in the meaning of evidentials, but they can be expressed by interactions between temporal categories and the evidential marker. This is exactly the same pattern as the Korean evidential *-te* exhibits.

The next problem with Chung's analysis pertains to her claim about the spatial meaning of *-te*. Chung argues that *-te* is a 'spatial deictic past tense that provides a vantage point for evidentials' (Chung, 2007, 204). In Chung's analysis, *-te* makes reference to locations as well as to time intervals. She takes the contrast in the following examples to make that point.

- (35) a. Keki-nun akka pi-ka o- \emptyset -te-la.
 There-TOP a.while.ago rain-NOM fall-PRES-TE-DECL
 '[I noticed] it was raining there a while ago.'
- b. #Yeki-nun cikum pi-ka o- \emptyset -te-la.
 Here-TOP now rain-NOM fall-PRES-TE-DECL
 '[I noticed] it is raining here now.' (Chung, 2007, 190)

Based on the examples in (35), Chung argues that *-te* is felicitous only in 'there and then' situations like (35a), but not in 'here and now' situations like (35b). However, note that the infelicity of (35b) is due to the occurrence of the temporal adverbial *cikum* 'now', but not due to the locative adverbial *yeki* 'here'. The following sets of minimal pairs illustrate this point explicitly:

- (36) a. Keki-nun ecey pi-ka o- \emptyset -te-la.
 There-TOP yesterday rain-NOM fall-PRES-TE-DECL
 '[I made a sensory observation that] it was raining there yesterday.'
- b. Yeki-nun ecey pi-ka o- \emptyset -te-la.
 Here-TOP yesterday rain-NOM fall-PRES-TE-DECL
 '[I made a sensory observation that] it was raining here yesterday.'
- (37) a. #Keki-nun cikum pi-ka o- \emptyset -te-la.
 There-TOP now rain-NOM fall-PRES-TE-DECL
 Intended: '[I made a sensory observation that] it is raining there now.'

b. #Yeki-nun cikum pi-ka o- \emptyset -te-la.

Here-TOP now rain-NOM fall-PRES-TE-DECL

Intended: '[I made a sensory observation that] it is raining here now.'

The minimal pair in (36) illustrates that a present tensed *-te* sentence is felicitous with a past-time denoting adverbial, whatever locative adverbial it occurs with. By contrast, as illustrated in (37), a present tensed *-te* sentence is not felicitous with the utterance time denoting adverbial *cikum* 'now', whatever locative adverbial it occurs with.¹¹ The above data show that spatial references do not affect (in)felicity of evidential utterances with *-te*. Therefore, the example in (35b) is infelicitous due to the occurrence of the time adverbial *cikum* 'now'. This is correctly predicted in my analysis; *-te* locates an evidence acquisition time prior to the utterance time, and present tense locates the eventuality time of the raining eventuality as overlapping with the evidence acquisition time. Thus, the eventuality time of the raining eventuality is located in the past of the utterance time. This is not compatible with the meaning of the time adverbial *cikum* 'now'. The infelicity of (35b) is attributed to this conflict of temporal meanings. It has nothing to do with spatiality.

Chung also compares a non-evidential sentence with a *-te* sentence to argue for a spatial meaning of the latter. Consider her examples below.¹²

(38) a. #Cikum pakk-ey-nun pi-ka o-koiss-essess-ta.

Now outside-LOC-TOP rain-NOM fall-PROG-ESSESS-DECL

Intended: 'It was raining outside now.'

b. Cikum pakk-ey-nun pi-ka o- \emptyset -te-la.

Now outside-LOC-TOP rain-NOM fall-PRES-TE-DECL

'[I noticed] it is raining outside now.' (Chung, 2007, 201)

Chung attributes the above contrast to the spatial meaning of *-te*. She argues that the locative adverbial *pakk-ey* 'outside' does not improve the ungrammaticality of (38a) because a spatial reference is not required for the non-evidential sentence (38a). By

¹¹ The adverbial *cikum* 'now' can refer to a recent past time. With this temporal meaning, the sentence (37a) is felicitous in a context like the following:

(i) Context: The speaker saw on TV that it was raining in Hawaii. Five minutes later, he got a call from his friend who lives in Hawaii. The speaker said to his friend:

Keki-nun cikum pi-ka o- \emptyset -te-la.

There-TOP recent.past rain-NOM fall-PRES-TE-DECL

'[I made a sensory observation that] it was raining there at a (contextually salient) recent past time.'

In (i), the contextually salient time is the time at which the speaker watched TV, i.e. five minutes prior to the utterance time. This sentence does not pose any problem for my analysis of the temporal meaning of *-te*. In my analysis, *-te* itself encodes the meaning that the evidence acquisition eventuality is prior to the utterance time, here at the recent past time. And with present tense, the eventuality time of the raining eventuality and the evidence acquisition time temporally overlap.

¹² Chung (2005) analyzes the two post-verbal morphemes *-ess* and *-essess* as a perfective aspect and a simple past tense, respectively. For reasons of space, this paper does not discuss the temporal meaning of *-ess* and *-essess* in detail, but see Lee (1987) and Lee (2007) for their contrastive meaning. Following the previous studies (Choe 1977, An 1980, Gim 1985, Lee 1987, Chong 1990, Sohn 1995, Yoon 1996, Lee 2007 among others), I assume that *-ess* is a past tense. I gloss *-essess* as ESSESS without further discussion.

contrast, (38b) is grammatical because *-te* encodes a spatial reference compatible with the adverbial *pakk-ey* ‘outside’.

However, the examples in (38) do not illustrate Chung’s claim about spatiality. The two sentences in (38) are not minimal pairs. They might have different grammaticality for other reasons, namely the presence of *cikum* ‘now’ as discussed above. The time adverbial *cikum* ‘now’ has the so-called ‘extended now’ meaning; (i) it refers to an utterance time, but (ii) it can also denote a recent past. Both (38a) and (38b) are infelicitous when *cikum* ‘now’ refers to an utterance time. However, with a recent past meaning of *cikum* ‘now’, there is a contrast between the two examples: The *-te* sentence (38b) is felicitous as in the example (i) in footnote 11, but the non-evidential sentence (38a) is infelicitous. This infelicity is well known in the literature (e.g. Lee 2007). The post-verbal morpheme *-essess* gives rise to a preterit pluperfect reading that is not compatible with the recent past meaning of *cikum* ‘now’ (parallel to English past perfect). This is illustrated in the following example.

- (39) a. #Chelswu-ka cikum ttena-essess-ta.
 Chelswu-NOM now leave-ESSESS-DECL
 Intended: ‘Chelswu had left at a (contextually salient) recent past time.’
 b. #Chelswu-ka pangkum ttena-essess-ta.
 Chelswu-NOM a.minute.ago leave-ESSESS-DECL
 Intended: ‘Chelswu had left a minute ago.’

Given this, the contrast between (38a) and (38b) is due to the (in)compatibility of the temporal meaning of *-te* and *-essess* with the recent past meaning of *cikum* ‘now’. The spatial meaning arising from *pakk-ey* ‘outside’ has nothing to do with the contrast in (38). The examples in (35) and (38) are the only examples discussed in her paper to argue for a spatial meaning of *-te*. However, once the meaning of *-te* is examined more thoroughly, her analysis of *-te* as a spatio-temporal operator is not empirically supported.

Furthermore, the spatio-temporal trace functions utilized by Chung make incorrect predictions on a described eventuality in question. Chung formalizes the meaning of *-te* in terms of the following three spatio-temporal trace functions. (She adopts the first two functions from Faller 2004).¹³

- (40) a. $e\text{-trace}(e) = \{ \langle t, l \rangle \mid t \subseteq \tau(e) \wedge AT(e, t, l) \}$
 $AT(v, t, l)$ is true iff the eventuality e takes place at location l at time t .
 b. $P\text{-trace}(s_c) = \{ \langle t, l \rangle \mid t \subseteq \tau(s_c) \wedge PERCEIVE(s_c, t, l) \}$
 $PERCEIVE(s_c, t, l)$ is true iff the speaker s_c perceives location l at time t .
 c. $v\text{-trace}(e) = \{ \langle t, l \rangle \mid \exists v [EVIDENCE\text{-}FOR(v, e) \wedge AT(v, t, l)] \}$
 $AT(v, t, l)$ is true iff the evidence v for the occurrence of the eventuality e appears at a location l at time t .

The *e-trace* function maps an eventuality (e) to its time-space coordinates $\langle t, l \rangle$, and the *P-trace* function maps a speaker (s_c) to his/her perceptual field for each time t in his/her life time (i.e. during his/her run time $\tau(s_c)$). The *v-trace* function maps an

¹³Chung utilizes the temporal trace function τ in two different ways, (i) mapping an eventuality to its run time (e.g. (40)), and (ii) mapping a spatiotemporal location to its temporal demension (e.g. (41)).

eventuality (e) to the time-space coordinates $\langle t, l \rangle$ of the evidence of the eventuality. Now, in terms of these spatio-temporal trace functions, consider the denotations of \emptyset , $-ess$, $-kyess$ that Chung analyzes as evidentials: (The variable L for spatiotemporal locations denotes a set of time-space coordinates.)

- (41) a. $[[\neg\emptyset]]^c = \lambda P \lambda L \exists e [P(e) \wedge \tau(L) \subseteq \tau(e) \wedge L \subseteq v\text{-trace}(e) \wedge e\text{-trace}(e) \cap P\text{-trace}(s_c) \neq \emptyset]$
(simplified as $[[\neg\emptyset]]^c = \lambda P \lambda L \exists e [P(e) \wedge L \subseteq e\text{-trace}(e)]$)
b. $[[\neg ess]]^c = \lambda P \lambda L \exists e [P(e) \wedge \tau(L) < \tau(e) \wedge L \subseteq v\text{-trace}(e) \wedge e\text{-trace}(e) \cap P\text{-trace}(s_c) = \emptyset]$
c. $[[\neg kyess]]^c = \lambda P \lambda L \exists e [P(e) \wedge \tau(L) < \tau(e) \wedge L \subseteq v\text{-trace}(e) \wedge e\text{-trace}(e) \cap P\text{-trace}(s_c) = \emptyset]$

As indicated by the existential binding of a described eventuality e in (41), Chung's analysis says that a described eventuality is realized in the actual world if the speaker infers it based on his/her evidence. However, with the Korean evidential sentence of the form ϕ TENSE *-te* DECL, the speaker does not assert the truth of the prejacent ϕ in the actual world. This is because the speaker's evidence from his/her sensory observation does *not* necessarily lead to his/her committing to the existence of an eventuality in the actual world. Consider the following examples for auditory evidence:

- (42) Context: The speaker woke up from the sound of somebody using water in the bathroom. Now, the speaker says to his roommate:
a. #Ne ecey pam-ey shyawueha-yess-e.
You yesterday night-at take.shower-PAST-DECL
'You took a shower yesterday night.'
b. Ne ecey pam-ey shyawueha- \emptyset -te-la.
You yesterday night-at take.shower-PRES-TE-DECL
'[I made a sensory observation that] you were taking a shower yesterday night.'

In (42), the speaker perceived the water dripping sound from the bathroom, and hypothesized that the water dripping sound was caused by his roommate's taking a shower. If the speaker makes such a hypothetical assumption, he/she is not committing himself/herself to its truth in the actual world. Thus, the speaker cannot make a full assertion as in (42a), but prefers a weak statement as in (42b). My analysis correctly predicts this assertive strength of Korean evidential sentences. They are weak statements involving a necessity modal, irrespective of evidence types. As shown in (33), the prejacent of a *-te* sentence is asserted to be true in the most highly ranked relevant worlds, but not in the actual world.

In Chung's analysis, however, lack of a modal component in the denotation of a *-te* sentence leads to the following wrong prediction: whatever the speaker infers from his/her sensory observation is true in the actual world. For example, given the wet ground, different people can draw different conclusions about what happened prior to the evidence acquisition time; some might infer that it rained, and others might infer that it snowed. Crucially, all possible scenarios cannot be true in the actual world. However, her analysis says that a described eventuality is realized in the actual world if the speaker infers it based on his/her evidence. In a nutshell, Chung's analysis does

not capture the modal nature of our inferences based on evidence, and this leads to a wrong prediction about the actual world.

6 Conclusion

This paper formally analyzed the evidential readings of Korean sentences realized with *-te*. Unlike languages with typologically common evidential systems, Korean does not employ distinct evidentials for distinct sources of information conveyed. However, the evidence types available with *-te* sentences are predicted by its interactions with temporal categories. This provides a new perspective in cross-linguistic studies of evidentiality; an evidential meaning is not necessarily marked by independent morphemes, but it can be expressed by interactions with other grammatical categories.

Furthermore, I discussed why a modal approach to the evidential *-te* is necessary, and developed a compositional analysis in terms of Kratzer's modal theory. The relation of evidentiality and modality is cross-linguistically varied, too. Some previous studies argued for a modal meaning of evidentials (e.g. Izvorski 1997 for Bulgarian, Turkish and Norwegian; McCready and Ogata 2007 for Japanese; Matthewson et al. 2008 for St'át'imcets), and others argued against it (e.g. Faller 2002 for Quechua). This paper does not make a claim for language universals on the relationship of evidentiality and modality. But the crucial point made in this paper is that a modal analysis of *-te* is necessitated in order to capture our inference processes on the basis of evidence. In particular, the two core notions in Kratzer's system, a modal base and an ordering source, are crucial to formalize the process of our evaluating evidence (in the sense of de Haan 1999) and making a claim on the basis of it. This view differs from de Haan's view on evidentials as "asserting that there's evidence for the speaker's utterance but does not interpret the evidence in any way (de Haan 1999)". More cross-linguistic data needs to be taken into consideration to make further remarks on the relationship of evidentiality and modality, but this paper presented one case study of the Korean evidential *-te* as a modal with empirical evidence and a compositional analysis.

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Jungmee Lee
Ohio State University
jlee@ling.ohio-state.edu

Russian peripheral reciprocal markers and unaccusativity

Alexander Letuchiy*

Introduction

In the last few decades, the unaccusativity hypothesis and notion of unaccusativity has been widely discussed in linguistics. The hypothesis, as formulated by Perlmutter (1976), Rosen (1984), Mithun (1991), and others, says that the class of intransitive verbs is not homogenous. Different syntactic criteria show that in many languages one observes two classes of intransitives: *unaccusative verbs* and *unergative verbs*. The former are, roughly speaking, ‘patientive’ verbs which denote a situation which the subject does not control – in other words, the subject is a patient rather than an agent, since the absence of control, according to Dowty (1991) and Ackerman & Moore (2001) characterizes prototypical patients, and not prototypical agents. Structurally, according to Perlmutter (1976), the subject of unaccusatives at some level of representation occupies the same place as the object of transitive verbs.

In contrast, the core of the unergative class includes situations controlled by the subject (though other verbs join the unergative class as well). In the syntactic structure, the subject occupies the same place as the subject (agent) of transitive verbs.

In this paper, I discuss ‘peripheral’ reciprocal markers in Russian¹. First, I analyze the grammatical properties of the prefix *vzaimo-* ‘mutually’. Surprisingly, this prefix, which cannot be the sole reciprocal marker in the verb form, can serve as the sole marker in nouns and even in participles. I am trying to explain this difference between verbs vs. participles and nouns. I argue that there are reasons to treat verbs carrying this prefix as unaccusatives, though they are not at all typical representatives of the unaccusative class. Then, I turn to the adverbial *vzaimno* ‘mutually’. This marker is always optional and accompanied by another reciprocal marker, but I will show that it has a peculiar semantic property: it is compatible with structures including the reflexive possessive pronoun *svoj* ‘own’ and changes the interpretation of *svoj*. In Section 1, I briefly present different means of expressing reciprocity in Russian, including the suffix *-sja*, the reciprocal pronouns *drug druga* and *odin drugogo*,² and the markers

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¹The term ‘peripheral’ refers both to low frequency of these lexical items and to absence of attention to them in linguistic research.

²*Drug druga* and *odin drugogo* are called ‘pronouns’ in Russian grammar tradition. In fact, though,

vzaimo-, *vzaimno* and *vzaimnyj*. In my paper, I will focus on the last group of markers. In Section 2, the prefix *vzaimo-* and its relation to reciprocity and unaccusativity is discussed. Finally, in Section 3, I analyze the properties of the adverbial *vzaimno*.

1 Means of expressing reciprocity in Russian

In Russian, as in many other languages, reciprocity is expressed with a variety of means which belong to different domains of grammar.

1.1 Pronoun *drug druga*

The main reciprocal marker, both in respect of text frequency and lexical productivity, is the pronoun *drug druga* ‘each other’. Though synchronically it seems to include the forms of the word *drug* ‘friend’, historically it contains two forms of the short masculine form of adjective *drugoj* ‘other’ which is rather natural for reciprocal markers.

The first component of the pronoun is always in the form *drug*³, whereas the second one reflects the case and syntactic position of the second (syntactically lower) participant of the reciprocal relation: it is accusative DO in (1), dative IO in (2) and accusative complement of the preposition *za* ‘for’ in (3)⁴.

- (1) Vanj-a i Petj-a ne ljubi-l-i drug druga-a.
Vanja-NOM and Petja-NOM not like-PST-PL other other-ACC
‘Vasja and Petja did not like each other.’
- (2) My doverja-em drug druga-u.
we trust-PRS.1PL other other-DAT
‘We trust to each other.’
- (3) Na vybor-ax politik-i golosuj-ut drug za druga-a.
on election-PL.LOC politician-PL.NOM vote-PRS.3PL other for other-ACC
‘On the elections, the politicians vote for each other.’

The pronoun has virtually no restrictions on its use except the one which was pointed at by Knjazev (2007): the pronoun can hardly be used in the position of agentive instrumentally-marked NP in passive constructions such as ²*ranen-y drug druga-om* ‘injured by each other’ (injure.PART.PASS-PL other-NOM other-INS).

they are complex diachronically and even synchronically: for instance, prepositions occupy the position between the components of the pronouns and not before both components (e.g. *drug s drugom* ‘with each other’), contrary to English where prepositions occur before both elements (*with each other*).

³Note that this form of the first component does not always correspond to syntactic subject. The pronoun *drug druga* can be bound by two non-subject referents, for instance: *Ja poznamomi-l-ø Vasj-u i Petj-u drug s drug-om* (I.NOM introduce-PST-SG.M Vasja-ACC and Petja-ACC other with other-INS) ‘I introduced Vasja and Petja to each other’, where the pronoun is bound by the direct object and the prepositional phrase with *s* ‘with’.

⁴Abbreviations: 1, 2, 3 - first, second, third person; ACC - accusative case; DAT - dative case; F - feminine; INS - instrumental case; LOC - locative case; M - masculine; NACT - non-active (middle) inflection; NOM - nominative case; PART - participle; PASS - passive; PL - plural; PREF - prefix; PRS - present tense; PST - past tense; REC - reciprocal; REFL - reflexive; SG - singular.

Another reciprocal pronoun is *odin drugogo* ‘one another’ which is much less frequent than *drug druga* but does not differ from it significantly, both in semantic and syntactic respects. For instance, in examples (1)-(3) *odin drugogo* could be substituted for *drug druga*. Knjazez (2007) notes that there is one semantic difference, though it is a tendency, rather than a strict rule: *odin drugogo*, more than *drug druga*, tends to denote reciprocal relation between **two** participants.

1.2 Suffix *-sja*

The most grammaticalized (but not the most frequent and productive) marker of reciprocity is the intransitivizer *-sja*. Though almost all European languages have a cognate suffix or clitic, productivity of particular readings differs from one language to another. In some languages, such as Bulgarian and French, the reciprocal reading is very productive, whereas in some others, including Russian, it appears to be a peripheral phenomenon. According to Knjazez (2007), only two groups of verbs regularly have reciprocal derivatives on *-sja*: namely, aggressive contact verbs, such as *tolkat* ‘push’, *pixat* ‘push aggressively’, and ‘close relation verbs’ – the group which includes some verbs of contact, such as *celovat* ‘kiss’, *obnimat* ‘hug’, as well as some lexemes denoting social events, for instance, *vstretit* ‘meet’, *uvidet* ‘see’, ‘meet’:

- (4) a. Paren'-∅ celova-l-∅ devuš-k-u.
boy-SG.NOM kiss-PST-SG.M girl-SG.ACC
‘The boy kissed the girl.’
b. Na skamejk-e celova-l-i-s' paren'-∅ i devuš-k-a.
on bench-SG.LOC kiss-PST-PL-REC boy-SG.NOM and girl-SG.NOM
‘A boy and a girl were kissing on the bench.’
- (5) a. Menja kto-to tolkn-u-l-∅.
I.ACC someone.SG.NOM push-PST-SG.M
‘Someone pushed me.’
b. V metro vs-e tolka-j-ut-sja
in metro all-PL.NOM push-PRS.3PL-REC
‘Everyone pushes each other in the metro.’

In other words, we can say that *-sja* alone marks the reciprocal meaning with ‘inherent reciprocals’ (Kemmer 1993):

celovat'-sja ‘kiss each other’ *traxat'-sja* ‘fuck each other’
obnimat'-sja ‘hug each other’ *vstrečat'-sja* ‘meet each other’
tolkat'-sja ‘push each other’ *videt'-sja* ‘meet each other’ (lit. ‘see each other’)

Inherent reciprocals, in Kemmer’s definition, are verbs describing situations which are more natural (or at least not less natural) in their reciprocal variants than in non-reciprocal ones. For instance, very often when A kisses B, B also kisses A (although it is not obligatory). The situation ‘meet’ is in a sense obligatorily reciprocal: if A meets B, it is also true that B meets A.

The suffix *-sja* has also a range of other meanings which have been discussed in a number of works, including Janko-Trinickaja (1962), Knjazez (2007a, 2007b), and so on. Let us quote only some most productive and textually frequent meanings:

Anticausative meaning:

- (6) a. Vasj-a razbi-l-∅ čašk-u.
 Vasja-SG.NOM break-PST-SG.M cup-SG.ACC
 ‘Vasja broke the cup.’
 b. Čašk-a razbi-l-a-s’.
 cup-SG.NOM break-PST-SG.F-REFL
 ‘The cup broke.’

Reflexive meaning:

- (7) a. Maš-a brej-et dedušk-u.
 Masha-SG.NOM shave-PRS.3SG grandfather-SG.ACC
 ‘Masha shaves her grandfather.’
 b. Dedušk-a brej-et-sja.
 grandfather-SG.NOM shave-PRS.3SG-REFL
 ‘The grandfather shaves.’

The suffix also has passive meaning (see 18 below).

This polysemy may seem to be irrelevant for the reciprocal issue; however, below I will show that it is crucial for our topic that *-sja* has not only reciprocal, but also reflexive and other readings.

1.3 Vzaimo-, vzaimnyj, vzaimno

The present paper will be focused on the reciprocal prefix *vzaimo-*. This marker belongs to a group of markers derived from stem *vzaim-*: there is also adjective *vzaimnyj* ‘mutual’ and adverb *vzaimno* ‘mutually’. Let me first sketch some features of the adjective and the adverb.

1.3.1 Vzaimnyj

The adjective *vzaimnyj* modifies nouns (mainly deverbal nouns):

- (8) vzaimn-aja ljubov’-∅
 mutual-F.SG.NOM love-SG.NOM
 ‘mutual love’
 (9) vzaimn-yje oskorblenij-a
 mutual-PL.NOM insult-PL.NOM
 ‘mutual insults’

In most cases, the same verbal nouns can combine with *drug druga*, the two constructions being roughly similar, as in (10):

- (10) ljubov’-∅ drug k drug-u
 love-SG.NOM other for other-DAT
 ‘love for each other’

There are, however, some exceptions when constructions with *drug druga* are impossible, less frequent or awkward. For instance, the construction with *drug druga* in genitive is impossible for the noun *oskorblenije* ‘insult’

- (11) *oskorblenij-a drug drug-a
 insult-PL.NOM other other-GEN
 Intended: ‘mutual insults’

The sole possible construction is *oskorblenija v adres drug druga* [lit. insult-PL.NOM in address other other-GEN] ‘insults directed against each other’. Here, *drug druga* is governed by the complex preposition *v adres* + GEN ‘in address, directed to’. However, this variant is much less frequent and much worse stylistically than (9).

Cases like (11) usually emerge when the base verb which the noun is derived from is transitive and the participants of the reciprocal relation are Subject and Direct object. Some transitive verbs, such as *ljubit* ‘love’ in (8) and (10) seem to be counterexamples, because their deverbal nouns can take a prepositional object. However, when the deverbal noun can only take a genitive object (this is the case of *oskorbljat* ‘insult’: the noun *oskorblenije* can only take a genitive object, cf. *oskorblenij-e milicioner-a* [insult-SG.NOM policeman-SG.GEN]), the construction with *drug druga* is impossible.

1.3.2 Vzaimno

The adverb *vzaimno* ‘mutually’, contrary to *vzaimnyj* ‘mutual’, cannot be the sole marker of reciprocity in the clause; it must be accompanied by *-sja* or *drug druga* (in terms of Nedjalkov & Geniušienė (2007) it is an adverbial modifier). For instance, in (12) the main reciprocal marker is *drug druga*:

- (12) Oba userdno prinja-l-i-s’ vzaimno oskorblja-t’ drug-ø
 both.NOM heartily begin-PST-PL-REFL mutually offend other-NOM
 drug-a.
 other-ACC
 ‘Both of them begin heartily to offend each other’.

If *drug druga* was eliminated from (12), the sentence would become ungrammatical. However, below I will present a piece of evidence that the adverb *vzaimno* is not a pure modifier either.

2 Prefix vzaimo-

The prefix *vzaimo-* is not a very productive marker. It appears mainly in the formal style and is not very frequent in the Russian National Corpus. The prefix can modify verbs (13a) and nouns (13b), it can also sometimes occur with adjectives (13c).

- (13) a. Častic-y vzaimo-uničtožaj-ut-sja.
 particle-PL.NOM REC-destroy-PRS.3PL-REC
 ‘The particles destroy each other.’
 b. vzaimo-svjaz’-ø
 REC-connection-SG.NOM

- ‘mutual relation’
 c. *vzaimo-vygodn-yj*
 REC-beneficial-NOM.SG.M
 ‘mutually beneficial’

We will first discuss the use of *vzaimo-* with finite forms of verbs.

Vzaimo- with finite forms of verbs

With finite forms, the prefix *vzaimo-*, like the adverb *vzaimno* ‘mutually’, cannot be the sole marker of reciprocity. This is why (14) is ungrammatical, contrary to (13a) which is perfectly correct:

- (14) **Častic-y vzaimo-uničtožaj-ut.*
 particle-PL.NOM REC-destroy-PRS.3PL
 ‘The particles destroy each other.’

A rare case when *vzaimo-* is the sole reciprocal marker is illustrated by (15):

- (15) *Sotrudnik-i vzaimo-dejstvuj-ut.*
 worker-PL.NOM REC-act-PRS.3PL
 ‘The workers interact.’

However, in this case the prefixal derivative has undergone some lexicalization: its meaning ‘interact’ is rather far from ‘act on each other’ – we can rather rephrase it as ‘act together, contacting each other’, therefore, in this case *vzaimo-* marks something different from the reciprocal meaning *sensu stricto*. Moreover, the use of *vzaimo-* in (15) is not very typical, because the verb *dejstvovat* ‘act’ is intransitive, and *vzaimo-* mainly attaches to transitive verbs. In any case, *-sja* in the reciprocal reading is impossible for (15).

In what follows, I will analyze syntactic properties of *vzaimo-*. I will show that, although this prefix is usually accompanied with other means of expressing reciprocity, it cannot be regarded as a pure case of optional modifier.

2.1 Is *vzaimo-* just a modifier?

In most cases, the suffix *-sja* is used together with *vzaimo-*. Addition of *-sja* to (14) makes the sentence grammatical:

- (16) *Častic-y vzaimo-uničtožaj-ut-sja.* (=13a)
 particle-PL.NOM REC-destroy-PRS.3PL-REC
 ‘The particles destroy each other.’

The sentence (16) bears the same reciprocal meaning as examples (1)-(5) and (5). This makes us think about the status of *vzaimo-*.

Indeed, if *-sja*-derivatives without *vzaimo-* bear the same meaning as with *vzaimo-*, this seems to mean that *vzaimo-* is not really a reciprocal marker. It is rather a reciprocal *modifier*, just as the adverb *vzaimno*:

- (17) *My vzaimno podderživa-l-i odin-ø drug-ogo.*
 we.NOM mutually support-PST-PL one-M.SG.NOM other-M.SG.GEN

‘We (mutually) supported one another.

In (17), it is possible to eliminate *vzaimno*, but the meaning will not change and the reciprocity will remain the same.

However, the situation of *vzaimo*- is not that simple. Elimination of *vzaimo*- from (16) will lead to a grammatical possible structure, but with different meaning:

- (18) Častic-y uničtožaj-ut-sja.
 particle-PL.NOM destroy-PRS.3PL-REC
 i. ‘The particles are destroyed (by sth. or sb.).’
 ii. ‘The particles disappear (by themselves).’
 iii. *‘The particles destroy each other.’

The main meaning of (18) is passive, where an agent not mentioned in the sentence destroys the particles. Another meaning which is a bit colloquial but nevertheless perfectly grammatical is anticausative where the particles are destroyed or disappear by themselves. However, the sentence has no longer the reciprocal reading. As I have mentioned, *-sja* denotes reciprocity with only two restricted verb classes, and the verb *uničtožat* ‘destroy, make disappear’ does not belong to either of them.

2.2 Circumfix?

Therefore, we face a problem: in (16), two markers express reciprocity, but neither of them can express it alone. A usual solution in this situation is to postulate a circumfix *vzaimo*-...-*sja* which expresses reciprocity as a whole.

In fact, this solution seems plausible, because Russian has a number of circumfixes including a verbal prefix and the suffix *-sja*:

- (19) a. Malčik-i beg-ut.
 boy-PL.NOM run-PRS.3PL
 ‘The boys run.’
 b. Malčik-i raz-beža-l-i-s’.
 boy-PL.NOM PREF-run-PST-PL-REFL
 ‘The boys ran to different directions, one from another.’

It is impossible to eliminate either the prefix *raz-* or the suffix *-sja*: verb forms **raz-bežat* and **bežat-sja* do not exist. Therefore, the meaning of motion in different directions is expressed by the complex of two markers. Moreover, in this particular case the meaning is very close to reciprocal: the situation is symmetrical, the subject is obligatorily plural (or collective), and each of them moves in the same way with respect to the others.

Unfortunately, this solution is hardly plausible for *vzaimo*-. The reason is that the verb form *vzaimouničtožat* (and similar ones) sometimes occur without *-sja*. The suffix can be replaced with the reciprocal pronoun *drug druga* and *odin drugogo*:

- (20) Et-i kul’tur-y vzaimo-obogaščaj-ut drug drug-a.
 this-NOM.PL culture-NOM.PL REC-enrich-PRS.3PL each.other-ACC
 ‘These cultures mutually enrich each other.’

In this case, *vzaimo-* is really a modifier – in other words, the sentence has the same meaning without it. However, existence of structures like (20) make the circumfix analysis problematic: it means that *vzaimo-* can occur without *-sja*. For circumfixes like *raz-...-sja* it is impossible: for instance, the meaning of motion in different directions with the verb *bežat* ‘run’ can only be expressed by the combination of prefix and suffix.

Structures like (20) also pose the problem of relative order of derivations. On the one hand, if we consider that *vzaimo-* is attached first, and then *drug druga* is added, this analysis cannot explain why the sentence is ungrammatical without *drug druga*.

On the other hand, it is equally implausible to consider that *drug druga* is attached first: in general, it is strange for a morphological marker to be attached **after a free lexical item**. In what follows, I will explain that *vzaimo-* is attached before, and not after *drug druga*.

The distribution of *-sja* and *drug druga* in constructions with *vzaimo-* is unclear. However, it seems that two factors play a role: degree of lexicalization and degree of patientivity of the subject. *vzaimo-...-sja*, contrary to *vzaimo- + drug druga*, is used when the reciprocal verb is more lexicalized and the subject is patientive or, at least, is not a prototypical agent.

To account for this situation I will consider applications of unaccusativity hypothesis proposed for similar cases.

2.3 Unaccusativity

In the literature, we observe very similar examples in works by Alexiadou, Anagnostopoulou (2004), Embick (2004) and others. The difference is that it occurs in the domain of reflexivity, rather than reciprocity.

In Modern Greek as well as in Fula (Atlantic, Western Africa), Tolkopaya (a dialect of Yavapai, Yuman, western Arizona) and a number of other languages mentioned by Embick (2004), there exists a reflexive marker which is not entirely grammaticalized (it cannot be the sole reflexive marker). It must be accompanied by a grammatical marker of intransitive / unaccusative configuration or by inactive (middle) inflection markers: Greek:

- (21) I Maria htenizete kathe mera.
 the.NOM.SG.F Maria comb:NACT.3SG.PRS every day
 ‘Maria combs everyday.’ (active form: *htenizei*).
- (22) O Yanis afto-katastrefete.
 the.NOM.SG.M Yanis self-destroy:NACT.3SG.PRS
 ‘Yanis destroys himself.’ (active form: *katastrafei*).

For instance, neither in (21), nor in (22) in Greek can we replace the non-active inflection type with the active one – the resulting structure is ungrammatical.

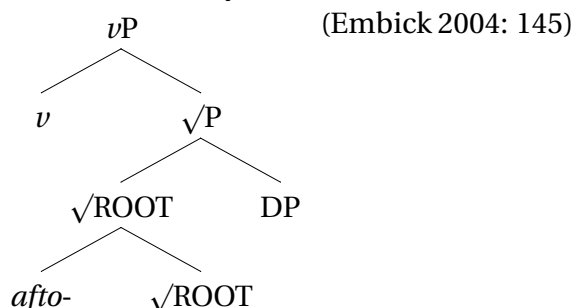
Moreover, the lexical distribution of two ways of expressing reflexivity: one with the non-active inflection only, as in (21), and one with the non-active inflection and the prefix *afto-*, as in (22) is roughly the same as the distribution of *-sja* reciprocals and *vzaimo-...-sja* reciprocals in Russian. For instance, in Greek, reflexivity can be expressed by the sole change of inflection type only inside a small group of grooming

verbs, such as *htenizo* ‘comb’ which, according to Kemmer (1993) are the best candidates to form grammatical reflexives. Outside this group, change of inflection type expresses other meanings related to detransitivization and non-agentivity: for instance, without *afto-*, (23) will have the passive meaning:

- (23) O Yanis katastrafike.
 the.NOM.SG.M Yanis destroy:NACT.3SG.PST
 ‘Yanis was destroyed.’

Embick proposes that *afto*-derivatives and their analogues are something like ‘passives’. More precisely, he thinks that the structure is as in (24):

- (24) the structure of *afto*-reflexives



In other words, Embick supposes (22) is literally something like ‘Yanis is self-destroyed’, and not ‘Yanis destroys himself’, as the most natural translation presupposes. The structure in (22) is passive, just as in (23) – the prefix *afto-* simply occupies the syntactic position of the agent of passive construction. The main reasoning he uses is that *afto*-formation uses the same inflection type (inactive inflection) as passives and anticausatives.

Let us address the question of whether the same line of argumentation is plausible for Russian. The answer seems to be no.

First of all, consider the construction with *vzaimo-* and *drug druga*. It can hardly be considered as unaccusative, even if the variant with *vzaimo-* and *-sja* can. Contrary to *-sja*, *drug druga* hardly changes the transitive verb into an unaccusative – the verb in (20) continues to be transitive, though the direct object position is occupied by *drug druga*. This pronoun is a free reciprocal pronoun in terms of Reinhart, Siloni (2004): according to Nedjalkov (2007), markers of this type markers do not change transitivity and agentivity of the base verb (the sole difference between *drug druga* and a free NP is that *drug druga* is a reciprocal anaphor and cannot occupy the subject position which is, however, very typical of anaphors).

Another feature of Russian which contradicts the unaccusativity analysis is a special construction with participles.

2.4 *Vzaimo-* and participles

Surprisingly, *vzaimo-* behaves in a special way with participles. In such constructions, *-sja* is optional, and *vzaimo-* can be the only reciprocal marker, as in (25):

- (25) Vzaimo-uničtožaj-ušč-ije-(sja) častic-y.
 REC-destroy-PART.PRS-PL.NOM-(REFL) particle-PL.NOM
 'Mutually destroying particles.'

This fact is unexpected from the view of unaccusativity theory, as well as other theories of transitivity. Grimshaw (1990) and Alexiadou (2004) argue that the structure of deverbal nouns is different from that of verbs. In Russian, for instance, deverbal nouns cannot have a direct object, and are syntactically different from verbs in many other relations. The fact that they can, as in (26), take *vzaimo-* as the sole reciprocal marker, cannot be considered really surprising (here I do not propose a description for this fact⁵).

- (26) vzaimo-uničtož-enij-e
 REC-destroy-NMLZ-SG.NOM
 'mutual destruction / destroying' ('destroying each other')

Note, for instance, that deverbal nouns in Russian cannot take *-sja* at all (here I do not address the question why the structure in (26) is not ungrammatical, just like (14) and other examples of verbs with *vzaimo-* as the sole reciprocal marker).

However, no difference between finite verbal forms and participles is predicted by the theory.⁶ Of course, if *-sja* was an unaccusativity marker, it would be obligatory in participles, because otherwise the participle in (25) would not be unaccusative. It is strange to propose that the same participle of the same verb, such as *vzaimo-uničtožaj-ušč-ije-(sja)* in (25), can be or not be unaccusative, depending on the presence of *-sja*, whereas the verb with *vzaimo-* is always unaccusative, because *-sja* is obligatory in (16). In our view, this means that *vzaimo-* should not be considered to be an unaccusativity marker. Moreover, we should revisit our hypothesis concerning the role of *-sja* in examples like (25).

2.5 *-sja* is a deobjectivizer

As in many languages, in Russian the direct object can be omitted under some conditions. For instance, some verbs admit object omission if the object is generic or indefinite:

- (27) Ubiva-t' grex-∅.
 kill-INF sin-NOM.SG
 'To kill is a sin.'

For emotion verbs, the condition is different: the object can be omitted when it is co-referent to the speaker or the addressee:

⁵What should be noted, however, is that *vzaimo-* **can** denote reciprocity on its own, without support of another reciprocal marker. This suggests that the second marker which is added to *vzaimo-* in previous examples (e.g., *-sja* in (16)) bears another function, not that of marking reciprocity. This function will be discussed in 2.8 below. I thank the anonymous reviewer for discussion of these matters.

⁶Along with the active present participle on *-ušč / -ašč*, Russian also has the active past participle with the marker *-vš*, the passive present participle with *-m* and the passive past participle with *-n*. I do not take into account the passive participles and the active past participle takes *vzaimo-* much more rarely than the active present participle. In this paper, I discuss only the active present participle.

- (28) Udivlja-et tot fakt- \emptyset čto on ne pozvoni-l- \emptyset .
 surprise-PRS.3SG that.NOM.SG fact that he.NOM not call-PST-SG.M
 'The fact that he did not call surprises (me / us).'

The crucial point for our analysis is that some verbs do not admit or rarely admit object omission in their finite forms. However, their participles can be used without an object (see also Grimshaw (1990) and others for the idea that argument frames can be postulated only for verbs; however, there seems to be no common opinion concerning the question whether the participles behave like verbs or like deverbal nouns):

- (29) a. Vozdejstvij-e alkoholj-a razrušaj-et ?[organism- \emptyset
 impact-SG.NOM alcohol-SG.GEN destroy-3SG.PRS [organism-SG.ACC
 čelovek-a].
 human-SG.GEN]
 'Impact of alcohol destroys human's body.'
 b. razrušaj-ušč-eje vozdejstvij-e alkoholj-a
 destroy-PART.PRS.ACT-NOM.SG.N impact-NOM.SG alcohol-SG.GEN
 'destructive impact of alcohol' (literally 'destroying \emptyset impact of alcohol')

This makes some authors of dictionaries and grammars regard forms like *razrušajuščij* as adjectives. In any case, the ability of participles to become objectless (or adjectives) is rather illustrative of their special syntactic properties.

In my opinion, the difference observed with *vzaimo-* between participles and finite forms is closely related to cases like (29a) and (29b). The hypothesis is that *vzaimo-* is not a syntactic modifier: it introduces only the semantics of reciprocity, not changing transitivity characteristics. And the possibility of objectless use in (25) and similar examples results from inherent syntactic properties of a participle like *uničtožaj-uščij* 'destroying', though a necessary condition for this use is presence of the reciprocal component in the meaning of the verb form (this is what *vzaimo-* denotes).

Now it is easy to see why *-sja* is used with finite forms of verbs. According to Janko-Trinickaja (1967) and Knjazev (2007), *-sja*, apart from uses like (6), (7) etc. is sometimes used as a deobjectivizer: it eliminates the direct object of the base verb:

- (30) a. Sobak-a kusa-et svo-ego xozjain-a.
 dog-SG.NOM bite-PRS.3SG own-M.SG.ACC owner-SG.ACC
 'The dog bites its owner.'
 b. Sobak-a kusa-et-sja.
 dog-SG.NOM bite-PRS.3SG-REFL
 'The dog bites.' (lit. 'The dog bites itself').

In examples like (30b), it is hardly plausible to regard the verb as unaccusative. For instance, circumstances like *special'no* 'by purpose' are possible with the verb *okusat'-sja*, which is unusual for unaccusatives.

In another use, *-sja* does not eliminate the object, but demotes its status to a peripheral instrumental NP:

- (31) a. Vas'-a kidaj-et kamn-i.
 Vasja-NOM throw-3SG.PRS stone-PL.ACC
 'Vasja throws stones.'

- b. Vas'-a kidaj-et-sja kamn'-ami.
 Vasja-NOM throw-3SG.PRS -REFL stone-PL.INS
 'Vasja throws stones.' (lit. 'Vasja throws with stones').

While *vzaimo-* is really only a semantic operator, but not a syntactic marker of reciprocity, this means that another marker of object demotion is needed: *-sja* fulfills this function in examples like (16).

Drug druga also fulfills the syntactic function in structures like (17). While the semantic component of reciprocity is already marked by *vzaimo-*, the verb is transitive and should have the DO position filled: this is why *drug druga* is used and why the sentence is ungrammatical without this pronoun.

2.6 Traces of unaccusativity

Though I have shown that *vzaimo-*derivatives are not obligatorily unaccusatives, a piece of evidence points to the fact that *vzaimo-* is in a way related to unaccusativity.

No verb which can be modified by *vzaimo-* has an agentive subject. Some of these verbs, such as *izmenit'* 'change', *uničtožat'* 'destroy' and so on, can in principle have agentive subjects, but in this case reciprocity is not usually marked by *vzaimo-* and is never marked by the combination of *vzaimo-* and *-sja*.

2.7 Incorporation

We have analyzed the synchronic properties of *vzaimo-*. However, how did a situation like this occur historically? Let us say some words on the history of this prefix.

Historically, *vzaimo-* is an incorporated variant of the adverb *vzaimno*. In Russian, incorporation is characteristic for nouns and participles, but not finite verb forms:

- (32) a. kislorod-soderž-ašč-ij
 oxygen-contain-PART.PRS.ACT-SG.M.NOM
 'oxygen-containing'
 b. *kislorod-soderža-t'
 oxygen-contain-INF
 Intended meaning: 'to contain oxygen'

Again, the question whether the participle in (32a) is a verbal form or an adjective is irrelevant for our analysis. Even if we consider it to be adjective, we need to explain why a deverbal adjective is morphologically different from finite verbs.

The data of Russian National Corpus support our assumption. In all texts created before 1900, finite verb forms take *vzaimo-* only in 6 cases (in all of them the verb is *vzaimodejstvovat'* 'interact', which is unique with respect to *vzaimo-*: it is the sole intransitive verb which regularly takes the reciprocal prefix). In contrast, nouns take *vzaimo-* in 312 cases. The situation between 1901 and 1950 is similar: although verbs now can take *vzaimo-*, they (except *vzaimodejstvovat'*) occur with the prefix in 19 cases only (8 of them are participles and converbs), whereas the number of nominal *vzaimo-*derivatives reaches 2385 occurrences. In other words, up to now the prefix is more characteristic for nouns than for verbs.

2.8 Conclusion on *vzaimo-*

Thus, *vzaimo-* is not just an optional reciprocal modifier, and I have shown that it does not form a circumfix with the postfix *-sja*. I argued that it is more plausible to distinguish *semantic reciprocity* and *syntactic intransitivity* in Russian. While *vzaimo-* is a reciprocal marker which bears no syntactic function (it only introduces a reciprocal relation, but does not intransitivize the verb), *-sja* in cases like (16) does not have any particular semantic function – in contrast, it makes the verb intransitive.

Thus, the question why structures like (14), with *vzaimo-* as the sole reciprocal marker are impossible, seems to be solved: verbs in Russian cannot be deobjectivized without any restrictions. But why are structures like (33) impossible, where a ‘usual’ NP occupies the object position?

- (33) *Petj-a vzaimo-obogaščaj-et Vasj-u
 Petja-NOM REC-enrich-PRS.3SG Vasja-ACC
 ‘Petja and Vasja mutually enrich each other’ (lit. ‘Petja mutually enriches Vasja’).

In (33), the verb remains transitive, thus, constraints on detransitivization do not account for ungrammaticality of this sentence. In my opinion, this fact results from a more general constraint which can be formulated as in (34):

- (34) **No reciprocal verb in Russian can govern one participant of reciprocal relation as a subject, and the other one as a direct object.**

This constraint accounts not only for structures like (16) with *-sja*, but also for the type (20) with *drug druga*. In (20), the verb remains transitive, but it is not true that one participant of the reciprocal relation is a subject and the other one a direct object: while the subject position is occupied by the NP denoting the whole group of participants, the object position is occupied by the reciprocal pronoun which is bound by the subject NP.

Yet, in this formulation, the constraint is too strong, since it does not account for verbs like *napominat* ‘be similar’ (lit. ‘remind’) or *vstretit* ‘meet’ which really denote a reciprocal relation. One participant is a subject, the other one an object:

- (35) Teper’ kvartir-a napomina-et zal-∅ ožidanij-a.
 now flat-SG.NOM remind-PRS.3SG hall-SG.ACC waiting-SG.GEN
 ‘The flat now resembles a waiting room.’

It seems that the relation ‘to be similar’ is really symmetrical – in other words, *napominaet* is a verb with a reciprocal component of meaning. If an object A is similar to B, it is also true that B is similar to A. Though one can say that the two arguments in (35) have different pragmatic properties, in general sentences of this type contradict our constraint. A plausible way is to restrict the formulation to structures with **grammatically marked** reciprocity.

The constraint is similar to Grimshaw’s (1991) well-formedness condition which prohibits bivalent verbs (except passive forms) to have a patient in the subject position and an agent in a non-subject one. Grimshaw’s rule says that syntactic arguments and semantic roles should match: the subject position must be occupied by the most agentive role. Our constraint is of the same type: it says that semantically reciprocal

and grammatically marked predicates should also be syntactically reciprocal: in other words, they should have a ‘symmetric’ pattern where the set of participants of the reciprocal relation occupies the same syntactic position. Note that though Dimitriadis (ms.) and Nedjalkov (2007) mention discontinuous reciprocals, which do not follow the symmetrical pattern of the type (4b-5b), Nedjalkov (2007) directly points to the fact that the symmetrical pattern is more prototypical for reciprocals in the world’s languages, and some languages, such as Adyghe (Letuchiy 2007) do not have discontinuous reciprocals at all.

As is widely known, constraints on detransitivization differ across languages: for instance, in English many transitive verbs can be used intransitively, though the English detransitivization is not of the same semantic class as in Russian. But the constraint on ‘transitive reciprocals’ is not universal either. For instance, in Arabic many reciprocals coded with a morphological marker are, nonetheless, syntactically transitive:

- (36) si‘r-u du:la:r-i y-usa:w-i si‘r-a
 price.SG-NOM dollar.SG-GEN 3SG.M-be.equal-PRS.SG price.SG-ACC
 yu:ru:.
 euro.SG.GEN
 ‘The price of dollar is equal to the price of euro.’ (Internet page).

Judging from the data of Baranov’ (1996) dictionary, it is easy to draw the conclusion that at least in some cases, the form of the third stem, which is built by lengthening the second vowel of the root, bears the reciprocal meaning (cf. also *qatala* ‘kill’ – *qa:tala* (III stem) ‘fight (with each other)’).

Below I will return to another marker of the same root (*vzaimno* ‘mutually’) to show that it is really a modifier. They are not core reciprocal markers, since they usually do not serve as the sole reciprocal marker. It does not mean, though, that *vzaimno* does not add any semantic content to the meaning of the sentence.

3 Adverbial *vzaimno*

3.1 Is *vzaimno* just a modifier?

Above I have shown that the adverb *vzaimno* ‘mutually’ is really an adverbial modifier: it never occurs without another reciprocal marker. However, there exists one case when *vzaimno* behaves very similarly to *vzaimo-*: namely, it changes the interpretation of the reflexive derivative it modifies.

- (37) Oni vzaimno obogaščaj-ut-sja.
 they.NOM mutually enrich-PRS.3PL-REC
 ‘They (mutually) enrich each other. / They are (mutually) enriched by each other.’

This case is similar to (16): without *vzaimno*, the verb *obogaščat’sja* can have either passive (‘they are enriched by someone / something’) or anticausative meaning (‘they become richer by themselves’). No reciprocal interpretation is available. However, when the adverb is added, the sole possible interpretation is reciprocal.

In this case, however, a remark is in order. *Vzaimno* is not a verbal prefix; therefore we do not need to postulate a reciprocal interpretation for the verb form in (37), as we have done in (16). In contrast, we can say that the verb in (37) has a passive interpretation, and *vzaimno* does not affect it (in this case it semantically corresponds to the agent of passive).

The main question, however, is what syntactic position *vzaimno* occupies.⁷ We have at least two possible decisions:

1. *vzaimno* is an adverbial modifier proper (the structure is passive, like ‘They are enriched by each other’);
2. *vzaimno* changes the interpretation of the verb form (the structure is reciprocal, like ‘They (mutually) enrich each other’)

If we adopt the first hypothesis, the structure is roughly like ‘They are enriched by each other’. *Vzaimno* in this case binds the syntactic subject with the (non-expressed) agent of the passive construction. The fact that *vzaimno* can bind arguments with very different syntactic properties is illustrated by (38):

- (38) My *vzaimno* obogati-l-i-s’ opyt-om.
 we.NOM mutually enrich-PST-PL-REC experience-SG.INS
 ‘We enriched each other with experience.’

In this example, *vzaimno* binds two arguments one of which is a subject, and another one is not even an argument of the verb ‘enrich’ – it is a possessor of *opyt* ‘experience’, which is expressed in the non-reciprocal correlate of (39) by the possessive modifier *tvoj* ‘your’⁸:

- (39) Ja obogati-l-sja tvoj-im opyt-om.
 I.NOM enrich-PST-SG.M-REC your-SG.M.INS experience-SG.INS
 ‘I enriched (myself) with your experience.’

Under the second hypothesis, *vzaimno* changes the interpretation of the verb form: the latter no longer bears the passive meaning, but has the reciprocal interpretation ‘to enrich each other’.

In my view, the first analysis is more plausible. One argument is that predicates which do not bear a passive meaning in the *sja*-form do not participate in constructions like (38) and (39): for instance, we found no examples of combination *vzaimno izmenit’-sja* ‘mutually change’ in this meaning (the reflexive verb *izmenit’sja* ‘change’ can bear only anticausative, but not reflexive meaning).

⁷ See Partee (2008, 2009) and Staroverov (in press) dealing with a similar problem, concerning semantics of symmetrical constructions like ‘husband and wife’. In this paper, I do not examine the compositional semantics of the construction under analysis, but see Letuchiy (2010) on semantics of other reciprocal constructions in Russian.

⁸ Another variant is that *vzaimno* binds the subject with the agent of passive, just as in (37). However, the idea that the second argument is a possessor seems more plausible, because (38) has the meaning that we enriched each other *with our / each other’s* experience, thus, the semantics of the sentence contains the possessive component.

The distinction between passive and anticausative is obvious for this case. Only passives, but not anticausatives, are compatible with agentive NP in the instrumental case cf. (38) and (40) which is ungrammatical:

- (40) *Situacij-a izmeni-l-a-s' peregovor-ami.
 situation-SG.NOM change-PST-SG.M-DEC negotiations-PL.INS
 Intended: 'The situation changed as a result of negotiations'

If *vzaimno* changed the reading of *-sja* and carried a reciprocal meaning, there would be no distinction of this sort between passive and anticausative. Therefore, in examples like (37) and (38) *vzaimno* is a modifier which does not yield a reciprocal interpretation to the verb form.

3.2 Further towards reciprocity: reciprocal interpretation of *svoj* 'own'

However, there is an interesting feature of *vzaimno* which make its analysis as a pure modifier doubtful, namely that this adverbial can change the interpretation of the possessive reflexive pronoun *svoj* 'own'.

- (41) Vuz-y v Čexi-i vzaimno priznaj-ut svoj-i
 university-NOM.PL in Czech mutually accept-PRS.3PL own-PL.ACC
 ekzamen-y i začet-y.
 exam-PL.ACC and test-PL.ACC
 'Czech universities accept (results of) exams and tests of each other'.
 (42) Eti grupp-y mog-ut vzaimno uvaž-a-t' svoj-i
 this-PL.NOM group-PL.NOM can-PRS.3SG mutually respect-INF own-PL.ACC
 različij-a.
 distinction-PL.ACC
 'These groups can mutually respect their distinctions.'

The Russian pronoun *svoj* is much similar to English *one's own*. However, (41) should not mean that each university accepts the results of its own its exams and tests. To the contrary, the author wants to say that each university accepts exams and tests of other universities. In other words, *svoj* bears a reciprocal interpretation when used together with *vzaimno*.

However, in my opinion, this reciprocal interpretation is not really reciprocal as it may seem. It is rather plausible to say that *svoj* has a usual reflexive interpretation in (41) and (42). *Vzaimno* only makes one type of interpretation of reflexive more plausible than the other one.

Let us speak of two interpretations of reflexives: collective and individual. In constructions with plural subject and reflexive marker, individual interpretation occurs when each subject is co-referent with different individual object, whereas under the collective interpretation, the whole class of subjects is co-referent with one class of objects. For instance, the sentence *John and his wife saw their parents on TV* most probably has the individual interpretation (John and his wife has different parents). In contrast, for *John and his brother saw their parents on TV*, the collective interpretation is accessible: it is possible that John and his brother together watched TV and saw their

parents in one TV show.

In sentence like (43), mainly the individual reading is accessible:

- (43) Vuz-y v Čexi-i zaščičaj-ut svoj-ix student-ov
 university-NOM.PL in Czech defend-PRS.3PL own-PL.ACC student-SG.GEN
 ‘Czech universities defend their students’.

For (43), the reading that the whole set of universities defend students of all these universities (for instance, if someone studies at St. Charles University, other Czech universities will also defend him) is maybe possible, but rather rare. The main reading is that each of the universities defends its own students, but not the students of other universities.

However, this reading is incompatible with *vzaimno*. This is why in (41) and (42), the individual reading changes to the collective one – thus, *svoj* does not bear any specific reciprocal semantics.

The collective reading is particularly clear in (42). Of course, the sentence cannot mean that each of the groups respects its own distinctions. Moreover, the notion of distinction itself is only defined when there are several distinct objects (on one element, it is not defined). Therefore, the sentence means something like ‘The whole set of groups can respect their (of the whole set) distinctions’, with the collective reading, and *vzaimo-* bears the reciprocal component.

In (43), even with collective reading, the meaning is that all universities defend their students. The difference between (43) in collective reading and (42) is that (42) means that each university defends *students of other universities*, whereas in (43), in collective reading, each university defends *students of all universities*, including its own students.

4 Conclusions

In the present paper, I analyzed the properties of Russian reciprocal markers *vzaimo-* and *vzaimno*. I have shown that, although these markers have been ignored by linguists and belong mainly to formal style, they have very interesting properties which can help us in understanding reciprocal meaning as such.

The common feature of the markers under analysis is that they cannot be the sole reciprocal marker when used with finite verb forms. However, *vzaimo-* can serve as the sole reciprocal marker when used with participles and nouns.

The prefix *vzaimo-* must be accompanied with the detransitivizer *-sja* or the reciprocal pronoun *drug druga* ‘each other’. The adverbial *vzaimno* can also be supported by *-sja* and *drug druga*, but also by the reflexive possessive pronoun *svoj* ‘own’. I tried to show that all these variants must be analyzed differently.

The first two variants, namely with *-sja* and *drug druga*, let us propose the distinction between *syntactic reciprocal markers* and *semantic reciprocal markers* (*drug druga* belongs to the first group, and *vzaimo-* to the second one). *Syntactic reciprocal markers* not only introduce a reciprocal component into the meaning of the sentence, but also change valency structure of the verb: the verb no longer is transitive, and the subject position is occupied by the NP (usually in plural) referring to all participants of the reciprocal relation.

In contrast, semantic reciprocal markers only add the reciprocal meaning component, but do not bear a valency-changing function. They cannot make the verb intransitive by themselves. They need the support of syntactic markers to carry out necessary syntactic changes.

An important fact is that the semantic reciprocal markers cannot exist without syntactic ones. Sentences like 'Peter mutually kisses Maria' are impossible in Russian, just as in English. I proposed that this is due to an independent principle which says that grammatically-marked reciprocals cannot be 'usual' transitive verbs in Russian: **No grammatically marked reciprocal verb in Russian can govern one participant of reciprocal relation as a subject, and the other one as a direct object.** This of course does not mean that reciprocal verbs cannot be transitive: in constructions with *drug druga* they are, but the subject position is occupied by a plural or group noun denoting the whole set of participants of the reciprocal relation. Therefore, if the verb is a grammatically marked reciprocal, it should also follow the 'reciprocal' syntactic pattern: the set of participants should occupy only one argument position. I showed that this constraint is similar to Grimshaw's well-formedness constraint. The constraint allowed me to show that *-sja* does not bear the reciprocal function in *vzaimo*-derivatives, but functions as a pure detransitivizer.

Finally, an important fact is that semantic markers can influence the meaning of non-reciprocal markers. As I showed, the adverb *vzaimno* which is syntactically a pure optional modifier, nevertheless changes the reading of the reflexive possessive pronoun *svoj*. I proposed that the meaning of *svoj* cannot be **reciprocal** – it is rather a collective reading of reflexive. This is the sole reading which is possible with *vzaimno*, whereas without *vzaimno* *svoj* mostly denotes individual reflexivity, and only rarely collective reflexivity.

Let me repeat that optional semantic markers in the world's languages cannot be ignored, since in some cases, such as (16) in Russian, they become the main markers of reciprocity, though syntactically they must be supported with syntactic markers.

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Alexander Letuchiy
Russian Language Institute of Russian Academy of
Sciences

On apparently non-modal evidentials

Lisa Matthewson*

1 Introduction

Current literature offers a range of analyses of evidentials in natural language, which can be broadly grouped into two types: *modal* analyses (Kratzer 1991, Izvorski 1997, Ehrich 2001, Garrett 2001, Faller 2006, Matthewson et al. 2007, McCready and Asher 2006, McCready and Ogata 2007, Waldie et al. 2009, Peterson 2009, 2010, Lee this volume, among others), and *non-modal* analyses (Faller 2002, 2003, Chung 2005, Portner 2006, Davis et al. 2007, Murray 2009a,b, Peterson 2009, 2010, among others). The split between modal and non-modal analyses correlates with significant empirical differences between the groups of evidentials being analyzed (as outlined in section 2 below). However, the question arises of what distinguishes the many distinct *non-modal* approaches from each other. The goal of this paper is to test available non-modal analyses against one previously unanalyzed evidential in St'át'imcets (Lillooet Salish): *lákw7a*.¹

I will argue that with respect to all the usual diagnostic tests (including known truth or falsity of the prejacent proposition, the impossibility of canceling or explicitly denying the evidence source, and so on), the available non-modal approaches do not make different empirical predictions from each other, and all appear to be applicable to *lákw7a*. However, I then show that *lákw7a* poses a problem for all non-modal analyses. In order to account for the evidence source restriction of *lákw7a*, we need to adopt Faller's (2003) notion of non-overlap between the event-trace and the speaker's perceptual field. If this is correct, then *lákw7a* must operate at the event level; this in turn means that it cannot be captured by any non-modal analyses, as all of these entail that evidentials operate at a level distinct from the propositional content. I conclude by arguing that *lákw7a* is a modal evidential after all. Following Matthewson 2009, 2010 (which in turn relies on Kratzer 2010, von Stechow and Gillies 2010), I suggest that the apparently significant empirical differences between the two classes of evidentials do not force us to abandon a modal analysis for *any* evidential.

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¹St'át'imcets data are presented in the orthography used in St'át'imc communities (see van Eijk and Williams 1981). The symbol 7 represents a glottal stop.

St'át'imcets is a Northern Interior Salish language, spoken in British Columbia, Canada, by fewer than 100 people. All data are from fieldwork unless otherwise noted.

2 Evidentials and epistemic modals

An evidential is something which encodes information about the speaker's source of evidence for the proposition being advanced. A well-known example is the Cuzco Quechua reportative *-si* (sometimes realized as *-s*), shown in (1). The proposition advanced in (1) is that Marya is at school, and *-si* conveys that the speaker obtained this information via a report.

- (1) Marya-qa yachay wasi-pi-**s** ka-sha-n
 Marya-TOP know house-LOC-**REPORT** be-PROG-3
 p = 'Marya is at school.' ev = Speaker was told that *p* (Faller2002:22)

An epistemic modal, on the other hand, is something which introduces quantification over epistemically accessible possible worlds. A well-known example is English *must*, as in (2). The meaning of (2) is roughly paraphrased underneath the example.

- (2) Maria must be at school.
 In all stereotypical worlds compatible with the speaker's knowledge, Maria is at school.

We see that evidentials and epistemic modals have conceptually distinct definitions, and significant empirical differences between modals and at least some evidentials have been noted. For example, the Quechua reportative *-si* differs from English epistemic modals in that the former is compatible with the assertion that the proposition it embeds is false. This is shown in (3-4).

- (3) pay-kuna-**s** ñoqa-man-qa qulqi-ta muntu-ntin-pi saqiy-wa-n,
 (s)he-PL-**REPORT** I-illa-TOP money-ACC lot-INCL-LOC leave-1O-3
 mana-má riki riku-sqa-yui ni un sol-ta centavo-ta-pis
 not-surp right see-PP-2 not one sol-ACC cent-ACC-add
 saqi-sha-wa-n-chu
 leave-PROG-1O-3-NEG
 'They [reportedly] left me a lot of money, but, as you have seen, they didn't leave me one sol, not one cent.' (Faller 2002:191)
- (4) para-sha-n-**si** ichaqa mana crei-ni-chu
 rain-PROG-3-**REPORT** but not believe-1-NEG
 'It's [reportedly] raining, but I don't believe it.' (Faller 2002:194)

Data as in (3-4) constitute one of Faller's main empirical arguments that the Quechua reportative *-si* is non-modal; Faller observes that 'In contrast, a speaker using English epistemic *may* or *must* cannot know for a fact that the embedded proposition is not true' (Faller 2002:194). This is illustrated in (5).

- (5) #They *must/might* have left me a lot of money, but, as you have seen, they didn't leave me one cent.

The infelicity of (5) follows from a standard modal analysis: a speaker who is certain that a proposition *p* is false cannot truthfully assert that *p* is possibly or necessarily true.²

Another evidential which allows its prejacent to be known to be false is the Cheyenne (Algonquian) reportative *séstse* (Murray (2009a,b)). The example in (6) constitutes Murray's (2009b) empirical argument that the Cheyenne reportative is not modal but 'parenthetical-like'.

- (6) é-hó'táheva-**séstse** Floyd naa+oha é-sáa-hó'táheva-he-∅
 3-win-RPT.3SG Floyd but 3-NEG-win-*h(an)e*-DIR
 'Floyd won, I hear, but I'm certain he didn't.' (Cheyenne; Murray 2009b:3)

Not all evidentials contrast with modals in this way, however, and it has often been argued that there are elements in language which perform both evidential and modal functions simultaneously – i.e., that there is a subset of evidentials which are epistemic modals with an extra restriction about evidence source.³ For analyses along these lines, see Kratzer (1991), Izvorski (1997), Garrett (2001), Matthewson et al. (2007), McCready and Asher (2006), McCready and Ogata (2007), Waldie et al. (2009), Peterson (2009, 2010), Lee (this volume), among others.

One example of a modal evidential is St'át'imcets inferential *k'a*, illustrated in (7).⁴ According to Matthewson et al. (2007), an utterance of the form *k'a p* asserts that according to the speaker's knowledge state, *p* is possibly or necessarily true, and presupposes that the speaker has inferential indirect evidence for *p*.

- (7) *Context: You are a teacher and you come into your classroom and find a nasty picture of you drawn on the blackboard. You know that Sylvia likes to draw that kind of picture.*
 nílh=**k'a** núkun' k=Sylvia ku=mets-cál ti=píktsh=a láku7
 FOC=INFER again DET=Sylvia DET=write-ACT DET=picture=EXIS DEIC
 'It must have been Sylvia who drew the picture again.'

(8) illustrates another modal evidential, the St'át'imcets reportative *ku7*. (8) asserts that according to the speaker's knowledge state, Maria is possibly or necessarily at school, and presupposes that the speaker has reported evidence that Maria is at school.

- (8) wá7=**ku7** láku7 skul-álhchw=a k=Sylvia
 be=REPORT DEIC school-house=EXIS DET=Sylvia
 '[reportedly] Maria is at school.'

²Although see Kratzer (2010), Matthewson (2009, 2010).

³The reverse has also been argued, namely that at least some epistemic modals are evidentials (Kratzer 2010, von Stechow and Gillies 2010). In Matthewson (2009, 2010) I suggest that the classes of evidentials and epistemic modals may be identical; see section 6 below.

⁴Abbreviations used in St'át'imcets glosses: CAUS: causative, COMP: complementizer, DEIC: deictic, DET: determiner, DIR: directive transitivizer, ERG: ergative, EXIS: assertion of existence, FOC: focus, IMPF: imperfective, INFER: inferential evidential, MID: middle intransitive, NEG: negative, NOM: nominalizer, OBJ: object, PL: plural, POSS: possessive, SG: singular, STAT: stative, SUBJ: subject, TOP: non-topical subject. The symbol - marks an affix boundary and = marks a clitic boundary.

Both *k'a* and *ku7* restrict the speaker's evidence source for the embedded proposition, and thus are evidentials. In (7), the speaker cannot have witnessed Sylvia drawing the picture, and in (8), the speaker must have been told by a third person that Maria is at school. *k'a* and *ku7* are also epistemic modals. (9-10) show that *k'a* and *ku7* pattern with English *must* or *might*, rather than with Quechua *-si* or Cheyenne *séstse*, when the embedded proposition is known to be false.

- (9) #wá7=**k'a** kwis, t'u7 áoz=t'u7 k=wa=s kwis
 IMPF=INFER rain but NEG=just DET=IMPF=3POSS rain
 'It may/must be raining, but it's not raining.' (Matthewson et al. 2007)
- (10) Context: *You had done some work for a company and they said they put your pay, \$200, in your bank account. but actually, they didn't pay you at all.*
 #um'-en-tsal-itás=**ku7** i=án'was-a xetspqíqen'kst táola,
 give-DIR-1SG.OBJ-3PL.ERG=REPORT DET.PL=two-EXIS hundred dollar
 t'u7 aoz kw=s=7um'-en-tsál-itas ku=stám'
 but NEG DET=NOM=give-DIR-1S.OBJ-3PL.ERG DET=what
 '[reportedly] They gave me \$200, but they didn't give me anything.' (Matthewson et al. 2007)

The data in (3-10) show that there are important empirical differences between two classes of evidentials, those which pattern with modals and those which do not seem to. My focus in the remainder of this paper is the latter set. I will examine one previously unanalyzed modal in St'át'imcets, *lákw7a*, and show that a range of facts about *lákw7a* can be captured by *any* of the available non-modal analyses. However, I will then show that *lákw7a* poses a problem for all analyses.

3 *Lákw7a* as a non-modal evidential

In this section I introduce the basic *lákw7a* data and show that with respect to two core tests, it patterns with non-modal evidentials like Quechua *-si*, rather than with modal evidentials like St'át'imcets *k'a* and *ku7*.

Lákw7a is historically a locative adverb, but also functions synchronically as an evidential which signals an absence of visual evidence for the proposition. A typical example is given in (11).

- (11) wa7 **lákw7a** u7s7-ám
 IMPF **lákw7a** egg-MID
 'It's laid an egg (by the sound of it).'

Lákw7a has previously been granted only brief treatment in the literature. In his grammar of the language, van Eijk (1997:172) writes that '*Lákw7a* 'generally refers ... to a smell, a sound, or some other sensation (i.e., refers to s.t. that not only is invisible but ... *cannot even be made visible*)' (highlighting original). Davis (2006, chapter 15) argues that *lákw7a* is used when one senses something (either by hearing, smelling, or tasting) but cannot see it. Examples supporting this generalization are given in (12). I will provide an analysis of the evidence source restriction of *lákw7a* in section 5.

- (12) a. wa7 **lákw7a** ku=ts7ás=a
 be **lákw7a** DET=come=EXIS
 ‘Someone’s coming.’ The speaker can hear them, but not see them.) (Davis 2006)
- b. wa7 **lákw7a** k=wa ílal
 be **lákw7a** DET=IMPF cry
 ‘It sounds like somebody is crying over there.’
- c. áma **lákw7a**!
 good **lákw7a**
 ‘That tastes good!’ (Davis 2006)
- d. wa7 **lákw7a** ku=sq’áq’pa7 lts7a ti=ts’í7=a
 be **lákw7a** DET=dirt here DET=meat=EXIS
 ‘This meat tastes as if there’s dirt in it.’ (said while trying to eat it)
- e. tsem-s=kán **lákw7a** ti=ts’í7=a
 burn-CAUS=1SG.SUBJ **lákw7a** DET=meat=EXIS
 ‘I burnt the meat.’ (Context: you smell it)
- f. *Context: You are blindfolded. I ask you to tell me which of three cups a stone is in. You feel around and feel the stone.*
 nilh **lákw7a** lts7a
 FOC **lákw7a** here
 ‘It’s in this one.’

Lákw7a patterns with non-modal evidentials on two core tests. The first test was already introduced above, namely whether the evidential is felicitous when the embedded proposition is known by the speaker to be false. As can be seen in (13), *lákw7a* is felicitous in such contexts.

- (13) *Context: It smelled as if the pie was good, but there was too much salt so it was actually horrible.*
 t’éc=t’u7 **lákw7a** ku=páoy, t’u7 áoz=t’u7 kw=a=s áma
 sweet=just **lákw7a** DET=pie but NEG=just DET=IMPF=3SG.POSS good
 ‘The pie seemed good, but it wasn’t good.’

(14) is a minimal pair with (13), reiterating that a modal evidential is infelicitous in this environment.

- (14) *t’éc=**k’a**=t’u7 ku=páoy, t’u7 áoz=t’u7 kw=a=s áma
 sweet=INFER=just DET=pie but NEG=just DET=IMPF=3SG.POSS good
 ‘The pie might/must have been good, but it wasn’t good.’

(15-18) are further minimal pairs showing that *lákw7a* is acceptable when the preja-cent is known to be false, unlike English epistemic modals or St’át’imcets modal evidentials.

- (15) wa7 **lákw7a** ku=mám’teq láku7 áltsq7=a, t’u7 nilh=a cwílh=t’u7
 be **lákw7a** DET=walk DEIC outside=EXIS but FOC=a after.all=just
 ti=sk’éxem=a wa7 qan’ím-ens-an
 DET=wind=EXIS IMPF hear-DIR-1SG.ERG
 ‘It sounded like someone was walking outside, but it was the wind.’

- (16) *wá7=**k'a** ku=mám'teq láku7 áłtsq7=a, t'u7 nílh=a cwílh=t'u7
 be=INFER DET=walk DEIC outside=EXIS but FOC=a after.all=just
 ti=sk'éxem=a wa7 qan'ím-ens-an
 DET=wind=EXIS IMPF hear-DIR-1SG.ERG
 'Someone might/must have been walking outside, but it was the wind.'
- (17) *Context: When you left the house there were dirty dishes in the sink and a dirty floor. When you come home, it's spotless. You know that Eddy doesn't know how to clean and never has and never will.*
 o, ts'ex-n-ás **lákw7a** ti=tsítcw=a k=Eddy
 oh clean-DIR-3ERG **lákw7a** DET=house=EXIS DET=Eddy
 'Looks like Eddy cleaned up.'
- (18) *Context: Same as for (17).*
 #o, ts'ex-n-ás=**k'a** ti=tsítcw=a k=Eddy
 oh clean-DIR-3ERG=INFER DET=house=EXIS DET=Eddy
 'Eddy might/must have cleaned up.'

A second empirical distinction between evidentials which are analyzed as modals and those which are not is the inverse of the one just discussed: only the latter set of evidentials are felicitous if the embedded proposition is known to be true. The idea behind this test is that Gricean reasoning prevents a speaker from using an epistemic modal if they are in a position to assert the embedded proposition, as the plain proposition would be a stronger statement.⁵

This test is applied to *lákw7a* in (19) (repeated from (12f)). We see that *lákw7a* is felicitous in a situation in which the speaker is certain that the prejacent proposition is true. An epistemic modal in English would sound very odd in this situation.

- (19) *Context: You are blindfolded. I ask you to tell me which of three cups the stone is in. You feel around and feel the stone.*
 nílh **lákw7a** łts7a
 FOC **lákw7a** here
 'It's in this one.' (Consultant mimes putting hand on the stone)

Both Quechua and Cheyenne possess evidentials which allow the speaker to be certain of the truth of the prejacent (the 'best possible grounds' and the 'direct' evidential, respectively). As predicted, however, the St'át'imcets modal evidential *k'a* is bad in this type of situation:

- (20) *Context: Same as for (19).*
 #nílh=**k'a** łts7a
 FOC=INFER here
 'It might/must be in this one.'

We have seen that with respect to both empirical tests discussed in this section, *lákw7a* patterns with non-modal evidentials. It seems reasonable to conclude that *lákw7a* is not a modal. In the following sections I will address the extent to which the various

⁵Although see von Stechow and Gillies (2010) for arguments that a universal modal statement is not always weaker than a plain proposition. See also section 6 below.

available non-modal analyses of evidentials are applicable to *lákw7a*.

4 Applying non-modal analyses to *lákw7a*

Non-modal evidentials have been variously analyzed as speech-act/illocutionary operators (which alter the type of speech act and modify sincerity conditions; Faller 2002, 2003), as sentential-force specifiers (which specify which type of conversational update is performed; Portner 2006), illocutionary operators which alter the pragmatic threshold for felicitous utterance (Davis et al. 2007), and as contributors of not-at-issue assertions (offering new information which is not negotiable; Murray 2009a,b). The differences between these analyses form part of a larger debate about what types of not-at-issue meaning exist in natural language (cf. Potts 2005, to appear, Roberts et al. 2009), and about the nature of assertion. The questions to be addressed here include how we determine which is the best framework to adopt for non-modal evidentials, and whether the different approaches correspond to substantive empirical differences.

In this section I will show in turn how each of the available non-modal analyses can be applied to *lákw7a*, and I will therefore argue that the choice between the different approaches has no significant empirical consequences. I begin with Portner's (2006) sentential force specifier approach.

4.1 *Lákw7a* as a sentential force specifier

In any conversation at any particular time, the common ground is the set of propositions which the interlocutors mutually assume to be taken for granted (Stalnaker 1978). A successful assertion updates the common ground by adding a proposition to it. Since non-modal evidentials like Quechua *-si* or St'át'imcets *lákw7a* are felicitous when the prejacent is known to be false, it is natural to assume that they do not attempt to place their prejacent proposition in the common ground. Within speech-act theory, this necessitates a speech-act with fewer commitments than asserting (such as Faller's 2002 'presenting', or von Stechow's 2003 'putting forward'). Portner (2006) argues that we can capture this effect directly, by using conversational updates. The basic idea is that 'The common ground is not every proposition's home' (Portner 2006:8).

Suppose that presenting (rather than asserting) is the most basic conversational update. The *Presented Set* (ps) then contains all the propositions of which the participants are mutually aware. Depending on the sentential force of an utterance, meaning is added to different subsets of ps. One subset of ps is the Common Ground, cg(ps): those propositions to which we have made additional commitments. Assertions, if successful, are added to cg(ps). The universal default home for a presented proposition is cg(ps), but there are other subsets of ps; for example, Report(ps) is the set of propositions for which we have reported evidence. Evidentials, then, can be viewed as grammaticized ways of indicating which subset of ps to update.

Applying this analysis to *lákw7a*, we could say that *lákw7a* signals that the proposition is added to a sensory-non-visual evidence set.⁶ (Peterson 2010 says something

⁶The non-visual restriction on *lákw7a* is slightly more complicated than was indicated above; see

similar to this for the Gitksan evidential *n'akw*.) This is illustrated in (21), where 'ds' stands for 'discourse structure' and 'SNV' represents the sensory-non-visual evidence set. See Portner (2006) for formal details of the system.

- (21) $[[\textit{lákw7a}]] = \lambda p \lambda ds \text{PUT}_{\text{SNV}}(ds, p)$

Portner's analysis makes a number of predictions which are upheld by *lákw7a*. First, we predict non-cancelability of the evidence source restriction. Just as for example the question-status of a question cannot be canceled, Portner's sentential-update approach predicts that the evidence source of *lákw7a* cannot be canceled. This is correct, as shown in (22).

- (22) *Context: You're telling your friend how you heard someone prowling around your house. After you heard the noise, you saw them.*

#wa7 **lákw7a** ku=mám'teq láku7 áłts'q7=a, ats'x-en=łhkán aylh
be **lákw7a** DET=walk DEIC outside=EXIS see-DIR=1 SG.SUBJ then
'There was someone walking around outside – in fact, I saw them.'

(22) is infelicitous because the speaker's having seen the person outside violates the non-visual condition on *lákw7a*.

A second prediction is that the evidence source will be non-deniable by an interlocutor. Markers of sentential force cannot be explicitly denied by an interlocutor; responses such as *That's not true* target only the prejacent proposition (Portner 2006:13). (23) shows that the evidence source of *lákw7a* is not subject to denial. The mother's utterance violates the evidence source restriction of *lákw7a* (since the mother saw the event). Nevertheless, Laura is unable to respond using *cw7aoz kw swenácw* 'that's not true'. The consultant's comment suggests that the contribution of *lákw7a* is not at-issue, asserted content.

- (23) *Context: You sneak some of your mother's ts'wan (wind-dried salmon) and she sees you doing it. Later on, you hear her telling your father:*

#tsicw **lákw7a** kwam s=Laura i=ts'wán=a láku7 xétsem=a
get.there **lákw7a** take(MID) NOM=Laura DET.PL=ts'wan=EXIS DEIC box=EXIS
'Laura took some ts'wan from the box.'

You say:

#aoz kw=s=wenácw, áłts'x-en-ts=kacw
NEG DET=NOM=true see-DIR-1 SG.OBJ=2 SG.SUBJ
'That's not true, you SAW me (take the ts'wan).'

Consultant's comment: "No, you just wouldn't say it ... because it's something you already know."

The sentential-update analysis also predicts that *lákw7a*-statements do not assert their embedded proposition. Empirically, one consequence of this is that the speaker should not have to believe the prejacent proposition to be true: unlike the common ground, the set of propositions for which we have sensory-non-visual evidence may contain propositions not believed by the speech participants. This prediction is correct for *lákw7a*, as shown above in (13,15,17). In fact, *lákw7a* is predicted to be compatible

with *any* certainty level, from certain falsity to certain truth.⁷ Further supporting evidence for the full certainty range of *lákw7a* is given in (24-25).

- (24) Context: *Wa7 k'a kánem k Mary? (What's Mary doing?)*
 wa7 **lákw7a** ít'-em
 IMPF **lákw7a** sing-MID
 'I guess she's singing / sounds like she's singing.'
 Consultant's comment: "You're not very sure."
- (25) Context: *You're next door and hear through the wall that someone is baking some pies. Eddy was the only one home, so it must be him.*
 wa7 **lákw7a** mayt k=Eddy ku=páoy
 IMPF **lákw7a** make DET=Eddy DET=pie
 'Eddy must be making pie.'
 Consultant's comment: "Yeah. He's the only one home."

A second empirical argument for the claim that *lákw7a*-utterances do not assert the prejacent runs as follows. If a speaker asserts p, s/he cannot later deny having said that p. But if a speaker uses *lákw7a*, s/he *can* later deny having said that p, as shown by the felicitous conversation in (26).

- (26) A: wa7 **lákw7a** k=wa ílal
 IMPF **lákw7a** DET=IMPF cry
 'Sounds like someone is crying.'
Later...
 B: tsút=kacw kw=a=s wa7 láku7 k=wa ílal. áy=t'u7 swat
 say-2sg.SUBJ DET-IMPF-3POSS be DEIC DET-IMPF cry NEG=just who
 láku7 ku=wá7
 DEIC DET=be
 'You said someone was crying there. Noone is there.'
 A: áy=t'u7 áku7 kw=en=s tsut. kan tsut-ánwas
 NEG=just DEIC DET=1SG.POSS=NOM say 1SG.SUBJ say-inside
 kw=en=s qan'ím-ens k=wa ílal
 DET=1SG.POSS=NOM hear-DIR DET=IMPF cry
 'I didn't say that. I thought I heard someone crying.'

The conversation in (26) contrasts with that in (27), which shows that assertions are not retractable in this way.⁸

- (27) A: wa7 k=wa ílal
 IMPF DET=IMPF cry
 'Someone is crying.'

⁷Chung (2010:939) argues the same for non-assertive evidentials in Korean: 'the speaker is totally neutral about his (her) attitude toward or belief in the proposition.'

⁸Déchaine (2007) makes the interesting and strong proposal that in Cree, plain declaratives are not asserted (not intended by the speaker to be added to the common ground). Déchaine argues for something very similar to Portner's Presented Set, with the added twist that languages can vary in whether the default set to which a presented proposition is added is the common ground or not. However, Déchaine does not apply tests like those given here to test the assertive status of Cree utterances.

Later...

B: tsút=kacw kw=a=s wá7 láku7 k=wa ílal. áy=t'u7 swat
 say=2sg.SUBJ DET=IMPF=3POSS be DEIC DET=IMPF cry NEG=just who
 láku7 ku=wá7
 DEIC DET=be

'You said someone was crying there. Noone is there.'

A: #áy=t'u7 áku7 kw=en=s tsut. kan tsut-ánwas
 NEG=just DEIC DET=1SG.POSS=NOM say 1SG.SUBJ say-inside
 kw=en=s qan'ím-ens k=wa ílal
 DET=1SG.POSS=NOM hear-DIR DET=IMPF cry
 'I didn't say that. I thought I heard someone crying.'

Consultant's comment: "Not the way you said the first part. You definitely heard the cry, you definitely know it on that sentence."

We have seen that Portner's sentential-update approach accounts well for several core facts about *lákw7a*. Interestingly, the sentential-force analysis also accounts for some facts about determiner choice in St'át'imcets. As argued by Matthewson (1998), St'át'imcets has two sets of determiners: assertion-of-existence and non-assertion-of-existence. Non-AOE determiners are ungrammatical in environments which would result in an assertion of the existence of an individual satisfying the NP description. Non-AOE determiners therefore require licensing by an attitude verb, negation, an *if*-clause, a question, etc. (cf. Giannakidou's 1998 nonveridical contexts, and see also Lin 1996 on Chinese). This is illustrated in (28). (28a) is ungrammatical because the non-AOE determiner *ku* in this environment is incompatible with existential closure, which would result in the assertion that a woman exists.

- (28) a. *ít'-em **ku**=smúlhats
 sing-MID NON.AOE.DET=woman
 'A woman is singing / sang.'
 b. **cw7aoz** kw=s=ít'-em **ku**=smúlhats
 NEG DET=NOM=sing-MID NON.AOE.DET=woman
 'No woman is singing / sang.'

As shown in (29), *lákw7a* licenses non-AOE determiners (cf. Lyon 2009):

- (29) a. wa7 **lákw7a** **ku**=sq'áq'pa7 lts7a ti=ts'í7=a
 be **lákw7a** NON.AOE.DET=dirt here DET=meat=EXIS
 'This meat tastes as if there's dirt in it.' (said while trying to eat it)
 b. wa7 **lákw7a** **ku**=wá7 lasál lts7a
 be **lákw7a** NON.AOE.DET=be salt here
 'I can taste salt in this.'

The licensing of *ku* by *lákw7a* is predicted if we say that only propositions which are asserted (added to the common ground) can result in assertion of existence environments. Any proposition in the sensory-non-visual evidence set is free to use a non-AOE determiner.

In sum, we have seen in this section that a wide range of facts about *lákw7a* are accounted for by a sentential force specifier analysis as in Portner (2006).

4.2 *Lákw7a* as a speech act operator

In this section we examine whether *lákw7a* is amenable to a speech-act analysis along the lines of Faller (2002). First let's see how Faller (2002) uses speech act theory to account for the Quechua reportative *-si*. Faller argues that *-si* is a function from speech acts to speech acts. The addition of *-si* has two effects: the illocutionary force is changed from 'assertion' to 'presentation', and the reportative evidence source is added as a sincerity condition (a pre-condition on felicitous utterance of the speech act; the speaker must believe the content of the sincerity conditions). Faller's analysis is shown in (30). The sincerity condition states that there is a individual s_2 who asserted p , and who is neither the speaker nor hearer of the current utterance. A speaker is therefore being insincere who utters a sentence *-si p* when p has not been asserted by some third person.

$$(30) \quad \begin{array}{ll} -si: \text{ASSERT}(p) & \rightarrow \text{PRESENT}(p) \\ \text{SINC} = \{\text{Bel}(s,p)\} & \text{SINC} = \{\exists s_2 [\text{Assert}(s_2,p) \wedge s_2 \notin \{h,s\}]\} \end{array}$$

(Faller 2002:200)

A speech-act analysis of *lákw7a* would parallel that of Quechua *-si* in that the illocutionary force would be 'present' rather than 'assert'. The sincerity conditions would have to include the requirement that there be sensory non-visual evidence for the proposition. This might look something like (31):

$$(31) \quad \begin{array}{ll} lákw7a: \text{ASSERT}(p) & \rightarrow \text{PRESENT}(p) \\ \text{SINC} = \{\text{Bel}(s,p)\} & \text{SINC} = \{\text{Snv}(s,p)\} \end{array}$$

Just like Portner's analysis, Faller's speech-act analysis also successfully predicts the following salient features of *lákw7a*:

- (32) i. Non-cancelability of the evidence source
 ii. Non-deniability of the evidence source
 iii. Failure of *lákw7a* to assert / compatibility with any certainty level

As above, (32iii) accounts for the behaviour of *lákw7a* in the two tests discussed in section 3: felicity if the preadjacent proposition is known to be true, or if it is known to be false. From this I conclude that *lákw7a* is apparently amenable to a speech-act operator analysis along the lines of Faller (2002).

4.3 *Lákw7a* as introducing not-at-issue assertion

An alternative analysis of non-modal evidentials is provided by Murray (2009a,b)⁹; Murray's analysis relies on the contrast between *at-issue* and *not-at-issue* content. At-issue assertions, which constitute the 'main point' of an utterance and which are proposals to update the common ground, are up for negotiation by interlocutors. Thus, a hearer can directly deny the at-issue assertive content of an utterance (for example by saying *That's not true*). Not-at-issue content, in contrast, is added to the common ground directly, and therefore is not negotiable. A hearer cannot directly deny not-at-issue con-

⁹At the time of the writing Murray (2010) was not yet available.

tent. Presuppositions are one kind of not-at-issue content, and Potts' (2005, to appear) conventional implicatures are also not-at-issue.

Murray observes that the evidence source restriction of the Cheyenne reportative and direct evidentials is not up for discussion and is not deniable. It is not at-issue. However, the evidential restriction is new information, not a presupposition. Murray therefore proposes that the evidence source restriction of the Cheyenne evidentials is a *not-at-issue assertion*.¹⁰

According to Murray, a sentence containing an evidential contributes three things: (i) an *at-issue proposition* (which may or may not be asserted), (ii) an *evidential restriction* (which is asserted, but not at-issue), and (iii) an *evidential proposal* / relation (an ordering of worlds and a proposal to restrict the common ground to the TOP worlds in the ordering). For example, the Cheyenne reportative asserts the evidential restriction in (33). This reduces the input worlds in the common ground to worlds in which the speaker (i) heard the proposition p.

(33) HRD(i,p) = {w | in w, speaker heard that p}

The evidential proposal of the reportative proposes no change to the common ground; with a reportative, the embedded proposition is not asserted. The evidential proposal is that the hearer 'take note of p'.

An important feature of Murray's analysis is that the evidential restriction is new information, not a presupposition. Murray (2009a,b) provides no specific data in support of this claim, but it makes intuitive sense that an utterance of a sentence containing an evidential does not take the evidential restriction for granted, but rather provides it as new information. This means that the presupposition-based modal analyses of e.g., Izvorski (1997) or Matthewson et al. (2007) should probably be altered so as to involve some non-common-ground type of not-at-issue content. This is easily doable without altering the main thrust of these analyses.

Interestingly, however, the claim that the evidential restriction is new information does not distinguish Murray's analysis from that of Faller (2002), who models the evidential restriction as part of the sincerity conditions. Sincerity conditions are not presupposed: preparatory conditions are taken for granted, but sincerity conditions are not (Faller 2002:16-17, describing Vanderveken 1990). Similarly, for Portner (2006), the restriction on evidence source is not presupposed. The rejection of presupposition for the evidential restriction is therefore common to all the available analyses of non-modal evidentials.

Murray's analysis also replicates the same speech-act-like effects as Faller does for the reportative, namely that the reportative is not a proposal to update the common ground (cf. Faller's 'present' speech act). For Murray, this comes from the evidential proposal, which for the reportative is that the hearer 'take note of' p. Murray's argument against Faller is a conceptual one; she argues that the not-at-issue assertion analysis is more parsimonious, requiring 'no appeal to a separate level of illocutionary meaning' (Murray 2009b:2). However, empirically speaking the two theories appear to account for exactly the same facts. In fact, all *three* theories so far account for exactly the same facts¹¹. We turn in the next sub-section to the final non-modal analysis to be

¹⁰See Roberts et al. (2009) for recent discussion of the (not-)at-issue distinction.

¹¹At the time of writing, Murray (2010) was not yet available. The fuller version of Murray's proposals

considered, that of Davis et al. (2007).

4.4 *Lákw7a* as signaling the lowering of the quality threshold

According to Davis et al. (2007), evidentials are illocutionary force operators which function to change the *quality threshold* of the context in which they are uttered. The quality threshold corresponds, roughly speaking, to the level of certainty a speaker must have to assert a proposition: a speaker can only felicitously assert p if the probability of p is greater than the current quality threshold in the context. An evidential can lower the quality threshold so the speaker can assert something when she only has indirect evidence for its truth. Thus, Davis et al. allow propositions to be ‘asserted’ when the speaker is less than fully certain, and evidentials indirectly signal this.¹²

Applying Davis et al.’s analysis to *lákw7a* would work as follows. First, evidentials specify an evidence source; this is given in (34).

- (34) Uttering $S[lákw7a]$ commits the speaker to the existence of a situation in which he receives sensory-non-visual evidence for $[[S]]$. (cf. Davis et al. 2007:9)

Next, Davis et al. define a function which associates evidence types with probabilities:

- (35) Let $\varphi_{lák7a}$ be the proposition that a situation in which an agent obtains *lákw7a*-type evidence for p is also a situation in which p is true.
 μ maps context-morpheme pairs to probabilities: $\mu_c(lákw7a) = P_c(\varphi_{lák7a})$

(35) reflects the idea that for each situation, there may be a different probability that sensory-non-visual evidence for a proposition p entails that p is true. For example, in a context c where the *lákw7a*-type evidence is fairly reliable, $\mu_c(lákw7a)$ might equal .9. The evidential then changes the contextually-given quality threshold from whatever it was to the value given by $\mu_c(lákw7a)$. The reader is referred to Davis et al.’s paper for remaining technical details, which I do not have space to spell out here.

The threshold-changing analyses successfully accounts for the core fact that *lákw7a*-type evidentials are compatible with any certainty level. Although all prejacent assertions are asserted on Davis et al.’s analysis, ‘assertion’ is now relativized so that given an appropriately low quality threshold, a speaker is not committed to the truth of their assertions. As the Davis et al. analysis is an illocutionary one, it will also account for the non-cancelability and non-deniability of the evidence source. Again we see that empirically, all the core facts of *lákw7a* are accounted for.

My question for the quality threshold analysis is a conceptual one, namely whether we need all these steps. Under the quality threshold analysis, the evidential still lexically encodes evidence type. Evidence type, plus the reliability of that type of evidence in the particular discourse context, leads to a shift in the quality threshold by the right

does involve some empirical differences with Faller’s analysis (Sarah Murray, p.c.).

¹²According to Davis et al., epistemic modals differ from evidentials in not being able to change the quality threshold. However, ‘both the evidential and modal strategies are likely to be fueled by the same fact about the epistemic state of the speaker’, namely that the speaker lacks the required level of certainty to outright assert the prejacent (2007:84). Davis et al. note (2007:84-85) that the speaker’s choice of whether to choose an evidential or an epistemic modal ‘is likely to be governed by the question of whether the evidence source is relevant at that point in the discourse.’

amount so that one can felicitously assert *p*. This implies that for each context, there is a way to determine what the quality threshold is, how reliable the evidence is, and therefore how much the quality threshold needs to shift.

However, in any given context, it is unclear that the hearer has any way of knowing how reliable the speaker's evidence is. For example, if I use a reportative, you have no way of knowing whether the report I heard was uttered by a reliable or an unreliable person. So the values for $\mu_{c\text{REPORT}}$ and $P_c(\varphi_{\text{REPORT}})$ are known only to the speaker. All the hearer knows is that the speaker has a certain type of evidence for *p*, and that the probability of *p* may be less than the current quality threshold.

I therefore suggest that instead of adopting contextually-given function values, it is simpler – and even more correct – to say that non-modal evidentials leave probability entirely vague. A simpler analysis is one where the function of the evidential is purely to encode evidence type, and no information is given about certainty level. This fits with an evidential like *lákw7a*, which allows any certainty level from 0% up to 100%, and for which the hearer usually has no way of guessing the speaker's certainty level. This accords well with, for example, Portner's analysis, which dispenses with the idea that all declaratives perform assertions. *Lákw7a*-propositions are simply placed into a set of propositions for which a certain type of evidence exists. Propositions in that set may have any probability of being true, from 0 to 1.

To summarize this section, I have argued that the choice between the different approaches to non-modal evidentials has no significant empirical consequences. This is interesting in itself, because proliferation of frameworks in the absence of significant empirical differences is perhaps not ideal. In the next section I turn to an empirical problem posed by *lákw7a* for the available non-modal analyses of evidentials.

5 The evidence source of *lákw7a*

In section 3 I gave a brief and simplified characterization of the restrictions *lákw7a* places on evidence source. In this section I investigate evidence source in more detail. I will argue that *lákw7a* is subject to both a positive and a negative restriction with respect to evidence source; these are given in (36i,ii) respectively. I will provide an analysis of these restrictions which requires *lákw7a* to operate at the event level (rather than, say, at the speech-act level).

- (36) i. *Lákw7a* requires sensory evidence for the proposition.
 ii. *Lákw7a* disallows visual evidence of the eventuality itself.

The distinction between evidence for the *proposition* and evidence of the described *eventuality* is crucial here. I will provide data below illustrating the difference, but the idea is that we must distinguish between cases where a speaker has witnessed the event itself, and cases where the speaker has any other kind of evidence (for example, some results of the event) which leads her to conclude that the proposition might be true.¹³

The restrictions in (36) make a number of predictions, outlined in (37). In the next sub-section I show that these predictions are upheld.

¹³See Nikolaeva (1999) for the claim that evidentials can restrict the speaker to only having evidence of the results of an event rather than the event itself.

- (37) *Lákw7a* should allow:
- i. Non-visual sensory evidence of the eventuality.
 - ii. (Any kind of) sensory evidence of the results (or precursors) of the event.
- Lákw7a* should disallow:
- iii. Visual evidence of the eventuality itself.
 - iv. Pure inference or reasoning.

5.1 *Lákw7a*'s evidence source: The data

We saw above that *lákw7a* is felicitous with any kind of non-visual, sensory evidence of the eventuality, including hearing, taste, smell and touch (see (12)). This much confirms prediction (37i). As will become important below, the requirement that the evidence be non-visual does not entail that the evidence of the event is 'indirect'. In (38), the proposition is that the object smells, and the evidence is olfactory. The evidence could not be more direct.

- (38) cw7ucw *lákw7a*
 smell *lákw7a*
 'That smells.'

Similarly, in (39) the proposition is that the radio is too loud, and the evidence is auditory. This is direct evidence for the proposition being advanced.

- (39) wenacwts-7úl *lákw7a* ti=radio=ha
 loud-too *lákw7a* DET=radio=EXIS
 'The radio is too loud.'

The second prediction of the double restriction on *lákw7a*, (37ii), is that any kind of sensory evidence from results of the eventuality should be permitted, including visual evidence. This is illustrated in (40-42). In (40), the speaker did not witness how long the object was under the water, but feels the dryness, the results of the event.

- (40) cw7áy=t'u7 *lákw7a* k=s=cin'=s kw=s=wá7
 NEG=just *lákw7a* DET=NOM=long.time=3SG.POSS DET=NOM=be
 l-ti-qú7=a- wá7=t'u7 wa7 k'ac
 in=DET=water=EXIS IMPF=just IMPF dry
 'It couldn't have been under the water long – it's dry!'

In (41-42), the sensory evidence of the results of the event is visual. *Lákw7a* is felicitous here because the negative restriction on *lákw7a* only rules out visual evidence of the event itself.

- (41) Context: You had five pieces of *ts'wan* [wind-dried salmon] left when you checked yesterday. Today, you go to get some *ts'wan* to make soup and you notice they are all gone. You are not sure who took them, but you see some *ts'wan* skins in John's room.
 ts'áqw-an'-as *lákw7a* i=ts'wán=a k=John
 eat-DIR-3ERG *lákw7a* DET.PL=ts'wan=EXIS DET=John
 'Looks like John might have eaten the *ts'wan*.'

- (42) *Context: You are a teacher and you come into your classroom and find a nasty picture of you drawn on the blackboard. You look around and you see that only one child has got chalk dust on her hands, Sylvia.*

nilh **lákwa** s=Sylvia ku=xílh-tal'i
 FOC **lákwa** NOM=Sylvia DET=do(CAUS)-TOP
 'Sylvia must have done it.'

(43-44) are further instances of seeing the results of an event, in these cases an event for which direct evidence would be auditory.

- (43) *Context: You don't have your hearing aid in and you can't hear much. The radio is on and you see that your grandkids are kind of wincing and one has her fingers in her ears.*

wenácwts=t'u7 **lákwa** ti=radio=ha
 loud=just **lákwa** DET=radio=EXIS
 'The radio must be too loud.'

- (44) *Context: You are watching through the glass at your daughter's dance class. They have two kinds of music that they play: rock and roll, and Tchaikovsky, the Dance of the Sugar Plum Fairy. You can't hear the music but you see them dancing around like fairies.*

nilh **lákwa** Tchaikovsky k=wa k'al'an'-min'-ítas
 FOC **lákwa** Tchaikovsky DET=IMPF listen-APPL-3PL.ERG
 'They must be playing Tchaikovsky.'

And (45) shows that as predicted, sensory evidence of the *precursors* (rather than the results) of an event is also allowed.¹⁴

- (45) o, cuz' **lákwa** kwis, kéla7=t'u7 wa7 qwál'qwel't i=nqweqwú7lh=a
 oh going.to **lákwa** rain very=just IMPF ache DET.PL=bone=EXIS
 'Oh, it's going to rain, my bones are really aching.'

(46-48) show that visual witness of the eventuality itself is disallowed (prediction (37iii). (46) is only acceptable if the speaker hears, rather than sees, symptoms of the sickness.

- (46) áols-em=lhkacw **lákwa**
 sick=2sg.SUBJ **lákwa**
 'You must be sick.'
Rejected if the speaker sees someone is shivering and sweaty. Accepted if the speaker hears them coughing.

(47) is acceptable if one only sees John's lights, not John himself, and a similar comment is given by the consultant for (48).

¹⁴Thanks to an anonymous reviewer for a comment which inspired me to discuss evidence which temporally precedes the event. The generalizations in (36) predict that visual 'precursive' evidence will also permit **lákwa** (for example, seeing black clouds gathering as a precursor to rain). This has not yet been tested.

- (47) *Context: A is driving past John's house with B and sees John's lights are on.*
 wá7 **lákw7a** l=ta=tsítcw-s=a s=John
 be **lákw7a** in=DET=house-3SG.POSS=EXIS NOM=John
 'John must be home.'
 Consultant's comment: "Okay, 'cause you don't really see him."
- (48) tsicw **lákw7a** kwam s=Laura i=ts'wán=a láku7 xétsem=a
 go **lákw7a** take(MID) NOM=Laura DET.PL=ts'wan=EXIS DEIC box=EXIS
 'Laura took some ts'wan from the box.'
 Consultant's comment: "Okay if she didn't see her doing it."

An interesting subtlety confirms the distinction between visual evidence of the *eventuality itself* as opposed to its *results*. In (49-50), the speaker has visual evidence of the result state encoded by the predicate, and the utterances are infelicitous. They contrast with the data in (41-42), where the visual evidence was not entailed by the predicate, but merely contextually counted as a result of the event.

- (49) *Context: You are waiting for Billy to arrive. You suddenly see that he's here.*
 #t'iq **lákw7a** k=Billy
 arrive **lákw7a** DET=Billy
 'Billy must've arrived.'
- (50) *Context: You needed a door put in. You come home and you see the door is in.*
 #lan **lákw7a** es-máys ti=séps=a
 already **lákw7a** STAT-made DET=door=EXIS
 'The door must've been made.'

The final prediction of the restrictions on *lákw7a*, (37iv), is that pure inference or reasoning is disallowed. This is correct, as shown in (51-53), where in each case the speaker is using inference or reasoning rather than having sensory evidence for the prejacent proposition.¹⁵

- (51) *Context: You are a teacher and you come into your classroom and find a nasty picture of you drawn on the blackboard. You know that Sylvia likes to draw that kind of picture.*
 #nilh **lákw7a** s=Sylvia ku=xílh-tal'i
 FOC **lákw7a** NOM=Sylvia DET=do(CAUS)-TOP
 'It must have been Sylvia who did it.' (Corrected to inferential *k'a*).
- (52) *Context: I show you a coin and three cups. I put the coin under one of the cups and then I mix them around so you can't see any more which one it's under. I ask you to guess. You guess one cup, and I lift it up and show you that it's not under there. You guess a second one, the same. You point at the last cup and say:*
 #látí7 **lákw7a** lh=as legw
 there **lákw7a** COMP=3SBJN get.hidden
 'It must be under that one.' (Volunteered with inferential *k'a*.)

¹⁵Data such as these show that *lákw7a* is not licensed by just anything which is invisible; cf. van Eijk (1997:172). For example, the event in (53) is invisible, but is ruled out because the speaker has only inferential, rather than sensory, reasons for stating that her daughter is currently above the Pacific.

- (53) *Context: You take your daughter to the airport for a flight to Hawaii. You see the plane take off. Three hours later your son asks you where your daughter is (he's forgotten she was going on holiday today).*

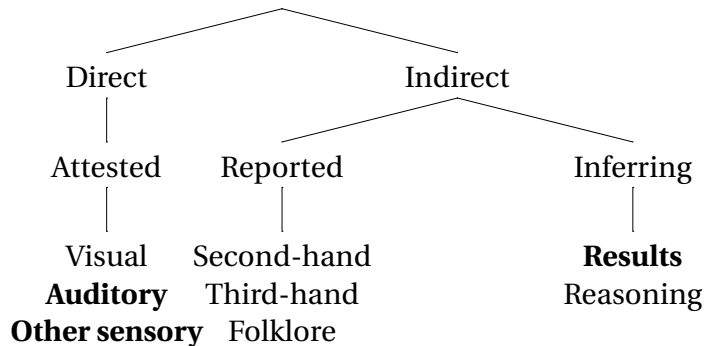
#cá7-s=a **lákw7a** ti=xzúm=a qu7 lh=as wá7
 high-3POSS=EXIS **lákw7a** DET=big-EXIS water COMP=3SBJN be
 'She's above the Pacific.' (Fine with inferential *k'a*.)

To summarize the generalizations about evidence source, we have seen that *lákw7a* requires that the speaker have sensory evidence for the proposition, but disallows visual evidence of the eventuality.¹⁶ In the next sub-section I will show that *lákw7a* does not fit with traditional categorizations of evidence source, and argue for an analysis along the lines of Faller (2003), Chung (2005, 2007).

5.2 *Lákw7a*'s evidence source: Analysis

Willett's (1988:57) categorization of evidence types is given in (54), with the types of evidence allowed by *lákw7a* highlighted.

- (54)



Lákw7a does not fit into this classification; the traditional division into 'direct' vs. 'indirect' evidence fails for *lákw7a*, since *lákw7a* allows both direct perception of the event (as long as it's non-visual), and indirect evidence (as long as it's sensory).

More broadly, the traditional classifications of e.g., Willett (1988) and Aikhenvald (2004) (and much work which builds on these) conflate two different issues: first, what *means* (sense(s), reasoning) the speaker uses to gain knowledge of the eventuality, and second, whether the speaker directly perceived the *eventuality itself* (as opposed to its results or precursors). For example, Aikhenvald's (2004) definition of 'direct' is that it involves 'speaker's sensory experience'. But the speaker can have sensory experience of results of the event - a type of *indirect* evidentiality. Once we realize that there are two distinct issues in evidence source, the need for a disjunctive statement of *lákw7a*'s restrictions makes a lot more sense. The restrictions are repeated in (55). (55i) restricts the means by which the speaker obtained their evidence, and (55ii) restricts perception of the eventuality itself.¹⁷

¹⁶ *Lákw7a* shares similarities with the Gitksan sensory evidential *n'akw* (Peterson 2009, 2010), and with the Thompson Salish evidential *nukw* (Mackie 2010).

¹⁷ Korean data in Lee (this volume) support the claim that evidentials may cross the direct/indirect boundary. Lee concludes from her data that evidentials do not have to distinguish evidence source.

- (55) i. *Lákw7a* requires sensory evidence for the proposition.
 ii. *Lákw7a* disallows visual evidence of the eventuality itself.

In the remainder of this section I will provide an analysis for the restriction in (55ii), making use of the notion of the speaker's perceptual field (Faller 2003).

The first thing to note is that (55ii) is very reminiscent of the restriction on a Quechua past tense suffix *-sqa*, as analyzed by Faller (2003). According to Faller, *-sqa* requires that the event be outside the speaker's perceptual field at the topic time. Faller models this in terms of (at least partial) non-overlap between the event-trace and the speaker's perceptual trace at the topic time (see also Nikolaeva 1999 and Chung 2005, 2007 for similar ideas). Faller's lexical entry for *-sqa* is given in (56):

- (56) $[[-sqa]] = \lambda t_R \lambda P \lambda e . P(e) \wedge t_R < t_s \wedge \neg \forall \langle t, l \rangle [t \subseteq t_R \wedge \langle t, l \rangle \in e\text{-trace}(e) \rightarrow \langle t, l \rangle \in P\text{-trace}(sp)]$

The P-trace is a function which maps an individual *x* onto *x*'s perceptual field, for each time throughout their lifespan. (56) states that *-sqa* applied to a reference time, a predicate and an event, gives a value of true iff not all time-location $\langle t, l \rangle$ coordinates which are included in the spatio-temporal trace of the event at the reference time were included in the speaker's perceptual field. In other words, there is at least partial non-overlap between the speaker's perceptual field and the event at the reference time. Chung (2005, 2007) adapts Faller's analysis to deal with the Korean evidential tense *-te*; see also Nikolaeva (1999) and discussion in Speas (2008).

Lákw7a differs from *-sqa* in a couple of ways, the most obvious being that *lákw7a* is not a tense marker. *Lákw7a* is also more specialized than *-sqa*, in that for *lákw7a*, the event must be outside the speaker's *visual* field at the topic time. The idea of non-overlap between the speaker's visual field and the event trace correctly allows the speaker of a *lákw7a*-clause to have non-visual sensory perception of the event itself. The final difference between *lákw7a* and *-sqa* is that *lákw7a* requires no overlap whatsoever (as opposed to partial non-overlap) between the speaker's visual trace and the event trace.

The non-visual-overlap condition is given in (57) for a context *c* and an event *e*, with reference time *R*. The V-trace is a function which maps an individual *x* onto *x*'s visual perceptual field, for each time throughout their lifespan.

- (57) $[[lákw7a]] = \lambda t_R \lambda P \lambda e . P(e) \wedge \forall \langle t, l \rangle [t \subseteq t_R \wedge \langle t, l \rangle \in e\text{-trace}(e) \rightarrow \langle t, l \rangle \notin V\text{-trace}(sp_c)]$

Whether or not the precise analysis in (57) is correct, what is crucial is that the restrictions on *lákw7a* *must* make reference to the event argument. This was shown in section 5.1, where we saw that visual evidence is permissible if and only if the speaker sees results of the event, *not* the event itself. The consequence of this is that *lákw7a* must operate at the propositional level. This in turn sheds quite a bit of doubt on whether any of the analyses discussed in section 4 are applicable to *lákw7a*. In fact, Faller (2003) uses the fact that Quechua *-sqa* makes applies to the event argument as a motivation

However, given the argumentation here, Lee's results can be understood as implying that evidence source is a complex notion, and that evidentials may encode *only* evidence *source*, but do not have to encode *directness* ((non-)witness of the eventuality itself).

to reject a speech-act level analysis of *-sqa*.

Another interesting result of (57) is that Faller uses the fact that *-sqa* merely locates the event trace with respect to the speaker's perceptual field to argue that *-sqa* is not an evidential. This is because *-sqa* does not directly encode anything about information source. However, *lákw7a* is an evidential: *lákw7a* also encodes a positive requirement on information source, namely that it has to be sensory. From this we can conclude that even for some true evidentials, the notion of (non-)overlap between the event-trace and the speaker's perceptual field is required. This is in line with what I argued above, namely that the traditional notion of direct vs. indirect evidence conflates two distinct issues, and that some evidentials require a twofold restriction on evidence source: a restriction on the means by which the speaker obtained the evidence, and also a restriction on whether the speaker perceived the eventuality itself. The former is taken care of a traditional lexical restriction on evidence source, while the latter is taken care of by Faller's (non-)overlap condition.

6 *Lákw7a* might be a modal after all

I have argued in this paper that although many facts about *lákw7a* are in line with available analyses of non-modal evidentials, there is one critical stumbling block to applying such analyses to *lákw7a*, namely the fact that *lákw7a* applies at the level of the event argument. It is hard to see how to reconcile the conclusions of section 5 with any of the analyses discussed in section 4, all of which assume that non-modal evidentials operate at a level above, or separate from, the proposition. In this final section I briefly outline an analysis whereby *lákw7a* is a modal evidential, after all. This idea is spelled out in more detail in Matthewson (2009, 2010), although I argue for it there on the basis of different evidence, some of which is alluded to below.

Recall the core empirical differences between modal and non-modal evidentials, as outlined in sections 2 and 3: non-modal evidentials are felicitous when their prejacent is known to be true, and when it is known to be false. This is not normally the case for epistemic modals, as shown in (5, 14) above. However, neither of these arguments hold up when examined more closely. First let's take the claim that epistemic modals are infelicitous when their prejacent is known to be true. This is falsified by von Fintel and Gillies (2010), who give data such as in (58).

- (58) Chris has lost her ball, but she *knows* with full certainty that it is in either Box A or B or C She says:
 The ball is in A or B or C.
 It is not in A ... It is not in B.
 So, it must be in C. (von Fintel and Gillies 2010:362)

von Fintel and Gillies argue that *must p* is infelicitous not when the speaker is certain about *p*, but rather when the speaker's evidence for *p* is *direct*. In other words, *must* contains indirect evidential semantics. This explains the contrast between (58) and (59); in (59), the evidential source requirement of *must* is violated, while in (58) it is not.

- (59) [Seeing the pouring rain.]

It's raining.

??It must be raining. (von Fintel and Gillies 2010:353)

These data show that the test involving truth of the prejacent is invalid as a way of showing that an evidential is non-modal. It can only show that an evidential has different evidence requirements from some other modals.

As for whether or not the speaker can know the prejacent to be false, this also provides no evidence against the modal status of an evidential. This follows from the analysis in Kratzer (2010), according to which there are at least two different types of conversational backgrounds for 'epistemic' modals: *realistic* and *informational*, with only the former ruling out a known-to-be-false prejacent. The realistic/informational distinction is given in (60-61).

- (60) A realistic conversational background for an evidential: a function f such that for all w in the domain of f , there is a body of evidence in w that has a counterpart in all $w' \in \cap f(w)$.

in view of the available evidence; given the evidence (Kratzer 2010:12)

- (61) An informational conversational background: a function f such that for any w in the domain of f , $f(w)$ represents the content of some salient source of information in w .

according to the content of... (Kratzer 2010:13)

(62) has a realistic conversational background; it asserts that in all worlds in which there is the same rumour as in the actual world, Roger was elected chief. Since the actual world is a world in which there is this rumour, the speaker of (62) makes a strong claim about the actual world, and cannot know that the prejacent is false.

- (62) *Context: There is a rumour that Roger has been elected chief.*

Given the rumour, Roger must have been elected chief.

(63) has an informational conversational background; it asserts that in all worlds which are compatible with the content of the rumour, Roger was elected chief. This is a claim about what the rumour says, not a claim about whether Roger was elected in the actual world. Unlike (60), (61) is felicitous even if the speaker is sure that Roger was not elected chief.

- (63) *Context: There is a rumour that Roger has been elected chief.*

According to the rumour, Roger must have been elected chief.

Given that informational epistemic modals are felicitous if p is known to be false, the false-prejacent test is invalid as a way of showing that an evidential is non-modal. It can only show that the evidential may be restricted to having an informational conversational background.¹⁸

These are not the only two tests for the (non-)modal status of an evidential, and

¹⁸Kratzer (2009) argues exactly this, namely that the St'át'imcets reportative *ku7* has an evidential conversational background (and is therefore incompatible with the speaker knowing that p is false), while the German reportative *sollen* has an informational conversational background (and is therefore compatible with the speaker knowing that p is false).

space does not permit me to give a full defence here of the claim that *lákw7a* is a modal (see Matthewson 2009, 2010 for fuller argumentation). However, it is already significant that (a) the evidence source requirement of *lákw7a* suggests that it operates inside the proposition, and (b) the two major arguments for non-modality of an evidential are both invalid.

7 Conclusions

In this paper I have argued for four main points. First, a range of current non-modal analyses of evidentials make equivalent empirical predictions with respect to the core features of the set of evidentials they are designed to account for. The choice between them must therefore be made on conceptual grounds. Second, traditional conceptions of evidence source conflate two separate issues: the means by which the speaker obtained their evidence, and whether or not the speaker directly witnessed the event itself. Third, the St'át'imcets evidential *lákw7a* sheds doubt on all the non-modal analyses examined (in spite of seeming at first to be amenable to all of them). The problem posed by *lákw7a* is that its evidence source restriction requires reference to the event argument, and as such *lákw7a* must operate at the propositional level. Finally, two of the main arguments for non-modal evidentials are invalid, and *lákw7a* may – in spite of its striking similarities with non-modal evidentials – be a modal after all. If the last claim is right, this would in turn cast doubt on all non-modal analyses, and open up the possibility that all evidentials in human language are modal in nature.

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Lisa Matthewson
University of British Columbia

Licensing focus on pronouns and the correct formulation of AvoidF

Clemens Mayr*

1 Introduction

Focus can serve, among other things, to contrast a constituent with a previous one, thereby – pre-theoretically – making clear which part of an information is old and which is new. The two foci in (1), for instance, signal that the relation of kissing someone is old in the context given, i.e., it is given by the previous context. What is, however, not given is that Bill kissed Sue, i.e. it is new information and thus *Bill* and *Sue* must be focused – that is, they must be focus-marked (F-marked).

- (1) John kissed Mary. But BILL kissed SUE

Rooth (1992) argues that this effect can be captured by employing his notion of focus value.¹ For this approach to work it is essential that focus is interpreted by the semantic component. Recently it has been questioned whether it is really focus that is interpreted. Schwarzschild (1999) – but also Williams (1997), Sauerland (2005), Wagner (2006) – base their theories on the notion of givenness. These theories share the following: Essentially (1) is treated as an extension of the anaphor phenomenon – that is, non-focused material has a certain semantic trait that lets it get interpreted as anaphoric to some material in the previous discourse. Therefore focus values as a semantic primitive are dispensed with, at least for phenomena such as (1). As we will see, focus in such theories plays the role of identifying material that need not be given, i.e., need not be anaphoric to some antecedent constituent.

We will see that most if not all aspects of Schwarzschild's 1999 approach can be integrated into a theory using focus values as well. As has been shown by Schwarzschild (1999) there must be some condition, called AvoidF in his theory, that compares a structure with focus with the same structure without focus. The one without focus is to be preferred if givenness is satisfied. The empirical problem to be discussed in the present paper has to do with focus on pronouns that could in principle be interpreted

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¹See Rooth (1985) and Kratzer (1991) for two prominent approaches on how to derive the focus value of a given constituent and the discussion below in section 4.

as bound or as referential. The gist of the present argument is that Schwarzschild's theory as it stands cannot deal with transderivational comparisons for focus licensing, i.e., situations where two different structures need to be compared. I suggest that the modification of the AvoidF-condition argued for by Truckenbrodt (1995) who considers it an instance of *Maximize Presupposition!* (MP!, cf. Heim (1991)), directly predicts these data and is thus to be preferred to Schwarzschild's formulation. In other words, I will argue for a principle that strives to reduce the size of focus values. AvoidF viewed this way straightforwardly allows us to compare two (independent) structures if they have the same ordinary semantic value, on the one hand, and focus values that are related by the proper subset relation, on the other hand. Therefore the present paper has two objectives: First, it investigates what the correct formulation of AvoidF should be like. Second, on a more conceptual level, it suggests that givenness can be implemented in a theory with focus values without any problems.

The paper is structured as follows: Section 2 summarizes the main points of a theory of givenness. In particular, I introduce as much as necessary from Schwarzschild's 1999 theory in order to see why the data from section 3 are problematic for it. Section 3 introduces the novel empirical observation and discusses the problem caused by it. Section 4 implements the theory of givenness by using Rooth's 1985 focus values and MP!. Schwarzschild's condition of AvoidF is modified accordingly. Section 5 returns to Schwarzschild's theory in more detail, and we show that the present theory can capture his insights as well. Section 6 concludes the paper.

2 Givenness and F-marking

Consider the discourse in (2). Only (2-a) is a felicitous continuation of (2), but (2-b) is not. Apparently the realization of F-marks is restricted in some way. In other words, a condition is needed that reduces the number of F-marks. One can only focus a constituent if it is absolutely necessary, it seems. What goes wrong in (2-b) intuitively is that *Obama* is already mentioned in the antecedent sentence and therefore does not qualify for F-marking. *Obama* is given. I will now briefly review Schwarzschild's 1999 theory, which was the first to my knowledge to propose a condition that reduces the number of F-marks. Moreover his theory is chosen because it can serve as an illustration of a system relying on givenness instead of focus values. I will return to discuss Schwarzschild's theory in more detail in section 5 once the empirical puzzle and the present theory have been introduced.

- (2) Obama praised Bush
 a. No, Obama praised CLINTON
 b. #No, OBAMA praised CLINTON

2.1 Schwarzschild's 1999 givenness and focus on pronouns

I will discuss Schwarzschild's theory by considering the data in (3). These are not actually discussed by him. But understanding them will be helpful to grasp the puzzle to be presented in the following section. It should be fairly easy to extrapolate the ac-

count for (3) to the problem in (2) above.² Consider (3) and the possible continuations in (3-a)-(3-b) under the reading where the pronoun *his* refers to Bill. Focus is required on the pronoun on this reading. The question to be addressed is why the pronoun in (3-b) must be stressed in the given discourse.

- (3) John likes Bill's mother, but ...
 a. #BILL likes his mother
 b. BILL likes HIS mother

Schwarzschild's basic idea is that the notion of givenness drives F-marking. In particular he assumes the condition in (4). That is, there is a condition that checks for each constituent that is not F-marked whether it is given. F-marked constituents are excluded from that condition and need not be given as a consequence.

- (4) GIVEN_{ness}
 If a constituent is not F-marked, it must be GIVEN.
 (Schwarzschild 1999:155)

What it means for a constituent to be given is defined in (5). The definition requires that for each non-F-marked constituent there be an antecedent constituent in the context. The requirement in (5-a) is straightforward. The mechanism of existential type shifting existentially binds open argument positions of the expressions to which it applies. The existentially type shifted version of the antecedent constituent must then entail the existential F-closure of the utterance constituent. The existential F-closure of a constituent is the result of replacing each F-mark with a variable of the appropriate type and existentially type shifting the outcome of this process.

- (5) *Definition of GIVEN* (final informal version)
 An utterance U counts as GIVEN iff it has a salient antecedent A and
 a. if U is type e, then A and U corefer;
 b. otherwise: modulo \exists -type shifting, A entails the Existential F-closure of U.
 (Schwarzschild 1999:151)

Furthermore there is the constraint *AvoidF* in (6) which is responsible for reducing the number of foci. It is basically an economy condition. It states that if material is given, it need not be F-marked – that is, it compares two derivations, one with F-mark and one without F-mark. If the one without F-mark satisfies givenness for all its subconstituents, it is to be preferred to the one with F-mark, even if the latter one satisfies givenness for all of its subconstituents, as well.

- (6) AVOIDF
 F-mark as little as possible, without violating Givenness.
 (Schwarzschild 1999:156)

²In short, (2-b) is a case of overfocusing. Both (2-a) and (2-b) satisfy Schwarzschild's condition of givenness in (4). The economy condition *AvoidF* (6) therefore applies and dictates that the structure with fewer F-marks is the only one that is licensed.

Let us now return to the discourse in (3) and see how the theory just introduced accounts for the data. But before going into detail, a further remark is in order, which is quite independent from the particular theory of focus licensing chosen to evaluate the data at hand. When we want to see whether the difference in acceptability of the two continuations of (3) is predicted, we have to consider at least two structures that could be assumed for each of the continuations. In particular, it seems that there is a choice between coreference and binding in (3-a) and (3-b). In the following, I investigate whether the account in terms of givenness discussed above yields the correct results when these two options are considered. I start by considering the coreference structure and then proceed to binding.

Option 1: coreference Let us first consider givenness for (7) – a possible representation of (3-a) – where $g(1)$ refers to *Bill*. In other words, (7) shows the structure without F-mark on the pronoun coreferring with the subject.

(7) [BILL_F likes 1's mother]

In all the cases to be considered in this section and the following one, givenness calculation yields the same results for the IP and VP constituents whenever one of the two counts as given. They will therefore not be discussed separately each time. The argument to be given now extends to the other cases, as well. For both the IP and the VP we have to find out whether $\exists x[x \text{ likes } \textit{Bill's mother}]$, their shared existential F-closure, is entailed by the existentially type shifted version of some antecedent constituent. The reason for this requirement is that the subject is always F-marked in the examples to be considered.³ Indeed, *John likes Bill's mother* entails this. So both the IP and the VP are given. The property of liking is trivially given as well, and so is the individual *Bill's mother*.

Now consider the same structure with F-mark on the pronoun. Again, $g(1)$ maps onto *Bill*:

(8) [BILL_F likes 1_F's mother]

If there is focus on the pronoun, we need for both the IP and the VP a constituent such that its existentially type shifted meaning entails $\exists x.\exists y[x \text{ likes } y's \text{ mother}]$. Clearly, *John likes Bill's mother* does entail this. The property of liking is, of course, again given. Moreover the property of liking someone's mother is given because again *John likes Bill's mother* entails it. Since both the structure with focus on the pronoun and the one without focus on it satisfy givenness, AvoidF tells us that the latter must be used. This, however, seems to be the wrong result as we want (3-b) to be ruled in and not (3-a). Since we have another structure to test – that is, binding – we expect that the binding option must be such that we cannot leave the F-mark off the pronoun. It turns out that this is the case.

³I will not discuss below whether the F-mark on the subject could be dropped. The answer is that it cannot be dropped. To see this, consider the option under discussion without focus on the subject. In this case it would be required that the proposition *Bill likes Bill's mother* is given. This is clearly not the case, as neither *John likes Bill's mother* nor $\exists x[x \text{ likes } \textit{Bill's mother}]$ entails it. Parallel considerations apply to all examples to be discussed below.

Option 2: binding Assume that the LFs for the binding option are as in (9). Moreover, for completeness, assume that $g(2) = \text{Jack}$, although nothing said below will hinge on the interpretation of the variable.

- (9) a. John likes Bill's mother
 b. $BILL_F 2[t_2 \text{ likes } 2_{(F)}\text{'s mother}]$

If focus is left off the pronoun, we get multiple violations of givenness. These are listed in (10). In each case it is impossible to find a suitable antecedent such that its existentially type shifted meaning would entail the existential F-closure of the focus constituent.⁴

- (10) *Non-given constituents*
- a. $[BILL_F 2[t_2 \text{ likes } 2\text{'s mother}]]$:
 John likes Bill's mother \neg entails $\exists x[x \text{ likes } x\text{'s mother}]$
 $\exists x[x \text{ likes Bill's mother}] \neg$ entails $\exists x[x \text{ likes } x\text{'s mother}]$
- b. $[2[t_2 \text{ likes } 2\text{'s mother}]]$:
 John likes Bill's mother \neg entails $\exists y[y \text{ likes } y\text{'s mother}]$
 $\exists x[x \text{ likes Bill's mother}] \neg$ entails $\exists y[y \text{ likes } y\text{'s mother}]$
- c. $[2\text{'s mother}]$: John likes Bill's mother \neg entails $\exists P[P(\text{Jack's mother})]$
 $\exists x[x \text{ likes Bill's mother}] \neg$ entails $\exists P[P(\text{Jack's mother})]$
 $\exists P[P(\text{Bill's mother})] \neg$ entails $\exists P[P(\text{Jack's mother})]$

This means that the option without focus on the bound pronoun is not licensed by the theory of givenness. What about the version with focus on the pronoun? In this case givenness is satisfied. In order to see why, just notice that by putting an F-mark on the bound pronoun, we have gotten rid of the requirement that some constituent entails that someone likes his own mother. In other words, it is now for instance required that some constituent entails $\exists x.\exists y[x \text{ likes } y\text{'s mother}]$. And *John likes Bill's mother* does entail this. It moreover entails that there is a property holding of someone's mother, as required by the existential F-closure of the non-F-marked constituent $[2_F\text{'s mother}]$.

This means that if the binding option is chosen, the obligatory F-marking of the pronoun in the continuation of (3) becomes clear. The only question remaining is why coreference should not be an option. After all proper names are referring expressions, and therefore binding should not be the only possibility. In other words, givenness makes the right predictions if we find a reason why binding must be used instead of coreference. We do not have to look far for an answer. I will suggest that the use of contrastive *but* has this consequence.

2.2 *but* requires contrastiveness

Intuitively, the reason why binding is chosen is that the use of contrastive *but* in (3), repeated as (11), requires that the antecedent sentence somehow contrasts with the focus sentence.

⁴Note that the non-givenness of the constituent $[2\text{'s mother}]$ depends on the particular choice for $g(2)$. But even if $g(2)$ were actually given, the non-givenness of the other two constituents would be problematic enough anyway.

- (11) John likes Bill's mother, but ...
 a. #BILL likes his mother
 b. BILL likes HIS mother

The question is how contrastiveness is to be defined. This has been a long-standing question in the literature. For reasons of space we cannot go into a full discussion of this issue. But it has often been assumed that contrastiveness is best addressed by the use of focus values (cf. Büring (2008) a.o.). If one follows this line, one could assume that *but* has the presupposition in (12) introducing a condition of contrastiveness on the denotations of the VPs used (cf. Sæbø (2003) and Umbach (2005) a.o. for related proposals).⁵ The focus value $[[\phi]]^f$ for a given constituent ϕ is the set of all alternatives to its ordinary denotation $[[\phi]]^g$ of the same type, where the F-mark has been replaced by a variable of the appropriate type. See subsection 4.2 below for the definition of focus values and further discussion.⁶

- (12) $[[IP_1 \text{ but } IP_2]] = [[IP_1 \text{ and } IP_2]]$
 if $[[VP_1]] \in [[VP_2]]^f$ and $[[VP_1]] \neq [[VP_2]]$, otherwise undefined.

The antecedent VP of (11) denotes the property $\lambda x.x \text{ likes Bill's mother}$. This, however, does not contrast with the VP of either (11-a) or (11-b) once we view the pronouns as being coreferential with the subject. The denotation of the VP in (11) is a member of the focus values of both the VPs in (11-a) and (11-b). But the denotations are equivalent in both cases. Therefore contrastiveness is not satisfied in this situation. If the binding option is used in the continuations in (11-a) and (11-b), however, the predicate denotes the property $\lambda x.x \text{ likes } x's \text{ mother}$. What is the focus value of the respective VPs? In case the pronoun is not focused, we obtain the singleton set in (13-a). The denotation of the antecedent VP is not a member of that set. I.e., contrastiveness is not licensed for this case. If, however, we choose to put an F-mark on the bound pronoun, the set in (13-b) obtains.⁷ Moreover, the denotation of the antecedent VP is not identical to the binding VP. Thus the presupposition of contrastive *but* is satisfied if there is an F-mark on the bound pronoun. But notice that this is also the configuration favored according to givenness and AvoidF. In other words, the theory of givenness and the requirements imposed by *but* conspire to rule in only the continuation in (11-b).

⁵Note that Umbach (2005) distinguishes between focus and contrastive topic values in the sense of Büring (1997). In particular, the subject would be marked as a contrastive topic rather than as a focus. This is presumably correct, but what matters for the present discussion is how contrastiveness is defined. For this purpose values are needed that have sets as their denotations. Both focus values and contrastive topic values provide exactly this. There is more to be said about the correct lexical entry for *but*. But for our present purposes the one in (12) should suffice. The presupposition of *but* in (12) is similar to the one for adnominal *however* proposed by Sauerland (2000) with the difference that it does not require the subjects to contrast. The reason for this are cases such as (i). Thanks to an anonymous reviewer for EISS 8 for reminding me of cases such as (i), where the subjects do not contrast.

(i) My children can't stand liver, but they do love chicken

⁶Note that it is not obvious how contrastiveness could be defined without the use of focus values. The notion of givenness does not have anything to say about contrastiveness.

⁷Note that the ordinary value of the VP – that is, the denotation of the binding configuration – is not a member of that set itself.

- (13) a. $[[VP]]^f = \{\lambda x.x \text{ likes } x\text{'s mother}\}$
 b. $[[VP]]^f = \{\lambda x.x \text{ likes } y\text{'s mother} \mid y \in D_e\}$

At first it might seem that there is some redundancy in the system when we restrict ourselves to data such as (11). Both the theory of givenness and the requirements posed by *but* converge on the same solution. In particular, one might think that the correct definition of *but* is all that is needed. This is, however, not correct, as can be shown as follows: When *and* is used instead of *but*, the presuppositions of *but* disappear. As a consequence there should be no pressure to use the binding VP anymore. In particular, both binding and coreference should be options. But because of this focus on the pronoun and no focus should be equally felicitous, as the former is favored by givenness for binding, whereas the latter is favored for the coreference VP. This is confirmed by (14).

- (14) John likes Bill's mother, and ...
 a. $BILL_F$ likes HIS_F mother
 b. $BILL_F$ likes his mother

We observe that all of a sudden the focusing of the pronoun becomes optional. That this optionality is the consequence of having two independent structures at disposal – that is, coreference and binding – is shown by (15). Here binding is not an option and the possibility of leaving the F-mark off *John* is not there. This is so because the VP in (15-b) violates givenness. The property of liking John's mother is not given. But the property of liking someone's mother is, which is why F-marking *John* produces a felicitous outcome. From this we conclude two things: First, our conjecture that (14-a) is the consequence of binding and (14-b) the one of coreference finds independent support. The optionality of focusing only appears in situations where two structural analyses are possible. Moreover, the theory of givenness together with *AvoidF* applies to the two possible structures independently. Second, if givenness is at stake in (14) and (15), it should also apply in (11). In other words, in addition to the correct definition of contrastive *but* the theory of givenness is needed.

- (15) John likes Bill's mother, and ...
 a. $BILL_F$ likes $JOHN_F$'s mother
 b. $\#BILL_F$ likes John's mother

This line of argumentation is further supported by (16). In case the antecedent VP is made up of a conjunction where one conjunct denotes the property of liking one's own mother and the other the one of liking Bill's mother, both the binding and the coreference option are ruled out. First, assume a further modification of the definition of *but*: All that is required by it is that one of the conjuncts in the antecedent VP contrasts with the one in the utterance VP. When we consider the binding option, there is an antecedent that contrasts with it. In particular, the property of liking Bill's mother contrasts with liking one's own mother. *AvoidF*, however, dictates that focus on the bound pronoun cannot be used because the property of liking one's own mother counts as given. The binding VP without focus on the bound pronoun, on the other hand, does not satisfy the definedness condition imposed by *but*. The focus value of this VP is just

the singleton set in (13-a). There is no antecedent denotation that is both a member of this set and is not identical to the ordinary value of the VP. What about the coreference option? This option is not licensed because there is no antecedent denotation that satisfies contrastiveness. In particular, the focus value of the coreference VP with an F-mark on the free pronoun is as in (13-b). The only antecedent denotation that is a member of it is the property of liking Bill's mother. But it is also identical to the ordinary value of the VP. Contrastiveness is not fulfilled. The same applies to the coreference option without F-mark on the free pronoun. If we just had the requirements of *but* at our disposal, the unacceptability of (16-a) and (16-b) could not be accounted for.

- (16) John likes his own mother and Bill's mother, but ...
 a. #BILL_F likes HIS_F mother
 b. #BILL_F likes his mother

So far a theory of givenness and in particular Schwarzschild's 1999 approach accompanied by a few assumptions about contrastiveness being introduced by *but* makes the right predictions. Let us now turn to another set of data which complicates the picture. In particular, the assumptions made about *but* will generate problems.

3 Contrastive focus on pronouns

This section presents a problem for theories of givenness, in particular the one formulated by Schwarzschild (1999) and discussed in the preceding section. Data with focus on pronouns suggest that a revision is necessary. The data are minimally different from the ones discussed in section 2. We will see that a minimal change – essentially the addition of negation – affects the predictions of the theory dramatically. On the basis of these data an argument can be made that the set of competitors considered by AvoidF needs to be enlarged. In the discussion below, I will not show for all the constituents whether they are given if it is obvious that they are. Rather, I will pick the ones where it is not immediately clear whether givenness holds and discuss them in detail.

3.1 Adding negation

Consider (17), under the reading where the pronoun refers to Bill. When there is negation involved, focus on the pronoun is not allowed (17-a)-(17-b). The negation is necessarily focused. This suggests that focus on the negation satisfies the contrastiveness requirement introduced by contrastive *but*. Moreover the impossibility of focusing the pronoun in (17-b) reminds us of data like (2) that were used as an argument for the postulation of a condition that minimizes the number of foci as AvoidF does in Schwarzschild's 1999 theory. This leads us to expect that an account in terms of givenness should be possible. In other words, the treatment of (2) should extend to the case in (17).⁸

⁸Stress on the pronoun *his* can be ameliorated under particular circumstances, namely if the stress on *Bill* is dropped – that is, if (i) is the sentence in question. But in this situation it seems that the sentence is not read as a continuation of *John likes Bill's mother* anymore. Rather an antecedent of the form *Bill*

- (17) John likes Bill's mother, but ...
 a. BILL DOESN'T like his mother
 b. #BILL DOESN'T like HIS mother

We will see, however, that (17) behaves differently from the data introduced in the preceding section and that a straightforward explanation using givenness and AvoidF is not available. Let us first see why the theory as sketched so far fails. We look, again, at the coreference and the binding options separately.

Option 1: coreference Again, $g(1)$ refers to Bill. If the pronoun is referential and there is no F-mark on the pronoun (18), all the relevant constituents are given. The DP [*I's mother*] and the pronoun itself are trivially given. In the following t is a variable over functions of type $\langle t, t \rangle$:

- (18) [$BILL_F$ DOESN'T $_F$ like 1 's mother]
 (19) *Given constituents*
 a. [$BILL_F$ DOESN'T $_F$ like 1 's mother]:
 [John likes Bill's mother] entails $\exists t. \exists x [t(x \text{ likes Bill's mother})]$
 b. [$DOESN'T_F$ like 1 's mother]:
 $\exists x [x \text{ likes Bill's mother}]$ entails $\exists t. \exists x [t(x \text{ likes Bill's mother})]$

If there is an F-mark on the pronoun (20), givenness will be satisfied because having more foci makes givenness-licensing easier. It is sufficient to notice that in all existential F-closures where *Bill* is used in (19), *Bill* is replaced by an existentially bound variable. But $\exists t. \exists x. \exists y [t(x \text{ likes } y\text{'s mother})]$ is, of course, given in that situation.

- (20) [$BILL_F$ DOESN'T $_F$ like 1_F 's mother]

By AvoidF the F-mark on the pronoun is not licensed in this situation. This means that under the coreference option (17-a) should be preferred to (17-b), i.e., the pattern in (17) is explained. In that respect the new data differ from the data discussed in the previous section. As we have seen coreference is not an option there due to the contrastiveness requirement of *but*. Would contrastiveness be satisfied by (18)? The focus value for the VP in (18) is as in (21). The denotation of the VP in the antecedent is the property of liking Bill's mother. This can be taken to be a member of (21) if one assumes that the identity-function serves as an alternative to negation. In this case, the denotation of the antecedent VP would contrast with the one of the VP in (18). In other words, the felicitousness of (17-a) and the infelicity of (17-b) are predicted by the coreference option.

- (21) $[[VP_{(18)}]]^f = \{\lambda x. t(x \text{ likes Bill's mother}) \mid t \in D_{\langle t, t \rangle}\}$

likes Mary's mother is accommodated.

- (i) Bill DOESN'T like HIS mother

We still have to consider the binding option. If the contrast in (17) is to be explained, this option should not rule in (17-b) either.

Option 2: binding For the binding option assume the LFs in (22), where $g(2) = \text{Jack}$, again. Note that negation is in the VP and the subject is QRed above it. This is necessary because we want the focus on negation to be licensed in order to let the VP contrast with the antecedent VP.

- (22) a. John likes Bill's mother
b. $BILL_F 2[NOT_F t_2 \text{ likes } 2_{(F)} \text{ mother}]$

If there is no F-mark on the bound pronoun, no violation of givenness obtains except for the constituent *[2's mother]*, which is not given. Similar remarks as in footnote 4 apply with respect to its givenness. It is left out below therefore.

- (23) *Given constituents*
a. $[BILL_F 2[NOT_F t_2 \text{ likes } 2's \text{ mother}]]$:
[John likes Bill's mother] entails $\exists t. \exists x[t(x \text{ likes } x's \text{ mother})]$
 $\exists x[x \text{ likes Bill's mother}]$ entails $\exists t. \exists x[t(x \text{ likes } x's \text{ mother})]$
b. $[2[NOT_F t_2 \text{ likes } 2's \text{ mother}]]$:
[John likes Bill's mother] entails $\exists t. \exists x[t(x \text{ likes } x's \text{ mother})]$
 $\exists x[x \text{ likes Bill's mother}]$ entails $\exists t. \exists x[t(x \text{ likes } x's \text{ mother})]$

As with the data in section 2, if we get rid of the offending bound pronoun in the existential F-closures considered by focusing it, givenness is again satisfied. In particular, the existential F-closure of both the IP and the VP is given because *John likes Bill's mother* entails $\exists t. \exists x. \exists y[t(x \text{ likes } y's \text{ mother})]$. By AvoidF, however, the bound pronoun should not be focused, as less F-marks are preferred. The remaining question is whether this option satisfies the requirements imposed by contrastive *but*. The focus value of the VP in (22-b) without F-mark on the bound pronoun is as in (24). The property denoted by the antecedent VP – that is, the property of liking Bill's mother – is not a member of (24). I.e., the contrastiveness requirement is not satisfied if we choose to leave the F-mark off the bound pronoun.

- (24) $[[VP_{(22-b)}]]^f = \{\lambda x. t(x \text{ likes } x's \text{ mother}) \mid y \in D_e, t \in D_{\langle t, t \rangle}\}$

When we consider the option for the VP with F-mark, the focus value in (25) obtains. This time the denotation of the antecedent VP is a member of (25), provided again that the identity function is an alternative to negation. Moreover, the antecedent denotation is not identical to the ordinary value of the VP in (22-b). Therefore the contrastiveness requirement is satisfied by the VP with an F-mark on the bound pronoun.

- (25) $[[VP_{(22-b)}]]^f = \{\lambda x. t(x \text{ likes } y's \text{ mother}) \mid y \in D_e, t \in D_{\langle t, t \rangle}\}$

But this means that the binding option would actually dictate the use of (17-b) over (17-a), because without focus on the pronoun contrastiveness is not satisfied. Note that AvoidF would not block the F-mark on the bound pronoun. It is an economy condition. As such it only applies if no other condition is violated. In the present case the

contrastiveness condition is violated. Therefore the option satisfying both givenness and contrastiveness must be chosen. This, however, is the one with an F-mark on the bound pronoun. This moreover suggests that the coreference option is used for the continuation in (17). As we will see momentarily, it is not clear, however, why the binding option and therefore focus on the pronoun is not licensed. From what we have seen so far, we expect optionality of focus on the pronoun.

3.2 The puzzle

To summarize: Remember that for the data in section 2 we said that the contrastiveness requirement of *but* requires the use of the binding option. Binding in turn required the use of an F-mark on the pronoun by givenness. This explained the pattern in (3) repeated as (26). In the data of the present section, (17) repeated as (27), on the other hand, the F-mark on the pronoun is prohibited. Given what we just saw, this means that the coreference option is chosen in this case. This explains the pattern.

- (26) John likes Bill's mother, but ...
 a. #BILL likes his mother
 b. BILL likes HIS mother
- (27) John likes Bill's mother, but ...
 a. BILL DOESN'T like his mother
 b. #BILL DOESN'T like HIS mother

The problem with this account is that one would expect (27-b) to be an option under the reasoning from above. In particular, the binding option should rule in (27-b). We have seen that in this case the bound pronoun must be F-marked. Otherwise a violation of the contrastiveness condition would incur. Only if the pronoun is stressed, the contrastiveness requirement is also fulfilled in that situation. Again, *AvoidF* does not apply in this situation because only the less economical option with an F-mark satisfies both givenness and contrastiveness. Thus nothing blocks (27-b) from surfacing.

Intuitively speaking the problem in (27-b) seems to be that there are too many foci. This means that *AvoidF* should rule it out. Recall that it is the coreference structure without F-mark on the pronoun in (28-a) that rules out the coreference version with F-mark on the pronoun in (28-b) because givenness checking does not lead to any violations of givenness in either of them.

- (28) a. $BILL_F$ NOT_F likes 3's mother
 b. $BILL_F$ NOT_F likes 3_F's mother

But there is no way that (28-a) can rule out the binding structure in (29), which has focus on the pronoun. This is because givenness compares identical structures that only differ in the presence or absence of an F-mark. But (29) differs from (28-a) in having a QRed subject and a binder co-indexed with the pronominal variable.⁹ Moreover

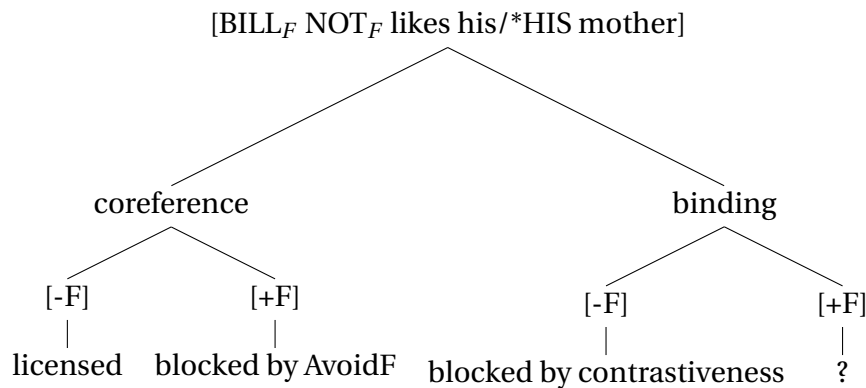
⁹Note that one cannot claim that the binding option simply does not exist because binding is needed to explain the data from section 2. Otherwise (26-a) would be preferred over (26-b). Moreover, if anything, one would expect following Reinhart (1983), Heim (1998) a.o. that the binding option is preferred if both binding and coreference are possible. In any case, if one is to defend that the coreference option

binding without F-mark cannot rule (29) out either because it is not even licensed by contrastiveness.

- (29) BILL_F 2[NOT_F t₂ likes 2_F's mother]

The nature of the problem can therefore be characterized as follows:

- (30) *Nature of the problem*
Coreference_[-F] cannot block binding_[+F] by AvoidF because coreference and binding employ different structures:



Intuitively, in order to achieve the correct distribution of F-marking, we want to find a way to let (28-a) not only block (28-b), but also (29). That means that the set of competitors considered by our theory must be expanded. In the following section I propose a solution that does exactly this in order to deal with this transderivational dilemma.

But before going on we have to be sure that the effect we are observing in (27) is not of a more general sort; that is, is it ever possible or necessary to stress part of the VP when negation and contrastive *but* are involved? Consider (31) and its possible continuations. It seems that we find a preference for F-marking *John* in this situation. It is clear why *John* in (31-a) is F-marked: The property of liking John's mother is not given in the present discourse. (31-b) might not be completely out as a continuation to (31), but it is definitely disfavored compared to (31-a). This is as expected because the property of liking John's mother is not given in the discourse.

- (31) John likes Bill's mother, but ...
a. BILL DOESN'T like JOHN's mother
b. ?BILL DOESN'T like John's mother

The reason why the judgements regarding (31-b) are a little delicate, I suspect, is as follows: In a situation where we are talking about the individuals John and Bill and their respective mothers, the utterance of (31) might give rise to an expectation that each one likes the other's mother. In other words, (31) could give rise to the additional implicated antecedent *Bill likes John's mother*. In this sense, the property of liking John's

is the one that is used in (27-a), it must be claimed that the preference of binding over coreference is overridden by an additional requirement, the requirement being givenness. Presumably this is no problem, as the preference of binding over coreference has the status of a rider that can be voided if need be, anyway.

mother could count as given and *John* would not have to be F-marked. Note that such an additional antecedent might also be available for (26) and (27). But in neither case do the continuations make use of that antecedent. Therefore, only the overt linguistic antecedent material matters for givenness calculation. At any rate, (31) shows that F-marking part of the VP is possible when negation and contrastive *but* are used. Therefore the puzzle discussed above cannot be reduced to independent factors.¹⁰

4 Focus values redux

In the present section I implement givenness by employing focus values and I argue for a modified version of AvoidF. AvoidF is replaced by MP! that essentially reduces the size of focus values.

4.1 Informal presentation of the idea

Recall the nature of the puzzle from subsection 3.2: We want a structure without F-mark to block a *different* structure that has an F-mark. But this is impossible with a condition that compares parallel structures that only differ in F-marking. A natural way to circumvent this problem is to try to capitalize on semantic values because in principle two different structures can yield the same semantic value. This is especially true for structures that allow both coreference and binding. Consider (32). It does not matter for the meaning whether the underlying structure is (33-a-i) or (33-a-ii), as long as *g*(3) maps onto *John*. If the latter holds, the semantic values are identical (33-b).

(32) John finished his dissertation

- (33) a. (i) John finished 3's dissertation
 (ii) John 2[t₂ finished 2's dissertation]
 b. [[(33-a-i)]] = [[(33-a-ii)]] = John finished John's dissertation

¹⁰Irene Heim (p.c.) notes that in the discourse in (i) focusing *patricide* is infelicitous. First, we have to see whether givenness is satisfied for the VPs in (i-a) and (i-b), respectively. The existential F-closure of the former is $\exists x[t(x \text{ commits } \textit{patricide})]$. The property denoted by the antecedent VP is *killing Bill's father*. Its existential closure, however, does not entail the existential F-closure. Moreover, the constituent [*patricide*] is crucially not given, either. The existential F-closure for the VP in (i-b), on the other hand, is $\exists x.\exists y[t(x \text{ commits } y)]$. It can be argued that this constituent is given because the property denoted by the antecedent VP – that is, *killing Bill's father* – entails committing murder. But then it is unclear why (i-b) is infelicitous, whereas (i-a) is felicitous. The only way to address the infelicity of (i-b) is to assume that *commit patricide* can either have a bound variable or a coreference structure. In the latter case what needs to be given is that someone killed Bill's father. The discourse guarantees this. (i-b), on the other hand, would have to have the binding configuration as underlying structure. Only focusing the underlying bound variable, which surfaces as focus on *patricide*, obeys givenness. If this is assumed, the pattern in (i) becomes parallel to the one in (27) in the text, and the solution to the latter should extend to the former.

- (i) John killed Bill's father, but ...
 a. BILL DIDN'T commit patricide
 b. #BILL DIDN'T commit PATRICIDE

Assume we have on the one hand focus values in our system and a condition on focus licensing more or less similar to Rooth's 1992 one, i.e., there must be an antecedent whose ordinary semantic value is a subset/member of the focus value of the focus constituent. Given the discussion from subsection 3.2, on the other hand, we also need something that lets the coreference structure without focus block the binding option with focus. So assume moreover that there is a condition that says: The smaller the size of a focus value, the better. In particular, (34-a) and (34-b) have the same ordinary semantic value if $g(3)$ maps onto Bill. So in principle both could be used as continuations in the example discussed in the previous section. But I will show that the focus value of a coreference structure without focus on the pronoun has a smaller focus value than both the coreference structure with focus and the binding structure with focus. The condition that reduces the size of focus values therefore prefers the former to the latter two.

- (34) a. $BILL_F$ NOT_F likes 3_F's mother
 b. $BILL_F$ 2[NOT_F likes 2_F's mother]

The binding structure without focus, however, is shown to not conform to the first condition – that is, Rooth's focus condition. In other words, there is no appropriate antecedent for such a structure. In addition it also does not satisfy the contrastiveness requirement, as we already know. Let us now turn to a more detailed outline of this idea.

4.2 The system

I will now introduce the assumptions made in order to account for the data discussed in the present paper. Remember that we are assuming Rooth's 1985 theory of focus, where an F-mark on a constituent makes alternative meanings of the same type as the constituent available. This is formalized by having two semantic values in the system, an ordinary semantic value and a focus value. The latter corresponds to the set of alternative meanings for the ordinary meaning an F-marked constituent. In other words F-marks introduce alternatives. Thus we have the following interpretive rules:

- (35) *Semantic values*
- a. (i) $[[A_{F,\sigma}]] = A$
 (ii) $[[A_{F,\sigma}]]^f = D_\sigma$
 - b. (i) $[[A_\sigma]] = A$
 (ii) $[[A_\sigma]]^f = \{[[A_\sigma]]\}$

Following Hamblin (1973) and Rooth (1985) the rule of functional application can be defined as in (36) when dealing with sets, as is necessary in the case of focus values. I assume that the rule in (36) is only necessary for the computation of focus values. In other words, ordinary values do not correspond to sets.

- (36) *Functional application*
 Given branching node A with daughters B of type $\langle\sigma\tau\rangle$ and C of type $\langle\sigma\rangle$, $[[A]]^f = \{f(x) \in D_\tau : f \in [[B]]^f \text{ and } x \in [[C]]^f\}$.

Moreover, the theory makes use of the \sim -operator which interprets foci. The semantic contribution of the operator is given in (37). It adds the presupposition that the contextually relevant alternatives $g(C)$ form a subset of the focus value of the sister constituent of the \sim -operator. In addition it resets the focus value to the ordinary value of its sister (cf. Rooth (1992) and Beck (2006)). In short (contrastive) focus is licensed if the ordinary value of the antecedent is a member/subset of the focus value considered. We refer to this as the *focus principle*. Furthermore I assume for concreteness that each sentential node has \sim adjoined to it. This has the effect that focus must be necessarily evaluated at the sentential level. Further \sim -operators are optional.

- (37) a. $[[[X \sim C [Y \dots]]]] = [[Y \dots]]$
 if $g(C) \subseteq [[Y \dots]]^f$, otherwise undefined
 b. $[[[X \sim C [Y \dots]]]]^f = [[Y \dots]]$

I will now introduce a new way of looking at AvoidF. In particular following Truckenbrodt (1995), I argue that it should be replaced by MP!. Truckenbrodt refers to this as *Maximize background*. MP! as a principle is introduced by Heim (1991). MP! is a condition which says that if there are alternatives ϕ and ψ conveying the same truth conditional information such that both satisfy the conditions imposed by the context, the alternative with the strongest requirement on the context has to be chosen. Heim motivates this condition by observing a competition in the use of the indefinite and definite articles following Hawkins (1981). The indefinite article cannot be used to modify a predicate in situations where it is already known that the predicate is only satisfied by one individual. It is assumed that the definite and the indefinite articles form lexical alternatives for purposes of MP!. Since an analysis of the definite article is assumed where the uniqueness of the modified predicate is presupposed, the definite article must be used in such situations. Consider (38). A car usually has only one engine. Both the indefinite article in (38-a) and the definite article in (38-b) could be used to convey the same information. But the definite article places a stronger requirement on the context due to the added uniqueness presupposition. By MP! it is preferred.

- (38) a. #An engine of my car broke
 b. The engine of my car broke

We can use MP! to do the job of AvoidF.¹¹ In particular, one can think of utterances as being split into focused and backgrounded material (cf. Stechow (1990) and Krifka (1992) a.o.). In Rooth's theory it is natural to extend this view to parts of utterances – that is, to focus domains (FD). Assume that FD is defined as in (39). MP! can be defined as in (40). ϕ and ψ in the discussion below will correspond to different choices for the values of FD.

¹¹In what follows I will assume that MP! only regulates the position of F-marks inside a focus domain. In Truckenbrodt's 1995 theory it is also the establishment of the focus domain itself that is regulated by MP!, i.e., the attachment site of \sim is subject to MP! as well. This is presumably the correct way to think about it. But since we are assuming that the sentential level has an obligatory \sim adjoined anyway, and since the data discussed in this section do not make it necessary to establish smaller focus domains, I will proceed as if MP! had nothing to say about the attachment site of \sim .

- (39) *Focus Domain*
A focus domain corresponds to the scope of a \sim -operator.
- (40) *Maximize Presupposition*
Given alternatives ϕ and ψ such that ϕ and ψ convey the same truth-conditional information, choose the one with the strongest requirement on the context possible.

Let us now turn to the application of the theory to the puzzling data discussed in the previous section.

4.3 Explanation of data

Let me first repeat the crucial data once more:

- (41) John likes Bill's mother, but ...
a. BILL DOESN'T like his mother
b. #BILL DOESN'T like HIS mother

I will now show that the system introduced in the previous subsection accounts for the obligatory absence of focus on the pronoun in (41). The LFs we have to consider are the ones given in (42), i.e., both the coreference and the binding option with and without focus on the pronoun, respectively. The value of $g(2)$ is immaterial for the present discussion since we are only considering the semantic values of the whole IPs. In each case the \sim -operator is coindexed with the antecedent sentence in (41).

- (42) a. (i) $[_{CP} \sim C [_{IP} \text{BILL}_F \text{NOT}_F \text{likes his mother}]]$
 (ii) $[_{CP} \sim C [_{IP} \text{BILL}_F \text{NOT}_F \text{likes his}_F \text{mother}]]$
 b. (i) $[_{CP} \sim C [_{IP} \text{BILL}_F 2 [_{VP} \text{NOT}_F t_2 \text{likes 2's mother}]]]$
 (ii) $[_{CP} \sim C [_{IP} \text{BILL}_F 2 [_{VP} \text{NOT}_F t_2 \text{likes } 2_F \text{'s mother}]]]$

First, note that all of the options have the same ordinary semantic value. This means that MP! as defined can apply. MP! compares alternatives with the same truth-conditional contribution and chooses the one with the strongest requirement on the context. So the question is which one of the options in (42) makes the strongest requirement:

- (43) $[[(42)]] = \lambda w. \neg \text{Bill likes Bill's mother in } w$

The focus value for the IP in the coreference option without F-mark on the pronoun – that is, for (42-a-i) – is given in (44). As there is no F-mark on the pronoun, no alternatives are introduced for the individual denoted by the pronoun. The focus value is the set of propositions of the form x likes Bill's mother, x an individual, with a function of type $\langle st, st \rangle$ applied to it. Notice moreover that I am treating the identity map (ID) as an alternative to negation, again.

- (44) $[[\text{IP}_{(42-a-i)}]]^f = \{ t(\lambda w. x \text{ likes Bill's mother in } w) \mid x \in D_e, t \in D_{\langle st, st \rangle} \}$

Consider now the focus values of the IPs of the coreference option and the binding option – where both exhibit an F-mark on the pronoun – (42-a-ii) and (42-b-ii) respectively. The two focus values are identical. Since the F-mark on the pronoun intro-

duces alternatives for the pronoun, the difference between binding and coreference becomes superfluous. The focus value is now the set of propositions of the form *x liked y's mother* with a function of type $\langle st, st \rangle$ applied to it.

$$(45) \quad [[IP_{(42-a-ii)}]]^f = [[IP_{(42-b-ii)}]]^f = \{t(\lambda w.x \text{ likes } y\text{'s mother in } w) \mid x, y \in D_e, t \in D_{\langle st, st \rangle}\}$$

Now we have to check which ones of the focus values considered so far satisfy the focus principle. I.e., it has to be seen whether the ordinary value of the antecedent sentence is a member of the focus values or not. The ordinary value of the relevant antecedent is obviously as follows:

$$(46) \quad [[IP_{antecedent}]] = \lambda w. \text{John likes Bill's mother in } w$$

It turns out that the focus principle would be satisfied by all of the focus values above, i.e., (46) is a member of all of the focus values above. Given that all three options would in principle be possible focus values given the antecedent, and given that we have seen that all structures under consideration share their denotation, MP! will determine which focus value is to be chosen. It turns out that the focus value of the coreference option without F-mark is a proper subset of both focus values with an F-mark, as stated in (47). Thus the former option is strictly stronger than the latter two, which means that it places a stronger requirement on the context. Thereby it blocks both options with a focus on the pronoun, i.e., the focus values of the structures with F-mark on the pronoun are simply too large, and thus they are uneconomical.

$$(47) \quad \{t(\lambda w.x \text{ likes Bill's mother in } w) \mid x \in D_e, t \in D_{\langle st, st \rangle}\} \subset \{t(\lambda w.x \text{ likes } y\text{'s mother in } w) \mid x, y \in D_e, t \in D_{\langle st, st \rangle}\}$$

Remember that we are assuming that in addition to the obligatory \sim -operator attached to the sentential level, further embedded \sim -operators are optional and sometimes necessary (cf. Rooth (1992) and the discussion in Mayr (to appear)). The question is whether these additional LFs would not actually license the infelicitous (41-b). This means that at least the following structures have to be considered possible LFs.¹²

$$(48) \quad \begin{array}{ll} \text{a. (i)} & [_{CP} \sim C [_{IP} \text{BILL}_F [\sim C [_{VP} 2[\text{NOT}_F t_2 \text{ likes his mother}]]]] \\ & \text{(ii)} \quad [_{CP} \sim C [_{IP} \text{BILL}_F [\sim C [_{VP} 2[\text{NOT}_F \text{likes his}_F \text{ mother}]]]] \\ \text{b. (i)} & [_{CP} \sim C [_{IP} \text{BILL}_F [\sim C [_{VP} 2[\text{NOT}_F t_2 \text{ likes 2's mother}]]]] \\ & \text{(ii)} \quad [_{CP} \sim C [_{IP} \text{BILL}_F 2 [\sim C [_{VP} 2[\text{NOT}_F t_2 \text{ likes 2}_F\text{'s mother}]]]] \end{array}$$

There are no significant differences to the cases considered above, however. Again, the focus value of the VP in (48-a-i) – that is, (49-a) – is the strongest requirement that can be placed on the context. The ordinary value of the antecedent VP is a member of that value. Moreover, (49-a) is strictly stronger than the focus value for both options with an F-mark on the pronoun given in (49-b). Thus MP! prefers the former focus value. (48-b-i) is again ruled out as structure because there is no binding relation in the antecedent VP. Thus the focus principle could never be satisfied. This means our

¹²Note that the attachment sites of \sim might also be regulated by MP! as discussed in footnote 11 above. Let us nevertheless see what the outcome is if this option is ignored, i.e., if we proceed as if the positioning of \sim were not conditioned by MP!.

theory makes the correct predictions concerning the data we set out to derive.

- (49) a. $\llbracket \text{VP}_{(48\text{-a-i})} \rrbracket^f = \{\lambda x. \lambda w. t(x \text{ likes Bill's mother in } w) \mid t \in D_{\langle st, st \rangle}\}$
 b. $\llbracket \text{VP}_{(48\text{-a-ii})} \rrbracket^f = \llbracket \text{VP}_{(48\text{-b-ii})} \rrbracket^f = \{\lambda x. \lambda w. t(x \text{ likes } y\text{'s mother in } w) \mid y \in D_e, t \in D_{\langle st, st \rangle}\}$

What remains to be shown is that the binding structure without focus on the pronoun (42-b-i) is ruled out by our system. First remember that this option is already blocked by the fact that the contrastiveness requirement is not satisfied by the VP used. This was the very reason why the puzzle in the preceding section arose. But in addition – in contrast to Schwarzschild's 1999 system – there is another reason why this option cannot surface. Consider the focus value for the corresponding IP. It can be seen that the ordinary semantic value of the antecedent IP (46) is not a member of (50). Therefore, in addition to the violation of contrastiveness, the focus principle is not satisfied by (42-b-i) either.

- (50) a. $\llbracket \text{IP}_{(42\text{-b-i})} \rrbracket^f = \{t(\lambda w. x \text{ likes } x\text{'s mother in } w) \mid x \in D_e, t \in D_{\langle st, st \rangle}\}$

Let us also briefly reconsider the data from subsection 2.1 above, which were used to introduce Schwarzschild's system. First recall the data:

- (51) John likes Bill's mother, but ...
 a. #BILL_F likes his mother
 b. BILL_F likes HIS_F mother

From our considerations regarding the contrastiveness requirement of contrastive *but* we already know that coreference as a whole is ruled out in this situation. Coreference, both with focus and without focus on the pronoun, is not available because the VPs do not contrast. Therefore we only have to consider the binding options in (52).

- (52) a. $[_{CP} \sim C [_{IP} \text{ Bill}_F 1 [_{VP} t_1 \text{ likes } 1\text{'s mother}]]]$
 b. $[_{CP} \sim C [_{IP} \text{ Bill}_F 1 [_{VP} t_1 \text{ likes } 1_F\text{'s mother}]]]$

The ordinary semantic value of the antecedent is not a subset of the focus value in (53-a) – that is, of the focus value of the binding IP without F-mark on the pronoun. (52-a) therefore does not satisfy the focus principle and is blocked. The antecedent value is, however, a subset of the focus value for (52-b), which is given in (53-b). The focus principle is satisfied. Moreover remember that although the coreference option without F-mark on the pronoun would also satisfy FR – because its focus value would be $\{\lambda w. x \text{ likes Bill's mother in } w \mid x \in D_e\}$ and the denotation of the antecedent is a member of that set – it does not block (52-b). As said above, a VP with a pronoun referring to Bill is never licensed, as it does not contrast with the antecedent VP. Therefore only (52-b) is licensed.

- (53) a. $\llbracket \text{IP}_{(52\text{-a})} \rrbracket^f = \{\lambda w. x \text{ likes } x\text{'s mother in } w \mid x \in D_e\}$
 b. $\llbracket \text{IP}_{(52\text{-b})} \rrbracket^f = \{\lambda w. x \text{ likes } y\text{'s mother in } w \mid x, y \in D_e\}$

In the present section we have shown that the assumption that AvoidF is an instance of MP! directly accounts for data that proved to be problematic for Schwarzschild's orig-

inal formulation of *AvoidF*. We have seen that we can account for the data, once we allow for comparison of focus values in the sense that smaller focus values are preferred by MP!. The reason is that MP! naturally expands the set of competitors when comparing alternatives for focus licensing. In the following section, further properties of the proposed system are discussed.

5 Replicating Schwarzschild's results

In the present section I will show how the predictions of Schwarzschild's 1999 system are replicated by the present proposal in terms of focus values combined with Truckenbrodt's 1995 suggestion to replace *AvoidF* with MP!. Recall that in Schwarzschild's 1999 theory givenness is the main force that drives F-marking of material. Let me briefly review the two conditions he proposes: First each non-F-marked constituent in a clause must be given, whereas F-marked constituents need not be given. This is condition (4) from section 2. To be given as an individual-denoting expression means that there is an antecedent constituent in the context whose denotation is coreferential with that expression. For expressions of all other types the existentially type shifted version of the denotation of some antecedent entails the existentially type shifted denotation of the non-F-marked constituent, where all F-marks are replaced by existentially bound variables. Second, Schwarzschild uses the condition *AvoidF* (6) that compares structures with and without F-mark and says that the one with the fewest F-marks satisfying givenness must be chosen.

The givenness condition (4) allows for given material to be F-marked, although it does not require it. Schwarzschild shows that this assumption is necessary. In (54), where the pronoun is coreferential to *John*, it is given as the context – the antecedent question – mentions John. Nevertheless the pronoun can and in fact must be focused.

- (54) {Who did John's mother praise?}
 A: She praised [HIM]_F
 (Schwarzschild 1999:145)

Schwarzschild considers the F-markings A₁-A₅ in (54) as potential structures for the answer. The first one is the only possible one he argues.

- (55) Who did John's mother praise?
 A₁: She praised [HIM]_F
 A₂: *[She praised him]
 A₃: *[SHE_F praised him]
 A₄: *[She PRAISED_F him]
 A₅: *She [[PRAISED]_F him]_F

Before showing how the present system accounts for the obligatory F-mark on the pronoun in (54), let us briefly discuss how Schwarzschild rules out all structures except for A₁. We will see that all other answers either violate givenness or *AvoidF*. In Schwarzschild's system we have to check whether each constituent that is not F-marked is given by the context. In the present case the context only contains the question. We assume Karttunen's 1977 semantics of questions. The existential type shift of the se-

mantic value of the question, $\{p : \exists x[p = \text{John's mother praised } x]\}$, is equivalent to $\exists x[\text{John's mother praised } x]$ – that is, the existential type shift of the question is the disjunction of all the answers.¹³ This is the antecedent for the answers for which we check givenness.

First consider the grammatical A_1 . The pronoun *she* is coreferential with *John's mother* and *him* with *John*, i.e. both count as given. They are left out in (56). But (56) shows that also for all remaining non-F-marked constituents there is an existentially type shifted antecedent that entails the existential F-closure of that constituent.

(56) *Given constituents*

a. $[\text{She praised } [HIM]_F]$:

$\exists x[\text{John's mother praised } x]$ entails $\exists x[\text{John's mother praised } x]$

b. $[\text{praised } [HIM]_F]$: $\exists x[\text{John's mother praised } x]$ entails $\exists x.\exists y[y \text{ praised } x]$

c. $[\text{praised}]$: $\exists y[\text{John's mother praised } y]$ entails $\exists x.\exists y[y \text{ praised } x]$

But why is the F-mark obligatory, i.e., why is AvoidF that pushes for less F-marks not violated? Consider the ungrammatical A_2 . Since A_2 is wholly non-F-marked, there should be antecedents that entail *John's mother praised John* and $\exists x[x \text{ praised John}]$, the existential F-closures of the IP and the VP, respectively. The existentially type shifted question does not entail this, however. A_3 is ruled out for essentially the same reason. Since the subject is F-marked in this case, the existential F-closure of the IP and the VP collapse to $\exists x[x \text{ praised John}]$. As we have already seen during the discussion of A_2 , this is not given.

The existential F-closure of the IP in A_4 , on the other hand, is $\exists R[R(\text{John's mother}, \text{John})]$. But again, there is no antecedent that entails that there is some relation between John and John's mother.¹⁴ The VP is not given either by any constituent. I leave the verification of this to the reader. When we consider A_5 , we see that each non-F-marked constituent is given. In addition to the pronouns *she* and *him*, the whole IP counts as given (57). Note that the pronoun *him* itself is not F-marked, but it is dominated by an F-mark.¹⁵

(57) $[\text{She } [[\text{PRAISED}]_F \text{ him}]_F]$:

$\exists x[\text{John's mother praised } x]$ entails $\exists R[R(\text{John's mother})]$

But in this case AvoidF is violated because $[\text{She } [[\text{PRAISED}]_F \text{ him}]_F]$, A_5 , has more F-marks than $[\text{She praised } [HIM]_F]$, A_1 . As both satisfy givenness, the latter is preferred. This is the desired outcome.

¹³See (Schwarzschild 1999:152) for an exact definition of existential type shift. For the present purposes it seems enough to intuitively grasp the main idea.

¹⁴See (Schwarzschild 1999:160 fn.5), where he claims that the expression *John's mother* might not entail that John has a relation to John's mother, but that it might rather be a presupposition. Moreover, he speculates that *R* might stand in for verbal predicates and that a nominal predicate might not be an instantiation for this variable. By this reasoning the givenness of *John's mother* does not entail that there is a relation between John and John's mother.

¹⁵Note that the F-marking indicated in A_5 is argued to be possible by many works following Selkirk (1984) (also cf. Rochement (1986)), where it is assumed that if a syntactic head is F-marked, then this F-mark can project to the phrase level. Moreover F-marking of an internal argument licenses an F-mark on the head selecting for the internal argument (see Selkirk (1996)).

Let us now see whether the present theory can replicate Schwarzschild's results. We assume that the potential LFs are as in (55) above with the only difference that a \sim -operator together with a contextually determined set of alternatives is adjoined to each answer. Recall once more that the ordinary semantic value of the antecedent question is $\{p : \exists x[p = \lambda w.\text{John's mother praised } x \text{ in } w]\}$. The focus value of A_1 is (58). The question denotation is necessarily a subset of (58), i.e., the focus principle is satisfied.

$$(58) \quad [[A_1]]^f = \{\lambda w.\text{John's mother praised } x \text{ in } w \mid x \in D_e\}$$

Consider answer A_2 , which has the focus value in (59). The denotation of the question is not a subset of $[[A_2]]^f$. It could only be so if the set of answers were only a singleton. Thus FR is not satisfied by A_2 .¹⁶

$$(59) \quad [[A_2]]^f = \{\lambda w.\text{John's mother praised John in } w\}$$

Answer A_3 , on the other hand, denotes the set of propositions where different people praise John. Clearly, the denotation of the antecedent question is not a subset of this focus value either, i.e., A_3 does not satisfy the focus principle:

$$(60) \quad [[A_3]]^f = \{\lambda w.x \text{ praised John in } w \mid x \in D_e\}$$

A_4 is ruled out for similar reasons as A_3 . The question denotation cannot be a subset of the possible relations holding between John's mother and John:

$$(61) \quad [[A_4]]^f = \{P(\text{John's mother}, \text{John}) \mid P \in D_{\langle e, st \rangle}\}$$

Consider now A_5 . Its focus value denotes John's mother's potential properties:

$$(62) \quad [[A_5]]^f = \{P(\text{John's mother}) \mid P \in D_{\langle e, st \rangle}\}$$

Notice that the F-mark on the verb does not contribute to this focus value at all. A_5 , too, is ruled out by our considerations. In Schwarzschild's account it was blocked by AvoidF. In other words, there is a more economical version than A_5 . This also holds for the modified account where MP! takes its place. In particular, the set in (58), the focus value of A_1 , is a proper subset of (62). As we have seen, (58) is licensed. Thus MP! prefers A_1 over A_5 .

We have thus carried over Schwarzschild's explanation for the intriguing question-answer data. Notice that in the new account it suffices to check whether the ordinary value of the antecedent sentence is a subset of the focus value of the whole focus utterance. We have not felt the need to apply this checking to any subconstituents of the latter as in Schwarzschild's account.

¹⁶In case questions denote the set of true answers, instead of possible answers, as proposed by Karttunen (1977), it could happen that the semantic value of the antecedent is a subset of $[[A_2]]^f$. I am following Hamblin (1973) and other work more closely in assuming that the denotation of a question is the set of possible answers. In particular see Beck and Rullmann (1999) for arguments that this is the correct approach.

6 Conclusion

In the present paper I have advanced the following claim: The competitor set necessary for focus licensing must be enlarged. In particular, it was suggested that if two structures share their denotation, then they are both equally relevant for focus licensing. It was shown that this is a direct prediction of the theory advocated by Truckenbrodt (1995) whereby AvoidF should be seen as an instance of MP!. The second contribution I hope to have made is to have shown that Schwarzschild's 1999 insight that structures without F-marks are more economical than ones with can be easily incorporated into a system making use of focus values.

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Welsh Prenominals: at the Syntax-Morphology Interface

Ingo Mittendorf and Louisa Sadler*

Welsh is a strongly head-initial vso language: within a variety of projections only a very limited range of elements may appear in pre-head position. This paper is concerned with the *prenominal* field within noun phrases, and discusses a set of elements which occur in this position and which also exhibit a number of quite puzzling restrictions on their syntactic behaviour.

We present the data drawing together observations from standard descriptive grammars, examples from corpus searches of reputable sites and work with informants, and show that the observed picture departs in some respects from the standard view in descriptive grammars. Data from the interaction with NP-internal coordination throws up some intriguing challenges.

The restrictions on the prenominal domain which we explore appear to place the problem squarely at the interface of syntax and morphology: are we dealing with morphological constructions, cases of phrasal affixation, or some form of restricted lexical constructions? What weight should be given to tests such as the Coordination Criterion (Miller, 1992a)? In sum, we consider that the data we discuss pose a challenge to linguistic analysis, which we explore within the context of existing work and the assumptions adopted in lexicalist constraint-based formalisms.

This paper is structured as follows. We start by outlining the data in section 1. Section 2 reviews existing work relevant to some of the data described. In section 3 we briefly present arguments in favour of recognising the existence of lexical level coordination in Welsh, and hence the conclusion that the restrictions which we observe in the data, which involve elements failing to take scope over (putative) cases of lexical coordination, cannot be attributed to the non-availability of lexical level coordination in this language. We then turn to previous work on the nature of lexical level constructions in section 4, and conclude that there is nothing in that literature which provides any particularly helpful leverage on the problem at hand: that is, there is no basis from existing work to conclude that coordination is not permitted in lexical constructions. A final section starts out from the premise encapsulated in the coordination criterion, namely that the failure to scope over a coordination should provide evidence for a morphological treatment of the element in question, and considers some alternative analyses in the light of that criterion.

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1 Restrictions on Prenominal Material

The elements which come before the head noun are fairly few and include the definite determiner *y* and its variants *yr*, *'r*,¹ other determiners such as *pob* 'every', *pa* 'which' and *sut* 'what kind of', a set of pronominal possessive markers, a handful or so of adjectives (most occur postnominally) and numerals in Numeral-Noun constructions. The following examples illustrate this range of elements.

- (1) a. *y tair cath ddu*
 the three.F cat black
 'the three black cats' (Borsley et al., 2007, 152)
- b. *y bedwaredd wobr*
 the fourth.F prize
 'the fourth prize' (Borsley et al., 2007, 156)
- c. *fy nghar i*
 1S car me
 'my car' (Borsley et al., 2007, 156)
- d. *y tair gwahanol iaith*
 the three.F various language
 'the three different languages' (Borsley et al., 2007, 156)

In common with the other Celtic languages, Welsh uses a construction highly reminiscent of the Semitic construct state construction to express possession, in which only the highest possessor in the construction is marked for definiteness. Non-pronominal possessors appear postnominally and will be separated from the head by any adjectival modifiers of the head but will precede any complements.

- (2) *siop mab chwaer y meddyg*
 shop son sister the doctor
 'the shop of the doctor's sister's son' (Borsley et al., 2007, 184)

If in contrast the possessor is pronominal, a prehead possessive marker additionally occurs, as *fy* in (1c). The posthead (dependent) pronoun (*i* in 1c) may in fact be dropped (and must be absent under certain binding conditions).² There is persuasive evidence (see Sadler, 1997; Borsley, 2009, for extensive discussion) that the prehead pronominal marker (generally referred to as a clitic in the theoretical literature on Welsh) is part of the agreement system in Welsh, in which the majority of lexical heads agree with their pronominal arguments. In outline, finite verbs inflect showing agreement with their pronominal subjects, prepositions inflect to agree with their

¹Welsh has no indefinite determiner and uses just the bare noun. A complex set of considerations govern selection of the correct form of the definite article, a matter which is extensively discussed in Hannahs and Tallerman (2006), and briefly reviewed below.

²The prehead marker (or its mutation effect on the following word) is sometimes absent in non-standard speech.

pronominal objects, nouns are preceded by agreement clitics coding their pronominal possessors and non-finite verbs take the same set of clitics agreeing with their pronominal objects. As such, and as Borsley (2009) observes, although it is natural to view them as affixes realizing agreement, the fact that they can be separated from the head by (a restricted set of) intervening elements, is problematic for this view.³

- (3) ei hen lyfr (o)
 3SGM old book he
 ‘his old book’

(Borsley, 2009, 234)

The standard position for attributive adjectives is postnominal, and the vast majority of adjectives are limited to this position in non-literary Welsh. A small number of adjectives occur only before the noun (and a very few alternate with a difference in meaning according to their position: e.g. *unig blentyn* ‘an only child’ vs. *plentyn unig* ‘a lonely child’): there is then, a strong degree of lexical selection here. The list of adjectives which precede the noun include the following (Borsley et al., 2007; Thomas, 1996): *dewis* ‘chosen’, *dirprwy* ‘deputy’, *diweddar* ‘deceased’, *gwir* ‘true, real, genuine’, *hen* ‘old’, *hoff* ‘favourite’, *cas* ‘nasty’, *mân* ‘minor’, *prif* ‘main’, *unig* ‘only’, *uchel* ‘high’. Such adjectives are in general non-gradable, occur in a fixed order, and are not modifiable by adverbial intensifiers such as *rhy* ‘too’ or *iawn* ‘very’.⁴

Turning now to pronominal numerals, the usual pattern for complex numerals in the traditional vigesimal system is that a simple (lower) numeral precedes the noun (if one is present). The noun is followed by either or both of two components: first the remainder of the complex numerals between ‘11’ and ‘19’ (*ar ddeg* ‘on ten’ or *ar bymtheg* ‘on fifteen’); second, one of the vigesimal numerals ‘20’, ‘40’, ‘60’ or ‘80’, preceded by either *ar* ‘on’ (‘20’ only) or *a* ‘and’ (‘40’, ‘60’, ‘80’). In the modern decimal system, all parts of the numeral precede the nominal. Examples are given in (5). A notable aspect of this construction is that the numeral is followed by a *singular* noun as in (5) (for an LFG analysis of this construction, see Mittendorf and Sadler, 2005).

- | | | | | | | | |
|-----|-----------|---|--------------|---|----------------------|-----------------|---------|
| (4) | 11, 13-14 | = | [Simple Num] | N | ar ddeg | ['+10'] | |
| | 16-19 | = | [Simple Num] | N | ar bymtheg | ['+15'] | |
| | 21-39 | = | [Simple Num] | N | (ar ddeg/ar bymtheg) | ar hugain | ['+20'] |
| | 41-59 | = | [Simple Num] | N | (ar ddeg/ar bymtheg) | a deugain | ['+40'] |
| | 61-79 | = | [Simple Num] | N | (ar ddeg/ar bymtheg) | a thrigain | ['+60'] |
| | 81-99 | = | [Simple Num] | N | (ar ddeg/ar bymtheg) | a phedwar ugain | ['+80'] |

- (5) a. tri dyn
 three.M man.M.SG
 ‘three men’

³Borsley does not provide an explicit analysis of the prehead material or of the prehead clitic which he suggests (without further discussion) might be taken as a phrasal affix in the sense of Anderson (1992).

⁴*Hen* ‘old’ can be adverbially modified but in that case must be postposed: *hen ddyn* ‘an old man’ but *dyn rhy hen* ‘a too old man’ (Thomas, 1996, 210).

- b. un deg tri dyn
 one ten three.M man.M.SG
 'thirteen men'
- c. tri dyn ar ddeg
 three.M man.M.SG on ten
 'thirteen men'

There is also a second, (pseudo-)partitive construction in which the numeral is followed by *o* 'of' and a plural noun. Examples are given in (6) but this construction is not further discussed in the paper; it is the pattern numeral followed by a singular noun which is of relevance here.

- (6) a. tri o ddynion
 three.M of man.M.PL
 'three men'
- b. un deg tri o ddynion
 one ten three.M of man.M.PL
 'thirteen men'
- c. tri ar ddeg o ddynion
 three.M on ten of man.M.PL
 'thirteen men'

Particular restrictions on the prehead material begin to emerge when we consider its behaviour in combination with coordination. Thomas (1996, pp. 209, 265) notes that (some) pre-nominal material cannot take scope over a following coordination. For example, in (7) the definite article must be repeated.

- (7) y dynion a'r merched vs. *y dynion a merched
 the men and=the girls vs. *the men and girls
 'the men and girls' (Thomas, 1996, 265)

- (8) y tadau a *('r) meibion
 the fathers and the sons
 the fathers and sons

As shown in the following example, the same is true of the proclitic possessive pronoun. In (9) the clitic pronoun *ei~'i*⁵ must be repeated, but the post-nominal pronoun *hi*, which doubles the prenominal clitic(s) occurs only once and thus scopes over the coordination.

⁵Note that the 3SM and 3SF clitic pronouns *ei~'i* are homophones (and homographs) but trigger different Initial Mutations: *tad* 'father', *ei dad* (/t/ ⇒ /d/) 'his father', *ei thad* (/t/ ⇒ /θ/) 'her father'.

- (9) ei ffagots a'i phys hi
 3SF faggots and=3SF peas 3SF
 'her faggots and peas' (Thomas, 1996, 209)

- (10) ei wasanaeth, ei gyflog, ei weision, ei lywodraeth, ei gwmni
 3SM services, 3SM wages, 3SM servants, 3SM government, 3SM company
 a'i wlad
 and=3SM country

In the pseudo-partitive construction, the numeral can take wide scope over a coordination but this seems to be impossible in the numeral noun construction.

- (11) pump o fechgyn a merched
 five of boy.PL and girl.PL
 'five boys and girls'
- (12) *pum bachgen a merch
 five boy.SG and girl.SG
 'five boys and girls'

Thomas (1996) also mentions prenominal adjectives as being subject to this same restriction, but the examples that he provides (13) to demonstrate repetition of the pre-nominal adjective are problematic since they also contain clitic pronouns or the definite determiner, for which it is independently established that these must be repeated. Since the adjective intervenes between the clitic/determiner and the noun by necessity it must also be repeated. To establish this point more firmly further investigation is necessary to show that pre-nominal adjectives are independently unable to occur with a nominal coordination.⁶

- (13) a. ei hunig fab a'i hunig ferch
 3SF only son and=3SF only daughter
 'her only son and daughter'
- b. yr hen ddefaid a'r hen foch
 the old sheep.PL and=the old pigs
 'the old sheep and pigs'

However, this simple generalization, that no prenominal material can take scope over a coordination within the noun phrase, turns out to be not completely accurate. We base this view, which partly contradicts descriptions given in Thomas (1996, pp.

⁶In our data work, one informant did accept *hen ddefaid a moch* for 'old sheep and [old] pigs', but this informant exceptionally also accepted a number of other examples with wide scope numerals, and thus these judgements cannot be taken to establish the grammaticality of such structures more widely. The judgements of this (*bona fide*) native speaker were curiously at odds with those of other speakers on a number of data points concerning the behaviour of prenominal numerals, for which we have no explanation.

209, 265) on searches in the *Cronfa Electroneg o Gymraeg* (CEG, Ellis et al. (2001)) and work with native informants. The main points to emerge would seem to be as follows:

Although the definite article and possessive clitics, both arguably determiners, must be repeated as in (7) and (9) the same rule does not apply to the determiner *pa* 'which', which can take wide scope over a coordination. The scoping issue therefore has nothing to do with determiners per se:

- (14) *pa unigolion a sefydliadau*
 which individuals and institutions
 'which individuals and institutions'

Contra the assumption above, text data and native speaker information suggest that a pre-nominal adjective can take wide scope over a coordination:

- (15) *prif gylchgronau a phapurau newydd Cymru*
 main journals and papers news Wales
 'the main journals and newspapers of Wales'

Where the article (or a possessive) precedes Adj + [N + N], it is **not** repeated.

- (16) a. *yr unig feirdd a llenorion*
 the only poets and men-of-letters
 'the only poets and men of letters'
- b. *yr hen Aztecaid a Sbaenwyr hynny*
 the old Aztecs and Spaniards those
 'those old Aztecs and Spaniards'
- c. *y gwahanol afiechydon a chlefydau*
 the different illnesses and diseases

Wherever we found examples of pre-nominal adjectival coordinations, the article and possessives are repeated with each conjunct. (Note: one informant was unhappy with 17a).

- (17) a. *yr unig a'r prif gymeriad*
 the only and=the main character
 'the main and only character'
- b. *y prif gymeriad a'r unig un*
 the main character and=the only one

If a numeral in the plain construction is separated from a N-coordination, it apparently can take wide scope over the coordination:

- (18) **pum [llyfr a ffilm]*
 five [book.SG and film.SG]

- (19) *pum hoff [lyfr a ffilm]*
 five favourite [book.SG and film.SG]
- (20) *y pum prif nod ac amcan*
 the five main aim.SG and objective.SG
 ‘the five main aims and objectives’

On the other hand, if the first coordination in the NP is one of ordinal numbers numerals, the determiner appears on each conjunct (21). (A similar coordination of pre-nominal adjectives is unacceptable for many speakers, but where it occurs, or is accepted, the pattern is the same as for (21).)

- (21) *y trydydd a *(’r) pedwerydd mis*
 the third and the fourth month

This section has presented some quite complex restrictions on the prenominal position within the Welsh noun phrase. Having first noted that the only elements which occur prenominally are a small set of determiners, a handful of adjectives, a set of pronominal markers and numerals in Numeral-Noun construction, we have then shown that this material is subject to further restrictions which are apparent when we consider the behaviour of such prenominal material in interaction with coordination.

2 Previous Analyses

2.1 Previous Analyses of the Definite Determiner

As noted above, the Welsh definite determiner has three forms *y*, *yr*, *’r* and the selection of the correct form is determined by a complex interplay of phonological and other factors. This matter is discussed extensively in Hannahs and Tallerman (2006) and we briefly present their approach in this section. The analysis in Hannahs and Tallerman (2006) is essentially concerned only with the matter of explicating this choice of forms, and does not address the nature of the constituent structure in any detail or provide any discussion or proposal as far as the coordination facts are concerned. As for the choice of form for the definite determiner, firstly, *yr* precedes a V- or *h*-initial element, *y* precedes a C-initial element, as in *yr afon* ‘the river’, *yr haul* ‘the sun’, *y dyn* ‘the man’. This holds irrespective of whether the immediately following material is a noun or an adjective or numeral:

- (22) *y brif ddinas*
 the main city
 ‘the capital city’ (Hannahs and Tallerman, 2006, 783)
- (23) *yr unig blentyn*
 the only child
 ‘the only child’ (Hannahs and Tallerman, 2006, 783)

Secondly, *r* follows a V-final element and satisfaction of the environment for *r* overrides selection of the other two.

- (24) a. *o'r llyfr*
 from=the book
 'from the book'

- b. *yn canu'r emyn*
 PROG sing=the hymn
 'singing the hymn'

(Hannahs and Tallerman, 2006, 783)

Thirdly, with respect to *yr/y* alternation, the **post-mutation** form of the following element determines the selection of the article form, even though the article itself actually provides the environment governing soft mutation (of FSG forms). Thus, FSG forms appear in soft mutated form after the definite article, and the effect of soft mutation on an initial *g* is to remove the segment, so that in soft mutated form, a *g*-initial word may be vowel initial. In this circumstance, the prevocalic variant *yr* is selected:

- (25) a. *glasog y lasog*
 gizzard.FSG the gizzard
 b. *gardd yr ardd*
 garden.FSG the garden
 c. *glo y glo*
 coal.MSG the coal

(Hannahs and Tallerman, 2006, 785)

Hannahs and Tallerman (2006) establish that (i) the alternation between the three article forms is not amenable to a straightforward phonological treatment (it is not a simple case of allomorphy), and (ii) in terms of overall architecture, they treat the article as a syntactic word (occupying a c-structure node) but as phonologically enclitic onto the previous word (in the case of *r*). Note that this phonological encliticization is promiscuous as to host and therefore quite un-affixlike. In order to account for the fact that the post-mutation form of the following element determines the choice between *y/yr*, Hannahs and Tallerman (2006) adopt an architectural assumption which does not sit well with a standard lexicalist approach, in that they permit tiered insertion of lexical items into already generated trees, with different elements entering the tree at different points in a derivation.

2.2 Possessor Agreement Markers

Sadler (1997) considers the morphosyntactic status of the phonologically proclitic pre-head pronominal forms which encode possessors in nominal structures (26), objects of non-finite verbs (27) and the SUBJ of non-finite *bod* ('be') in I, as exemplified in (28).

- (26) *fy mhen (i)*
 1s head (1s)
 'my head'

- (27) Wyt ti'n meddwl y bydd y brenin am *ein lladd ni*?
 be.PRES.2S you=ASP think PT be.FUT.3S the king ASP 1P kill 1P
 'So you think that the king will wish to kill us?'

- (28) Dywedodd Gwyn *ei fod ef yn ddiog*.
 say.PT.3S Gwyn 3SM be 3SM PT lazy
 'Gwyn said he is lazy.'

The fact that these weak forms are generally referred to as clitics in the theoretical literature does not settle their analysis. As is well known, some (pre-theoretical) clitics turn out to be canonically positioned *affixes*, combining with their structural (and prosodic) host in the morphology, subject to the rules of the word-formation component and of the lexical phonology. Such (pre-theoretical) clitics, when correctly viewed as affixes turn out to display no mismatch whatever between their structural (morphosyntactic) and phonological or prosodic behaviour. The affixal status of such 'clitics' may be evidenced by the existence of lexical exceptions and idiosyncratic allomorphic variation, haplology, suppletion, ordering with respect to other affixes, indeed, by any behaviour symptomatic of a lexical origin. A clitic which is in fact a word-internal affix will, given Lexical Integrity, have no syntactic representation at all. An analysis along these lines, within a lexicalist framework, is proposed for the French (object) clitic pronouns in Miller (1992a).

At the other end of the spectrum are clitics which turn out to be (true) *syntactic clitics* or *bound words*. A syntactic clitic is a syntactic X^0 element which forms a transparent syntactic construction with its (syntactic or structural) host, but which does not have the phonological status of a word. Bound word clitics involve interactions at the boundary between syntax and the phrasal phonology. A syntactic clitic (bound word) will show no morphological or lexical phonological interaction with its (structural or prosodic host), since its phonological and its constructional (structural) attachment is post-lexical. It can be expected to participate as other X^0 categories do in syntactic processes. As is well established, a single bound word may have different syntactic and prosodic hosts, being for example, (syntactically) proclitic and thus initial in its syntactic constituent, and prosodically enclitic on the preceding word.^{7,8} Sadler (1997) argues that the Welsh pronominal clitics should be treated as combining syntactically with their host: that is, as elements which occupy a c-structure node. There are no lexical exceptions to the availability of pre-head (prefixal) cliticisation in Welsh (although the choice of forms may be phonologically conditioned by surrounding elements), and

⁷It has been argued that a number of (pre-theoretic) clitics do not fit into this simple picture. Essentially these clitics (variously termed *lexical clitic*, *phrasal affix*, *edge inflection*) appear to show a mixed behaviour, combining the morphophonological interactions of an affix with the syntactic positioning and low selectivity of a syntactic clitic. A series of articles (Zwicky, 1987; Lapointe, 1992a,b) suggest that the English possessive marker is one such element: a typical account is Halpern (1995)'s analysis which uses two sorts of feature, a *trigger* and a *marker* feature to introduce and spell out the possessive.

⁸Unambiguous evidence of a syntactic relationship/attachment of clitic and host is evidence for a (phonologically) bound word analysis over an affixation analysis, since the clitic-host relationship is syntactically transparent, but this sort of evidence is difficult to find. Tests such as low selectivity do not distinguish properly between phrasal affixation and syntactic cliticisation, since obviously phrasal edge phenomena are not sensitive to their host in syntactic terms.

as shown above in (26-28), the (same) clitic forms occur both with nominal and non-finite verbal heads. This widespread and exceptionless distribution is suggestive of a syntactic rather than a morphological source. In sum, we argue that there is substantial evidence that the morphosyntactic relation between the pronominal form and the head is syntactic rather than morphological, from the interpolation of lexical material between the pronoun, namely numerals and those adjectives which may occur pronominally. Note in particular the form with disjointed numerals in (30).

- (29) ei hen gi mawr (hi)
 3SF old dog big (3SF)
 'her big old dog'

- (30) ei ddwy neu dair cylllell
 3SM two or three knife
 'two or three knives'

Working within LFG, Sadler (1997) proposes expanding Bresnan (2001) configurational structure-function mapping principles to admit lexical adjunction to lexical heads, where such lexically adjoined elements may map either to an argument function (under certain conditions) or to an adjunct function, and hence adopting a c-structure analysis along the lines of (32) for an example such as (31).

- (31) ei hen gi
 3SM old dog

- (32)
- ```

 N
 / \
 D N
 | / \
 ei A N
 | |
 hen gi

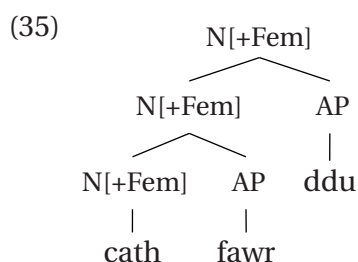
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In a recent paper, Borsley (2009) is concerned with the analysis of agreement phenomena in Welsh more broadly, and hence with the analysis of the pronominal pronominal clitics. The main thrust of Borsley's argument is that agreement is governed by linear order in Welsh, rather than by configurational structure or by grammatical functions/predicate argument relations: a head inflects to show agreement with an immediately following pronominal NP. In Welsh, N, P and V heads all show agreement with pronouns: (33) provides examples showing prepositions inflecting for a following pronominal object. He treats agreement at the superficial level of linear structure encoded in the HPSG DOM feature.

- |      |        |     |        |      |                             |
|------|--------|-----|--------|------|-----------------------------|
| (33) | arnaf  | i   | arnon  | ni   | (Borsley et al., 2007, 199) |
|      | on.1s  | me  | on.1P  | us   |                             |
|      | arnat  | ti  | arnoch | chi  |                             |
|      | on.2s  | you | on.2P  | you  |                             |
|      | arno   | fo  | arnyn  | nhw  |                             |
|      | on.3MS | him | on.3P  | them |                             |
|      | arni   | hi  |        |      |                             |
|      | on.3FS | her |        |      |                             |

In the case of pronominal possessors, agreement shows up in the form of the prenominal clitic doubling an optionally expressed pronominal possessor in postnominal position. It will be recalled however, that in the case of nominal agreement, there is an additional complication in that postnominal adjectives intervene between the nominal head and the pronominal agreement controller. Given that postnominal APs do in fact intervene, he assumes that “adjectives are adjoined to a preceding noun, forming a complex nominal constituent” (Borsley, 2009, 236). The constituent structure which he adopts is shown in (35) (note that the nodes are complex data structures which are highly abbreviated here). It is assumed that the nominal and any following APs undergo ‘compaction’ in the DOM feature so that they occur together as a single element directly preceding the pronominal argument in the linear order.

- (34) cath    fawr ddu  
       cat(FS) big    black  
       ‘a big black cat’



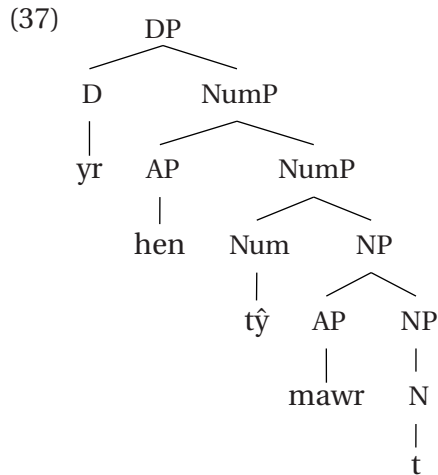
As for the exponence of agreement itself, that is, the prehead clitic, Borsley does not address this matter in any detail at all (the abbreviated representation of *ei dad o* ‘his father’ shows *ei dad* as a N), beyond remarking in passing that his assumption is that such clitics are phrasal affixes in the sense of Anderson (1992). Beyond this remark, the account is not very explicit on the issue of prenominal material intervening between the clitic exponent of agreement and the nominal head: ‘I am assuming that noun phrases contain a possibly complex head. If numerals and pre-nominal adjectives.... are part of this head, then the head will always be domain initial’ (Borsley, 2009, 257).

In summary then: Sadler uses lexical structures for the possessive clitic but this does not capture the coordination restriction. Borsley does not give an explicit analysis but suggests that the possessive clitics might be phrasal (agreement) inflections. Again, no analysis is provided of the coordination restriction.

## 2.3 Prenominal Adjectives and Numerals

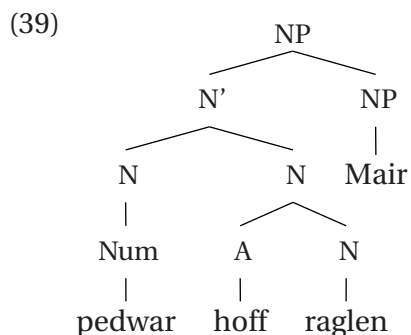
The vast majority of attributive adjectives in Welsh occur postnominally, occurring directly after the head noun, preceding any complements of that noun. Much of the derivationally-based syntactic literature on the structure of the Welsh (and Irish) noun phrase adopts some form of N movement analysis, and is principally concerned with accounting for this N > Adj word order (see Rouveret, 1994; Duffield, 1996, for example): a typical approach is that of Rouveret (1994) which proposes an analysis in which N moves to a Num projection intervening between D and N. In this analysis, prenominal adjectives are assumed to be APs adjoined to NumP rather than to NP:

- (36) yr hen dŷ mawr  
 the old house big  
 'the big old house'



Both Sadler (2003) and Willis (2006) point out a number of significant empirical and theoretical problems with the head raising analysis, and adopt non-head raising analyses in which postnominal adjectives are right-adjoined: Sadler (2003) is explicit in adopting a lexical adjunction structure along the lines illustrated in (32) for the prenominal material (see 39). None of these accounts, however, provide an analysis of the interaction of prenominal material with coordination.

- (38) pedwar hoff raglen Mair  
 four favourite programme Mair  
 'Mair's four favourite programmes'



In conclusion then, previous work provides a range of approaches to at least some of the prenominal data, and suggests that at least some of these constructions might be best treated using lexical level constructions, but it seems that none of the existing accounts provides any real analysis of the restrictions we observe, particularly as far as the interaction with coordination is concerned. Most work had adopted a syntactic approach but there are some underdeveloped suggestions in the existing literature that agreement clitics might be treated as phrasal affixes.

In the following section we turn to the question of the existence (or otherwise) of lexical level coordination, first reviewing and accepting the arguments of Abeillé (2006)

in defence of lexical coordination and then providing evidence that lexical level coordination exists in the grammar of Welsh. If this is correct, then the observed restrictions do not follow from the unavailability of lexical coordination.

### 3 Lexical Coordination

Although previous literature does contain some suggestions to the contrary, Abeillé (2006) gives clear and extensive evidence for the existence of lexical level coordination, showing *inter alia* that you can lexically coordinate weak forms such as French definite determiners (*Paul cherche **le** ou **la** responsable* ‘Paul is looking for the(M) or the(F) person responsible’), and that weak forms (which are  $X^0$  categories) occur as sister to a lexical coordination as in *Ce malade mange et boit **mieux** depuis quelques jours* (‘That sick person has been eating and drinking better for a few days now’).<sup>9</sup>

Additionally, she provides interesting evidence for French that at least some instances of lexical level coordination are subject to semantic constraints, evidence which may well be relevant to an analysis of the Welsh data. For example, coordinated  $V^0$  must be of the same type and need to assign the same semantic role to the arguments which they share, similar to a requirement that they form a natural coordination. In respect of verbs, she states “with an additive conjunction [as opposed to RNR:IMLS], the two coordinated verbs must be understood as forming a natural activity, or a natural class of process, so that they denote one (possibly complex) event” (Abeillé, 2006, 17).<sup>10</sup> Similarly, “there is a semantic constraint on lexical additive coordination of As, similar to that on Vs, namely that lexically coordinated adjectives must denote one (possibly complex) property” (Abeillé, 2006, 24).

- (40) une belle        et    grande piscine  
       a    beautiful and large    swimming-pool

Moreover putative  $X^0$  coordinations may occur in some positions which are known to be (in her terminology) ‘light’ - an example is the Danish syntactic noun incorporation (SNI) construction discussed by Asudeh and Mikkelsen (2001) where the syntactically incorporated N can be an N coordination (but not a normal phrase). In summary, then, we have every reason to assume that in principle, lexical level coordination is possible in Welsh.

Examples of the type illustrated in (16c) and (19) (those in which, unexpectedly, a definite determiner, numeral and/or adjective **can** take wide scope over a nominal coordination) above would appear to involve lexical level coordination, as do the following examples with *prif* ‘main’ (unless otherwise noted, examples are taken from CEG and the UK Welsh language websites):

- (41) a. o’r            prif    ddigwyddiadau a    symudiadau  
           from=the main events                    and movements

<sup>9</sup>The use of data involving elements which are known to combine only with  $X^0$  categories is crucial in defending a lexical coordination analysis over an alternative analysis using RNR.

<sup>10</sup>In this connection she contrasts *cinq voitures et camions* with *cinq voitures et maisons* which is permitted given the right sort of context: *les cinq voitures et maisons qui ont été saccagées la nuit dernière*. (Note however, that she also observes that this argument is weakened by the fact that this sort of constraint appears also to be true of  $N'$  coordination in French, and so is perhaps not a decisive argument.)

‘from the main events and movements’

- b. y prif ddatganiadau a dehongliadau  
the main statements and perceptions  
‘the main statements and perceptions’

Though we wholeheartedly agree with the position advanced in Abeillé and see absolutely no reason to exclude it in principle, it remains nonetheless true that lexical level coordination is actually quite difficult to establish in Welsh in general, partly because of the very close connection between preverbal particles and the following verbal elements. So, for example, the progressive marker *yn* must in general be repeated before a verb noun (cf. Jones, 1976, p. 86): “With a chain of verb-nouns, if *yn* is placed before the first verb-noun, it is required also before all the others ...”.

- (42) Yr oeddynt yn bwyta, yn yfed, yn prynu, yn gwerthu  
PRT were.3PL PROG eat PROG drink PROG buy PROG sell  
(Lk 17:28, quoted from Jones, 1976)

In principle, (42) could involve phrasal (VP or AspP) coordination, or lexical level coordinations matching in PROG. In order to establish that this is lexical level coordination, one would need first to establish that the particle and the (non-finite) verb form a lexical level construction (see below).<sup>11</sup> What is of interest, then, is that even in a (moderately) conservative text such as the recent 1988 (rev. 2002) Welsh Bible translation *Y Beibl Cymraeg Newydd*, while the requirement to repeat the particle generally holds, a few exceptions can be found, and these would seem to indicate lexical level coordination:

- (43) a. fel llew yn rheibio a rho  
like lion PROG raven and roar (Ps 22:13)  
‘like a ravening and roaring lion’  
b. y mae ’n mynd a dod fel cysgod  
PRT is PROG go and come like shadow (Ps 39:6)  
‘he comes and goes like a shadow’  
c. Bûm yn disgwyl a disgwyl wrth yr ARGLWYDD  
was.1S PROG wait and wait for the Lord (Ps 40:1)  
‘I was waiting and waiting for the Lord’

Having accepted, then, that not only is there no reason in principle to exclude lexical coordination but also that there is evidence within the grammar of Welsh for the existence of such a phenomenon, the question becomes that of determining what the constraints are on when and where lexical coordination is permitted in the prenominal field (and elsewhere). It is striking that these biblical examples involving a shared

<sup>11</sup>Note however that assuming a VP or AspP analysis does not in fact capture the requirement to repeat the PROG particle: Asp would be blind as to how many verbs there were within its complement VP.

PROG particle fully meet the characterisation proffered by Abeillé for  $V^0$  coordination in French (“understood as forming a natural activity, or a natural class of process, so that they denote one (possible complex) event” (Abeillé, 2006, 17). These cases and very possibly also the examples of putative lexical level coordination within the noun phrase (19), (16c), (41) might then be viewed as cases of natural coordination. and seem to involve describing a single complex event in the manner of Abeillé, so while there is nothing in principle ruling out lexical level coordination it might well be the case that it is subject to some restrictions. A good deal of further research would be required to establish whether this really is a syntactic restriction of the first order on the distribution of lexical level coordination in Welsh: at this stage it is no more than suggestive that the best examples that we have do indeed appear to be analyzable as natural (or otherwise semantically restricted) coordinations.

## 4 On the Nature of Lexical Constructions

Having established that there is no good reason to exclude lexical coordination either crosslinguistically or in the grammar of Welsh, we move on to consider the question of the nature of lexical constructions (in relevant formalisms) and whether this might afford an analysis of the observed restrictions on the prenominal field in Welsh. Lexical level constructions are recognised in both LFG and HPSG but we will see that neither framework rules out the existence of coordination within such constructions. We start by briefly reviewing the treatment of lexical constructions in these formalisms.

Building in part on previous work, including Sells (1996) and Sadler (1997), Toivonen (2003) provides an articulated theory of small or lexical constructions in LFG, in her study of the phrase structure of Swedish particle verb constructions. She argues that Swedish particles are appropriately viewed as words that cannot be modified, do not project a phrase (“non-projecting words”) and head-adjoin to the finite verb. Toivonen introduces a distinction between projecting and non-projecting categories (the later now standardly notated as  $\hat{X}$ , and allows for multiple adjunction at the same hierarchical level).

$$(44) X^0 \rightarrow X^0, \hat{X}$$

Toivonen suggests a different status for the particle in Swedish than in English: Toivonen (2003)’s own work on particles actually draws a clear distinction between Swedish verbal particles, on the one hand, and the English particles which occur in preverbal position (in examples like *John picked up the money*, *Peter turned off the light*.) For T, English *pre-object* particles, on the other hand, “form a single lexical item” with the verb (Toivonen, 2003, p. 176) with which they “are lexically combined” (Toivonen, 2003, p. 171). The evidence is mostly concerned with coordination, in that in English, but not in Swedish, the verb and the particle can be gapped together, compare *Gary looked up Sam’s number*, and *Mittie, my number* and \**Gary looked up Sam’s number*, and *Mittie, up my number*.

Asudeh (2002) applies these notions to the analysis of preverbal particles in Irish, in an attempt to capture both the insight of Sells (1984) that the preverbal particles are head-adjoined to a finite verb and the idea that they are complementisers (McCloskey,

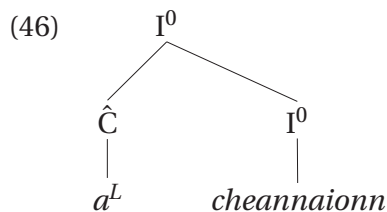
1979). Reconciling these notions, Asudeh argues, means postulating a functional head (C) which does not appear as the c-structure head of its own projection, but rather, lower in the tree (this is a little reminiscent of the Det lowering notion one finds elsewhere).

In the following example, the particle used in gapped relative clauses must be repeated (the superscripted L on the particle denotes that this particle causes soft mutation (or Lenition) of the following element).

- (45) a. an fear a<sup>L</sup> cheannaionn agus a<sup>L</sup> dhíolann tithe  
           the man PTC buys                      and PTC sells            houses  
           ‘the man that buys and sells houses’
- b. \*an fear a<sup>L</sup> cheannaionn agus d(h)íolann tithe  
           the man PTC buys                      and sells            houses  
           (Irish; adapted from Asudeh (2002, p. 6) citing Sells (1984, p. 131))

Sells takes two properties to be crucial to the distribution of preverbal particles: the fact that they are inseparable from the verbal head, and the fact that there must be a particle in each conjunct in VP coordination.<sup>12</sup>

Asudeh (2002) suggests that Irish complementizers are head-adjoined non-projecting words, building both on Toivonen (2001, 2003)’s work on the phrase structure of Swedish verbal particles, and on Sells (1984)’s lexical adjunction proposal for the Irish particle data. (46) shows a simplified partial tree for *a cheannaionn* ‘who buys’ in (45) along these lines.



For reasons that are not strictly relevant to our concerns here, Asudeh wishes to require that the “lowered”  $\hat{C}$  projects (and heads) a CP rather than simply an IP. This is the purpose of the annotations associated with the  $\hat{C}$  node in the rule in (47), which require the CP itself to be projected. The function CAT is defined as shown in (48), using the label function ( $\lambda$ ) and the inverse mapping from f to c ( $\phi^{-1}$ ) to give the set of category labels of the c-structure nodes that map to a given f-structure (see Dalrymple (2001) for detailed explanation of LFG notation and the projection architecture).

- (47)  $I \rightarrow$
- |                         |                         |
|-------------------------|-------------------------|
| $\hat{C}$               | $I$                     |
| $\uparrow = \downarrow$ | $\uparrow = \downarrow$ |
| $CP \in CAT(\uparrow)$  |                         |

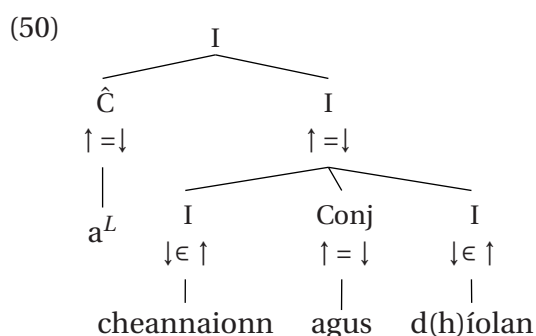
- (48)  $CAT(f) = \{ c \mid \exists n \in \phi^{-1} \wedge \lambda(n) = c \}$  (Dalrymple, 2001, 171)

<sup>12</sup>But in fact the latter property is not explicitly accounted for on the present account, although such a requirement could be added.

The adjoined non-projecting  $\hat{C}$  actually serves as the (extended) head of the CP projection, by virtue of the definition of extended head shown in (49).

- (49) Given a c-structure containing nodes  $\mathcal{N}$ ,  $\mathcal{C}$  and c- to f-structure correspondence mapping  $\phi$ ,  $\mathcal{N}$  is an extended head of  $\mathcal{C}$  if  $\mathcal{N}$  is the minimal node in  $\phi^{-1}(\phi(\mathcal{C}))$  that c-commands  $\mathcal{C}$  without dominating  $\mathcal{C}$  (Bresnan, 2001, 132)

As noted above, Sells (1984) argues that two properties are key, the inseparability of particle and I and the fact that the particle must be repeated in cases of coordination. The first property follows straightforwardly from Asudeh's c-structure assumptions, as does repetition of the particle in cases of phrasal coordination (if both I and  $\hat{C}$  are obligatory daughters of I). But if lexical coordination is available, the non-projecting word analysis does not on its own contribute the requirement that the particle be repeated. That is, the structure in (50) does not seem to be ruled out in principle by an approach based on non-projecting words.



As is evident from the annotations on the nodes in (50), a coordinate structure maps to a set of f-structures, with each conjunct contributing an f-structure to the set corresponding to the coordinate structure as a whole (hence the annotation  $\downarrow \in \uparrow$  on the daughter I nodes). Information associated with the lexical entry for a particle (such as *goN* 'that' in 51; cf. Asudeh, 2002, p. 13) is associated with the coordinate structure as a whole and hence will be contributed to the set (and whether it is then distributed to members of the set will depend on whether the feature in question is a distributive or non-distributive feature). The lexical entry in (51) defines the value of MOOD to be AFFIRM for the set (corresponding to the coordinate structure) and requires the value of the TENSE feature to be not PAST.

- (51) *goN*  $\hat{C}$  ( $\uparrow$  TENSE)  $\neq$  PAST  
 ( $\uparrow$  MOOD) = AFFIRM

We note in passing that the non-projecting word approach of Asudeh (2002) could in principle (given appropriate subsidiary assumptions) account for the obligatory repetition of the particle in cases of phrasal (IP or VP) - as opposed to lexical - coordination, as in the Welsh example (52). This is because a particle attached to the I in the first clause will contribute its f-structure information only to one member of the coordinate structure, because of its c-structure position. Should any such information be necessary for the second conjunct, then it would be missing in the second conjunct.

- (52) Mae Gwyn yn dweud na ddaw o i Lundain ac \*(na)  
 be.PRES.3S Gwyn PROG say NEG come.FUT.3S he to London and NEG  
 welith o Megan.  
 see.FUT.3S he Megan.  
 ‘Gwyn says that he won’t come to London and see Megan.’  
 (Welsh; adapted from Borsley et al., 2007, p. 37)

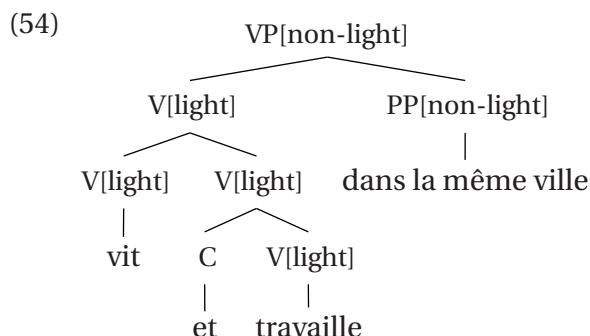
The analysis of lexical level (or ‘light’) constructions (the correlate of LFG’s lexical adjunction of non-projecting words) is well established in HPSG, notably through the work of Abeillé and Godard (Abeillé and Godard, 2000, 2004) (see also Sadler and Arnold, 1994). Far from excluding coordination from lexical level or light constructions, much of this work explicitly establishes the existence of lexical coordination within ‘light’ constructions, and also addresses cases which involve particles and other non-projecting elements taking scope over lexical level coordinations. A representative sample of such examples from Abeillé (2006) is in (53).

- (53) a. les deux ou trois premiers volumes  
 the two or three first volumes  
 b. il continuait à lire et relire sans cesse le même livre  
 he continued to read and reread without stopping the same book  
 c. il continuait à le lire et le relire sans cesse  
 he continued to it read and it reread without stopping  
 d. Paul vit et travaille dans la même ville  
 Paul lives and works in the same town  
 e. un film de et avec Woody Allen  
 a film by and with Woody Allen

Note that the obligatory repetition of the clitic object in (53c) follows for Abeillé on the assumption that it is an affix and thus expected neither to coordinate nor to take scope over a coordination. (53b) and (53c) also show that the marker *à* can be shared by a coordination of V (while it is repeated for a coordination of VPs<sup>13</sup>).

The theory of lexical constructions in HSPG involves introducing a feature *WEIGHT* which serves to distinguish phrases which behave like words from those that do not. This feature takes values *light* and *non-light*: the default value for phrases is *non-light*. Words can be underspecified or have either value, depending on whether they project a phrase on their own or not. A light phrase can only be made up of light daughters. It should be readily apparent that this does not prevent light elements taking scope over an entire light phrase, of course.

<sup>13</sup>The same applies to the marker *de*. — It is not clear that Abeillé’s analysis actually accounts for this restriction.



We conclude, then, that recent approaches to lexical level constructions in relevant constraint-based formalisms, such as the recognition of a notion of ‘weight’ in HPSG or the recognition of non-projecting categories in LFG do not provide a straightforward mechanism for accounting for the restrictions on the prenominal field (and in particular the interaction with coordination) outlined in section 1.

Have we now reached an impasse? If this is syntactic material, it seems that it should be treated by light or lexical constructions. Yet coordination is not excluded in such constructions (although lexical coordination may be limited to natural coordinations in a given language).

## 5 Scope and the Coordination Criterion

Interaction with coordination is classically used in lexicalist frameworks to distinguish affixes from elements which occupy syntactic nodes and are therefore syntactically transparent<sup>14</sup>: if an element fails to take scope over a coordination, by Miller’s coordination criteria it is considered an affix:

- (55) a. If an item must be repeated on each conjunct in a coordinate structure, then it must be an affix and cannot be a PLC. [= postlexical clitic]
- b. If an item must fail to be repeated on each conjunct in a coordinate structure, then it must be a PLC and cannot be an affix. (Miller, 1992b, 385)

As Miller further observes, for this to be a reasonable and valid conclusion, it must first be shown that there is not some more general prohibition on the relevant type of coordination. If the considerations given above are correct, then this has been shown for the Welsh cases under consideration.

The question then is, should the interaction with coordination be taken as evidence that the definite article and pronominal possessor marker are affixes? An argument along these lines is made by Wintner (2000) for the Modern Hebrew definite article which similarly must appear on each conjunct in the case of nominal coordination: “[The Modern Hebrew definite article] *ha-* cannot have wide scope over the coordination, but rather must be repeated for each of the conjuncts. [...] An omission of one of the occurrences of *ha-* results either in ungrammaticality or in a different reading, in

<sup>14</sup>It should be noted that the existence of phrasal affixation or edge inflection complicates this simple picture.

which the article has a narrower scope” (Wintner, 2000, p. 336). The Modern Hebrew article differs, however, in several respects from the Welsh definite article and possessive markers.

However there are also a number of difficulties with interpreting the failure to scope over a coordination as evidence that the determiner and possessive are affixes. Firstly, evidence for lexical interaction with the host is extremely scant, and what there is concerns the initial mutation system alone and is not therefore prime evidence of lexical interaction. The basic mutation rules are: if the head noun is FEM SG, the article is followed by Restricted Soft Mutation (SMR), otherwise (MASC SG, gender-indifferent PL) by the radical form.<sup>15</sup> The following lexical irregularities are found within the pronominal field (i) the plural of *gefell* ‘twin’ irregularly shows Soft Mutations (SM), not the radical, after the article: *yr efeilliaid*/\**y gefeilliaid* (Thomas, 1996, p. 154); (ii) both the MASC and FEM forms of the numeral ‘two’ (*dau* M, *dwyr* F) are subject to SM after the article. In line with other numerals (which count as PL both on their own and in numeral-noun constructions) the radical would be expected (cf. Thomas, 1996, p. 304); (iii) pre-nominal adjectives in an NP headed by a FSG noun, as well as adjectives having a FSG noun as referent, are not subject to SMR (not affecting *ll/rh*) but ‘plain’ SM (affecting *ll/rh*): *y lwyd wawr* ‘the grey dawn’ (Jones, 1976, 127; *llwyd* ‘grey’, *gwawr* ‘dawn’).<sup>16</sup>

Second, as we have seen, both the possessive marker and the definite determiner can be separated from the head noun by various intervening elements (numerals and a restricted set of adjectives). Thus affixation is, at the very least, relatively promiscuous as the definite article would then affix not only to the nominal but equally to pronominal adjectives and numerals.<sup>17</sup>

Third, the fact that, although the definite article immediately preceding a noun cannot take wide scope over a nominal coordination, the definite determiner can precede to a pronominal adjective material which itself may take scope over a coordination of Ns (as in (16) somewhat undermines the whole logic of the position whereby failure to take scope over a coordination is a sufficient and key criterion motivating a lexical affixal analysis. For these reasons, then it does not seem ideal to maintain that the definite determiner and the pronominal possessive marker are lexical affixes (akin to the Romance clitic pronouns).

Before rejecting the affixal route, we should consider the possibilities afforded by a further possibility, that is, that we are dealing not with standard affixation but with some form of lexical cliticisation or phrasal affixation. The notion of phrasal affixation

<sup>15</sup>(Plain) Soft Mutation (SM) and Restricted Soft Mutation (SMR) differ in the treatment of initial *ll*- and *rh*-. SM: *ll* /*ɬ*/ → *l*, *rh* /*r*<sup>h</sup>/ → *r*; whereas SMR: *ll* and *rh* remain. Otherwise SM and SMR are identical.—The following are examples of definite determiner + noun, showing the different mutational effects depending on gender/number of the head noun.

|     |                |                  |               |                                                                                                        |
|-----|----------------|------------------|---------------|--------------------------------------------------------------------------------------------------------|
| FSG | <i>merch</i>   | <i>y ferch</i>   | ‘(the) girl’  | SMR (likewise SM) <i>m</i> → <i>f</i> / <i>v</i> /                                                     |
| FSG | <i>llong</i>   | <i>y llong</i>   | ‘(the) ship’  | SMR <b>not</b> <i>ll</i> / <i>ɬ</i> / → <i>l</i> (and <i>rh</i> / <i>r</i> <sup>h</sup> / → <i>r</i> ) |
| MSG | <i>bachgen</i> | <i>y bachgen</i> | ‘(the) boy’   | Radical                                                                                                |
| PL  | <i>merched</i> | <i>y merched</i> | ‘(the) girls’ | Radical                                                                                                |
| PL  | <i>bechgyn</i> | <i>y bechgyn</i> | ‘(the) boys’  | Radical                                                                                                |

<sup>16</sup>According to Thomas (1996, p. 689) this rule is now only observed in conservative Welsh, otherwise the adjective may optionally be subject to SMR like nouns.

<sup>17</sup>Similar patterns to those found in Welsh may also occur in Romanian Ortmann and Popescu (2001) and Albanian Dobrovie-Sorin and Guirgea (2006). The realization of the Albanian definite article also appears to be lexically determined to some extent.

is most familiar from the work of Anderson (e.g. Anderson, 1992), where it is proposed as an approach to special clitics, that is elements marking properties of the phrase and realized at the edge of the phrase. In Anderson's approach, phrase-edge realization is determined by OT-style constraint ranking and such elements are realized by "the (post-lexical) operation of the phrasal equivalent of a Word Formation Rule" (Anderson et al., 2006, 3), and hence are free of the normal lexical interaction with the host. However, such an approach to phrasally determined affixation would appear to make the wrong prediction, in that the phrasally affixed element would be expected to take wide scope over a coordinate structure to which it attached.

A subtly different analysis of such elements is provided in approaches which follow Lapointe (1992a,b); Halpern (1995); Miller (1992a) in using edge features (typically pairs of TRIGGER and MARKING features) to phrasally introduce the relevant morphosyntactic requirement, to transport it to the lexical host and to spell it out lexically.<sup>18</sup> The use of edge feature machinery avoids the violation of lexical integrity which the alternative phrasal affixation analysis would appear to entail. In fact, however the use of edge features also permits quite subtle control of the interaction of edge-expressed properties with coordinate structures, for in principle lexical realization (on the edge of a word) may be combined with wide scope contribution of the associated property (in LFG this may be achieved by the use of inside out functional equations, and by HEAD feature percolation in HPSG - on the latter see Fokkens et al. (2009) for some relevant discussion). Nonetheless, in the absence of such (additional) machinery, an edge inflection approach would contribute the property locally, that is, with narrow scope.

To return to the problem posed by the Welsh data, the determiner placement observations are summarised in (56).

- |      |    |                                                                                   |                                 |
|------|----|-----------------------------------------------------------------------------------|---------------------------------|
| (56) | a. | [y tadau] a [’r meibion]<br>the fathers and the sons                              | N[DET+] + N[DET+]               |
|      | b. | [y gwahanol] [[afiechydon] a [chlefydau]]<br>the different illnesses and diseases | A[DET+] [N[DET-] + N[DET-]]     |
|      | c. | [y trydydd] a [’r pedwerydd] [mis]<br>the third and the fourth month              | [Ord[DET+] + Ord[DET+]] N[DET-] |
|      | d. | [yr unig] a [’r prif] [gymeriad]<br>the only and the main character               | [Adj[DET+] + Adj[DET+]] N[DET-] |

(56a) involves the determiner with a simple coordination of Nouns: a determiner occurring as an edge inflection (or in the terminology of Halpern as a lexical clitic) will take scope over only one conjunct: given the possibility of interpreting bare nouns as indefinites, it should in principle be possible for a string such as *y dynion a merched* to mean 'the men and (some) girls', whereas it seems that this is excluded. Nonetheless such a proposal would account for the failure of the determiner to take wide scope. In (56b) the determiner is affixed to the Adj, outside the coordinate structure and thus its scope will correspond to that of the adjective. The explanation for the examples in

<sup>18</sup>In an interesting intervention Anderson et al. (2006) discuss some differences in predictions between phrasal affixation and lexicalist edge feature accounts and draw attention to a number of cases which appear to show the sort of lexical interaction which supports an edge feature account for these particular sets of data.

(56c-d) would be along the same lines: the determiner appears within the conjunct and therefore cannot scope widely over the whole coordinate structure. In principle, then, an edge inflection treatment would provide some traction on this set of data.

There are however some problems which at the very least serve to decrease the attractiveness of this intuitively appealing solution. Chief among these is perhaps that there is very little evidence of the sort of lexical interaction between “inflection” and “host” which one might wish to see in the case of an edge inflection.

Further, and somewhat surprisingly, it appears that an example such (30) repeated here as (57), is grammatical. On an edge inflection approach, it is difficult to see why this is so, given that the pronominal marker would be expected to contribute its information only within the one conjunct, leading to incoherence.

- (57) ei ddwy neu dair cylllell  
       3SM two or three knife  
       ‘his two or three knives’

Something akin to the reverse issue might be thought to arise with cases which look like natural coordination - an example of this sort might be (9), repeated here as (58) and in which again the pronominal marker must be repeated

- (58) ei ffagots a'i phys hi  
       3SGF faggots and=3SGF peas 3SGF  
       ‘her faggots and peas’ (Thomas, 1996, 209)

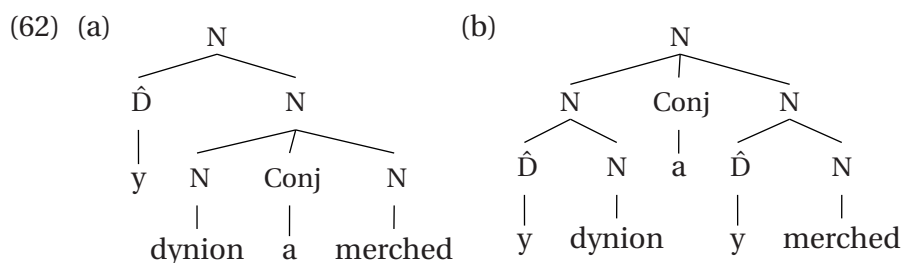
If Dalrymple and Nikolaeva (2006) are correct in proposing that natural coordination structures differ from accidental coordination in essentially projecting a single f-structure as in (59), rather than a set of f-structures as shown in (60) (for the accidental coordination ‘my house and your cottage’), then the requirement to repeat the possessive marker also in cases of natural coordination (in order that it might scope over both conjuncts) is unexpected.

- (59) 
$$\left[ \begin{array}{l} \text{CONJ AND} \\ \text{ADJ } \left[ \text{PRED 'MAIN'} \right] \\ \text{CONJ1 } \left[ \text{PRED 'IDEAS'} \right] \\ \text{CONJ2 } \left[ \text{PRED 'CONCEPTS'} \right] \end{array} \right]$$
- (60) 
$$\left[ \begin{array}{l} \text{CONJ AND} \\ \left( \left[ \begin{array}{l} \text{PRED 'HOUSE< POSS>'} \\ \text{POSS } \left[ \begin{array}{l} \text{PRED 'PRO'} \\ \text{PERS 1} \\ \text{NUM SG} \end{array} \right] \end{array} \right] \right) \\ \left( \left[ \begin{array}{l} \text{PRED 'COTTAGE< POSS >'} \\ \text{POSS } \left[ \begin{array}{l} \text{PRED 'PRO'} \\ \text{PERS 2} \\ \text{NUM SG} \end{array} \right] \end{array} \right] \right) \end{array} \right]$$

In the light of these observations, a syntactic account, in which the definite determiner and the possessive marker do occupy a c-structure node as light or non-projecting elements should not, perhaps, be dismissed out of hand, the Coordination Criteria notwithstanding.

Taking *y* (and also possessive markers such as *fy*, *ei* and so on) to be non-projecting words the issue for a syntactic account is that of ruling out (62a) and allowing only (62b).

- (61) *y dynion a'r merched* vs. \**y dynion a merched*  
 the men and=the girls vs. \*the men and girls  
 'the men and girls' (Thomas, 1996, 265)

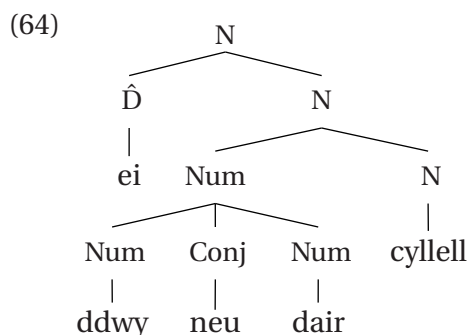


The observations summarised in (56) might be interpreted as follows:

- (63) a. Welsh non-projecting determiner forms (the definite article and the possessive) appear as sister to Adj and N:  
 $X^0 \rightarrow \text{Det}^0 \hat{X}$  where  $X = \{\text{Adj}, N\}$
- b. N coordination and Adj coordination is subject to a restriction such that conjuncts must agree in determinedness.

Note that it is only lexical level coordination of N (or Adj) which is subject to the categorial, feature matching restriction in (63 b). Thus a string such as *y dynion a merched* (as in (61) is perfectly grammatical with the interpretation 'the men and some girls' as a NP/DP coordination, and similarly a string such as *pum bachgen a merch* (in (12) is grammatical as a phrasal coordination, in which case it means 'five boys and a girl'.

Finally this brings us to the vexing matter of the very puzzling examples involving numerals. Here we seem to be left with two observations. The first is the wellformedness of (57). If (63) is along the right lines, this follows. The structure is as given in (64).



The cardinal numerals are members of the category Num, rather than adjectives: the  $\hat{D}$  combines with the entire lexical phrase, which is a lexical construction headed by a N. Since this structure does not involve the coordination of nouns or adjectives, all the conditions of (63) are satisfied.

The failure of numerals to take wide scope over a nominal coordination remains puzzling, however, especially given that it appears that the acceptability of such examples is considerably improved by the intercalation of a prenominal adjective. It is a relatively simple matter to add this stipulation into the c-structure grammar, but this of course does not provide an answer as to why things should be so.

- (65) a. \*pum [llyfr a ffilm]  
           five [book.SG and film.SG]
- b. pum hoff [llyfr a ffilm]  
           five favourite [book.SG and film.SG]

## 6 Conclusion

This paper has been concerned with some quite puzzling restrictions on the prenominal field in Welsh which emerge especially when date concerning coordination below the phrasal level is considered. We have defended the view that Welsh does permit lexical level coordination, and hence conclude that these restrictions do not simply follow from the non-availability of lexical level coordination within the relevant categorial projections. We have suggested that while it is in principle possible to give an account of (at least some of) the data considered here in terms of some sort of phrasal affixation (of the prenominal material in question), one should not in fact rule out a syntactic treatment. Under such an approach, the restrictions on determiners, possessive markers, adjectives and prenominal numerals would have to follow from particular requirements of various sorts on lexical level constructions: one such restriction suggested is that lexical level N and Adj conjuncts must agree in definiteness.

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Louisa Sadler  
University of Essex  
[louisa@essex.ac.uk](mailto:louisa@essex.ac.uk)  
Ingo Mittendorf  
University of Essex  
[ingo.mittendorf@btopenworld.com](mailto:ingo.mittendorf@btopenworld.com)

# Non-finite *do*-support in Danish

Bjarne Ørsnes\*

## 1 Introduction

*Do*-support (henceforth: DS) generally refers to construction where a finite form of the verb *do* (or its equivalent in other languages) occurs in place of a lexical verb or with a non-finite lexical verb without adding semantic content and without altering the assignment of thematic roles or grammatical functions (Houser et al., 2010). When a lexical verb is present, it can be either in complement position or fronted. *Do*-support of this kind is observed in many languages and is shown below for English, German, Low German and Danish.<sup>1</sup>

- (1) a. Did he read the newspaper? (ENGLISH)
- b. Aber so richtig verstehen tut sie mich auch nicht<sup>2</sup> (GERMAN)  
          but so really understand does she me also not  
          ‘But she doesn’t really understand me.’
- c. Das täte mich interessieren (GERMAN)  
         that did.SUBJUNC me interest  
         ‘I would be interested in that.’
- d. Wi haln rutkreegen, dat uns Oma mit Vörnohm Hedwig  
         we had found out, that our Grandmother with first name Hedwig  
         heeten däh<sup>3</sup> (LOW GERMAN)  
         was called did  
         ‘We had found out that the first name of our Grandmother was Hedwig.’
- e. Hører efter gør han aldrig (DANISH)  
         listen.PRES PREP does he never  
         ‘He never listens.’

Finite DS (henceforth FDS) as illustrated above may be either optional or obligatory. Optional FDS is observed in varieties of German, Dutch and Low German (Langer,

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<sup>1</sup>Examples with no source are constructed. Examples from the Internet are provided with URL and the date they were last checked. Examples marked *KorpusDK* are extracted from the 56-million-words corpus *KorpusDK* of *Det Danske Sprog- og litteraturselskab*: <http://ordnet.dk/korpusdk>.

<sup>2</sup>Digitales Wörterbuch der deutschen Sprache: <http://www.dwds.de/>.

<sup>3</sup>[www.plattland.de/Texte/mb-Hedwig.htm](http://www.plattland.de/Texte/mb-Hedwig.htm), 25/2 2010.

2001; Schwarz, 2004). The *do*-verb and the lexical verb form a kind of verbal complex, but the construction does not semantically differ from a construction with the lexical verb in the same tense and mood as the *do*-verb,<sup>4</sup> cf. the examples in (1c) and (1d). Optional DS is subject to dialectal variation and appears not to occur in Danish.

Obligatory FDS, however, is required by the rules of the grammar. It appears to be motivated by a need to have a finite verb in cases where the lexical V is prevented from appearing in the position of the finite verb. In English, obligatory DS is observed with inversion (1a), negation (2a), polarity focus (2b), ellipsis (2c) and VP-topicalization (2d).

- (2) a. He did not wash the dishes
- b. He DID wash the dishes
- c. He should wash the dishes. And he did
- d. Wash the dishes he did

In Danish, obligatory FDS is observed when a VP goes “missing” not only due to fronting (3a) or elision (3b), but also due to pronominalization (3c) (Houser et al., 2010).

- (3) a. Venter gør han ikke (FRONTING)  
     waits does he not  
     ‘He doesn’t wait.’
- b. Han venter. Nej, han gør ej (ELLIPSIS)  
     he waits no he does not  
     ‘He’ll wait. No he won’t.’
- c. Han venter. Nej, det gør han ikke (PRONOMINALIZATION)  
     he waits no that does he not  
     ‘He is waiting. No he is not.’

But the requirement to have a finite verb cannot be the whole story about *do*-support. Also non-finite occurrences of *do*-support (in the following NFDS) are observed in English (Chalcraft, 2006; Kato and Butters, 1997; Miller, 2002; Sag, 2005).

- (4) So far, everything that could go wrong has done<sup>5</sup>

However, contrary to FDS, NFDS is claimed to be optional, only to occur with VP-ellipsis, and to be restricted to British English (Miller, 2002).<sup>6</sup> Similarly, NFDS in Danish and Swedish is claimed to be optional and subject to other constraints than FDS (Houser et al., 2010; Platzack, 2008).

Concentrating on non-comparative clauses, the purpose of this paper is to show that NFDS in Danish is much more complex than previously assumed and that NFDS

<sup>4</sup>Many explanations for the use of optional DS have been put forward in the literature. Cf. Langer (2001) for an overview.

<sup>5</sup>The Guardian, 26/5 2001. Example from Miller (2002, p. 2).

<sup>6</sup>Miller (2002) notes that NFDS is also observed in comparative clauses in American English. This use of NFDS appears to be poorly understood.

sheds interesting light on the interaction between phrase structure and functional syntactic structure. NFDS occurs in the standard language and it is subject to subtle constraints making it obligatory in some contexts and optional in other contexts. And optional NFDS is not random. Clear preferences for the use of NFDS can be stated. The following examples all involving VP-pronominalization show cases where NFDS is optional (5a), strongly preferred (5b) and obligatory (5c).

- (5) a. Det plejer jeg (at gøre)  
           that use I to do.INF  
           'I usually do that.'
- b. Peter undskylder, men det ville jeg ikke ??(gøre)  
           Peter apologizes but that would I not do.INF  
           'Peter apologizes. I wouldn't do that.'
- c. Peter skal \*(gøre) det  
           Peter must do.INF it  
           'Peter has to do it.'

Contrary to English, NFDS occurs in the very same syntactic environments as FDS with the exception of VP ellipsis where NFDS appears to be impossible (Houser et al., 2010). Starting from this observation, the analysis will show that NFDS serves to establish a canonical association of structure and function in the Danish clause, and that NFDS serves a crucial disambiguating function for verbs with both main verb and auxiliary-like readings. Furthermore the analysis will show that grammaticalized discourse functions such as Topic and Focus play a special role in the syntax, given that they are allowed to relax the requirement on canonical structure-function association - even in cases where a Topic is not in its canonical pre-verbal position.

The formal framework is that of Lexical-Functional Grammar (LFG) (Bresnan, 2001; Dalrymple, 2001; Falk, 2001). The proliferation of functional structure and constituent structure as two distinct levels of syntactic representation in LFG makes it particularly apt for stating the generalizations on NFDS uncovered in the present analysis.

## 2 The distribution of finite *do*-support in Danish

A brief discussion of FDS in Danish will provide the context for a discussion of NFDS, given that FDS appears to be more thoroughly investigated than NFDS.

In FDS a finite form of the verb *gøre* ('do') is inserted in place of a lexical verb. The following criteria apply to *do*-support (Jäger, 2006; Houser et al., 2010): 1) *do* and its complement belong to one tempus, aspect and modus domain 2) There is only one event, introduced by the complement of *do* 3) *do* does not influence the assignment of thematic roles 4) *do* does not influence the assignment of grammatical relations 5) *do* imposes no selectional restrictions on its complement. Thus the *do*-verb differs from the traditional class of temporal and passive auxiliaries in making no semantic contribution to the clause<sup>7</sup> and in not altering the assignment of thematic roles or grammatical relations.

<sup>7</sup> As we will see in section 4.2 this statement is not true in its full generality. There are examples where the use of non-finite *do*-support does have a semantic impact on the clause. But in these cases the use

In Danish, finite *gøre* ('do') never occurs with a verbal complement in complement position. FDS is observed in three syntactic environments where *do*-support is obligatory: VP-topicalization, VP pronominalization and VP ellipsis (Houser et al., 2010). Cf. the following examples.

- (6) a. Nej, pynter                gør de   ikke<sup>8</sup>(TOPICALIZATION)  
       No   decorate.PRES do   they not  
       'No, they are not actually decorating.'
- b. Han siger han ikke gjorde det med vilje        (PRONOMINALIZATION)  
       he   says he   not did   it   on   purpose  
       'he says he did not do it on purpose.'
- c. Han påstod, at   jeg gjorde (ELLIPSIS)  
       he   claimed that I   did

VP topicalization as illustrated in (6a) is a marked construction occurring in both root and embedded clauses. The VP with all its complements (but excluding left-adjoined adverbials, cf. Platzack (2008)) occurs in the prefield (SPEC of CP). The verb is either a bare infinitive or it carries the same tense as the finite support verb, as shown in (6a).

VP pronominalization is illustrated in (6b) for the pronoun *det* ('it'). Other VP pronominals are the relative/interrogative *hvad* ('what') and *hvilket* ('which') or a relative zero pronoun, as shown in (7).

- (7) Her var det frivilligt at sende svar   ind, hvad / hvilket / som 746 gjorde.<sup>9</sup>  
       here was it   optional to send   answer in   what / which / as   746 did  
       'it was optional to hand in an answer, what 746 did.'

There is an important difference between VP-Pronominalization in English and Danish. In English, VP-pronominalization is claimed not to involve *do*-support, but rather the main verb *do* since it is impossible with non-eventive verbs (Miller, 2000, p. 4). In Danish, VP pronominalization fulfills all the criteria for *do*-support: it adds no semantic content, it does not change the assignment of thematic roles to syntactic functions and it imposes no selectional restrictions on the antecedent of the VP-anaphor. VP anaphors are also possible with antecedents containing non-eventive verbs as in (8).

- (8) Peter elsker lasagne, og det gør Louise også  
       Peter loves   lasagna   and that does Louise also  
       'Peter loves lasagna and so does Louise.'

Moreover, Houser et al. (2007) have shown that VP anaphors of the kind shown in (6b) and (7) are overt surface anaphors making their internal structure visible to syntax. Anaphoric reference to an antecedent contained in the anaphor is possible (9a), and structural identity between the antecedent and anaphor is required (9b). Cf.

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of NFDS brings out a specific reading of the governing verb rather than contributing semantic content itself.

<sup>8</sup>www.hedemarken.dk, 25/2 2010.

<sup>9</sup>Modification of an example from KorpusDK.

- (9) a. Jeg har aldrig redet på en kamel, men det har Ivan og han siger, at  
 I have never ridden on a camel but that has Ivan and he says that  
 den stank forfærdeligt<sup>10</sup>  
 it stank terribly  
 'I've never ridden a camel, but Ivan has and he says it stank terribly.'
- b. \*Jeg ville hænge hesteskoen over døren og det gør den nu<sup>11</sup>  
 I would hang horseshoe.DEF over door.DEF and that does it now  
 'I wanted to hang the horseshoe over the door and it is hanging there now.'

VP pronominalization is the most frequent environment for *do*-support in Danish. In general, Danish appears to use VP pronominalization where English uses VP ellipsis.

In VP ellipsis, the complement of *gøre* ('do') is missing all together as shown in (6c). As compared to English, VP ellipsis is highly restricted in Danish. VP ellipsis is observed in elliptical clauses and in sentential tags forming questions or affirming the polarity of the host clause.<sup>12</sup>

- (10) Jeg snød ikke, men Peter sagde jeg gjorde  
 I cheated not but Peter said I did  
 'I wasn't cheating, but Peter said I was.'
- (11) Han snyder, gør han / gør han ikke?  
 he is cheating, does he / does he not  
 'he is definitely cheating / he is cheating, isn't he?'

Dislocation, pronominalization or elision of the VP results in the lack of a finite verb and FDS appears to fulfil a requirement for a finite verb in a clause. This requirement may be given different formulations according to the specific theoretical assumptions: inflectional features must be spelled-out in cases where the inflectional features cannot be associated with a lexical verb (Roberts, 1985, a.o), all projections must contain a lexically filled (extended) head (Bresnan, 2000), or little *v* must be spelled-out (Platzack, 2008). A recent proposal by (Houser et al., 2010) assumes that the support verb is a special kind of auxiliary which is defective in the sense that it has a restricted distribution and that it only subcategorizes for a pronominal *vP* which can be either overt or covert. In ellipsis and VP topicalization the support verb combines with a

<sup>10</sup>Example from Houser et al. (2006).

<sup>11</sup>Example from Houser et al. (2006).

<sup>12</sup> Halliday and Hasan (1976) make a distinction between substituting *do* and the verbal operator *do* (p. 129). In Danish, no substitution of *gøre* ('do') with a lexical verb is possible in VP topicalization and VP Pronominalization. VP ellipsis splits as to whether substitution is possible. Sentential tags do not allow substitution, but bona-fide elliptical constructions do allow substitution, as do comparative clauses.

- (i) Jeg snød ikke, men Peter sagde jeg gjorde / snød  
 I cheated not but Peter said I did / cheated  
 'I wasn't cheating, but Peter said I was.'
- (ii) Han kommer, gør / \*kommer han ikke?  
 he is coming, does / comes he not?  
 'he is coming, isn't he?'

The consequences of this observation must be left for future research.

covert pronominal. In the latter case the topicalized VP is adjoined to CP and co-indexed with the covert pronominal in SPEC of CP. I will return to a discussion of the nature of the verb *gøre* ('do') in section 5.

### 3 The Distribution of non-finite *do*-support in Danish

In standard Danish, *do*-support is also observed in all environments where non-finite verbs occur. Non-finite *do*-support is not only observed in non-finite complements of predicates, but also in non-finite root clauses such as *wh*-root infinitivals.<sup>13</sup> This suggests that the presence of finiteness cannot be the crucial licensing factor for *do*-support in general.

- (12) Skuespilleren Flemming Jensen elsker at rejse, så [hvorfor ikke gøre det]  
 actor.DEF Flemming Jensen loves to travel, so why not do it  
 samtidig med, at man arbejder.<sup>14</sup>  
 simultaneously with that you work  
 'The actor Flemming Jensen loves to travel, so why not do so and work at the same time.'

NFDS is, however, most frequently observed in the non-finite complements of verbs, as shown below for the raising verb *pleje* ('tend to').

- (13) Peter besvimede / protesterede / manglede. Det plejer han ikke at gøre.  
 Peter fainted / protested / was missing that uses he not to do  
 'Peter fainted / protested / was missing. That is unusual for him.'

As expected, NFDS is also observed in the non-finite complement of non-verbal predicates, i.e. adjectives, nouns and prepositions as shown for the adjective *forkert* ('wrong') below.

- (14) Jeg mener ikke, at børn på 12 år skal sættes i fængsel. Det synes  
 I think not that children of 12 years shall be put to jail that think  
 jeg ville være ganske forkert at gøre.<sup>15</sup>  
 I would be totally wrong to do  
 'I don't think that children of 12 years of age should be put to jail. That would be a completely wrong thing to do.'

The present discussion, however, will concentrate exclusively on NFDS in complements of verbal predicates as illustrated in (13).

The occurrence of non-finite *do* in (13) fulfills the criteria for *do*-support, outlined above: only one event is introduced and no changes in the assignment of thematic roles or grammatical relations is observed. Furthermore, the non-finite *do* imposes no selectional restrictions on its complement, i.e. on the fronted complement VP or the

<sup>13</sup> Given that *wh*-root infinitivals always receive a directive interpretation (Reis, 2003), *do*-support is only observed with action verbs in *wh*-root infinitivals.

<sup>14</sup> KorpusDK

<sup>15</sup> KorpusDK

antecedent of the VP anaphor. In (13) the antecedent VP contains an unaccusative, an unergative and a non-eventive verb respectively.

Also syntactically there are no restrictions on what kind of verbs license NFDS. NFDS is observed with all kinds of verbs taking non-finite complements: auxiliaries, modals, raising and control verbs. Cf.

- (15) a. Det havde han ikke gjort (AUXILIARY)  
that had he not done  
b. Det skulle han ikke gøre (MODAL)  
that should he not do  
c. Det plejer han ikke at gøre (RAISING)  
that uses he not to do  
d. Det nægtede han at gøre (CONTROL)  
that refused he to do

NFDS is observed in almost the same syntactic environments as FDS. It occurs with VP topicalization and with VP pronominalization. But crucially it is not licensed in VP ellipsis. I will consider each of these environments in turn.

### 3.1 NFDS with VP-topicalization

NFDS occurs with VP topicalization in both root sentences and embedded sentences.<sup>16</sup> The VP with all internal complements (excluding left-adjoined adjuncts) is fronted to the position to the immediate left of the finite verb.

- (16) a. See paa hende syntes han ikke at goere<sup>17</sup>  
look.INF at her seemed he not to do  
'He didn't seem to be looking at her.'  
b. Døbt har de altid gjort, men Helligåndens belønning har  
baptised have they always done but the whole ghost's reward have  
de aldrig modtaget<sup>18</sup>  
they never received  
'They have always been baptising, but the reward of the holy ghost they never received.'  
c. Jeg vil sige, at købe den ville jeg aldrig gøre<sup>19</sup>  
I would say that buy it would I never do  
'Buy it, I don't think I would ever do that.'

As with FDS the V of the topicalized VP is either a bare infinitive as in (16a) or it has the same morpho-syntactic form as the *do*-verb, cf. (16b) and (16c).<sup>20</sup>

<sup>16</sup> Embedded topicalization is observed in embedded V2-sentences, cf. e.g. Vikner (1995).

<sup>17</sup> [www.adl.dk/adl\\_pub/.../AsciiPgVaerk2.xsql?](http://www.adl.dk/adl_pub/.../AsciiPgVaerk2.xsql?), 3/3 2010.

<sup>18</sup> [www.yaohushua.dk/HELLIGGOERELSE.pdf](http://www.yaohushua.dk/HELLIGGOERELSE.pdf), 25/2 2010.

<sup>19</sup> [www.min-mave.dk](http://www.min-mave.dk), 25/2 2010.

<sup>20</sup> Topicalized VPs may be bare infinitives even though the governing verb requires a full infinitive with *at* ('to'). Cf. Hansen (1967) who gives the example in (i) from Nis Petersen, *Muleposen*, 1942 (Hansen,

In conjunction with VP-topicalization, NFDS is always optional, but the use of NFDS is not entirely random. NFDS is strongly preferred with auxiliaries and verbs with auxiliary-like readings. I will return to this point in section 4.2.

### 3.2 NFDS with VP-anaphors

NFDS is most frequently observed with VP pronominalization as also noted for FDS. NFDS is used with the same kind of surface VP anaphors as are observed with FDS. Cf. the following examples.

- (17) Nu nævner du Jerry, hvad jeg ikke ville have gjort, for ikke at såre  
 now mention you Jerry what I not would have done so as not to hurt  
 hans familie<sup>21</sup>  
 his family  
 'Now you mention Jerry, which I wouldn't have done, so as to not hurt his family.'
- (18) Det skulle han ikke have gjort<sup>22</sup>  
 that should he not have done  
 'He shouldn't have done that.'

NFDS is either optional or obligatory in conjunction with VP-pronominalization. The gross generalization is that *do*-support is optional when the anaphor precedes the verbal head and it is obligatory when the anaphor follows the verbal head.<sup>23</sup> But even when NFDS is optional, the use of NFDS is not entirely random, as also noted for NFDS with VP topicalization. There are cases where NFDS is strongly preferred even with fronted VP anaphors, and similarly there are cases where NFDS is optional even with postverbal VP anaphors. All these intricate cases will be dealt with below.

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1967, p. 70). *lære* ('to learn') otherwise selects a full infinitive with *at* ('to').

- (i) Synge lærte han  
 sing.INF learned he  
 'As for singing, he learned to do so.'

A bare infinitive, however, is only possible with verbs taking infinitival complements. A bare infinitive is not possible with participial complements of auxiliaries, contrary to English (Bresnan, 2001, p. 18). Cf.

- (ii) \*Læse / læst bogen har han  
 read.INF / read.PERFPART book.DEF has he  
 'He has indeed read the book.'

This set of facts suggest that there is crucial difference categorial difference between true auxiliaries and the support verb *gøre* ('do') as discussed in section 5.

<sup>21</sup> [onlinedebat.religion.dk/showflat.php?Number=50173](http://onlinedebat.religion.dk/showflat.php?Number=50173), 3/3 2010.

<sup>22</sup> KorpusDK

<sup>23</sup> Since interrogative and relative anaphors always precede their verbal head (apart from *wh-in-situ*-questions), NFDS is most often optional with *hvad* ('what'), *hvilket* ('which') and *som* ('that').

### 3.3 NFDS and VP ellipsis

While FDS and NFDS pattern in their ability to occur with VP topicalization and VP anaphora, there are crucial differences between the two kinds of *do*-support as regards VP ellipsis. In general, NFDS does not appear to occur with VP ellipsis, neither in full clauses nor in sentence tags. Cf. the following examples.

- (19) a. Du skal arbejde hele natten. Nej, jeg skal ej (\*gøre).  
 you must work all night.DEF no I must not do  
 'You'll have to work all night. No, I won't.'
- b. Du har snydt hele tiden, har du (\*gjort).  
 you have cheated whole time.DEF have you done  
 'You have been cheating the whole time, have you.'

This generalization is challenged by comparative clauses where we do find NFDS in what appears to be elliptical structures. Cf. the following examples illustrating participial as well as infinitival *do*-support.

- (20) Per Toftlund boede på samme hotel, som Teddy havde gjort nogle dage  
 Per Toftlund lived in same hotel as Teddy had done some days  
 tidligere.<sup>24</sup>  
 earlier  
 'P.T. lived in the same hotel, as Teddy had a couple of days earlier.'
- (21) Hvis der lægges vægt på helt andre ting end man plejer at  
 if there is paid attention to quite different things than one tends to  
 gøre.<sup>25</sup>  
 do  
 'If you pay attention to quite different things than you usually do.'

These cases, however, appear not to be elliptical structures, but to be instances of structures with an optional (dislocated) comparative complement and a 0-relativizer respectively. In comparative clauses involving *end* ('than'), it is always possible to interpolate the comparative complement *hvad* ('what').

- (22) han sover mere end (hvad) han plejer at gøre / sove  
 he sleeps more than what he uses to do / sleep  
 'He sleeps more than he uses to.'

Examples such as (22) suggest that we are dealing with an optional dislocated complement and not with an elliptical structure. In equality comparative clauses as in (20) the comparative clause is a relative clause. For this kind of relative clauses with *som* ('that') there are two possible analyses: either *som* occurs with a 0-relativizer, or *som* ('that') is an invariant operator (Mikkelsen, 2002). In either case we are not dealing with an elliptical structure, but with VP-pronominalization. So comparative clauses do not constitute a counter-example to the claim that NFDS is not licensed with VP-ellipsis.

<sup>24</sup>Leif Davidsen: *De gode søstre*. Copenhagen: Lindhardt og Ringhof, p. 149. Example from Houser et al. (2010).

<sup>25</sup>KorpusDK

Houser et al. (2010) provide another example of an elliptical structure. Also conditional clauses appear to allow elliptical structures with NFDS. Cf. the following example from Houser et al. (2010):

- (23) Nu fisker jeg ikke efter en partner. Men hvis jeg havde gjort, havde jeg helt  
 now fish I not after a partner but if I had done had I most  
 klart ...<sup>26</sup>  
 certainly ...  
 'Now I am not looking for a partner, but if I were, I would definitely ...'

These examples lead Houser et al. (2010) to the conclusion that only infinitival *gøre* ('do') never licenses VP ellipsis, while participial *gøre* ('do') does license VP ellipsis. And indeed NFDS in conditional clauses with infinitival *gøre* ('do') is degraded compared to the example above.

- (24) Nu skal jeg ikke selv arbejde, men hvis jeg skulle (\*gøre), ...  
 now must I not myself work but if I must work  
 'Now I don't have to work myself but if I had to.'

But still the exact conditions for VP ellipsis with participial *gøre* ('do') are obscure. The following example is much worse than (23).

- (25) ??/\* Peter svigter aldrig. Hvis han har gjort, bliver jeg overrasket  
 Peter lets down never if he has done become I surprised  
 'Peter never lets you down. If he has, I'll be surprised.'

In a similar vein, conditional clauses with infinitival *gøre* ('do') do not appear to be totally impossible.

- (26) ? Du dumper ikke. Men hvis du skulle gøre, prøver du bare igen  
 you fail not but if you should do try you just again  
 'You don't fail. But if you do, you just give it another try.'

What this boils down to is that NFDS with VP ellipsis is only observed in conditional clauses and under circumstances that appear to be poorly understood. In this way NFDS does indeed behave differently than FDS as regards VP ellipsis. But for the remainder I will ignore comparative and conditional clauses.

### 3.4 Conclusion

While FDS is triggered by a "missing" lexical verb, NFDS occurs in more restricted environments. NFDS is triggered when a complement is not in its canonical position (it is fronted), or when a complement has a non-canonical form (a verbal complement is realized as a pronominal). NFDS is used in cases of a non-canonical structure-function association, either because the verbal complement has been dislocated, or because a verbal complement is realized as an NP in the phrase structure. When the whole VP is

<sup>26</sup>Skov, Leonora Christina. Review of David Rose (red.) "They call me Naughty Lola." Weekend Avisen, BÅrger. February 9-15, 2007, p. 5.

elided, there is no structure at all and so no mismatch between structure and function arises. VP ellipsis presents a mismatch between syntax and interpretation requiring interpretation of a syntactically missing constituent, but it is no mismatch between structure and function.

Concentrating on non-finite complements of verbal predicators, NFDS is observed when the non-finite complement is fronted or pronominalized. NFDS is optional with VP-fronting (including fronting of a VP-anaphor) and it is obligatory with non-fronted VP-anaphors. But there are exceptions to this gross generalization and there are strong preferences for NFDS even with fronted verbal complements (including VP anaphors).

## 4 Non-finite *do*-support - Analysis

Building on the observation that NFDS occurs when a verbal complement is not in its canonical position or does not have its canonical form, I will develop an analysis based on the assumption that NFDS establishes a canonical structure-function association. Still the structure/function-association is not sufficient to account for the whole range of data. NFDS is also used to disambiguate different verb readings and to license event-internal adverbs.

### 4.1 The Basic Generalization

The basic generalization underlying the use of NFDS with verbs taking non-finite complements consists of two parts and is given below.

- NFDS is OBLIGATORY with POST-verbal VP-anaphors
- NFDS is OPTIONAL with PRE-verbal (fronted) VP-anaphors and VPs

The effect of the first part of the generalization is illustrated below.

- (27) a. Peter plejer aldrig ??/\*(at gøre) det  
 Peter uses never to do that  
 'Peter never uses to do that.'
- b. fordi Peter aldrig plejer ??/\*(at gøre) det  
 because Peter never uses to do that  
 'because Peter never uses to do that.'

In LFG, verbs subcategorize for syntactic functions and not syntactic categories. A raising verb such as *pleje* ('use to') subcategorizes for a SUBJ(ect) and an open propositional complement XCOMP, i.e. a propositional complement lacking a functional subject (the infinitive in (27)). In (27) the propositional complement of the raising verb *pleje* ('use to') has been pronominalized: *det* ('it'). The VP anaphor occurs in the canonical complement-position inside the VP, the left edge of which is delimited by the sentential adverb *aldrig* ('never').<sup>27</sup> Thus in (27), the verbal complement of the raising

<sup>27</sup>In V1/V2-clauses the finite verb appears outside the VP as in (27a). In non-V1/V2-clauses as in (27b) the finite verb is inside the VP.

verb syntactically surfaces as a pronominal NP in the canonical complement position inside the VP. The result is a mismatch between structure and function: Canonically, an XCOMP is associated with a VP. Conversely an NP in complement position canonically is associated with an OBJ(ect). In this particular case an NP is associated with an XCOMP-function. The use of NFDS avoids this mismatch: insertion of *gøre* ('do') projects a VP, which is the canonical realization of an XCOMP-function. The generalization is that complements in a canonical complement position (inside the VP) require a canonical structure-function association, and this is exactly what motivates the use of NFDS.

Support for this analysis comes from verbs selecting either an XCOMP or an OBJ such as the control verb *forsøge* ('to try').<sup>28</sup> Since these verbs can combine with either function we predict that they do license an NP-anaphor in complement position without any *do*-support (in which case the anaphor is an OBJ). And this is exactly what we find. In the following example *forsøge* ('to try') combines with both a VP (XCOMP) and an NP (OBJ) in complement position. However, *do*-support for the anaphor would also have been possible, projecting an XCOMP.

- (28) Jeg har aldrig forsøgt [at efterligne min far]. Enhver, der forsøgte [det],  
 I have never tried to imitate my father anybody who tried that  
 var bare en andenranskopi.<sup>29</sup>  
 was just an inferior copy  
 'I never tried to be like my father. Anybody who tried to, was just an inferior copy.'

The second part of the generalization states that NFDS is optional when a VP or a VP anaphor is fronted. Cf. the following examples illustrating fronting of a VP anaphor and a VP respectively.

- (29) a. [Det] plejer Peter ikke (at gøre).  
 that uses Peter not to do  
 'Peter doesn't usually do a thing like that.'  
 b. [Hørt efter] har han aldrig (gjort).  
 listened PREP has he never done  
 'Listen! he never did that.'

When a VP or a VP anaphor is fronted, NFDS is optional as shown in the examples above. Why is NFDS optional with fronted constituents? When a constituent is fronted, it is no longer in a canonical complement position. It appears in the prefield (SPEC of CP), which in Danish (as in most other V2-languages) allows (almost) any kind of grammatical function and any kind of syntactic category. SPEC of CP is the position for discourse prominent constituents and counts as a grammaticalized discourse function (either Topic or Focus) (Bresnan, 2001). It has long been recognized that fronting of constituents can give rise to so-called *movement paradoxes*, i.e. filler-gap constructions where the filler does not match the syntactic category of the gap (Bresnan, 2001; Webelhuth, 2007, a.o.). Cf. the following example from Bresnan (2001, p. 17).

<sup>28</sup>I am grateful to a reviewer for drawing my attention to control verbs with either XCOMPS or OBJs.

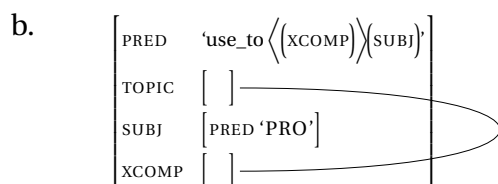
<sup>29</sup>KorpusDK

- (30) [<sub>cp</sub> That he was sick] we talked about [<sub>np</sub> \_\_\_] for days

The gap in (30) requires an NP constituent since prepositions in English only license NPs in complement position, but the fronted constituent is a CP which is excluded from occurring in the position of the gap. Such movement paradoxes pose no problems for LFG since dependency constructions are identified in the functional structure as a dependency between a discourse function and a syntactic function, and not as a relation between a fronted constituent and its extraction site in the constituent structure. The generalization behind these cases of movement paradoxes is that fronted constituents are not subject to the same structure-function associations as constituents in complement positions are. In (30) a CP is allowed to map to the OBJ of a preposition, while a CP in the canonical position to the right of the P cannot map to an OBJ. This special status of fronted constituents explains why *do*-support is optional with fronted constituents. I will first consider what happens if no *do*-support is used.

The example in (31a) is associated with the (simplified) f-structure in (31b). The TOPIC (either the VP anaphor or the VP) is the subcategorized XCOMP of the verb. However, only the fronted VP anaphor triggers a relaxation of structure-function association. Canonically a pronominal NP does not map to a verbal function. But fronting of a constituent allows for a mismatch between structure and function, and so the fronted NP is allowed to map to a verbal XCOMP just as a CP is allowed to map to an OBJ in (30).

- (31) a. [<sub>np</sub> Det] / [<sub>vp</sub> at betale] plejer han ikke  
           it           to pay       uses.to he   not  
           ‘He doesn’t usually pay / he doesn’t usually do that.’



The broad generalization is that NFDS provides for a canonical structure-function association in complement position, but that fronted constituents are special in not requiring a canonical structure-function association. NFDS is obligatory to ensure that a verbal function matches a VP in complement position (to the right of the verb). NFDS is optional when the constituent is fronted since fronting suspends the canonical structure-function association. But still there may be independent reasons for preferring NFDS in these cases.

The canonical structure-function association is represented in the c-structure rules. The c-structure rules define the phrase structure and at the same time they define the mapping of phrase-structure nodes to the functional structure by means of functional annotations. In the rule expanding the VP, an NP is required to map to an OBJ while a VP is required to map to an XCOMP.<sup>30</sup>

- (32) C-structure rule for VP-expansion (preliminary version)

$$\begin{array}{ccccccc}
 \text{VP} & \rightarrow & \text{V} & & (\text{VP}) & & (\text{NP}) \\
 & & \uparrow=\downarrow & & (\uparrow\text{XCOMP})=\downarrow & & (\uparrow\text{OBJ})=\downarrow
 \end{array}$$

<sup>30</sup>This may be an oversimplification as far as the VP is concerned. As shown in (Dalrymple and Lødrup, 2000) complement clauses may be either OBJ or XCOMP. In the present context it is important that an NP does not map to an XCOMP. NFDS is even invoked to avoid this. Cf. also footnote 41.

The special status of fronted constituents (grammaticalized discourse functions) is stated in the c-structure rule expanding the CP. This rule states that fronted VPs and NPs may either map to XCOMP or OBJ thus implementing the case of apparent *movement paradoxes* discussed above. The rule furthermore uses functional uncertainty to account for the fact that the fronted VP or VP anaphor can participate in long distance dependencies (Källgren and Prince, 1989). But this is not crucial for the present analysis.

(33) C-structure rule for CP-expansion

$$\begin{array}{ccc} \text{CP} \rightarrow & \{\text{VP|NP}\} & \text{C}' \\ & (\uparrow\text{DF})=\downarrow & \uparrow=\downarrow \\ & (\uparrow\text{DF})=(\{\uparrow\text{XCOMP|COMP}\}*\{\text{XCOMP|OBJ}\}) & \end{array}$$

On the basis of these rules a sentence such as the one in (34) without *do*-support is correctly ruled out. The NP maps to an OBJ, but the modal verb *skulle* ('must') requires an XCOMP complement as shown in the lexical entry in (35). This is a violation of Completeness and Coherence. The PRED(icate) is not associated with all subcategorized functions and the f-structure contains a function that is not licensed by a PRED(icate). With *do*-support a VP is projected in the c-structure mapping to the XCOMP required by the modal verb.

- (34) \* Peter skal ikke det  
 Peter must not it  
 'Peter doesn't have to do it.'

- (35) *skulle* ('must') V (↑PRED)='MUST<(XCOMP)>(SUBJ)'

## 4.2 Preferences for NFDS when optional

The fact that NFDS is optional when the VP or the VP anaphor is fronted (as also noted in Platzack (2008) and Houser et al. (2010)) does not mean that the use of NFDS is totally random. There are strong preferences for using NFDS with particular kinds of verbs and with particular readings of verbs taking non-finite complements. Cf. the following examples.

- (36) Han ved godt, at mange taler om at forberede den tredje alder,  
 he knows very well that many talk about to prepare the third age  
 men det fik han aldrig ??/\*(gjort)<sup>31</sup>  
 but that got he never done  
 'He knows very well that many people talk about getting prepared for the time after retirement, but he never managed to do so.'
- (37) Peter undskylder. Det ville jeg ikke ??/\*(gøre)  
 Peter apologizes. That would I not do  
 'Peter is apologizing. I wouldn't do that.'

In the examples above the use of NFDS turns out to be crucial for the interpretation of the clause as was alluded to in footnote 7. The verb *få* ('to get') in (36) has a main verb

<sup>31</sup> [www.kristeligt-dagblad.dk/.../231338:Liv—Sjael—Ikke-saa-ringe-endda](http://www.kristeligt-dagblad.dk/.../231338:Liv—Sjael—Ikke-saa-ringe-endda), 11/5 2010.

use and an auxiliary-like use. As a main verb it takes an NP complement and means *to receive*. In the auxiliary-like reading it takes a VP complement and it is used for the recipient-passive or for an agentive causative reading *to manage to VP* (Jakobsen, 2009). In (36) NFDS provides the subcategorization of the auxiliary-like reading thus bringing out the associated agentive causative reading *but he did not manage to do so*.

Like other modals, the verb *ville* ('to want') allows for several readings roughly characterized as circumstantial and epistemic readings. In (37) *ville* ('to want') is used as a marker of counterfactuality, i.e. as an epistemic operator of another verb. The second clause is interpreted as a counterfactual statement: *I wouldn't have done so*. Omission of the *do*-verb forces another reading, where *ville* ('to want') receives a circumstantial reading, roughly meaning: *but I refused to do so*. Both readings are associated with a VP complement, so NFDS serves a somewhat different purpose here than with the verb *få* ('to get') above. All analytical verb forms are associated with Unit Accentuation, i.e. only the most salient non-finite verb is stressed. In the absence of non-finite verbs, stress is assigned to the finite verb. Epistemic readings, however, appear to be incompatible with stress in contexts where no contrastive focus is possible, as also noted for German in Öhlschläger (1989, p. 207).<sup>32</sup> Cf.

- (38) Peter ville 'huske det  
 Peter would remember it  
 'Peter would remember / Peter wanted to remember.'
- (39) Peter 'ville  
 Peter will  
 '\*Peter would / Peter wanted to.'

In order to bring out the epistemic reading of the modal in (37), NFDS must be used. *gøre* ('do') acts as a landing site for stress assignment, and destressing the modal brings out the intended epistemic reading.

When optional, the use of NFDS serves to bring out the auxiliary-like reading of an ambiguous verb. Auxiliarization is a gradual process (Heine, 1993) and main verb uses and auxiliary uses co-exist. The auxiliary reading is strongly associated with a non-finite verb (Heine, 1993) and the verbal complements are bare infinitives and participles, a typical property of auxiliaries (Ijbema, 2002). NFDS brings out the auxiliary-like reading by establishing the associated canonical subcategorization of a VP complement. In the case of modals NFDS provides a non-finite verb to establish Unit Accentuation. For this reason the following examples have slightly different interpretations out of context: (40a) favours a circumstantial reading, and (40b) favours a future-like (epistemic) reading of the modal.

- (40) a. Hvad skal jeg? (CIRCUMSTANTIAL)  
 what shall I  
 'What am I expected to do?'
- b. Hvad skal jeg gøre? (EPISTEMIC)  
 what shall I do?  
 'What am I supposed to do?'

<sup>32</sup>Öhlschläger (1989, p. 207) actually claims that epistemic readings can never carry stress, but this claim is too strong since contrastive stress on epistemic readings appears to be possible.

The preference of auxiliary-like elements for *do*-support is captured in the lexical entries of the verbs. The auxiliary reading carries a further functional annotation to the effect that a VP node has to be among the nodes mapping to the XCOMP-function. The CAT predicate associates the f-structure of the XCOMP with the set of c-structure nodes mapping to that f-structure. The second argument of the predicate states that a VP must be among the c-structure nodes mapping to that piece of f-structure (Kaplan and Maxwell, 1996). Given this lexical entry NFDS will be enforced, also when a VP or a VP anaphor is topicalized.

(41) Lexical entry for two readings of *ville* ('will/would')

*ville* ('will')    V    (↑PRED)='WANT<(XCOMP)>(SUBJ)'  
                          V    (↑PRED)='COUNTERFACTUAL<(XCOMP)>(SUBJ)'  
                          CAT((↑XCOMP),VP)

### 4.3 Exceptions to basic generalization: dislocated TOPICS

As shown in (27), VP-anaphors in postverbal position require NFDS to establish a canonical structure-function association: in complement position a verbal function is projected from a VP. However, there are cases where NFDS is only optional – even when VP anaphors occur postverbally, i.e. in complement position within the VP. In polar questions and clauses with *wh*-constituents or fronted sentence adverbials (Houser et al., 2010; Andréasson, 2008), a VP anaphor in complement position does not require NFDS. Contrary to the generalization above, NFDS is only optional. Cf. the following examples.

- (42) a.    Må han vel det?  
               may he    VEL that  
               'He is not allowed to do that, is he?'  
       b.    Hvem vil ikke gerne det?  
               who    will not like    that  
               'Who wouldn't like to do that?'  
       c.    Det eneste er at han ikke tager på - og selvfølgelig skal han det<sup>33</sup>  
               the only    is that he    not gains weight    and of course    must he    that  
               'Only thing is that he doesn't gain weight - and of course he needs to.'

Even though the VP anaphor in these examples is no longer in a fronted (discourse prominent) position, there are indications that the anaphor is nevertheless discourse prominent. In Danish, anaphors representing discourse-given, NON-prominent information undergo object-shift (Mikkelsen, 2009). A shifted object is unstressed and is linearized to the left of sentential adverbs in V1/V2-clauses with simple tenses.

- (43)    Peter afslørede det ikke  
               Peter revealed it    not  
               'Peter did not reveal it.'

The pronominal anaphors in (42a) and (42b) do not undergo object-shift. The objects are stressed and linearized to the right of a sentence adverbial. In fact, object-shift appears to be excluded in (42b) through (42c).

<sup>33</sup>www.ammenet.dk, 8/3 2010.

- (44) a. ??/\* Må han det vel?  
           may he that VEL  
           ‘He is not allowed to do that, is he?’
- b. ??/\* Hvem vil det ikke gerne?  
           who will that not happily  
           ‘Who wouldn’t wanna do that?’
- c. ??/\* Selvfølgelig skal han det ikke  
           of course shall he that not  
           ‘Of course he is not supposed to do that.’

However, as shown in Andréasson (2008) these anaphora do not presuppose a set of alternatives against which the present proposition is evaluated, i.e. they are not focal in the sense of Krifka (2007). On the analysis in Andréasson (2008), the VP anaphors fail to shift because pronouns with clausal antecedents in non-factive environments are harder to process than pronouns with NP antecedents or pronouns with clausal antecedents in factive environments. These anaphors are thus inherently topical and qualify as salient topics in these sense of Krifka (2007) and Cook (2001). They represent discourse prominent, given information. The default position for salient topics in Danish is SPEC of CP, but in (42) there are independent reasons why the salient topic cannot be fronted: In non-declarative clauses SPEC of CP is either empty (42a), or it is filled by a *wh*-operator (42b). In (42c), finally, another operator-like constituent occupies the first position.<sup>34</sup> The VP-anaphor, despite being a salient TOPIC, is forced to vacate the canonical position of a salient topic for independent reasons. Fanselow (2003) discusses similar word order phenomena in German where displacement of constituents cannot be explained by information structural properties of the displaced constituents themselves. Rather these constituents are displaced in order to allow other constituents to be fronted. Fanselow terms these kinds of displacement *altruistic movement*. What we see in the examples (42a) through (42c) is thus *altruistic movement*: a salient topic is linearized within the VP in order to let another constituent occupy the fronted position.

As shown in section 4.1, VP-anaphors as Topics are allowed to relax the canonical structure-function association. Being salient topics, though linearized postverbally due to *altruistic movement*, the VP anaphors in (42) are allowed to relax the canonical structure-function association and map to a verbal function without *do*-support. These examples are no exceptions to the basic generalization if we add the qualification that only post-verbal non-topics trigger NFDS. Instead they are exceptions to the rule that salient topics are fronted. The preliminary generalization about NFDS can now be stated more succinctly: NFDS establishes a canonical structure-function association for postverbal non-topics.

In order to account for dislocated topics, the c-structure rule for the VP-expansion given above must be altered. The rule must allow for an NP mapping to an XCOMP function under very specific circumstances: the NP is an anaphor and the NP is a topic, that is displaced due to altruistic movement. Altruistic movement in turn obtains when the clause contains a focal operator (a *wh*-word or a sentence adverbial) or if it is a polar question. The revised rule is given below.

<sup>34</sup> Andréasson (2008) does not consider this particular context of un-shifted pronouns.

## (45) C-structure rule for VP-expansion (final version)

$$\begin{array}{lll}
 \text{VP} \rightarrow & (\text{V}) & (\text{NP}) & (\text{VP}) \\
 & \uparrow=\downarrow & \{(\uparrow\text{OBJ})=\downarrow\} & (\uparrow\text{XCOMP})=\downarrow \\
 & & (\uparrow\text{XCOMP})=\downarrow & \\
 & & (\uparrow\text{TOPIC})=\downarrow & \\
 & & (\downarrow\text{ANA})=c + & \\
 & \{(\uparrow\text{FOCUS-OP})=c + | & & \\
 & (\uparrow\text{POL-INT})=c + \} & & 
 \end{array}$$

#### 4.4 Exception to basic generalization: Event-internal adverbs

In some cases a VP anaphor is accompanied by an adjunct which is semantically licensed by the denotation of the antecedent VP. This phenomenon is reminiscent of Bare Argument Ellipsis or Sluicing where the sole constituent can be a supplemental constituent of the antecedent clause (“Sprouting” in Culicover and Jackendoff (2005, p. 257)). When a manner adjunct or an instrumental adjunct is added, NFDS is always obligatory.

- (46) Sørg desuden for at rense huden grundigt. Det skal du ikke  
 be sure also PREP to clean skin.DEF carefully that must you not  
 ??/\*(gøre) [med vand og sæbe]<sup>35</sup>  
 do with water and soap  
 ‘Be sure to clean your skin carefully. Don’t do that with water and soap.’
- (47) Hvorfor skulle det være en statslig opgave at tvinge landets  
 why should it be a governmental task to force country.DEF.GEN  
 katolikker til det som de ikke vil \*(gøre) [frivilligt]?<sup>36</sup>  
 catholics to that which they not will do voluntarily?  
 ‘Why should it be a governmental task to force the catholics of the country to do what they are not prepared to do voluntarily?’

In (46) the second clause adds an instrument to the denotation of the antecedent VP and in (47) the relative clauses adds a manner adverb to the denotation of the antecedent VP. Note that NFDS is not required with sentential adverbs.

- (48) Det kan man [heldigvis]  
 that can you fortunately  
 ‘Fortunately you can.’

The reason for NFDS in (46) and (47) cannot be that an event-internal adjunct needs a VP to adjoin to, while a sentence adverb must adjoin to an IP. Rather an event-internal adjunct can appear in the very same position as a sentence adverbial without NFDS as shown in (49). An event-internal adverb must be licensed by a lexical verb such as *arbejde* (‘to work’) in (49) or *gøre* (‘do’) in (46) and (47).

- (49) I dag arbejder Peter [frivilligt]  
 today works Peter voluntarily  
 ‘Today Peter is working voluntarily’

<sup>35</sup>KorpusDK

<sup>36</sup><http://karenmlarsen.eftertanke.dk/2010/02/16/skal-staten-inddrive-kirkeskat-for-den-katolske-kirke/>, 26/2 2010.

Following Bresnan (2001), I assume that adjuncts are licensed in functional structure. The *Extended Coherence Condition* (Bresnan, 2001) states that adjuncts must be in f-structures containing PREDs. However, the fact that sentential adjuncts and event-internal adjuncts have different licensing conditions suggests that these adjuncts require different kinds of PREDs as their licensors. While a sentential adjunct is licensed by a modal verb, an event-internal adjunct is not. So one possibility is to assume a subtyping of PREDs, such that e.g. an event-internal adjunct requires the f-structure to contain a special kind of lexical PRED, while a sentential adverb imposes no such restrictions. This would ultimately lead to a more refined version of the *Extended Coherence Condition*. However, the actual implementation of such an enhanced version of the *Extended Coherence Condition* must be tied to a complete theory of the licensing of different kind of adjuncts, which is beyond the scope of this paper. In this context the relevant generalization is that NFDS is pressed into service by providing a PRED to license an event-internal adjunct. Thus we arrive at the following generalization about the use of NFDS:

(50) **Non-finite *do*-support**

NFDS establishes a canonical structure-function association for postverbal non-topics and for verbal arguments of auxiliary-like verbs. NFDS licenses event-internal adjuncts by providing a lexical PRED.

## 5 The verb *gøre* ('do') as a main verb

The preceding discussion has remained silent on the nature of the dummy-verb *gøre* ('do') as used in *do*-support. The central question is whether dummy *do* is an auxiliary or a main verb. In this section I will argue that dummy *do* is best analysed as a main verb albeit a special kind of main verb, a raising verb selecting for a VP anaphor.

The crucial insight in the analysis of *gøre* ('do') in (Houser et al., 2010) is that there is no inherent relation between tense/finiteness and the occurrence of *gøre* ('do'), since non-finite *gøre* ('do') also occurs embedded under auxiliaries. This observation argues against the analysis of *gøre* ('do') in Platzack (2008), who makes *gøre* ('do') a host for the uninterpretable INFL-feature to be checked by T. Houser et al. follow Lødrup (1990) in assuming that *gøre* ('do') is an auxiliary, however a defective auxiliary in the sense that it only selects for a pronominal vP. Ellipsis is analyzed as a covert pronominal and VP topicalization as adjunction to a CP with a covert pronominal in SPEC of CP. As shown by Houser et al. (2010), *gøre* ('do') does exhibit a remarkable resemblance with auxiliaries in its syntactic behaviour, for example in its ability to occur in tag-questions just like true auxiliaries. Cf.

- (51) a. Peter har læst bogen, har han ikke?  
           Peter has read book.DEF has he not  
           'Peter has read the book, hasn't he?'  
       b. Peter læser bogen, gør han ikke?  
           Peter reads book.DEF does he not  
           'Peter is reading the book, isn't he?'

But still there are also crucial differences between *gøre* ('do') and the bona-fide auxiliaries, arguing against an analysis of *gøre* ('do') as an auxiliary. And these properties apply to *gøre* ('do') no matter whether it combines with an NP or with a (topicalized) VP.<sup>37</sup>

First of all auxiliaries take verbal complements in complement position, while *gøre* ('do') never does. This is the main motivation for making *gøre* ('do') an auxiliary selecting for a pronominal vP in Houser et al. (2010). Still, a simpler solution is to assume that *gøre* ('do') is not an auxiliary.

- (52) a. Han ville have læst sine lektier  
he would have done his home work  
b. \* Han ville gøre læse sine lektier  
he would do read his home work

Auxiliaries determine the morphological shape of their complement. The core auxiliaries *have* ('have'), *være* ('be') and *blive* ('get') combine with perfect participles. *gøre* ('do'), however, does not impose any morpho-syntactic constraints on its complement (Cf. also footnote 20).

- (53) Læser / læse bogen gør han  
read.PRES / read.INF book.DEF does he

*gøre* ('do') allows both a finite and an infinite fronted VP. The fact that *gøre* ('do') does not impose any restrictions on the morpho-syntactic shape of its complement follows straight-forwardly, if *gøre* does not select a verbal complement in the first place, but rather a nominal object. The special configuration in (53) is only possible when a VP is fronted. As we have already seen, fronted constituents may violate category restrictions on complements (*movement paradoxes*). It follows from this analysis that fronted VPs with *do*-support as in (54) also present a category mismatch (*movement paradox*) between the filler and the gap.

- (54) [<sub>VP</sub> Betale / betaler] plejer han ikke at gøre *e*  
pay / pays uses he not to do  
'He doesn't usually pay.'

Here the fronted VP maps to the OBJ of *gøre* ('do'). This particular configuration is also accounted for by the c-structure rule in (33). If the configuration in (53) is a non-canonical realization of an otherwise subcategorized OBJ, it is only to be expected that the verb of the topicalized VP surfaces in a default verbal form: either as a bare infinitive or as the same verbal form as the support verb. The governing verb imposes no restrictions. Thus the construction in (53) is expected viz-à-viz the existence of movement paradoxes and by assuming that *gøre* ('do') is not an auxiliary.

There are further differences between *gøre* ('do') and true auxiliaries. Auxiliaries like *have* ('have') and *være* ('be') do not license event-internal adverbials ("sprouting"). *gøre* ('do'), however, does license event-internal adverbials as discussed in section 4.4. Again *gøre* ('do') does not behave as an auxiliary.

<sup>37</sup>Therefore there is no basis for assuming a main verb and an auxiliary verb *gøre* ('do'), as otherwise suggested by a reviewer.

- (55) Louise har ledet mange møder og det har hun altid \*(gjort) godt  
 Louise has conducted many meetings and that has she always done well  
 'Louise has conducted many meetings and she always did it well.'

True auxiliaries are marginal in the imperative, while *gøre* ('do') is impeccable in the imperative.

- (56) Du skal løse denne opgave. \*Hav / gør det til imorgen  
 you must solve this task have / do it until tomorrow

Finally, the complement of *gøre* ('do') appears to have a different syntactic function from the complement of true auxiliaries. The complement of *gøre* may participate in missing-object-construction such as the complement of *tough*-adjectives, which are assumed always to be associated with an object gap in the infinitival complement (Dalrymple and King, 2000, a.o.). The auxiliaries *have* and *være* do not seem to allow *tough*-constructions suggesting that auxiliaries do not select objects the way *gøre* ('do') does.<sup>38</sup>

- (57) Hvordan omregner jeg? Findes der en side på nettet hvor det er let at  
 how calculate I is there a page on net.DEF where it is easy to  
 gøre?<sup>39</sup>  
 do  
 'How do I calculate it? Is there a page on the net where it is easy to do?'  
 (58) ??/\* Peter har gjort rent. Det er let at have når man ikke skal på arbejde  
 Peter has done cleaning it is easy to have when you not must to work  
 'Peter has cleaned. It is easy to have managed to do so when you don't have to go to work.'

This data points to the conclusion that the complement of *gøre* ('do') is different from the complement of auxiliaries. The complement of *gøre* ('do') is an object and not part of an auxiliary complex. So even though there are remarkable similarities between *gøre* ('do') and auxiliaries, there are also remarkable differences pointing to the conclusion that *gøre* ('do') is indeed a main verb and no auxiliary.

However, there is no doubt that *gøre* is a subject raising verb. The subject is determined by the antecedent of the anaphor. *gøre* ('do') itself does not assign a thematic role to the subject.

- (59) Regner det? Det plejer [det] at gøre  
 rains it it uses it to do  
 'Is it raining? It usually does.'

<sup>38</sup>The passive-auxiliary *blive* ('to get') does allow *tough*-constructions, but there is independent evidence, that this auxiliary behaves like a main verb. Like other main verbs, *blive* ('to get') allows *gøre* ('do') in tag-questions.

(i) Peter blev forfremmet, gjorde / ?blev han ikke?  
 Peter was promoted did / was he not  
 'Peter was promoted, wasn't he?'

<sup>39</sup><http://www.webfora.dk/geocaching/archive/index.php/t-1268.html>, 8/3 2010.

- (60) Arbejder han? Ja, det gør [han]  
 works he yes that does he  
 'Is he working? Yes, he is.'

In (59), *gøre* ('do') occurs with an expletive subject as required by the VP antecedent containing the athematic verb *regne* ('rain'). In (60) *gøre* ('do') occurs with an agentive subject as required by the unergative *arbejde* ('work') in the VP antecedent.

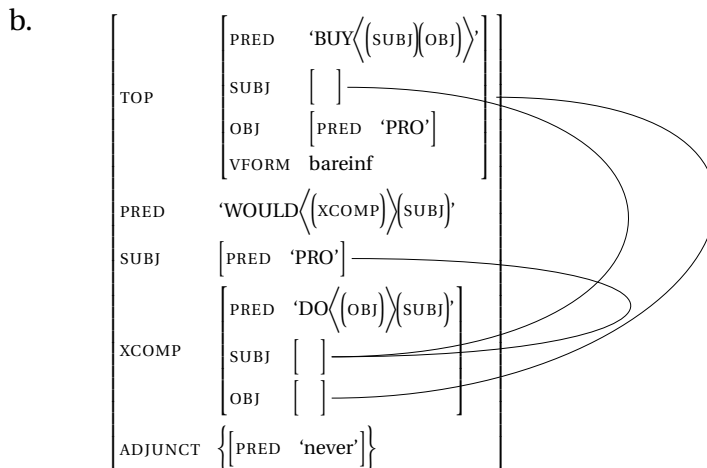
Thus, I propose that *gøre* ('do') is a subject-raising main verb obligatorily selecting for a VP-anaphor as its object. The semantics of this verb is highly underspecified, but still the verb is able to license event-internal adjuncts that cannot be licensed by modals and auxiliaries alone. A corollary of this analysis is that VP-anaphors must be allowed to take subjects, even though they are categorially nouns. The lexical entry for *gøre* ('do') is given in (61).<sup>40</sup>

- (61) Lexical entry for *gøre* ('do')
- gøre* ('do') V (↑PRED)='DO<((OBJ))>(SUBJ)'  
 (↑SUBJ)=(↑OBJ SUBJ)  
 { (↑OBJ ANA) =<sub>c</sub> + | { (↑OBJ VFORM) =<sub>c</sub> (↓VFORM) |  
 (↑OBJ VFORM) =<sub>c</sub> BAREINF } }

The first part of the lexical entry states that the verb selects a non-thematic subject and an object. The subject is structure-shared with the subject of the object-complement accounting for the raising-behaviour of the verb (Bresnan, 2001, p. 80/81).

The second part with the disjunction takes care of the categorial realization of the OBJ(ect). The OBJ(ect) is constrained to be either an anaphor or a VP associated with a VFORM attribute. In the latter case the value of the VFORM must be a bare infinitive or identical to the VFORM of the support verb.<sup>41</sup> Thus the embedded clause in (62a) has the f-structure shown in (62b).

- (62) a. Jeg vil sige, at købe den ville jeg aldrig gøre e  
 I would say, that buy it would I never do



<sup>40</sup>This entry will ultimately also account for the finite uses of *gøre* ('do'), since I assume that FDS is enforced by the c-structure rules, i.e. the requirement that a (finite) clause is projected from a finite verb. However, the different distribution of finite and non-finite *gøre* ('do') as regards ellipsis needs to be accounted for.

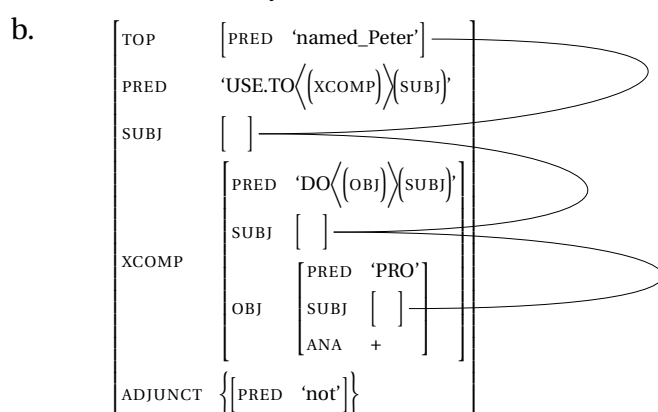
<sup>41</sup>If postverbal VPs are allowed to map to OBJ as in the analysis of Dalrymple and Lødrup (2000) this entry will have to be revised. However, in that case a mechanism to distinguish nominal from verbal objects is independently needed to prevent transitive verbs like *to read* from taking a VP object.

As noted above this analysis presupposes that a VP-anaphor selects a subject for *gøre* ('do') to raise. The lexical entry for the VP anaphor *det* ('it') is given below.

- (63) *det* ('it') N ( $\uparrow$ PRED)='PRO'( $\langle\uparrow$ SUBJ) $\rangle$ '  
 ( $\uparrow$ ANA)= +

The example in (64a) is assigned the f-structure shown in (64b).

- (64) a. Peter plejer ikke at gøre det  
 Peter uses not to do it  
 'Peter usually doesn't do it.'



## 6 Conclusion

The present analysis of NFDS in Danish has confirmed the claim in (Houser et al., 2010) that *do*-support in Danish is not entirely connected to tense. However, contrary to Houser et al. (2010) and contrary to Platzack (2008) NFDS has been shown not be optional. In specific environments NFDS is obligatory, and even in environments, where NFDS is indeed optional, its use is not random. Strong generalizations can be made about the use of NFDS in environments where it is otherwise optional. NFDS projects a VP where structure-function association requires a VP in the C-structure or where a specific reading of a verb requires a VP for reasons of subcategorization or stress placement. Finally NFDS serves to license event-internal adjuncts. Also, the status of support-*do* as an auxiliary as in Houser et al. (2010) has been cast into doubt. Instead support-*do* is analyzed as a special kind of raising verb obligatorily selecting a VP-anaphor. Several issues on NFDS are still pending. The claim that NFDS serves to license event-internal adjuncts needs to be given a firm theoretical underpinning, and other occurrences of NFDS are still in need of an analysis. I have offered no account of NFDS with non-verbal predicates (cf. section 2) and I have not accounted for NFDS in comparatives where NFDS even appears to allow ellipsis (contrary to the claim in Houser et al. (2010)). In this sense *do*-support still continues to present new questions and uses to be accounted for.

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Bjarne Ørsnes  
Freie Universität Berlin  
Bjarne.Ørsnes@fu-berlin.de

# Phrasal complements of *before* and *after*

Doris Penka & Arnim von Stechow\*

## 1 Introduction

The temporal connectives *before* and *after* can combine with complements of different semantic types. The examples in (1) illustrate this.

- (1) a. Mary arrived before/after 6 o'clock.  
 b. Mary left before/after the meeting.  
 c. Mary arrived before/after John left.  
 d. Mary arrived before/after John.

In (1-a), the complement of *before/after* is an expression denoting a time, while it denotes an event in (1-b). *Before* and *after* can also take clausal complements, as in (1-c). Finally, (1-d) illustrates that what looks superficially like a DP denoting an individual can also serve as complement.

The literature on *before* and *after* has focused on cases like (1-b) and (1-c) (Pratt and Francez, 2001; von Stechow, 2002; Beaver and Condoravdi, 2003; Artstein, 2005). Instances of *before* and *after* like (1-d), where the complement is *prima facie* a DP denoting an individual, have received little attention. One of the few places where the construction is discussed is von Stechow and Beck (2007). This analysis is in the context of pluriactionality, in terms of events and not easily compared with the approach taken in this paper, which is in temporal terms.<sup>1</sup>

Such phrasal complements of *before/after* pose interesting challenges for the syntax/semantics interface. Their analysis is the main concern of this paper. The question, in particular, arises whether the complement in (1-d) is really just a DP, or whether it is underlyingly clausal and reduced by ellipsis. That is, whether (1-d) really corresponds to (2).

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<sup>1</sup>Von Stechow and Beck (2007) analyse sentence (i-a) as (i-b), where  $\text{pred}(e)$  is the immediate predecessor of an event  $e$ .

- (i) a. Min entered the room (immediately) after Katie.  
 b.  $\lambda e_v$ . Min enters the room in  $e$  & Katie enters the room in  $\text{pred}(e)$   
 c.  $[[\text{after Katie}]] = \lambda R_{e(vt)}.\lambda x_e.\lambda e_v.R(x)(e) \ \& \ R(\text{Katie})(\text{pred}(e))$

- (2) Mary arrived before/after John ~~arrived~~

If (2) is the correct analysis of (1-d), these cases of phrasal *before/after* can be reduced to clausal cases. If, on the other hand, it turns out that the complement of *before/after* is just a DP, a different analysis is required.

It is interesting to note that other temporal connectives like *since* and *until* do not pattern with *before* and *after* in this respect. While both *since* and *until* can take times as well as events and clauses as complements, what looks like a bare DP is impossible.<sup>2</sup>

- (3) a. Mary has been awake since 6 o'clock.  
 b. Mary has been awake since the accident.  
 c. Mary has been awake since John left.  
 d. \*Mary has been awake since John.
- (4) a. Mary slept until 6 o'clock.  
 b. Mary slept until the meeting.  
 c. Mary slept until John left.  
 d. \*Mary slept until John.

Similar issues do, however, arise in the domain of comparatives, where they have received a lot of interest (Hankamer, 1973; Bresnan, 1973; Hoeksema, 1983, 1984; Heim, 1985, a.o.).

- (5) a. John is taller than Mary is.  
 b. John is taller than Mary.

For phrasal comparatives as (5-b), both reduction analyses, according to which they are underlyingly clausal and derived by some form of ellipsis, and direct analysis have been proposed. There evidence seems to be in favour of an analysis that assumes phrasal comparatives to be underlyingly clausal, at least in languages like English and German (see Lechner, 2001; Bhatt and Takahashi, 2007). Semantically, there is a connection between the temporal connectives *before* and *after* on the one hand, and comparatives on the other. Statements with *before* and *after* are semantically equivalent to comparatives involving the temporal adjective *early* and *late* as in the pairs in (6) and (7).

- (6) a. Mary arrived before John.  
 b. Mary arrived earlier than John.
- (7) a. Mary arrived after John.  
 b. Mary arrived later than John.

As times can be conceived as a particular sort of degrees (see von Stechow, 2009a), this equivalence between temporal comparatives and *before/after* follows.

This paper addresses the question what the correct analysis of phrasal complements of *before/after* is. To this end, we discuss evidence, partly applying tests that have been discussed in the literature on phrasal comparatives. In contrast to compar-

<sup>2</sup>Examples (3-d) and (4-d) are acceptable if the name *John* is used to refer to a time. For this interpretation, see (17). What is crucial is that these sentences do not have an interpretation that would arguably involve ellipsis.

atives, however, the evidence suggests that the complement is just a DP. This necessitates a separate analysis for this instances of phrasal *before/after*. We propose such an analysis. Adopting this analysis has interesting consequences for the conception of the syntax/semantics-interface, as non-standard assumptions about the formation of LF have to be made.

The next section lays the ground for the discussion of the temporal connectives, and fills in some background on the interpretation of tense. In section 3, we present the analysis of Beaver and Condoravdi (2003), which works well for instances of *before/after* where the complement is a clause or an expression denoting a time or an event. Section 4 discusses empirical evidence that strongly suggests that DP complements of phrasal *before/after* are not elliptically reduced clauses. We present a matching analysis in 5 and discuss what assumptions it requires about the syntax/semantics-interface.

## 2 Background assumptions on tense interpretation

For the interpretation of tense, we use the system laid out in detail in von Stechow (2009b), simplifying it for the purpose at hand. Our main assumptions can be summarised as follows.

We use the semantic type  $i$  for times, in addition to the usual types  $e$  (entities),  $v$  (events) and  $t$  (truth values). Times are points or intervals on the time scale ordered by the ‘earlier than’-relation  $<$ . For any two time points (moments)  $m$  and  $m'$ , it holds that either  $m < m'$  or  $m' < m$  (also written as  $m > m'$ ), or  $m = m'$ . The  $<$ -relation is extended in a natural way to intervals: The interval  $t$  is before the interval  $t'$  ( $t < t'$ ) iff each moment in  $t$  is before any moment in  $t'$ .

Verbs, and more generally expressions that are temporally located, have a temporal argument. We assume that this is the innermost argument, as shown in (8) for the verb *arrive*.

$$(8) \quad [[\text{arrive}_{i(et)}]] = \lambda t_i. \lambda x_e. x \text{ arrives at time } t$$

Temporal arguments are passed up in the syntactic structure by  $\lambda$ -binding until they are bound by a tense operator.<sup>3</sup> We furthermore assume that tense morphology on verbs is not interpreted, but points to covert semantic tense operators. Technically, this can be implemented via pairs of uninterpretable and interpretable features. A verb with past morphology, for instance, bears an uninterpretable PAST-feature [uPAST] which has to be checked against a corresponding interpretable PAST-feature [iPAST] on a covert PAST-operator located in  $T^0$ . For illustration, the syntactic structure of sentence (9-a) is given as (9-b).<sup>4</sup> From this, the LF (9-c) is derived.

<sup>3</sup>For concreteness, we assume that  $\lambda$ -operators are generated by PRO-movement in the style of Heim and Kratzer (1998). The temporal argument is base-generated as the pronoun PRO, which is semantically empty and doesn't have a semantic type. PRO has to be moved for type reasons and is subsequently deleted at LF. Crucially, PRO-movement creates a  $\lambda$ -abstract of type  $i t$ . We will generally gloss over the details of the derivation of  $\lambda$ -operators.

<sup>4</sup>We neglect the movement of the subject to Spec,TP and other kinds of movement for syntactic reasons which can be assumed to be reconstructed at the level of LF.

- (9) a. Mary arrived  
 b.  $[_{TP} \text{ PAST}_{[i\text{PAST}]} [_{VP} \text{ Mary arrived}_{[u\text{PAST}]} ]]$   
 c.  $[_{(it)t} \text{ PAST} [_{\lambda t_1} [_{\text{Mary}} [_{\text{arrive}(t_1)}]]]]]$

We assume an indefinite semantics of tense (cf. Prior, 1967). The temporal operator PAST, when evaluated at the speech time  $s^*$ , asserts the existence of a time preceding  $s^*$  of which the temporal property denoted by the complement holds, cf. (10). This leads to the truth conditions (11) for (9).

$$(10) \quad [[\text{PAST}]]^{s^*} = \lambda P_{it}. (\exists t < s^*) P(t)$$

$$(11) \quad [[(9\text{-c})]]^{s^*} = (\exists t < s^*) \text{ Mary arrives at } t$$

### 3 Temporal and clausal arguments of *before* and *after*

Beaver and Condoravdi (2003) propose a semantic analysis of *before* and *after* as relations between times. The only difference between *before* and *after* concerns the temporal relation employed in their semantics. While *before* denotes the  $<$ -relation, *after* corresponds to  $>$ . The meaning rules are given in (12).<sup>5</sup>

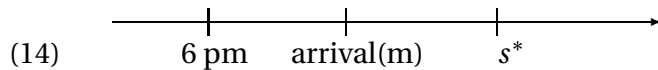
- (12) a.  $[[\text{before}]] = \lambda t_i. \lambda t'_i. \lambda P_{it}. P(t) \ \& \ t' < t$   
 b.  $[[\text{after}]] = \lambda t_i. \lambda t'_i. \lambda P_{it}. P(t) \ \& \ t' > t$

This semantics of *before* and *after* is very appealing, as it is simple and corresponds to the meaning these temporal connectives have intuitively.

Although Beaver and Condoravdi (2003) are concerned with clausal complements of *before/after*, the simplest cases are ones where the complement is an expression denoting a time, such as *6 pm*. As the complement is of the right type, viz.  $i$ , it can directly serve as the first argument of *before/after*. The second argument is the temporal argument which all temporally located expressions have and which is to be bound by the matrix tense. The semantic derivation is illustrated in (13).

- (13) a. Mary arrived after 6 pm.  
 b.  $[_{TP} \text{ PAST} [_{\lambda t_2} [_{t_2 \text{ after } 6 \text{ pm}}] [_{\lambda t_1} [_{\text{Mary arrive}(t_1)}]]]]]$   
 c.  $(\exists t < s^*) \text{ Mary arrives at } t \ \& \ t > 6 \text{ pm}$

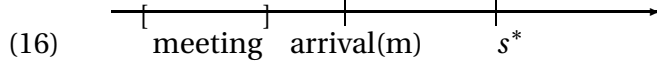
According to the truth conditions in (13-c), the sentence is true in a scenario as the one depicted in (14).



If the complement of *before/after* is a DP denoting an event, e.g. *the meeting*, the type shifter  $\tau$  can be used, which associates an event with its running time. With this, the semantic derivation is also straightforward, as shown in (15).

<sup>5</sup>The temporal connectives could even have the simple type  $i(it)$ , i.e. *before* and *after* could express  $<$  and  $>$  directly. The VP would then be analysed as  $[[\lambda t_2 t_2 \text{ after } 6 \text{ pm}}] [_{\lambda t_1} \text{ Mary arrive}(t_1)]]]$ , where the adjunct combines with the VP via Predicate modification. PAST would then simultaneously bind  $t_2$  and  $t_1$ .

- (15) a. Mary arrived after the meeting.  
 b.  $[ \text{PAST} [ \lambda t_2 [ [ t_2 \text{ after } \tau(\text{the meeting}) ] [ \lambda t_1 [ \text{Mary arrive}(t_1) ] ] ] ] ]$   
 c.  $(\exists t < s^*) \text{ Mary arrives at } t \ \& \ t > \tau(\text{the meeting})$



More challenging are cases where the complement DP is quantified, as in *after every meeting*, or ones involving cascades of temporally locating expressions like *after every meeting on a Monday*, but we don't discuss these here.

There are also cases, where DPs that intrinsically denote individuals are used to refer to times. (17) is an example.

- (17) The reputation of the USA was ruined after George W. Bush..

Here the name *George W. Bush* refers to the time of the presidency of the person.

For clausal complements of *before/after*, as in (18), deriving a time as the denotation of the complement clause requires more elaborate assumptions about the syntax/semantics interface.

- (18) Mary arrived before John left.

Following Heim (1997), we assume that temporal adverbial clauses are interpreted akin to relative clauses, such that *before John left* is equivalent to *before the time at which John left*. To this end, we assume that the clause contains a covert *at*-phrase, where *t at t'* means that  $t = t'$ . The inner argument of AT is wh-extracted to form a relative clause ('at which John left'). This results in the LF (19) for the temporal clause in (18).

- (19)  $\text{WH}_2 \text{ PAST } \lambda t_3 [ [ t_3 \text{ AT } t_2 ] \lambda t_1 [ \text{John leave}(t_1) ] ] ]$

In order to serve as the argument of *before*, this set of times at which John left has to be coerced into a single time. Beaver and Condoravdi (2003) argue that this is done by a covert coercion operator EARLIEST, defined in (20).<sup>6</sup>

- (20)  $[ [\text{EARLIEST}] ] = \lambda P_{it}. (t)P(t) \ \& \ (\forall t')P(t') \rightarrow t < t'$   
 (abbreviated as: the earliest  $t$  such that  $P(t)$ )

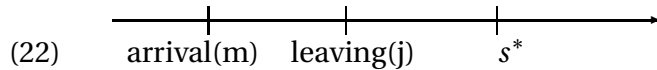
Combining all these assumptions, we get the LF (21-a) for sentence (18). The truth conditions (21-b) expressed by this LF correspond to *Mary arrived before the earliest time at which John left* and are true in a scenario such as (22).

- (21) a.  $[ \text{PAST} [ \lambda t_4 [ t_4 \text{ before } [ \text{EARLIEST WH}_2 \text{ PAST } \lambda t_3 [ [ t_3 \text{ AT } t_2 ] \lambda t_1 [ \text{John leave}(t_1) ] ] ] ] ] ]$   
 $[ \lambda t_5 [ \text{Mary arrive}(t_5) ] ] ] ]$   
 b.  $(\exists t < s^*) \text{ Mary arrives at } t \ \& \ t < \text{the earliest } t' \text{ s.t. } t' < s^* \ \& \ \text{John leaves at } t'$

<sup>6</sup>EARLIEST has to be restricted to contextually relevant intervals. This is necessary to prevent sentences like (i) from being tautological. (i) doesn't refer to the first time the sun set ever, i.e. the first day of the world, but rather to the day relevant in the context.

- (i) Mary went to bed after the sun set.

Temporal operators in general have to be restricted to contextually relevant intervals. We neglect this issue here.



Summarising this section, we can state that Beaver and Condoravdi (2003) offer an analysis for *before* and *after* that successfully deals with cases where these expressions take clausal complements, and also certain instances of phrasal complements, namely ones that denote times or events. This leaves phrasal complements denoting an individual as in (23).

(23) Bill left before Mary.

If such examples are really underlyingly clausal, Beaver and Condoravdi's analysis covers them as well. But if the complement is really just the visible DP, their analysis doesn't apply and a different semantics for these cases is required. In the next section, we consider empirical evidence bearing on the syntactic and semantic status of these phrasal complements of *before* and *after*.

## 4 Empirical evidence

### 4.1 Lexical distinction

As a first kind of evidence, we observe that some languages use different lexical items for *before* and *after*, depending on whether they take a clausal or a phrasal complement. In German, for example, the clausal variants are *bevor* and *nachdem*, cf. (24-a), while the phrasal variants are *vor* and *nach*. The phrasal variant doesn't distinguish the semantic status of the complement, i.e. whether it denotes an individual as in (24-b), or a time or an event as in (24-c).

- (24) a. Peter trank den Whiskey bevor / nachdem er das Bier getrunken hatte.  
 Peter drank the whiskey before / after he the beer drunk had
- b. Peter trank den Whiskey vor / nach dem Bier.  
 Peter drank the whiskey before / after the beer / six o'clock / the dinner
- c. Peter trank den Whiskey vor / nach sechs Uhr / dem Abendessen.  
 Peter drank the whiskey before / after six o'clock / the dinner

The contrast in the choice of lexical item makes it implausible that (24-b) is derived from (24-a) by ellipsis reduction. If (24-b) was an elliptical form of (24-a), this shouldn't affect the form of the temporal connective.

Note that the lexical distinction German makes doesn't, in fact, provide an argument against the analysis of Beaver and Condoravdi (2003), according to which the clausal case (24-a) is parallel to phrasal cases like (24-c). The conjunction *nachdem* is morphologically made up of *nach* ('after') and the dative form of the definite article. So this fact from German could be taken as evidence for the presence of a definiteness operator like EARLIEST.

## 4.2 Restrictions on category and number of complements

Further indication that DP complements of *before/after* are not elliptical clauses comes from restrictions on the category and number of the remnants of the alleged reduction. Phrasal complements of *before* and *after* are invariably DPs. PPs or adverbials can't serve as complements of phrasal *before/after*.

- (25) a. \*Tom lived in Scotland after in the US.  
b. \*John drove fast after slowly.

This restriction is unexpected under a reduction analysis. It doesn't show up in comparative complements, either, as the examples in (26) illustrate.

- (26) a. Tom lived longer in Scotland than in the US.  
b. More cars drove fast than slowly.

Furthermore, the remnant can only consist of one constituent, never two or more, cf. (27). This also contrast with comparatives, as shown in (28).

- (27) a. \*Mary drank the beer after Peter the whiskey.  
b. \*Austen wrote Sense and Sensibility before Brontë Jane Eyre.  
(28) a. Mary drank the beer quicker than Peter the whiskey.  
b. Austen wrote Sense and Sensibility earlier than Brontë Jane Eyre.

## 4.3 Case matching

Complement DPs of phrasal *before/after* appear invariably in the oblique case, independently of the case of its correlate in the matrix, cf. (29-a). In elliptical clausal complements in contrast, the case of the remnant corresponds to the case of the correlate, cf. (29-b).

- (29) a. Kim left before/after me/ \*I.  
b. Kim left before/after I did.

Case assignment on pronouns in English doesn't, however, constitute a conclusive argument. Similar data for comparatives, cf. (30), have been discussed in the literature on phrasal comparatives, without a conclusive result.

- (30) a. John is older than me/ \*I.  
b. John is older than I am.

More telling in the case of comparatives are data from languages that also have case marking on full DPs, such as German. Here the case of the DP embedded under *als* ('than') matches the case of the correlate in the matrix, and different case marking yields different interpretations, as the following examples from Heim (1985) illustrate.

- (31) a. Ich habe dir bessere Schlagzeuger als der Karlheinz  
I.NOM have you.DAT better.ACC drummers than the.NOM Karlheinz  
vorgestellt.  
introduced

- 'I have introduced better drummers to you than Karlheinz (has).'
- b. Ich habe dir bessere Schlagzeuger als dem Karlheinz  
 I.NOM have you.DAT better.ACC drummers than the.DAT Karlheinz  
 vorgestellt.  
 introduced  
 'I have introduced better drummers to you than (to) Karlheinz.'
- c. Ich habe dir bessere Schlagzeuger als Bassisten  
 I.NOM have you.DAT better.ACC drummers than bassists.ACC  
 vorgestellt.  
 introduced  
 'I have introduced better drummers to you than bassists.'

In contrast to complements of comparatives, DPs embedded under *vor* ('before') and *nach* ('after') in German always bear dative case, independently of the function and the case of the correlate in the matrix. This is illustrated in (32). Consequently, examples with ditransitive verbs are three-ways ambiguous, as any of the arguments of the verb can be the correlate – if pragmatically plausible. (33) is such an example.

- (32) a. Der Pfarrer trank den Whiskey nach dem Bürgermeister.  
 the.NOM priest drank the.ACC whiskey after the.DAT mayor  
 'The priest drank the whiskey after the mayor.'
- b. Der Pfarrer trank den Whiskey nach dem Bier.  
 the.NOM cowboy drank the.ACC whiskey after the.DAT beer  
 'The priest drank the whiskey after the beer.'
- (33) Er stellte seine Verlobte seinen Eltern nach seiner Sekretärin vor.  
 he introduced his.ACC fiancée his.DAT parents after his.DAT secretary PART  
 'He introduced his fiancée to his parents after he introduced his fiancée to his secretary.'  
 'He introduced his fiancée to his parents after he introduced his secretary to his parents.'  
 'He introduced his fiancée to his parents after his secretary introduced his fiancée to his parents.'

These data suggest that *vor* ('before') and *nach* ('after') are prepositions assigning dative case to their DP complements.

#### 4.4 Binding effects

In addition to the morphological facts discussed in the previous subsections, more elaborate tests can be applied to draw conclusions on the syntactic status of phrasal complements of *before/after*. One such test, which has been used by Lechner (2004) for phrasal comparatives, concerns binding effects. Lechner notes that direct and reduction analyses make different predictions for the binding possibilities of the comparative complements. In the case of *before/after*, the predictions are as follows:

- (34) a. Prediction by the direct analysis: The binding properties of DP complements of phrasal *before/after* are the same as the binding properties of DP

complements of other prepositions.

- b. Prediction by the reduction analysis: Binding properties of the remnant are determined by c-command relations in the matrix; the remnant is c-commanded by everything that c-commands the correlate.

So what are the empirical observations regarding binding properties of the complements of phrasal *before/after*? As discussed by Lechner (2004), clearest evidence comes from Principle C effects. We first consider cases where the reduction analysis predicts a Principle C violation. (35) is a case in point, under the intended interpretation with the subject (*Mary*) as correlate, i.e. meaning Mary saw Peter's sister before Peter saw Peter's sister.<sup>7</sup>

(35) ?Mary saw Peter<sub>i</sub>'s sister before him<sub>i</sub>.

Under the reduction analysis, (35) is an elliptical version of (36). There the unreduced complement clause violates Principle C, as the R-expression *Peter* is c-commanded by the coreferential pronoun *he*.

(36) \*Mary saw Peter<sub>i</sub>'s sister before he<sub>i</sub> saw Peter<sub>i</sub>'s sister.

Although (35) might not be perfect, it is decidedly better than the ungrammatical (36), indicating that the phrasal variant (35) doesn't have the same clausal structure underlyingly. The direct analysis, in contrast, predicts that (35) is parallel to other cases of PP-internal pronouns like (37).

(37) ?Mary visited Peter<sub>i</sub>'s sister without him<sub>i</sub>.

Similar binding facts also hold for German, as the grammaticality contrast between (38) and (39) illustrates.

- (38) Maria meldete den Peter<sub>i</sub> vor ihm<sub>i</sub> an.  
 Maria signed-up the.ACC Peter before him.DAT PART  
 Intended reading: Maria signed up Peter before Peter signed up himself.
- (39) \*Maria meldete den Peter<sub>i</sub> an, bevor er<sub>i</sub> den Peter<sub>i</sub> anmeldete.  
 Maria signed-up the.ACC Peter PART before he the.ACC Peter signed-up  
 Intended reading: Maria signed up Peter before Peter signed up himself.

There are also inverse cases where an R-expression, which is coreferential with a pronoun in the matrix, occurs in the DP-complement of *before/after*. In this constellation, a Principle C violation obtains, cf. (40).

(40) \*Mary saw him<sub>i</sub> before Peter<sub>i</sub>'s sister.

<sup>7</sup>As the correlate can be the subject or the object, (35) can also express a reading equivalent to (i), in which case the sentence is unobjectionable.

(i) Mary saw Peter<sub>i</sub>'s sister before she saw him<sub>i</sub>

What is relevant is that the sentence can also express the subject correlate reading. The ? in (35) refers to the sentence under this reading.

The ungrammaticality of (40) isn't predicted by the reduction analysis. Under the intended reading that Mary saw Peter before Peter's sister saw Peter, (40) should be equivalent to the clausal version (41-a). As the R-expression is free in its binding domain, the *before*-clause, (41-a) is grammatical.

- (41) a. Mary saw him<sub>i</sub> before Peter<sub>i</sub>'s sister saw him<sub>i</sub>.  
 b. Mary saw him<sub>i</sub> before Peter<sub>i</sub>'s sister did.

Thus, the reduction analysis doesn't account for the ungrammaticality of (40). There is also a clear contrast between (40) and the elliptical version (41-b) of (41-a), which is unexpected under the assumption that (40) is an even more reduced elliptical version of the clausal variant.

The direct analysis, in contrast, makes the correct prediction. Assuming that the direct object c-commands the *before*-PP, (40) represents a violation of Principle C. In any case, (40) is predicted to be parallel to analogous sentences with other prepositions like (42), which is borne out.

- (42) \*Mary visited him<sub>i</sub> without Peter<sub>i</sub>'s sister.

Again, the facts carry over to German.

- (43) a. \*Maria sah ihn<sub>i</sub> vor Peters<sub>i</sub> Schwester.  
 Maria saw him before Peter's sister  
 Intended reading: Maria saw Peter before Peter's sister saw Peter.  
 b. Maria sah ihn<sub>i</sub> bevor Peters<sub>i</sub> Schwester ihn<sub>i</sub> sah.  
 Maria saw him before Peter's sister him saw

Summarising the binding data, we observe that the binding properties of the DP complement of phrasal *before/after* are determined by surface syntax, not by c-command relations between the correlate and other matrix elements. This is compatible with the direct analysis, but not with the reduction analysis.

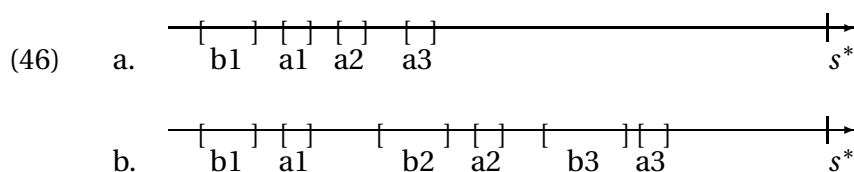
## 4.5 Quantificational arguments

Another type of data that might allow conclusions on the syntactic status of the complement of phrasal *before/after* concern the scope possibilities of quantificational complements. If phrasal *before* and *after* are prepositions, one would expect quantificational complements to interact freely with quantifiers in the matrix. If, in contrast, the complement is underlyingly clausal, the expectation would be that quantifier scope being generally clause bounded, quantificational remnants can't take scope outside the complement clause. This argument is, however, not as straightforward as one would wish. In the realm of comparatives, certain quantificational elements embedded in comparative clauses seem to defy clause boundedness (see a.o. Schwarzschild and Wilkinson, 2002; Beck, 2010). It has also been observed that quantifiers can take scope outside of a temporal adjunct clause in English (Artstein, 2005). Sentence (44) for instance has a reading with *each executive* taking scope above the matrix subject *a secretary* and is true in a situation where each resignation of an executive is followed by the crying of a different secretary, e.g. the resigned executive's secretary.

- (44) A secretary cried after each executive resigned.

However, as Artstein (2005) notes, the situation is different in German, where quantifiers can't take scope outside of a temporal adjunct clauses. Sentence (45), for instance, only has a specific reading, according to which one book is read before the reading of all articles.<sup>8</sup> The unspecific reading, where the reading of each article is preceded by the reading of a potentially different book is not available. Thus, (45) can describe the situation depicted in (46-a), but not in (46-b).

- (45) Peter las ein Buch bevor er jeden Artikel las.  
 Peter read a book before he every article read  
 'Peter read a book before he read every article.'



The behaviour of quantifiers embedded in *before/after*-clauses contrasts with quantificational complements of phrasal *before/after* in German. In (47), the quantifier *jeder Artikel* ('every article') can take wide scope over the matrix object *ein Buch* ('a book'), and (47) can be used in the scenario (46-b).

- (47) Peter las ein Buch vor jedem Artikel.  
 Peter read a book before every article  
 'Peter read a book before every article.'

Even though in German, the scope of quantifiers embedded in temporal clauses is clause bounded, quantificational complements of phrasal *before/after* can take scope over matrix elements. This, too, suggests that DP complements aren't remnants of ellipsis reduction of a clausal complement.

## 4.6 Summary of empirical evidence

All kinds of empirical evidence we considered are in favour of the direct analysis. We conclude that the DP complement of phrasal *before/after* is syntactically a DP and semantically an individual. Consequently, the semantics of Beaver and Condoravdi (2003) for *before/after* doesn't extend to cases where the complement is a DP denoting an individual. This phrasal *before/after* requires a separate analysis. In the next section, we propose a matching analysis.

<sup>8</sup>As *after*-clauses in German generally require use of the pluperfect, which introduces another temporal quantifier, we discuss an example with *before*, which allows simple tenses in complement clauses, rather than the sentence corresponding to Artstein's original example (44).

## 5 Analysis

### 5.1 Semantics

The semantics of phrasal *before/after* has to mimic the semantics of clausal *before/after*. What *before* and *after* set into relation are times at which a certain temporal property holds of different individuals, e.g. (48) compares the time of Mary's arrival to the time of John's arrival.

(48) Mary arrived after John.

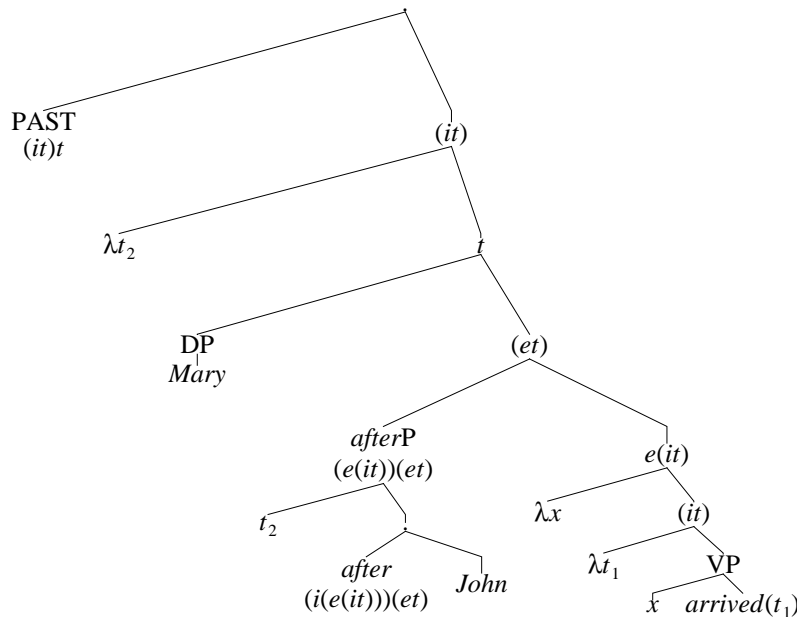
If the temporal property isn't present in the structure of the complement, and according to the empirical evidence discussed in the previous section it isn't, it nevertheless has to be represented in the semantics. We propose a semantics for phrasal *before/after* which closely follows Heim's (1985) direct analysis of phrasal comparatives.

- (49) a.  $[[\text{before}]] = \lambda x_e. \lambda t_i. \lambda R_{e(it)}. \lambda y_e. R(y)(t) \ \& \ t < \text{EARLIEST}(\lambda t. R(x)(t'))$   
 b.  $[[\text{after}]] = \lambda x_e. \lambda t_i. \lambda R_{e(it)}. \lambda y_e. R(y)(t) \ \& \ t > \text{EARLIEST}(\lambda t. R(x)(t'))$

According to this meaning rule, phrasal *before/after* takes four arguments. The innermost is the individual denoted by the complement DP. The second argument slot is occupied by the temporal argument of the *before/after*-phrase. The third argument is a relation between individuals and times (type  $(e(it))$ ). In the meaning rule, this relation  $R$  is applied both to the complement and the correlate. The individual corresponding to the correlate is the last argument.

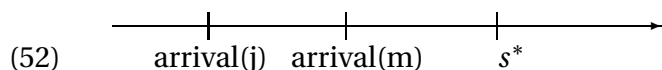
For illustration, we show how the semantics in (49) derives the correct meaning for sentence (48). The relation between individuals and times in this case is  $\lambda x_e. \lambda t_i. x$  arrives at  $t$ . This can be derived from the VP by  $\lambda$ -abstracting over the subject and the temporal argument of the verb, as shown in the LF (50). (The issue of LF formation is discussed in more detail in the next subsection).

(50)



Applying the meaning rule in (49), the LF (50) expresses the truth conditions (51), which correctly reflect the intuitive meaning of this sentence.

- (51)  $(\exists t < s^*)$  Mary arrives at  $t$  &  $t >$  the earliest  $t'$  s.t. John arrives at  $t'$



Note that in the meaning rule for phrasal *before/after*, the EARLIEST operator is incorporated. While Beaver and Condoravdi's (2003) analysis of clausal complements remains neutral whether EARLIEST is specified in the lexical meaning of the connectives or in the process of compositional build-up through type shifting operations, the later option isn't available for phrasal *before/after*.

Employing EARLIEST, our analysis inherits certain aspects of Beaver and Condoravdi's. The first concerns non-veridical readings of *before*, where the temporal clause isn't implicated to become true. (53-a) is such an example. Non-veridical readings are also possible for phrasal *before*. (53-b), for instance, doesn't imply that Jones closed the contract.

- (53) a. Mozart died before he finished the Requiem.  
b. Smith closed the contract before Jones.

Beaver and Condoravdi (2003) account for non-veridical readings of *before* by using a branching time framework. In the case of *before*, the earliest instantiation of the complement clause isn't necessarily on the branch which represents the actual continuation of the world. It is sufficient if the complement clause is instantiated on a branch representing a plausible alternative continuation at the time of the matrix clause. As the truth conditions resulting under our semantics of phrasal *before* are identical to Beaver and Condoravdi's for clausal cases, their explanation carries over.

Another asymmetry between *before* and *after* concerns the licensing of negative polarity items (NPIs) in their complements. NPIs can occur in clausal complements of *before*, cf. (54-a), and as DP complements, cf. (54-b), but they are generally excluded in the complement of *after*, cf. (55).

- (54) a. Mary left before anyone noticed her.  
b. Mary arrived before any of her friends.  
(55) a. \*Mary left after she ate anything.  
b. \*Mary left after anyone else.

Beaver and Condoravdi (2003) explain the licensing of NPIs in *before*-clauses with the EARLIEST operator: if a time  $t$  precedes the earliest time which instantiates a temporal property  $P$ ,  $t$  precedes every time instantiating  $P$ . The same doesn't hold for *after*: if a time  $t$  follows the earliest time which instantiates a temporal property  $P$ , it doesn't follow that  $t$  precedes every time instantiating  $P$ . Thus, the complement of *before* constitutes a downward entailing environment in which NPIs are licensed, whereas the complement of *after* doesn't.

Accommodating the licensing of NPIs by phrasal *before* in our analysis requires certain additional assumptions. If we try to analyse sentence (54-b) with the meaning rule (49-a) we do neither account for the licensing of the NPI nor do we get the right truth

conditions. This is due to the fact that in the meaning rule (49-a) the first argument is specified to be an individual. A quantificational DP like *any of her friends* in this position thus has to be QR-ed, yielding an LF like (56-a). It expresses the truth conditions in (56-b), which are fulfilled in the scenario (57). In other words, Mary wasn't the last to arrive. This is in fact not a reading (54-b) intuitively has.

- (56) a.  $[ \text{PAST } \lambda t_2 [ \text{anyone } \lambda x [ [ t_2 \text{ before } x ] \lambda t_1 \lambda y [ y \text{ arrive}(t_1) ] ] ] ]$   
 b.  $(\exists t < s^*) \text{ Mary arrives at } t \ \& \ (\exists x) x \text{ is a friend of Mary} \ \& \ t < \text{the earliest } t' \text{ s.t. } x \text{ arrives at } t'$
- (57)

In fact, the reading in (56) is excluded, because the NPI *any of her friends* takes scope outside of the *before*-phrase and thus isn't interpreted in a downward entailing environment. In order for the NPI to be interpretable below *before*, we need a type-shifted version (58), where the first argument is of the quantifier type.

- (58)  $[ [ \text{before}_2 ] ] = \lambda \mathcal{Q}_{(et)t} . \lambda t_i . \lambda R_{e(it)} . \lambda y_e . R(y)(t) \ \& \ t < \text{EARLIEST}(\lambda t . \mathcal{Q}(\lambda z . R(z)(t')))$

Applying this meaning rule, *any of her friends* is interpreted in the scope of *before* and the correct truth conditions (59-b) are derived, according to which Mary is the first to arrive.

- (59) a.  $[ \text{PAST } \lambda t_2 [ [ t_2 \text{ before}_2 \text{ anyone} ] \lambda t_1 \lambda y [ y \text{ arrive}(t_1) ] ] ]$   
 b.  $(\exists t < s^*) \text{ Mary arrives at } t \ \& \ t < \text{the earliest } t' \text{ s.t. } (\exists x) x \text{ is a friend of Mary} \ \& \ x \text{ arrives at } t'$
- (60)

## 5.2 Derivation of LF

The meaning rule we propose for phrasal *before/after* after requires that it applies to the following four arguments in order: (i) an individual (the DP complement), (ii) a time (the time argument), (iii) a relation between individuals and times, and (iv) another individual (the correlate). The first two arguments are realised in the *before/after*-phrase. The remaining two arguments are external to this phrase and have to be built up in the derivation of LF. How this is achieved is not a trivial question. Deriving the relation between individuals and times, in particular, proves challenging.

So far, we have considered a case where the correlate is the subject. To see what the derivation of an appropriate LF involves, consider an example with an object correlate like (61).

- (61) George drank the whiskey after the beer.

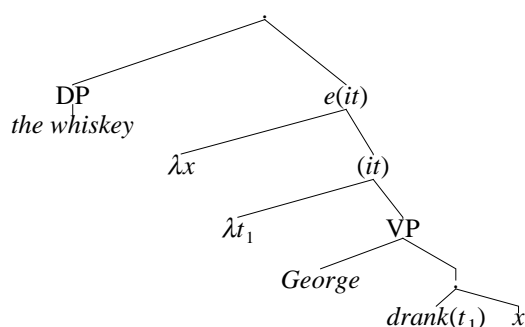
In this case, the relation between individuals and times our semantics requires corresponds to  $\lambda x_e . \lambda t_i . x \text{ George drinks } x \text{ at } t$ . This relation doesn't correspond to the meaning of any phrase, and thus has to be derived in the syntax/semantics interface. We show step by step how the derivation proceeds.

In the first step of the derivation of the LF, a temporal abstract of VP is created, resulting in (62).

(62)  $\lambda t_i$  [ George drank( $t_1$ ) the whiskey ]

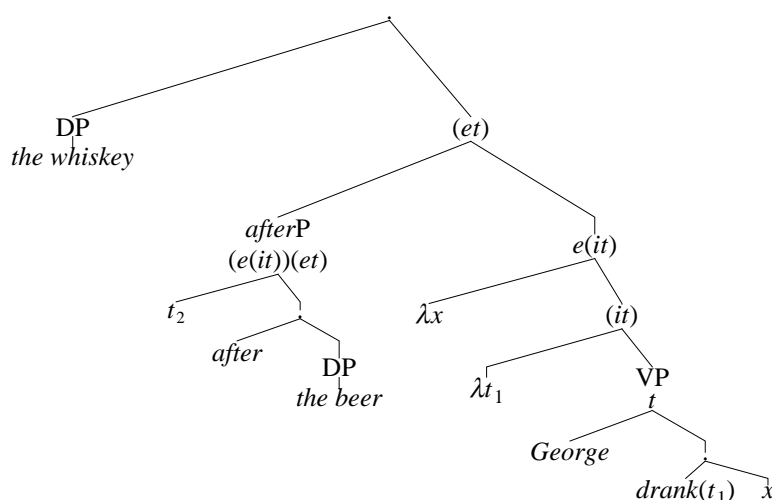
This creation of a temporal property isn't special, as our assumptions on the syntax/semantics interface require it in general for the interpretation of tense. However, to be able to serve as the relation argument of phrasal *before/after*, the temporal property has to be  $\lambda$ -abstracted even further to yield a relation of type  $e(it)$ . Such a relation can be derived by QR of the correlate DP *the whiskey*, as shown in (63).

(63)



Now, crucially, the relation of type  $e(it)$  derived by QR has to be available for combination with the *after*-phrase. For this, the *after*-phrase has to be merged in between the QR-ed correlate and the derived predicate, as shown in (64).

(64)



The tree in (64) represents an instance of Countercyclic Merge, as the *after*-phrase is merged after QR of the correlate has taken place creating the derived predicate. Countercyclic Merge has been argued to be needed in the analysis of other kinds of adjuncts as well (Lebeaux, 1991; Nissenbaum, 1998), so it might be that adjuncts in general are merged countercyclicly.

In the final step, the temporal argument of *after* is bound by the matrix tense, as shown in (65). This LF expresses the truth conditions in (65) covering the intuitive



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Doris Penka  
Zukunftskolleg der Universität Konstanz  
doris.penka@uni-konstanz.de

Arnim von Stechow  
Universität Tübingen  
arnim.stechow@uni-tuebingen.de

# Resolving the movement paradox in Verb Projection Raising. In favor of base-generation and covert predicate raising.

Martin Salzmann\*

## Abstract

This paper addresses and reanalyzes a movement paradox in Verb Projection Raising (VPR): While XPs contained in the VPR complement are transparent for extraction, they are scopally frozen, i.e. only allow surface scope. XPs outside the VPR-constituent, however, show mixed evidence w.r.t. movement vs. base-generation: There are no movement effects (no focus projection, freezing) in canonical orders except for scope reconstruction. In non-canonical orders, on the other hand, movement effects emerge. We propose to solve the paradox with a base-generation approach adapted from Fanselow (2001, 2003a/b) where free word order is licensed by means of covert verb incorporation. By means of a new implementation of predicate raising this automatically explains the scope facts by giving modals a possibility to outscope XPs at LF.

## 1 Verb Raising and Verb Projection Raising

Before describing the paradox we will briefly introduce the notions of Verb Raising (VR)<sup>1</sup> and Verb Projection Raising (VPR). In the earliest descriptions VR and VPR involve adjunction of V or VP to a higher head. In the case of VR it is the dependent verb that adjoins to the higher verb (Evers 1975).<sup>2</sup> Adjunction can be to the left as in Standard German (SG) or to the right as in Dutch or Zurich German (ZG), on which we

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<sup>1</sup>I will use the following abbreviations: Adj = adjunct; Arg = argument; Dat = dative; DS = D-structure; Gen = genitive; H & R = Haegeman & van Riemsdijk (1986); Inf = infinitive; Pl = plural; SG = Standard German; SS = S-structure; Subj = subjunctive; VPR = Verb Projection Raising; VR = Verb Raising; WF = West Flemish; ZG = Zurich German

<sup>2</sup>The description is simplified in that we have labeled the embedded clauses as VPs instead of S and have omitted the pruning mechanism that would apply to it.

will focus in this article. Starting out with an OV-structure this results in the following derivation for ZG:

- (1) a. dass er [<sub>VP1</sub> [<sub>VP2</sub> de Muetter es Buech schänke] wett] D-structure⇒  
           that he           the mother a book give.INF wants  
       b. dass er [<sub>VP1</sub> [<sub>VP2</sub> de Muetter es Buech \_\_<sub>1</sub>] wett+schänke<sub>1</sub>] S-structure  
           that he           the mother a book       wants+give.INF (ZG)

In VPR the entire VP-projection or part of it adjoins to the higher verb (den Besten & Edmonson 1983). Example (2) illustrates full VP-raising, (3) shows partial VPR:

- (2) a. dass er [<sub>VP1</sub> [<sub>VP2</sub> de Muetter es Buech schänke] wett] DS ⇒  
           that he           the mother a book give.INF wants  
       b. dass er [<sub>VP1</sub> \_\_<sub>1</sub> [wett + [<sub>VP2</sub> de Muetter es Buech schänke]<sub>1</sub>]] SS (ZG)  
       (3) a. dass er [<sub>VP1</sub> [<sub>VP2</sub> de Muetter [<sub>V'</sub> es Buech schänke]] wett] DS ⇒  
           that he           the mother a book give.INF wants  
           b. dass er [<sub>VP1</sub> [<sub>VP2</sub> de Muetter \_\_<sub>1</sub>] [wett + [<sub>V'</sub> es Buech schänke]<sub>1</sub>]] SS (ZG)

While the adjunction analysis of VR is still adopted by many nowadays, adjoining projections to heads has been abandoned for reasons of structure preservation. Before discussing more recent approaches to VR/VPR we will lay out the movement paradox.

## 2 The movement paradox in Verb Projection Raising

The first observation is that XPs contained in the VPR complement, i.e. VP<sub>2</sub> from above or part of VP<sub>2</sub> that is putatively moved, are transparent for extraction (Haegeman & van Riemsdijk 1986: 450):

- (4) Was<sub>1</sub> häsch wele [<sub>VP</sub> em Rägeli [\_\_<sub>1</sub> für Büecher] chauffe]?  
       What have.2s wanted the.DAT Regula for books buy.INF (ZG)

At the same time, the VPR complement is opaque for scopal elements, i.e. they always take narrow scope with respect to the governing verb, usually a modal. As soon as the constituent appears above the raised VP, however, it can have wide or narrow scope with respect to the modal. Importantly, these facts are independent of the VR/VPR-distinction; what counts is whether the XP is inside or outside the VPR complement (cf. also Haegeman & van Riemsdijk 1986, Haegeman 1992: 110ff.):

- (5) a. dass er i de Ferie wett [2 **Fraue** küsse] VPR: \*2 > want  
           that he in the vacation wants 2 women kiss.INF want > 2  
       b. dass er i de Ferie 2 **Fraue** wett küsse VR: 2 > want  
           that he in the vacation 2 women wants kiss.INF want > 2  
       c. dass er 2 **Fraue** wett [i de Ferie küsse] VPR: 2 > want  
           that he 2 women wants in the vacation kiss.INF want > 2 (ZG)

What these facts suggest is that – for some reason – QR is not an option in (5a) and that given that there is not only surface scope in (5b/c), there must be a mechanism

to derive the inverse scope. Before introducing our analysis, we will briefly sketch the most important previous accounts of VPR.<sup>3</sup>

### 3 Previous accounts

#### 3.1 Haegeman & van Riemsdijk (1986): reanalysis + inversion

In their influential contribution Haegeman & van Riemsdijk (H&R) analyze VR and VPR as a two-step process. It first involves (i) reanalysis of the higher verb with a) the dependent V, (7a) = VR or b) the entire dependent VP, (7b) = VPR or V', (7c) = partial VPR (V<sub>x</sub> is the reanalyzed node); then (ii), reanalysis is followed by PF-inversion. The starting point is an OV-structure (6).

- (6)    dass de    Hans [<sub>VP1</sub> [<sub>VP2</sub> emene Studänt es Buech schänke] wett]    DS  
          that the John                    a.DAT    student a    book    give.INF    wants
- (7)    a.    dass de Hans [<sub>VP</sub> emene Studänt es Buech [<sub>VX</sub> [<sub>V</sub> schänke] [<sub>V</sub> wett]]]  
               dass de Hans [<sub>VP</sub> emene Studänt es Buech [<sub>VX</sub> [<sub>V</sub> wett] [<sub>V</sub> schänke]]]  
           b.    dass de Hans [<sub>VX</sub> [<sub>VP</sub> emene Studänt es Buech schänke] [<sub>V</sub> wett]]  
               dass de Hans [<sub>VX</sub> [<sub>V</sub> wett] [<sub>VP</sub> emene Studänt es Buech schänke]]  
           c.    dass de Hans [<sub>VP</sub> [emene Studänt] [<sub>VX</sub> [<sub>V'</sub> es Buech schänke] [<sub>V</sub> wett]]]  
               dass de Hans [<sub>VP</sub> [emene Studänt] [<sub>VX</sub> [<sub>V</sub> wett] [<sub>V'</sub> es Buech schänke]]]

Since VPR does not involve movement, transparency for extraction as in (4) is expected. Haegeman & van Riemsdijk (1986: 453) also provide an account of the scope facts. Given that extraction is possible, it seems difficult to formulate a ban on QR; therefore, they reject the possibility of QR. Instead they account for the scope facts by means of a multi-dimensional analysis which is part of their reanalysis approach: Simplifying somewhat, one tree (usually the one on top) represents the unrealized structure that directly expresses the theta-relations while the other one connected to the lexical items

<sup>3</sup>One of the reviewers suggested that extraposition of PPs may illustrate an inverse movement paradox: While extraction from extraposed PPs is barred, the PP seems transparent for scope. He gives the following example:

- (i)    weil    die meisten Männer hätten    tanzen    wollen    mit    2 der    Promigäste most > 2  
          since the most    men    had.SUBJ dance.INF wanted with 2 the.GEN VIP:guests    2 > most  
          'because most men would have liked to dance with two of the VIP guests'

I do not have space to explore this in any detail and will confine myself to pointing out that the literature contains claims to the contrary: First, Müller (1998: 175) gives examples with extraction from extraposed PPs:

- (ii)    Wo<sub>1</sub>    hat keiner    \_\_\_<sub>2</sub> gerechnet [pp \_\_\_<sub>1</sub> mit]<sub>2</sub> ?  
          what has no-one    counted                    with

Second, Haider (1997: 131) argues that extraposed PPs cannot extend their scope. A particular clear case is the following contrast involving sentential negation: If the PP is in the middle it can have scope over 'be', in extraposed position it cannot:

- (iii)    dass er mit nichts zufrieden war  $\neg > be$     (iv)    dass er zufrieden war mit nichts    \*  $\neg > be$   
          that he with nothing content    was  $be > \neg$                     that he content    was with nothing  $be > \neg$

represents the reanalyzed structure. Concretely, the representation for a sentence like (7a/b/c) will thus also involve a structure similar to (6) (modulo any movement operations that take place from DS to SS). This co-presence and the different c-command relations between the two dimensions account for the scope facts: Since the modal always c-commands the XPs in the theta-structure, i.e. (6), it has scope over the XPs in any case, whether they end up above the modal in the reanalyzed structure or not. What varies is the scope of the XPs: If they are within the reanalyzed constituent  $V_x$  like both XPs in (7b) or *es Buech* in (7c), they fail to c-command the modal (they are embedded within a VP/V'). If, however, they are outside and thus above the reanalyzed structure  $V_x$  as in (7a) or *emene Studänt* in (7c), then they can c-command the modal, thereby leading to a wide-scope reading. Reanalysis thus extends the scope of XPs that are not affected by it.

Despite its virtues, especially the handling of the scope facts,<sup>4</sup> this approach has been abandoned largely for conceptual reasons: Reanalysis and multidimensional representations were considered uneconomical, cf. e.g. von Stechow & Sternefeld (1988), Sternefeld (1991). Furthermore, in addition to conceptual counterarguments, Haegeman (1992: 142-147) provides empirical evidence against the reanalysis approach. For reasons of space, we cannot reproduce these arguments here. But we would like to point out that H&R's approach has nearly the same empirical coverage as the approach to be proposed below and therefore certainly has its merits. Given the recent rise of multidimensional analyses of various phenomena in syntax (Right Node Raising, amalgams etc.) some of the conceptual counterarguments may turn out to be irrelevant and put an analysis along the lines of H&R back on the map.

### 3.2 Haegeman (1992): VPR = scrambling + VP-extrapolation

Haegeman (1992: 148-209) provides an analysis of both VR and VPR. While she takes VR to involve incorporation of the lower verb into the higher one as in (1), VPR is analyzed as extraposition, i.e. as adjunction of the lower VP to the higher VP (and eventually to TP/AgrP, which we ignore here; the underlying order is OV):<sup>5</sup>

- (8) a. dass er [<sub>VP1</sub> [<sub>VP2</sub> es Buech läse] wett] DS  
       that he a book read.INF wants  
       b. dass er [<sub>VP1</sub> [<sub>VP1</sub> —<sub>1</sub> wett] [<sub>VP2</sub> es Buech läse]<sub>1</sub>] SS  
       that he wants a book read.INF

Partial VPR is analyzed parallel to remnant topicalization: The DP that is not affected by VPR is first scrambled out and adjoined to  $VP_1$ . Thereafter,  $VP_2$  is adjoined to  $VP_1$ :

<sup>4</sup>One case is not accounted for by H&R under the original definitions, as pointed out in Haegeman (1992: 142ff.): In partial VPR as in (7c) the reanalyzed structure involves a V'. Since intermediate projections are taken not to count for scope in H&R (1986: 454), an XP should be able to extend its scope and end up scoping over the modal even if contained inside the VPR constituent. This is not correct. In an example like (7c) *es Buech* can only have narrow scope with respect to the modal. I believe, though, that an appropriate reformulation of the c-command condition could take care of this.

<sup>5</sup>Essentially the same analysis is proposed for VPR by den Besten & Rutten (1989: 56, fn. 8), vanden Wyngaerd (1989) and den Besten & Broekhuis (1992). The latter differ from Haegeman in that they reanalyze VR as VPR with prior scrambling of all arguments.

- (9) a. dass de Hans [<sub>VP1</sub> [<sub>VP2</sub> de Muetter es Buech schänke] wett] DS  
       that the John the.DAT mother a book give.INF wants  
       b. dass de Hans [<sub>VP1</sub> [ de Muetter]<sub>1</sub> [<sub>VP1</sub> [<sub>VP2</sub>—<sub>1</sub> es Buech schänke] wett]]  
       that the John the.DAT mother a book give.INF wants  
       c. dass de H. [<sub>VP1</sub> [<sub>VP1</sub> [de Muetter]<sub>1</sub> [<sub>VP1</sub>—<sub>2</sub> wett]] [<sub>VP2</sub>—<sub>1</sub> es Buech  
       that the J. the.DAT mother wants a book  
       schänke]<sub>2</sub>]  
       give.INF

As for the transparency data in (4), Haegeman (1992: 121, 223, fn. 6) proposes that wh-movement precedes VP-adjunction, that is, as with scrambling, the wh-phrase first adjoins to VP<sub>1</sub> (perhaps after first adjoining to VP<sub>2</sub>), then VP<sub>2</sub> is adjoined to VP<sub>1</sub> and then the wh-phrase moves on to Spec, CP. The analysis is thus very similar in spirit to the remnant movement analysis of extraposition in Müller (1998).

Turning to the scope facts, the opacity of the VPR complement (5a) is attributed to a ban on QR from non-L-marked positions (pp. 203f.). The scopal ambiguity in VR, (5b), is assumed to follow from either a) QR of the indefinite, which adjoins it to VP<sub>2</sub> where the indefinite and the modal are taken to mutually c-command each other or b) assigning the sentence two different structures, one where the indefinite remains inside VP<sub>2</sub> (narrow scope) and one where it is scrambled (= adjoined) to VP<sub>1</sub> (wide scope). The structure for option a), QR, looks as follows:

- (10) [<sub>VP1</sub> [<sub>VP2</sub> XP<sub>1</sub> [<sub>VP2</sub> —<sub>1</sub>—<sub>2</sub>]] V1+V2<sub>2</sub>]

Option b (2 structures) involves the following representations:

- (11) a. [<sub>VP1</sub> [<sub>VP2</sub> XP—<sub>2</sub>] V1+V2<sub>2</sub>]  
       b. [<sub>VP1</sub> XP<sub>1</sub> [<sub>VP1</sub> [<sub>VP2</sub> —<sub>1</sub>—<sub>2</sub>] V1+V2<sub>2</sub>] ]

As discussed in detail in den Dikken (1994: 74f., 1995: 97f.), Haegeman's account of the movement paradox does not work in the representational Barriers framework since both the traces of putative QR and traces of overt wh-movement will have to be (antecedent –) governed at LF so that one does not expect a difference between (4) and (5a). Admittedly, things may be different in a strongly derivational framework where the difference in timing of extraction will indeed result in the observed asymmetry. Therefore, one cannot dismiss Haegeman's proposal so easily.

Concerning the treatment of the scope ambiguities in (5b/c), there emerges a certain inconsistency: While the two possible solutions sketched above work for (5b), they do not seem to work for (5c), where the indefinite ends up outside the VPR complement: Here, the ambiguity cannot follow from two different structures (scrambled vs. non-scrambled) since the object must be adjoined to VP<sub>1</sub> to escape adjunction of VP<sub>2</sub> to the right. In that position the XP c-commands the modal, but the reverse is arguably not the case (this seems to be the assumption in Haegeman 1992: 205; unfortunately, she is not explicit about the precise definitions of c-command that she assumes). It is unclear then how to derive the narrow scope reading of the indefinite. The only possibility seems to be reconstruction of the scrambled XP (which in turn necessitates reconstruction of the adjoined VP<sub>2</sub>). Consequently, for a consistent treatment of scope in the framework of Haegeman (1992) one has to assume for both (5b/c) that scram-

bling to VP<sub>1</sub> creates the wide-scope reading while the narrow scope reading obtains after reconstruction. If QR is not taken to be responsible for scope, the scopal opacity in (5a) then follows from the surface position of the QP. Reconstruction of scrambled XPs may cause concern since scrambling is well-known not to reconstruct for binding (e.g. Bayer & Kornfilt 1994). I refrain from discussing the plausibility of reconstructing scrambling here as there is a simple way of avoiding it (cf. 3.4 below). There are, however, quite a number of serious problems with the scrambling operation necessary for partial VPR (9c) and wide-scope in VR (11b). These will be addressed in section 4. Finally, extraposition has become suspect as an operation in recent years because a) it is movement to the right, in violation of the Antisymmetry hypothesis (Kayne 1994), b) because there is no obvious trigger, at least not one that can be easily stated in Minimalist terms, and c) because it does not seem to have any semantic effects (i.e. it obligatorily reconstructs, cf e.g. Haider 1997). Consequently, it would be highly desirable to find a solution that does without extraposition. Some of these issues are addressed in more detail in Hinterhölzl's (2006: 80ff.) discussion of Haegeman (1992).

### 3.3 Scrambling + PF-inversion

Von Stechow & Sternefeld (1988) and Broekhuis (1993) have independently proposed analyses of VPR that involve PF-inversion between V1 and VP<sub>2</sub> instead of adjunction of VP<sub>2</sub>. Furthermore, as opposed to H&R (1986), no reanalysis is involved. Applied to sentences like (2) this results in the following derivation (the basis is an OV-order):

- (12) a. dass er [<sub>VP1</sub> [<sub>VP2</sub> de Muetter es Buech schänke] wett] DS  
           that he           the mother a book give.INF wants  
       b. dass er [<sub>VP1</sub> wett [<sub>VP2</sub> de Muetter es Buech schänke]] PF (after inversion)  
           that he       wants       the mother a book give.INF

Partial VPR as in (3) involves scrambling of an XP out of VP<sub>2</sub> prior to PF-inversion:

- (13) a. dass er [<sub>VP1</sub> [<sub>VP2</sub> de Muetter es Buech schänke] wett] DS  
           that he           the mother a book give.INF wants  
       b. dass er [<sub>VP1</sub> de Muetter<sub>1</sub> [<sub>VP1</sub> [<sub>VP2</sub>—<sub>1</sub> es Buech schänke] wett]] scrambling  
           that he       the mother                   a book give.INF wants  
       c. dass er [<sub>VP1</sub> de Muetter<sub>1</sub> [<sub>VP1</sub> wett [<sub>VP2</sub>—<sub>1</sub> es Buech PF  
           that he       the mother       wants           a book  
           schänke]]]  
           give.INF

As for VR, while von Stechow & Sternefeld (1988) adopt verb incorporation as in (1), Broekhuis (1993), following den Besten & Broekhuis (1992), proposes that it is also derived by means of PF-inversion, which is preceded by scrambling of all XPs of VP<sub>2</sub>:

- (14) a. dass er [<sub>VP1</sub> [<sub>VP2</sub> de Muetter es Buech schänke] wett] DS  
           that he           the mother a book give.INF wants  
       b. dass er [<sub>VP1</sub> de Muetter<sub>2</sub> es Buech<sub>1</sub> [<sub>VP1</sub> [<sub>VP2</sub> —<sub>2</sub>—<sub>1</sub> schänke] wett]]  
           that he       the mother a book                   give.INF wants

- c. dass er <sub>[VP1</sub> de Muetter<sub>2</sub> es Buech<sub>1</sub> <sub>[VP1</sub> wett <sub>[VP2</sub> \_\_\_<sub>2</sub>\_\_\_<sub>1</sub> schänke] ]]  
 that he the mother a book wants give.INF

The transparency for wh-extraction as in (4) is unproblematic given that VP<sub>2</sub> is in its base-position. As for scope, the absence of ambiguity in (5a) cannot be linked to some ban on QR because VP<sub>2</sub> is in its base-position at LF. Instead, the scope readings must be read off the surface structure. To obtain the ambiguity in (5b/c), the indefinite must be interpreted either in its derived position, i.e. adjoined to VP<sub>1</sub>, or in its base-position at LF after reconstruction. This account is thus quite simple and captures the movement paradox in a straightforward way. However, serious problems will be shown to arise with the scrambling operation adopted here in (13) and (14). They will be discussed after the next approach is introduced, which also makes use of scrambling.

### 3.4 Den Dikken (1994/1995/1996): The size of the complement

Den Dikken adopts an antisymmetric VO-analysis of Dutch and German. The VPR complement is thus in its base-position. Den Dikken assumes that VR and VPR differ in the size of the complement that the higher verb can take. In VR, the complement is just a VP and the agreement projections occur above it. In VPR, however, the complement is larger, arguably a TP; as a consequence, the agreement projections are within the VPR complement.<sup>6</sup>

- (15) a. <sub>[VP1</sub> AgrO mod <sub>[VP2</sub> inf]] VR  
 b. <sub>[VP</sub> mod <sub>[TP</sub> AgrO inf]] VPR

We will reproduce two arguments in favor of TP-status here with ZG-equivalents of the West Flemish (WF) data used by den Dikken. First, overt subjects are possible within the VPR complement (den Dikken 1996: 89); the results are best with epistemic modals:

- (16) Es het sölle öpper de Wage wäsche.  
 it had.SUBJ should someone the car wash.INF  
 'Someone should have washed the car.'

Second, the VPR-constituent can contain a temporal adverbial which locates it in a different point in time than the matrix clause (den Dikken 1995: 107f., 1996: 78ff.):

- (17) dass si **geschter** hät wele [ires Chläid **am Mittwoch** chauffe]  
 that she yesterday has wanted her dress on Wednesday buy.INF  
 'that yesterday she wanted to buy her dress on Wednesday'

Further arguments for TP-status involve floating quantifiers (H&R 1986: 445) and negative concord (Haegeman 1992: 113ff., den Dikken 1995: 102, 1996: 78).<sup>7</sup>

<sup>6</sup>In VR, only the object is generated in the dependent VP. The external theta-role of V2 is assigned to the specifier of V1 via some process of argument structure composition that takes place if two VPs are stacked immediately on top of each other. The modal is taken to lack an external theta-role of its own.

<sup>7</sup>The position of clitics in WF also provides evidence for TP status: They normally occur above TP and are also licensed in the VPR complement (Hinterhölzl 2006: 79). Interestingly, they can also climb into the matrix clause (Haegeman 1992: 109). In ZG, clitics have to occur in the matrix clause, they are not licensed within the VPR complement. I do not know what causes this difference.

To account for the scope facts, den Dikken adopts Aoun & Li's (1991) scope principle:

- (18) X has scope over Y if X c-commands a link of the chain containing Y

In the case of VR, the object moves across the modal for case-checking so that ambiguity results. In VPR, however, the object checks its case within the complement so that it does not cross the modal. Consequently, the modal always outscopes the XP:

- (19) a.  $[_{\text{AGROP}} \text{Obj}_1 [_{\text{AgrO}'} \text{AgrO} [_{\text{VP1}} V_{\text{MODAL}} [_{\text{VP2}} V2 \text{---}_1 ]]]]$  VR (5b)
- b.  $[_{\text{VP1}} V_{\text{MODAL}} [_{\text{TP}} [_{\text{AGROP}} \text{Obj}_1 [_{\text{AgrO}'} \text{AgrO} [_{\text{VP2}} V2 \text{---}_1 ]]]]]]$  VPR (5a)

As for extraction as in (4), den Dikken seems to assume that movement to a case-checking position does not lead to opacity of that DP (cf. also Broekhuis 2006: 38, fn. 2). Under these premises, the movement paradox is accounted for. The assumption is not trivial, though, especially in the light of more recent incarnations of the Minimalist Program where movement for case checking and scrambling target the same position, viz. Spec, vP. Furthermore, it is not embedded into a systematic theory of freezing. We will come back to this issue in the discussion of Hinterhölzl's proposal in 10.2.1.

## 4 Scrambling without movement effects?

Attractive though it may seem, there are certain aspects of den Dikken's analysis that we consider undesirable. First, postulating movement for case-checking is unattractive in languages with free word order like German and its dialects (Fanselow 2001). Since free word order is also found within the VPR complement, movement to agreement projections (which would enforce strict ordering) is insufficient for ZG. The following example illustrates non-basic accusative-dative order for a ditransitive verb:<sup>8</sup>

- (20) ?Er hät [wele das Buech vom Chomsky sinere Muetter schänke].  
he has wanted that book of.the Chomsky his.DAT mother give.INF

The internal arguments can also occur in reversed order outside the VPR-constituent:

- (21) dass er s **Buech sinere Muetter** wett [zum Geburtstag schänke]  
that he the book his.DAT mother wants to.the birthday give.INF

Den Dikken adopts a scrambling mechanism different from movement for case checking for such cases. Applied to partial VPR (5c) we obtain:

- (22) a. dass er **2 Fraue** wett [i de Ferie küsse] VPR: 2 > want;  
that he 2 women wants in the vacation kiss.INF want > 2

<sup>8</sup>Object-subject order within the VPR complement, on the other hand, can be accommodated, cf. den Dikken (1996: 89) who assumes that the subject remains in Spec, VP and the object moves to AgrOP or spec, vP. Haegeman (1992) and Broekhuis (1993) on the other hand can accommodate examples like (20) by assuming scrambling within VP<sub>2</sub>, i.e. by adjoining an XP to VP<sub>2</sub>.

- b. dass er [2 **Fraue**]<sub>1</sub> wett [<sub>TP</sub> [<sub>AGR<sub>OP</sub></sub> <sub>1</sub> AgrO i de Ferie <sub>1</sub> küsse]]
- 
- scrambling                      case-checking

Since the scrambling chain crosses the modal, ambiguity is correctly predicted.

However, there are strong arguments against a scrambling operation in partial VPR: We will present evidence that what den Dikken takes to be scrambling has crucially different properties (cf. also Hinterhölzl 2006: 105ff. for similar discussion). Importantly, this criticism also applies to the approach by Haegeman (1992) and the PF-inversion account of von Stechow & Sternefeld (1988) and Broekhuis (1993) who would also have to assume scrambling in these cases.<sup>9</sup>

First, material that is usually taken not to be able to scramble can occur in higher positions. Here are examples with an idiomatic NP and a predicative AP:

- (23) a. dass er **känere Flüüg** hät chöne [öppis z Leid tue]  
 that he no.DAT fly has could something to suffering do.INF  
 'that he could not harm anyone'
- b. dass er sis Bier hät **küelt** wele [uf d Wanderig mitnee]  
 that he his beer has cooled wanted on the hike take.along.INF  
 'that he wanted to take his beer cooled with him on the hike'

Second, putatively scrambled DPs in partial VPR (24b) do not prevent focus projection (in canonical order, contra Fanselow 2003a: 208; stress is on the capitalized DP, but the entire VP can be interpreted as focused). Partial VPR, full VPR and VR thus all allow focus projection as long as the arguments occur in canonical order.

- (24) a. Er hät **de Muetter** s Buech vom CHOMSKY wele schänke.  
 he has the.DAT mother the book of.the Chomsky wanted give.INF  
 'He wanted to give mother the book by Chomsky.'
- b. Er hät **de Muetter** wele [s Buech vom CHOMSKY schänke].  
 he has the.DAT mother wanted the book of.the Chomsky give.INF
- c. Er hät wele [**de Muetter** s Buech vom CHOMSKY schänke].  
 he has wanted the.DAT mother the book of.the Chomsky give.INF

Finally, extraction from objects is possible not only if the object is inside the VPR constituent as in (4), but also if it occurs outside it in partial VPR. There are *no freezing effects*:<sup>10</sup>

<sup>9</sup>Additionally, they all have to posit scrambling for the wide-scope reading of VR-examples like (5b). Since these show the same non-scrambling properties like partial VPR, the problems are more general.

<sup>10</sup>Diagnosing freezing effects presupposes a worked-out theory of freezing which we cannot provide here. Descriptively, we will assume the strongest possible position here: Any constituent that has undergone movement becomes an island for extraction. Classical accounts based on the CED (Condition of Extraction Domains) fail because extraction takes place from a non-complement in (25). In the recent approach by Müller (2010) only last-merged specifiers of phases are opaque. Given that every XP is taken to be a phase in that approach and given that the XPs from where extraction takes place in (25) are the highest elements in the projection of *chöne/wele*, they are predicted to be opaque for extraction, irrespective of whether movement is involved or not. This prediction is not borne out.

- (25) a. Was<sub>1</sub> het de Hans söle [\_\_\_<sub>1</sub> für Buecher] chöne ohni Hilf läse?  
 what has the John should for books could without help read.INF  
 ‘What kind of books should John have been able to read without any help?’  
 b. Was<sub>1</sub> tänsch, dass de H hät [\_\_\_<sub>1</sub> für Lüüt] wele vo siine Idee  
 what believe.2s that the J has for people wanted of his ideas  
 überzüüge?  
 convince  
 ‘What kind of people do you think John wanted to convince of his ideas?’

Here are three examples showing that corresponding local scrambling behaves differently with respect to these tests:

- (26) a. \*dass de Peter sis Bier **küelt** morn uf d Wanderig mitnimmt  
 that the Peter his beer cooled tomorrow on the hike takes.along  
 b. Er hät s **Buech** vom Chomsky de MUETTER zäiget.  
 he has the book of.the Chomsky the.DAT mother shown  
 (no focus projection)  
 c. \*Was<sub>1</sub> hät [\_\_\_<sub>1</sub> für Buecher] de Hans geschter kchaufft?  
 what has for books the.NOM John yesterday bought

So far we can conclude that adopting scrambling for partial VPR is problematic. As the next section will show, things are somewhat more complex.

## 5 Movement effects emerge in non-canonical order

While arguments of the lower verb that occur outside the VPR complement did not show any movement effects in the previous section, we are now going to show that such effects do emerge in partial VPR once the constituents occur in non-canonical positions, usually in very high positions. First, elements that are normally thought not to scramble cannot occur in higher positions (e.g. above the subject):<sup>11</sup>

- (27) a. \*dass **känere Flüüg** de Hans hät chöne [öppis z Leid tue]  
 that no.DAT fly the John has could something to suffering do.INF  
 b. \*dass de Hans sis Bier hät **küelt** morn wele [uf d Wanderig  
 that the John his beer has cooled tomorrow wanted on the hike  
 mitnee]  
 take.with

<sup>11</sup>As correctly pointed out by one of the reviewers, the ungrammaticality of (26a) and (27b) is due to the sequence predicative adjective > temporal adverb within the same verbal projection. If in (27b) the temporal adverb occurs in a lower projection the result is well-formed (offered by reviewer):

- (i) dass de Hans sis Bier hät küelt wele morn uf d Wanderig mitnee  
 that the John his beer has cooled wanted tomorrow on the hike take.along.INF

From a scrambling perspective this could be interpreted as showing that only short/low scrambling is possible but not scrambling to higher positions. For our purposes it is sufficient to observe that to derive cases like (23b) under scrambling, an operation has to be posited that is substantially different from clausal scrambling operations that lead to reordering.

Second, focus projection is blocked in non-canonical order (narrow scope on ‘mother’). Again, VR, full and partial VPR pattern alike:

- (28) a. Er hät s **Buech vom Chomsky** de MUETTER wele schänke.  
           he has the book of.the Chomsky the.DAT mother wanted give.INF  
       b. Er hät s **Buech vom Chomsky** wele [de MUETTER schänke].  
           he has the book of.the Chomsky wanted the.DAT mother give.INF  
       c. ?Er hät wele [s **Buech vom Chomsky** de MUETTER schänke].  
           he has wanted the book of.the Chomsky the.DAT mother give.INF

Third, freezing effects re-emerge in non-canonical order (especially with movement from above the SU):

- (29) \*Was<sub>1</sub> hät [\_\_\_<sub>1</sub> **für Lüüt**] de Hans [wele vo siine Idee überzüügel]?  
           what has for people the John wanted of his ideas convince.INF

Here, partial VPR patterns with regular scrambling in (26). At first sight, the facts from the last two sections suggest that sometimes scrambling is involved and sometimes it is not in the derivation of partial VPR like (5c). It thus seems as if the movement paradox is exacerbated. In the next section we will introduce a new account of VPR that resolves the paradox and provides a straightforward explanation of the scope properties of the examples in (5) without adopting scrambling.<sup>12</sup>

## 6 A base-generation approach

In this section I will propose a base-generation approach to VPR that draws heavily on work by Fanselow (2001, 2003a/b) on free word order (cf. Bayer & Kornfilt 1994: 35ff. for a similar approach). The basic idea is that theta-role assignment can be delayed:<sup>13</sup>

- (30) An argument A can be merged with a projection P only if the head of P (or a sublabel of the head) selects A as an argument (Fanselow 2003a: 207)

Since no reference to argument hierarchy is involved, theta-roles of the same head can be discharged in free order.<sup>14</sup> The crucial part of the merge condition is in parenthesis:

<sup>12</sup>The pattern described for partial VPR in sections 4 and 5 finds almost perfect parallels in the domain of remnant movement (Fanselow 2002: 100), Hinterhölzl (2002: 137) and the Third construction, cf. Bayer & Kornfilt (1994: 45), Wöllstein-Leisten (2001), and Geilfuss (1991), who refers to the putative scrambling facts presented in section 4 as pseudo-scrambling. This shows that a proper understanding of the selective movement effects are indispensable for a proper understanding of verb clusters.

<sup>13</sup>Fanselow (2001) contains a number of flaws (cf. Assmann & Heck 2009 for discussion), especially the assumption that theta-role assignment only requires c-command by the predicate. This wrongly predicts that arguments can be merged below the projection of its predicate. The new definition in (30) avoids this complication. Together with the assumption of cyclic incorporation the account is more compatible with recent strongly derivational instantiations of the Minimalist Program.

<sup>14</sup>Additional assumptions are necessary for languages like Dutch and West Flemish which have VR, restructuring and (only West Flemish) VPR but do not allow the order of arguments to be reversed (unless focal stress/focal particles are involved, in which case one may be dealing with A'-movement – thanks to one of the reviewers for clarification of this point). Scrambling can only change argument – adverb orders in these languages. It seems therefore, that the argument hierarchy must be preserved in the mapping in these languages, cf. e.g. Neeleman (1994).

A verb can assign theta-roles after it has incorporated into (and thus has become a sublabel of) another head. This implies that incorporation extends the theta-marking domain. This view is clearly non-standard and also implies a different approach to case-checking; essentially, case-checking will have to be done at the point of merge of an argument and thus will be a concomitant effect of merge. Consequently, case-checking/valuation does not involve Agree in a free word order language like German (this is basically the reason why arguments can appear in any order). In a simple clause, V always incorporates into *v* and the resulting V+*v*-complex subsequently incorporates into T. This licenses the merger of arguments of V in the projections of *v* and T:

$$(31) \quad \begin{array}{c} [\text{TP} \text{ XP } [[\text{V}_1 + \text{v}]_2 + \text{T}] \text{ } \_\_2 \text{ } \_\_1] \\ \quad \uparrow \quad \quad \quad \downarrow \\ \quad \Theta \text{ (e.g. theme)} \end{array}$$

The mechanism can be extended to VR/VPR and coherent constructions (Fanselow 2001): The embedded V incorporates into the matrix V and then into matrix *v*/T. As a consequence, arguments of the dependent verb can be merged in the projection of the modal/Aux/restructuring verb:

$$(32) \quad \begin{array}{c} [\text{MODP} \text{ XP } [\text{V}_1 + \text{Mod}] [\text{VP} \text{ } \_\_1]] \text{ e.g. lit: 'a book wanted to read'} \\ \quad \uparrow \quad \quad \quad \downarrow \\ \quad \Theta \text{ (e.g. theme)} \end{array}$$

We assume that V-incorporation always takes place, but in many cases it does so abstractly, i.e. covertly. This holds for V-incorporation into T in V-final clauses, in VPR and in coherent constructions in the form of the Third Construction (where the verbs do not form a cluster on the surface).<sup>15</sup> Furthermore, incorporation is taken to apply cyclically. We thus adopt a single-output syntax where in many cases the lower copy of the verb will be realized, cf. Roberts (1997), Bobaljik (2002). The possible surface orders can be quite varied among varieties of German and are taken to be due to individual spell-out or linearization options, cf. Barbiers (2005/2009) and Salzmann (2010) for discussion. Importantly, we take incorporation to be full verb movement and not just feature movement; this aspect will be crucial in the account of the scope facts below. Finally, we assume that incorporation of verbs is triggered by strong c-selectional (Matushansky 2006) and/or verb status features (Bayer et al. 2005).<sup>16,17</sup>

<sup>15</sup>One of the reviewers asks about the evidence for abstract incorporation. The major motivation are the agreement relationships between the heads (c-selection/verb status), which are often expressed by overt incorporation (cf. e.g. VR and coherent constructions in SG).

<sup>16</sup>We assume that this is sufficient to guarantee the locality of theta-role assignment. Arguments of the V of a CP-complement thus cannot be merged in the higher clause (which would correspond to scrambling across finite clauses) because the lower verb cannot incorporate into the matrix V due to the intervening C, which does not incorporate.

This is an area that arguably constitutes the major shortcoming of the proposal in Boskovic & Takahashi (1998) who assume free base-generation and LF-movement (mostly lowering) into theta-positions. Since the lowering mechanism is rather unconstrained – it even allows upward movement into theta-positions, it seems inadequate for the (Zurich) German facts. Admittedly, the approach was designed to account for scrambling in Japanese, which has substantially different properties.

<sup>17</sup>One of the reviewers has correctly pointed out that there is a conceptual link between the availability of strong verb status features and the extension of theta-role assignment that remains unexpressed in the current analysis. I hope to be able to tackle a formalization of this relationship in future research.

## 7 Accounting for the properties of VR/VPR

### 7.1 Facts to be accounted for

The following facts need to be accounted for: (i) We have to deal with the selective movement effects: While section 4 presented evidence against a movement account for partial VPR cases like (5c), section 5 showed that movement effects can be diagnosed once the XP occurs in a higher position. (ii) We need to account for the scope facts in (5): There is no ambiguity if the XP is within the VPR cluster, (5b), while ambiguity obtains if the XP is outside the VPR constituent, (5c), or in VR, (5a).

### 7.2 Selective movement effects

The fact that elements of which it is normally assumed that they do not scramble can occur in – putatively – derived positions is accommodated as follows: Since we assume that arguments, but also adjuncts, can be freely merged (things are more complex with certain adverbials, cf. 7.4) nothing in principle rules out merging such elements in higher positions. This does not imply that all orders will be equally acceptable and equally unmarked. Rather, what the computational system generates is filtered by surface structure constraints as e.g. in Müller (1999), which will filter out certain orders altogether (e.g. predicative adjectives in high positions) or will assign a marked status to certain orders (with concomitant lack of focus projection), cf. also Fanselow (2003a/b). This implies that the difference between the facts in section 4 and 5 is not derived syntactically. The criticism against the scrambling solutions in the previous sections thus essentially boils down to a general criticism of a movement approach to free word order of which VPR is an instantiation. As for the selective freezing effects, we follow Meinunger (2000) and Fanselow (2003a/b) in assuming that what bars extraction from XPs in the middle field is not whether the XP has already undergone movement but rather its specificity/topicality: Once the XP receives a specific/topical interpretation, it is opaque for extraction. Since this usually correlates with a high position one gets the impression of a freezing effect with scrambling that targets a high position. In this sense, VPR simply mirrors what is found in simple clauses: If the XP is non-topical and thus tends to occur in a low position within the clause where it is merged, extraction is fine (25) even if the XP does not overtly occur in the projection of its predicator; if however, it is topical and as a consequence is merged high in the clause, extraction fails (29).<sup>18</sup>

<sup>18</sup>There is one systematic embarrassment for this base-generation approach (cf. also Assmann & Heck 2009): It fails to account for the possibility to „scramble“ from XPs in non-complement positions. XPs that occur outside the VPR complement, but in a low position as in the sentences in section 4 are not only transparent for wh-extraction, but also for scrambling:

- (i) dass niemert [über de Chomsky]<sub>1</sub> het [es Buech \_\_\_<sub>1</sub>] chöne [i äim Jaar schriibe]  
 that no.one about the C. had.SUBJ a book can.INF in one year write.INF  
 ‘that no one could have written a book about Chomsky within one year’

Scrambling from NPs is only discussed in Fanselow (2001) and – like scrambling from VP – reanalyzed as base-generation. Applied to the definition used in (30) above, an argument of N can be merged outside NP if N (abstractly) incorporates into the head of the projection where the argument is merged. While this works in case the NP is in a complement position – N then incorporates into V and XP can be merged

### 7.3 Scope

Turning now to the scope facts, we have to distinguish two cases: a) The argument-QP is base-generated in the projection of the modal (VR, VPR as in (5b/c); b) the argument-QP is base-generated within the VPR complement, e.g. as in (5a):<sup>19</sup>

- (33) a.  $[_{TP} T [_{VP} QP Mod [_{VP/TP} (XP)V]]]$  (5b/c)  
 b.  $[_{TP} T [_{VP} Mod [_{TP} QP V]]]$  (5a)

In both cases, the embedded V abstractly incorporates into the matrix V and the newly formed cluster then incorporates into v and T. In (33a) this allows the high merger of an argument of the embedded V. While the syntax of verb movement is the same in both configurations, the consequences differ due to the different merge position of the XP:

In the first configuration with the QP in the projection of the modal, the modal ends up in matrix T and c-commands the QP. As a consequence, the *mod* > *XP* reading obtains, cf. (34a). Wide scope of the QP, on the other hand, follows from reconstruction/interpretation of the lower copy of the modal, cf. (34b). The two LFs for (33a) look as follows (we assume that the lexical verb is always interpreted in the lowest position):

- (34) a.  $[_{TP} [V_{T+Mod}]_2 + T [_{VP} QP [V_{T+Mod}]_2 [_{VP/TP} (XP) V_1]]]$   
 b.  $[_{TP} [V_{T+Mod}]_2 + T [_{VP} QP [V_{T+Mod}]_2 [_{VP/TP} (XP) V_1]]]$

Note that for this account to work, covert head movement must not be executed as feature movement. Rather, it also involves the semantic and thus scopal properties of the heads so that covert head movement can lead to semantic effects (cf. Matushansky 2006: 104 and Lechner 2007: 11ff. for discussion of semantically active head-

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in any projection that contains N – it is by no means clear how this should be possible in cases like (i) where the NP is not a complement of V and fails to satisfy the c-command condition on incorporation (only heads that are c-commanded can be incorporated). Potentially, abstract incorporation of N does not take place until V has incorporated into matrix T in (i). This would, however, be in conflict with cyclicity.

Alternatively, one could take a very different position and argue that there is no scrambling from NPs altogether. What looks like scrambling in (i) would then be reanalyzed as a case of adverbial modification of the verb (cf. de Kuthy 2002, or, as suggested by one of the reviewers, as involving a three-place verb). Since such analyses are usually also applied to wh-movement, the entire argument involving freezing seems to break down: the transparency in configurations like (25) would then no longer indicate anti-freezing but would be the trivial consequence of the fact that there is no extraction in the first place. While (i) thus arguably cannot be used as an argument against freezing, things are different with examples like (25), which involve *was für*-split: Here the reanalysis analysis is not an option since it is restricted to PPs. Consequently, (25) would then indeed involve proper extraction and would indicate anti-freezing. To be fair, alternative analyses are available for *was-für* split, viz. remnant movement (Abels 2003) so that even this case may eventually turn out to be irrelevant for the freezing argument.

<sup>19</sup>We use a mixed V-VP/OV-system as in Cooper (1995), Barbiers (2000) where VP/CP complements occur as right-hand complements of V while all other complements appear to the left. See Salzmann (2010) for an explicit account that makes use of linearization parameters operative at PF. For the data at hand, an account that starts out with a consistently left-branching syntax and derives the right-branching order by means of PF-inversion between V and VP/CP delivers equivalent results.

For reasons that will become clear shortly, we treat VR and VPR as essentially the same thing. The only difference is that in cases of VR the dependent VP (rather: TP, cf. 7.4.2) does not contain any constituents other than the verb (the arguments against a unification advanced in Haegeman 1994 do not apply to ZG). See Salzmann (2010) for a proposal of how to explain why certain languages (notably Standard Dutch) are restricted to VR and disallow VPR.

movement).

In the second configuration where the QP is merged below the modal, (33b), scopal opacity follows since the modal c-commands the QP irrespective of whether predicate raising is reconstructed (35b) or not (35a) – the QP does not move (we exclude QR). We thus get the following two possible LFs for (33b):

- (35) a.  $[_{TP} [_{V-T+Mod}]_2 + T [_{VP} [_{V-T+Mod}]_2 [_{TP} QP V_1]]]$   
 b.  $[_{TP} [_{V-T+Mod}]_2 + T [_{VP} [_{V-T+Mod}]_2 [_{TP} QP V_1]]]$

The scope facts are thus an automatic side-effect of the predicate-raising approach.<sup>20</sup>

## 7.4 On the size of the VR complement – additional scope facts

### 7.4.1 Scrambling accounts

In this section we will discuss two additional types of scope facts that are important for a proper understanding of VR and VPR. Both were already noted in Haegeman & van Riemsdijk (1986: 446f.) and Haegeman (1992). First, adverbials outside the VR/VPR complement are ambiguous between high and low construal, i.e. they either have scope over the higher or just over the lower verb; if, on the other hand, they occur inside the VPR constituent, only the low construal is possible (we use translated examples of Haegeman 1992: 110, 113):<sup>21</sup>

<sup>20</sup>Base-generation approaches like Bader & Schmid (2009) that also base-generate the verb cluster itself have difficulties accounting for scope ambiguities because in certain configurations the modal will fail to c-command the QP. Take a VR or VPR-example with two indefinite objects outside a 3-verb cluster headed by an auxiliary, as schematically depicted in the following structure:

- (i)  $[IO [DO [Aux [Mod V]]]]$

Importantly, both the DO and the IO can have narrow scope with respect to the modal:

- (ii) 

|                                                         |            |
|---------------------------------------------------------|------------|
| dass de Lehrer eme Schüeler es Buech hät wele schänke   | IO > modal |
| that the teacher a.DAT pupil a book has wanted give.INF | modal > IO |

To extend the scope of the modal, some percolation mechanism is necessary. Percolation of the features of the modal up to the aux may be sufficient to handle narrow scope of the DO, but since the aux fails to c-command the IO, the narrow scope reading of (ii) remains unexplained. For such cases to be tractable under the Bader & Schmid approach, a different structural condition on scope (m-command?) seems unavoidable.

<sup>21</sup>Haegeman & van Riemsdijk (1986: 446) actually use examples with ambiguous temporal adverbials. While adverbials outside the VR/VPR constituent can indeed easily modify the embedded verb, it is difficult to construct examples where the adverb can actually also modify the matrix verb, i.e. the modal. Here is one example where the presence of an additional adverbial *nüme* ‘no longer’ disambiguates the example:

- (i) 

|                                                                                    |  |
|------------------------------------------------------------------------------------|--|
| dass er morn (nüme) wett (bi öis) verbiichoo                                       |  |
| that he tomorrow no.longer wants at us drop.by.INF                                 |  |
| a. ‘that tomorrow he will no longer want drop by at our place’ (with <i>nüme</i> ) |  |
| b. ‘that he wants to drop by at our place tomorrow’ (without <i>nüme</i> )         |  |

See Bouma (2003) for more data of this type.

- (36) a. dass de Hans de Peter *drüümaal* das Buech laat läse let > 3 times  
           that the John the Peter three.times that book lets read.INF 3 times > let  
       b. dass de Hans de Peter *drüümaal* laat das Buech läse let > 3 times  
           that the John the Peter three.times lets that book read.INF 3 times > let  
       c. dass de Hans de Peter das Buech laat *drüümaal* läse let > 3 times  
           that the John the Peter that book lets three.times read.INF \*3 times > let

Under the wide-scope reading of *drüümaal* there are three instances of causation; under the narrow scope reading there is only one instance of causation. Under movement approaches to VR/VP<sub>R</sub>, the low construal of *drüümaal* in (36a/b) is not unproblematic. For (36b), all scrambling approaches reviewed here would have to assume scrambling of the adverbial from VP<sub>2</sub> to VP<sub>1</sub> with optional reconstruction. Scrambling of adverbials is a controversial issue that I will come back to in the next subsection. What these facts certainly imply is that VP<sub>2</sub> contains more structure than just a VP. (36a) raises interesting issues: Under OV-approaches (Haegeman and Broekhuis) it can be handled by means of variable attachment sites (adjunction to VP<sub>2</sub> or VP<sub>1</sub>) if VR is a possibility (Haegeman) or by means of scrambling to VP<sub>1</sub> plus reconstruction (Broekhuis 1993). Crucially, however, the facts cannot be accounted for under den Dikken's approach where VP<sub>2</sub> is explicitly taken to be just a bare big VP – there would be no base-position for the adverbial into which it could reconstruct (the problem is hinted at in den Dikken 1994: 87, fn. 113).

The same problem obtains with ambiguities in the interpretation of modals: indefinites that occur above the modal 'can' are ambiguous between a deontic/root ('someone is able to ...') and an epistemic interpretation ('it is possible that someone ...'). If, however, the subject occurs inside the VPR complement only an epistemic interpretation is possible (the *-n* on *chan* in (37c) is a linking consonant).

- (37) a. dass de Wage öppert cha repariere                   ✓ root  
           that the car someone can repair.INF           ✓ epistemic  
           'that someone can repair the car'  
       b. dass öppert cha de Wage repariere               ✓ root  
           that someone can the car repair.INF           ✓ epistemic  
       c. dass de Wage chan [öppert repariere]           \*root  
           that the car can someone repair.INF          ✓ epistemic

Under the OV-approaches, the ambiguity in (37b) follows from scrambling of the subject from VP<sub>2</sub> to VP<sub>1</sub> plus optional reconstruction. (37a) can also be accounted for via scrambling + reconstruction (Broekhuis 1993) or, if VR is a possibility (Haegeman 1992), by assigning two different structures to it, i.e. with the subject either in SpecVP<sub>2</sub> or SpecVP<sub>1</sub> (in the first case, the modal is a raising verb, in the second case it is a control verb). As with the previous phenomenon, (37a) is problematic for den Dikken because the subject cannot come from VP<sub>2</sub> since the subject theta-role of VP<sub>2</sub> is projected in SpecVP<sub>1</sub> (recall fn. 6). The ambiguity thus remains unaccounted for.

### 7.4.2 The base-generation account

In the base-generation account proposed here, the ambiguities are the result of covert verb movement. We will begin with the ambiguity of the modal: If the subject of V2 is merged within the VPR complement, e.g. as a specifier of V2 (37c), it will always be in the c-command domain of the modal (regardless of reconstruction) so that only an epistemic interpretation is possible; the derivation is essentially as in (35) and we get the following LFs for (37c).

- (38) a.  $[_{TP} [V_T + Mod]_2 + T [_{VP} [V_T + Mod]_2 [_{TP} SU V_1]]]$   
 b.  $[_{TP} [V_T + Mod]_2 + T [_{VP} [V_T + Mod]_2 [_{TP} SU V_1]]]$

In (37a/b), the subject of the lexical verb is merged higher, in the projection of the modal. Since the modal can be interpreted above or below the subject, the two readings are easily obtained, basically as in (34), as the two LFs show:

- (39) a.  $[_{TP} [V_T + Mod]_2 + T [_{VP} SU [V_T + Mod]_2 [_{TP} (XP) V_1]]]$   
 b.  $[_{TP} [V_T + Mod]_2 + T [_{VP} SU [V_T + Mod]_2 [_{TP} (XP) V_1]]]$

The adverbial facts are more interesting as it is far from clear how an adverbial that modifies the embedded verb can occur outside the projection of that verb. While the base-generation mechanism can readily handle merger of arguments in higher projections, it is at first sight unclear how adverbials are to be treated since they are not arguments of verbs and therefore cannot be licensed by V-incorporation into higher heads. We would like to propose the following: If adverbials are merged as specifiers of functional heads, one can extend the predicate raising approach: suppose that in examples like (36a/b) a functional head F is merged below the causative verb. When V incorporates into *laat*, it will carry F along so that it can license the adverb within the projection of the causative verb (checking of the relevant feature of F can be delayed):

- (40) a. dass de Hans de Peter **drüümaal** laat [F das Buech läse]  
 that the John the Peter three.times lets that book read.INF  
 b. dass de Hans de Peter **drüümaal** [läse<sub>1</sub> +F]<sub>2</sub> + laat [\_\_<sub>2</sub> das Buech  
 that the John the Peter three.times read.INF lets that book  
 \_\_<sub>1</sub>]

The ambiguity in the interpretation of the adverbial then results from predicate raising and optional reconstruction (interpretation of the lower copy of *laat*, basically as in (34)). We thus get the following LFs for (36b):

- (41) a. dass de Hans [[läse<sub>T</sub> +F]<sub>2</sub> + *laat*]<sub>3</sub> + T de Peter **drüümaal** [[läse<sub>T</sub> +F]<sub>2</sub> +  
 that the John read.INF lets the P. three.times read  
~~*laat*~~<sub>3</sub> [[läse<sub>T</sub> +F]<sub>2</sub> das Buech läse<sub>1</sub>]  
 lets read that book read  
 b. dass de Hans [[läse<sub>T</sub> +F]<sub>2</sub> + ~~*laat*~~<sub>3</sub> + T de Peter **drüümaal** [[läse<sub>T</sub> +F]<sub>2</sub> +  
 that the J. read.INF lets the P. three.times read  
~~*laat*~~<sub>3</sub> [[läse<sub>T</sub> +F]<sub>2</sub> das Buech läse<sub>1</sub>]  
 lets read that book read

This analysis treats adverbials and arguments on a par, which implies that adverbials can be scrambled. This clashes with much of the literature where scrambling of adverbials is normally ruled out on the basis of examples like the following (the example is, of course, fine with high construal of the adverb; SG, Fanselow 2001: 401):

- (42) \*dass [**morgen** <sub>1</sub> [TP niemand [CP PRO <sub>—1</sub> ein Buch zu lesen] versprach]]  
           that tomorrow       no.one                   a book to read.INF promised

However, the facts are not so straightforward. As pointed out in Fanselow (2003a: 214), some selected adverbials resist scrambling while certain adjuncts do seem to scramble (these are coherent constructions):

- (43) a. ??dass man **im Hotel** niemandem zu wohnen versprechen sollte   ARG  
           that one in.the hotel nobody.DAT to live.INF promise.INF should  
           ‘that one should not promise anyone to live in the hotel’       (SG)  
       b. dass man **in diesem Hotel** niemandem zu essen empfehlen  
           that one in this hotel nobody.DAT to eat.INF recommend.INF   ADJ  
           kann  
           can  
           ‘that one cannot recommend anyone to eat in this hotel’       (SG)

Examples like (43b) show that adverbials can be licensed within the projection of the higher verb. What seems to be the case, though, is that they are much more restricted in their reordering possibilities: While they may be merged in higher clauses, they have to occur very low (cf. also den Besten & Broekhuis 1992: 30 for similar facts). I take these restrictions to follow from independent surface structure generalizations.<sup>22,23</sup>

## 8 Further arguments in favor of verb movement

In this section we will provide two additional arguments in favor of verb movement and against a scrambling account.

<sup>22</sup>This also applies to the contrast between (23b) and (26a) above: As long as the predicative adjective is in the c-command domain of its subject, it may also occur in the higher clause (at this point I am not sure whether the adjective is licensed by means of incorporation of some functional head as in (40) or whether it is independently licensed in the matrix clause as long as it is c-commanded by its subject).

<sup>23</sup>The scope facts in VR with Inf>Mod order are the same as with Mod>Inf order, i.e. indefinites are ambiguous (while WF disallows this order, it is possible in Standard Dutch, SG and also in ZG):

- (i) dass er 2 Fraue küsse wett                   2 > want  
       that he 2 women kiss.INF wants           want> 2 ZG

Under OV-approaches, the ambiguity follows from optional scrambling to VP<sub>1</sub> (cf. also Bobaljik & Wurmbrand 2005). Under den Dikken’s VO approach, the facts follow if it is additionally assumed that the dependent verb overtly incorporates into the modal. As long as the object moves across the modal, the scope facts come out right. In Salzmann (2010), such orders are analyzed as the result of overt PF-incorporation of the dependent verb. The scope facts can then be analyzed as in (34).

Hinterhölzl (2006: 113f.) provides one example that is clearly incompatible with a scrambling account. Consider the following VPR-example involving a causative verb (this is a translation of the West Flemish example used in Hinterhölzl; cf. also Bouma 2003: 37f. for similar data):

- The indefinite can have wide or narrow scope with respect to the causative verb in this example, as is expected given covert verb movement (under wide scope, there are two specific pieces that the students are told to practice three times, under narrow scope they are just told to practice the same two pieces three times, but which pieces they practice is irrelevant). What is crucial is that under narrow scope of the indefinite, it must have wide scope w.r.t. the adverbial. This is unexpected under a scrambling/movement account as the indefinite would arguably come from below the adverbial – the base-position of objects is below frequency adverbials.<sup>24</sup> Under verb movement the facts are as expected because the relative scope between the indefinite and the frequency adverbial is fixed, only the scope of the verb can change via predicate raising.<sup>25</sup>

Further evidence for verb movement comes from the interaction between VPR and negative indefinites (NI, Penka 2007). While NIs have been frequently used in the argumentation for scope (Haegeman & van Riemsdijk 1986, Haegeman 1992, den Dikken 1994/1995), what these approaches have failed to take into account is a third reading that negative indefinites allow. This third reading is often referred to as the split reading whereby the negative and the indefinite part are split by some scopal element. Consider the following VPR-example (the split reading is the third one):

- It should be pointed out that not all readings are equally salient, especially the narrow scope reading (may > ¬ prof) is difficult to obtain in this context. It can, however, be forced by using certain particles (cf. Penka & von Stechow 2001: 267ff.). Interestingly, if the negative indefinite is within the VPR-constituent, only the narrow-scope reading is possible (cf. also von Stechow 1992: 240 for this observation):

<sup>25</sup> A similar point can be made with the relative scope of multiple adjuncts (Bouma 2003: 34ff.): They are restricted to surface scope. If they were to involve scrambling from the embedded VP, reversed scope interpretations would in principle be conceivable. The facts discussed here also follow under Hinterhölzl's remnant movement account that we address in section 10.

- (46) dass bi de Prüefig törf [(au mal) **kän Profässer** debii siil] \*¬ pr > may  
 that at the exam may once no professor present be may > ¬ pr  
 'it is allowed that no professor is present during the exam' \*¬ > may > a pr

One straightforward explanation for this is that negative indefinites are actually the spell-out of two parts, an abstract negation + a non-negative indefinite. Crucially, for them to be realized as one word they have to be adjacent in surface syntax, i.e. at PF (Penka 2007: 103f.). If in (46) the abstract negation and the indefinite are within the VPR constituent, amalgamation is successful and the narrow scope reading obtains. The wide scope reading is impossible since both elements are in the c-command domain of the modal. The split scope reading would require the abstract negation to be located above the modal. But in that case the adjacency would be disrupted so that amalgamation fails. As a consequence, the split reading is not available:

- (47) \*Op¬ may [a professor ...]

The only grammatical derivation involves both the abstract negation and the indefinite within the VPR-constituent. Since there is no intervening material, they can be spelled-out together. In this case, however, there is no effect on scope:

- (48) may [Op¬ a professor ...]

Let us look at how a scrambling approach would analyze (45): To obtain the wide-scope reading (= de re reading), the indefinite must be scrambled into the matrix clause while the abstract negation is directly merged in the matrix clause. Finally, both elements are interpreted there:

- (49) Op¬ [a X]<sub>1</sub> Mod [VP ... \_\_\_]<sub>1</sub> wide-scope: scrambling of indefinite + high merger of Neg

To obtain the split reading, the indefinite is again merged below, then scrambled into the matrix clause (so that both elements can be spelled out as one element) while the negation is directly merged in the matrix clause. Subsequently, the indefinite is reconstructed (or scope is computed according to Aoun & Li 1991, which makes reconstruction unnecessary):

- (50) Op¬ [~~a X~~]<sub>1</sub> Mod [VP ... [a X]<sub>1</sub>]<sub>1</sub> split reading: scrambling + reconstr. of the indefinite + high merger of Neg
- 

While the previous derivations seem rather innocuous, the derivation for the narrow-scope reading (de dicto) of (45) raises concerns: Since both the abstract negation and the indefinite are interpreted in the scope of the modal, they have to originate within the VPR-constituent. Then, since the NI is realized in the matrix clause, they both have to be scrambled into the matrix clause so that they can be spelled-out as one word there. Subsequently, both elements have to be reconstructed (or scope is computed as in Aoun & Li 1991):

- (51) [Op¬]<sub>2</sub> [~~a X~~]<sub>1</sub> Mod [VP [Op¬]<sub>2</sub> [a X]<sub>1</sub>]<sub>1</sub> narrow scope: scrambling + reconstruction of both indefinite and negation
-

Scrambling of negation is, of course, a rather problematic operation, but seems inevitable under a scrambling approach, irrespective of whether a VO or an OV-approach is adopted. The derivation actually raises additional questions: From the perspective of economy one might expect the derivation in (51) to be blocked by the one in (48) where both negation and indefinite are directly generated in the complement of the modal and remain there. Furthermore, to obtain the correct interpretation it is crucial that reconstruction affects both the negation and the indefinite (or, under Aoun & Li 1991, that both are assigned narrow scope with respect to the modal). It is not obvious, though, how this can be enforced since both elements move independently. Theoretically, it should be possible to get a reading where the indefinite is interpreted upstairs and the negation below, resulting in a different kind of split reading (a  $X > \text{mod} > \text{neg}$ ), which, however, is never attested.<sup>26</sup>

Under verb movement, the various readings in (45) are obtained by interpreting the (abstractly incorporated) modal (cf. Lechner 2007: 17 on split readings with universals) in different positions ( $F_A/F_B$  are functional heads,  $F_A$  could be Neg and  $F_B$  T):

- (52) a. in the surface position:  
 $[_{XP} \text{Mod}+F_A+F_B \text{Op} \neg \text{Mod}+F_A \text{no prof Mod} [_{VP} \dots]] \Rightarrow$  wide scope  
 b. between  $\text{Op} \neg$  & indefinite:  
 $[_{XP} \text{Mod}+F_A+F_B \text{Op} \neg \text{Mod}+F_A \text{no prof Mod} [_{VP} \dots]] \Rightarrow$  split scope  
 c. above  $\text{Op} \neg$ :  
 $[_{XP} \text{Mod}+F_A+F_B \text{Op} \neg \text{Mod}+F_A \text{no prof Mod} [_{VP} \dots]] \Rightarrow$  narrow scope

Since the adjacency requirement only holds at PF, disrupting the adjacency at LF as in (52b) is unproblematic. Under the assumption that there is a (empty) functional head between the indefinite and the negation, the various readings follow automatically under verb incorporation. In cases like (46), both negation and indefinite are generated in the complement of the modal and will therefore always have narrow scope with respect to the modal.<sup>27</sup>

<sup>26</sup>The problems for the scrambling approach can perhaps be avoided if the selective reduction + choice function analysis of NIs by Abels & Martí (2010) is adopted.

<sup>27</sup>Similar interpretive possibilities obtain if adverbials co-occur with indefinites (modeled after Hinterhölzl 2006: 109ff.):

- (i) dass er öfter öppert wett bsueche  
 that he more.often someone wants visit.INF

There are three possible readings: i) both the adverbial and the indefinite are in the scope of the modal (narrow scope), ii) both can outscope the modal (wide scope) and iii) the modal can take scope between the two, i.e. more often > want > someone. What is crucially ruled out, though, is an interpretation where the indefinite has scope over the frequency adverbial (e.g. when there is a specific  $X$  that one wants to visit more often). This last reading could be obtained under scrambling by interpreting the indefinite in its surface position and the adverbial in its reconstructed position inside the complement. Under predicate raising, this reading cannot be derived since adverbial and indefinite are interpreted in their surface position, the ambiguities only resulting from the position where the modal is interpreted (as in (52)).

## 9 Against a similar verb-movement account

The present account shares a number of similarities with the base-generation analysis of Sternefeld (2006) that is based on composition of argument structures and percolation of theta-roles for VR, VPR and coherent constructions (similar ideas were also put forward in Neeleman 1994 and Neeleman & van der Koot 2002). Since no movement is involved, the movement and non-movement facts can arguably be handled as in the present account. Differences emerge in two areas:

Since there is no movement, scope reconstruction as in (5b/c) is unexpected. Therefore, Sternefeld (2006: 682ff.) proposes LF-movement of the modal across the XP, an instance of QR head-movement. This captures the wide scope of the modal in (5b/c); the absence of ambiguities in (5a) follows since the modal always c-commands the XP. To account for the narrow-scope reading in (5b/c), QR has to be optional. Sternefeld's account thus has basically the same coverage as the one proposed above; it can also handle the difficult cases discussed in the previous section. There is a problem, however, when there are several verbal elements:

- (53)    dass er **zwäine Schüeler** [hät wele    es Buech schänke]    2 stud > want  
          that he two.DAT students has wanted a book give.INF    want > 2 stud

According to this analysis, 'want' has to cross the indefinite to gain wide-scope. As a consequence, it also has to cross 'have'. Sternefeld does not assume any cluster formation (p. 685). As a consequence, movement of 'want' across 'have' violates the head movement constraint. For the derivation to respect the head-movement constraint, 'have' would first have to move across the indefinite; the motivation for this movement step is somewhat unclear; QR does not seem to be an obvious choice. Abstracting away from this problem, another question arises: Where does the modal subsequently land when it moves across the indefinite? Moving to a position below 'have' as in Sternefeld (2006: 685) does not seem to be an option from the point of view of cyclicity. Thus, even though the approach accounts for many of the scope facts, there remain unsolved problems that the present account is not confronted with.

The second problem concerns the interpretation of adverbials discussed in 7.4: Since free word order and especially high merger can only be licensed by means of theta-role percolation in Sternefeld's approach, there is no way for a non-argument to be merged in the projection of the modal but to be semantically interpreted in the projection of the lexical verb.<sup>28</sup>

I conclude therefore that while Sternefeld's approach provides an elegant analysis of many aspects of the movement paradox, it fails in one technical and in one rather important empirical respect.

## 10 A comparison with Hinterhölzl (2006)

In this section we will compare our approach with that of Hinterhölzl, which is probably the most comprehensive recent approach to scrambling, Verb Raising, Verb Projec-

<sup>28</sup>Admittedly, there have been proposals in non-derivational frameworks to handle reconstruction of adverbials, i.e. by treating adjuncts as arguments so that they can be inherited, cf. Bouma (2003).

tion Raising and Infinitival complementation. Given the limited scope of this paper, we will only be able to look at certain aspects of Hinterhölzl's work and therefore cannot do full justice to it.

## 10.1 The derivation of VR and VPR

To be able to evaluate Hinterhölzl's approach with respect to the movement paradox we first need to become familiar with the basic ingredients of his analysis. The base-structure of the sentence is as follows (Hinterhölzl 2006: 92, 97):

- (54) [CP [TP [scr DPs [S-Adv [NEGP [FOC [AGRP [manner [PredP [ASPP Partic [VP V ]]]]]]]]]]

Hinterhölzl adopts a strictly antisymmetric approach with a VO-basis (55a). As a consequence, all constituents that appear preverbally have to be moved out of VP by means of licensing movement. The derivation for VR proceeds as follows (p. 108): First, arguments of the embedded verb, particles, predicates and directional PPs move out of VP, an instance of licensing movement (55b). Then, the remnant VP moves to the embedded Spec, CP (55c). Finally, the embedded remnant TP moves into Spec, PredP of the matrix clause (55d). Schematically, the steps look as follows (I use English words for ease of readability):

- (55) a. John [PredP [VP wants [CP [TP [VP read the book]]]]]  
 b. John [PredP [VP wants [CP [TP [AGRP [the book]<sub>1</sub> [VP read \_\_<sub>1</sub> ]]]]]]  
 c. John [PredP [VP wants [CP [VP read \_\_<sub>1</sub> ]<sub>2</sub> [TP [AGRP [the book]<sub>1\_\_2</sub> ]]]]  
 d. John [PredP [TP [AGRP [the book]<sub>1\_\_2</sub> ]<sub>3</sub> [VP wants [CP [VP read \_\_<sub>1</sub> ]<sub>2</sub> \_\_<sub>3</sub> ]]]]

The derivation of VPR is essentially the same except that a constituent larger than VP, e.g. AgrP, moves to Spec, CP; in the following structures that constituent contains the direct object (p. 114):

- (56) a. John [PredP [VP wants [CP [TP [VP read the book]]]]] ⇒ licensing mvt  
 b. John [PredP [VP wants [CP [TP [AGRP [the book]<sub>1</sub> [VP read \_\_<sub>1</sub> ]]]]]] ⇒ AgrP to Spec, CP  
 c. John [PredP [VP wants [CP [AGRP [the book]<sub>1</sub> [VP read \_\_<sub>1</sub> ]]<sub>2</sub> [TP \_\_<sub>2</sub> ]]]] ⇒ TP to PredP  
 d. John [PredP [TP \_\_<sub>2</sub> ]]<sub>3</sub> [VP wants [CP [AGRP [the book]<sub>1</sub> [VP read \_\_<sub>1</sub> ]]<sub>2</sub> \_\_<sub>3</sub> ]]]]

If something is not pied-piped to Spec, CP, it will be affected by TP-movement and end up in the matrix clause. This derives cases of partial VPR, e.g. (3).

## 10.2 How it compares to the base-generation approach

### 10.2.1 Selective Movement effects

Hinterhölzl takes the selective movement effects described in sections 4 and 5 to follow from two different operations: When movement/scrambling effects are absent, movement is still involved, but is an instance of licensing movement. The putatively fronted constituents in the examples in section 4 would thus be part of the remnant TP that is moved into matrix PredP (56d). When movement/scrambling effects are observed, we



If QR is an option and if the freezing problem can somehow be avoided, the wide-scope reading can be derived. If, however, QR is not an option (which is likely to be the case in languages like ZG where scope relations can generally be read off the surface structure), an overt movement step, viz. scrambling, is necessary. However, there is evidence that the scopal XPs can have wide-scope without having undergone scrambling to the scr-position indicated in (59), recall (5b) where the indefinite is below an adverbial. If that temporal adverbial is in the position S-Adv in (59), then the object must be in a lower position. Specificity-driven scrambling therefore cannot be responsible for wide scope. According to Hinterhölzl (2006: 56ff.) there is a second trigger for scrambling, namely scope itself. Simplifying for reasons of space, formal scope features can be assigned to bare functional heads which are then merged above the element with respect to which the scrambled element needs to get wide scope. In the case at hand, the functional head would arguably be merged above PredP. Scrambling of the DP is then sufficient for it to gain wide scope with respect to the modal.

To account for the scopal opacity in (5a), Hinterhölzl (2006: 83) refers to earlier work by Lötscher (1978: 5) who shows that constituents within the VPR-constituent are focused. Hinterhölzl then goes on to argue that QR of focal elements is blocked because they have to be mapped into the nuclear scope (cf. also Lerner & Sternefeld 1984 and Sternefeld 1991: 120f. for essentially the same proposal). If QR is not an option, Hinterhölzl could also claim that scope interpretation follows from surface structure since the indefinite within the VPR complement is in the embedded Spec, CP and thus in the scope of the modal.

### 10.2.3 Negative indefinites

To facilitate understanding we will illustrate the derivation on the basis of an NI-example that is structurally closer to the previous examples (the modal particles in parentheses favor the narrow scope interpretation):

- (60)    dass er (au mal) kä Fläisch törf zum Fäsch mitbringe       $\neg$  meat > may  
           that he once    no meet    may to.the party bring.with.INF    may >  $\neg$  meat  
           ‘that he is allowed not to bring any meet (narrow scope)’       $\neg$  > may > meat

We will start with the narrow scope reading, which seems unproblematic: Arguably, both negation and the indefinite come from the embedded clause and are transported into the matrix clause via remnant TP-movement. Concretely, the object is first moved out of VP to Spec, AgrP (61b); thereafter, the remnant VP is moved to Spec, CP (61c). Finally, the embedded TP containing negation and the indefinite is moved to matrix Spec, PredP (61d) (for ease of exposition, we use the VR-variant of (60)):

- (61)    a. he [<sub>PREDP</sub> [<sub>VP</sub> may [<sub>CP</sub> [<sub>TP</sub> Op $\neg$  [<sub>VP</sub> bring meat]]]]]  $\Rightarrow$  mvt to AgrP  
           b. he [<sub>PREDP</sub> [<sub>VP</sub> may [<sub>CP</sub> [<sub>TP</sub> Op $\neg$  [<sub>AGRP</sub> [meat]<sub>1</sub> [<sub>VP</sub> bring \_\_\_\_<sub>1</sub> ]]]]]]  $\Rightarrow$  RM VP  
           c. he [<sub>PREDP</sub> [<sub>VP</sub> may [<sub>CP</sub> [<sub>VP</sub> bring \_\_\_\_<sub>1</sub> ]<sub>2</sub> [<sub>TP</sub> Op $\neg$  [<sub>AGRP</sub> [meat]<sub>1</sub> \_\_\_\_<sub>2</sub> ]]]]]  $\Rightarrow$  RM TP  
           d. he [<sub>PREDP</sub> [<sub>TP</sub> Op $\neg$  [<sub>AGRP</sub> [meat]<sub>1</sub> \_\_\_\_<sub>2</sub> ]]<sub>3</sub> [<sub>VP</sub> may [<sub>CP</sub> [<sub>VP</sub> bring \_\_\_\_<sub>1</sub> ]<sub>2</sub> \_\_\_\_<sub>3</sub> ]]]

Since negation and indefinite are adjacent, they can be realized as one word. The narrow scope interpretation obtains after reconstruction of the remnant TP (as with the



The low construal of the adverb obtains by means of reconstruction of the remnant TP.

### 10.2.5 Summary

To briefly summarize this detailed discussion of Hinterhölzl's approach: It provides a straightforward account of many of the puzzles discussed in this paper. Unsolved questions remain, though, with respect to freezing and the relationship between scrambling and specificity. Furthermore, wide-scope readings of negative indefinites may clash with the economy principles assumed in that work.

## 11 Open issues

In this final section I will briefly mention aspects of VPR that have been touched upon in the literature and that do not yet follow under the present proposal.

### 11.1 More scope facts

The first issue concerns additional scope facts. Haegeman & van Riemsdijk (1986: 451) argue that *wh*-in situ within the VPR complement is grammatical:

- (66) Ich wäiss nöd, wen dass wänd für wele Kurs iisetze.  
 I know not whom that they.want for which course assign.INF  
 'I don't know who they want to assign to which course.'

This seems to conflict with the scopal opacity noted in (5a). Haegeman (1992: 122) argues that this only holds for D-linked phrases and shows that Bare *wh*-elements are impossible inside the VPR constituent:

- (67) \*Kweten nie wien dat-ter goat wien anduden.  
 I.know not who that-there goes who indicate.INF  
 'I don't know who will appoint whom.'

Since D-linked *wh*-phrases can be licensed without covert movement, the data in (66) are considered irrelevant for the opacity issue; (67), on the other hand, shows that there is scopal opacity according to Haegeman. Schönenberger & Penner (1995: 291), on the other hand, claim that *wh*-in situ inside the VPR constituent is fine with bare *wh*-elements in Bernese:

- (68) Ich wäiss nöd, wäär (dass) wott was choufe.  
 I know not who that wants was buy.INF

We tend to agree with the judgment in (68); what is not discussed in the literature, though, are the possible readings of these in situ elements. It seems to us that (68), while grammatical, does not allow a multiple-pair reading but only a single-pair interpretation. For a multiple-pair reading to be possible, the *wh*-element has to occur outside the VPR complement:<sup>29</sup>

<sup>29</sup>One of the reviewers mentions that he gets a multiple-pair reading in cases like (68) with D-linked *wh*-phrases:

- (69) Ich wäiss nöd, wäär (dass) was wott choufe.  
 I know not who that was wants buy.INF

The interpretation of these facts (if they can be substantiated) then depends on one's treatment of *wh*-in-situ. Dayal (2002: 517) points out that multiple-pair readings can be blocked even in the absence of an island as e.g. in the following example:

- (70) *Which student* believes that Mary read *which book*?

According to Dayal, paired readings are subject to a very strict locality requirement. Given that the VPR complement can be analyzed as a TP (recall 3.4), the impossibility of the multiple pair reading in (68) may follow without assuming any opacity of the VPR constituent. The deviance of (67) remains unexplained for the moment.

The second scope issue involves interaction between two QPs. Den Dikken (1996: 82ff.) argues that two QPs allow inverse scope as long as they are within the same clause/TP, but not if only one is within the VPR complement (we use ZG equivalents):

- (71) a. dass si zwäine Studänte vier Büecher wänd gëë 2 > 4; 4 > 2  
           that they two.DAT students 4 book want give.INF  
       b. dass si wänd [zwäine Studänte vier Büecher gëë] 2 > 4; 4 > 2  
           that they want two.DAT students 4 book give.INF  
       c. dass si zwäine Studänte wänd [vier Büecher gëë] 2 > 4; \*4 > 2  
           that they two.DAT students want 4 book give.INF

Schönenberger (1995: 371), on the other hand, claims that all examples are ambiguous. I tend to side with den Dikken, but the facts are very subtle and would require empirical verification. The issue is exacerbated by the fact that languages like German and its varieties are generally taken to show surface scope so that ambiguities are not expected in the first place. Given these uncertainties, I have to leave this issue for further research.

## 11.2 Causative constructions

Haegeman & van Riemsdijk (1986: 432) discuss a surprising fact involving ECM-verbs that was first noted in Lötscher (1978: 8): If the complement of the ECM verb undergoes VPR, the ECM-subject must not be contained within the VPR complement:

- (72) a. \*dass er wil laa siini Chind Medizin studiere  
           that he wants let.INF his children medicine study.INF  
       b. dass er wil siini Chind laa Medizin studiere  
           that he wants his children let.INF medicine study.INF

- 
- (i) Ich wäiss nöme weli Buebe händ wele mit welne Mäitli tanze  
 I know no.longer which boys have.PL wanted with which girls dance.INF  
 'I no longer remember which boys wanted to dance with which girls.'

I tend to agree with this judgment and interpret it as another indication that the scope of D-linked in-situ *wh*-phrases is established differently than that of bare in-situ *wh*-quantifiers.

Under H&R's analysis, the facts follow because the ECM-subject is taken to be projected in Spec, TP so that it cannot be affected by reanalysis and inversion, which is restricted to VPs. But given the vP-internal subject hypothesis, such a solution is no longer available. Den Dikken (1994: 84f.) derives the facts by assuming that the ECM-subject can only be licensed in Spec, AgrOP of the causative verb.<sup>30</sup> Under the base-generation approach adopted here, the facts remain mysterious because the ECM-subject should be thematically licensed within the projection of *studiere*, from which it receives a theta-role. Furthermore, c-command by the ECM-verb should be sufficient for case-licensing (cf. the low subjects in (16); Broekhuis 1993: 37f. faces a similar problem). The only solution that comes to mind is reanalyzing the ECM-cases as instances of control so that the causee is an object of the causative verb and consequently has to appear within its projection. This is not implausible for perception verbs like 'see', 'hear' and the verb 'help' (Lötscher 1978: 8) where control paraphrases are available: 'I saw him as he was ...', 'I helped father in doing ...'. The control analysis is arguably also possible for the 'force' reading of *laa* 'let' ('I forced my children to ...'). However, a control interpretation does not seem to be available for the 'admit'-reading of *laa* 'let', but such a reading is possible in (72). It seems then, that the contrast between (16) and (72) illustrates a difference in case-licensing between nominative and accusative in German and its varieties: While c-command is sufficient for nominative in German, accusative requires the object to be within the projection of the case-licensor. (72) shows that what is crucial is the case-distinction, not the difference between external vs. internal argument. Why nominative and accusative differ in this respect is something I intend to address in future work.<sup>31</sup>

## 12 Conclusion

We have argued for a new approach to VR and VPR that involves base-generation. The VPR complement is taken to be in its base-position, which explains the transparency for extraction. Arguments are licensed in the projections of their predicates; covert predicate raising extends the theta-marking domain of the predicate and thus allows the merger of an argument of V in higher projections. This mechanism accounts for the absence of movement effects with arguments of V that occur outside the VPR complement. An intricate scope pattern (ambiguity of indefinites that are outside the VPR-complement, lack of ambiguity when they occur inside the VPR-complement) is analyzed as an automatic side-effect of covert predicate-raising: The various interpretations depend on where the modal is interpreted. Since the modal always c-commands the VPR complement, it will always have scope over scopal elements inside the VPR complement. With regard to indefinites outside the VPR complement, narrow scope is possible if the modal is interpreted in its reconstructed position below the QP. The analysis avoids the pitfalls of movement approaches and because of its applicability to the reconstruction of adverbials is also superior to base-generation approaches based on argument structure composition and theta-role percolation.

<sup>30</sup>The same holds under Wurmbrand's (2001) approach where accusative is always licensed in case agreement projections so that the causee has to move out of the complement of the causative verb.

<sup>31</sup>As pointed out to me by Henk van Riemsdijk the facts would follow under the old notion of directionality of case assignment, which is, however, no longer available in Minimalism.

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# Incremental *more*

Guillaume Thomas

## 1 Introduction

The morpheme *more* has been mostly studied as a comparative operator. However, it appears that *more* can be used non comparatively, as in (1):

- (1) It rained for three hours this morning, and it rained a little more in the afternoon.

There is an interpretation of (1) in which the second conjunct, *it rained a little more in the afternoon*, is an assertion that it rained in the afternoon, possibly less than three hours. In this reading, the second conjunct is interpreted neither as an assertion that the duration of the rain in the afternoon was greater than some standard (the duration of the rain in the morning), nor as an assertion that it was a little longer than this standard. Rather, this interpretation of (1) conveys that it rained for some short period of time in the afternoon, and that this event of raining is in some sense added to the event of raining that took place in the morning, the two events forming a larger eventuality of raining. We call this the incremental use of *more*.

In this paper, we argue that incremental *more* (*more<sub>inc</sub>*) is a pluractional additive operator. As shown in sections 2 and 3, *more<sub>inc</sub>* combines with a relation *D* between degrees and eventualities, triggers a presupposition that a similar relation is satisfied by a pair of degree and eventuality ( $d_p, e_p$ ), asserts that *D* itself is satisfied by another pair of degrees and eventuality ( $d, e$ ), and asserts also that a similar relation is satisfied by the sum of the two pairs, ( $d_p + d, e_p \oplus e$ ). It is this last component of the meaning of *more<sub>inc</sub>* that makes it a pluractional operator. Evidence for such a pluractional semantics comes from the analysis of some restrictions on the use of *more<sub>inc</sub>* with stative predicates on the one hand, and with achievements and accomplishments on the other hand.

*More<sub>inc</sub>* is attested in some stative predications, c.f. (2), but not in others, c.f. (3):

- (2) Michael owns two apartments in Boston and he owns one more apartment in New York.  
(3) This area was quite dangerous a few years ago. Now it is a little more dangerous.

(2) has an incremental reading according to which John owns (at least) three houses, two in Boston and one in New York. By contrast, the only available reading of *more* in (3) is comparative (this area is a little more dangerous now than it was before). We

argue in section 5 that gradable stative predicates (like *dangerous*) denote relations between individuals, states and degrees. It is shown in section 6 that incremental *more* is ungrammatical in exactly those stative predications where *more* binds the degree argument of the stative predicate. This generalization correctly predicts that *more<sub>inc</sub>* is unattested in sentences such as (3), where *more* binds the degree argument of *dangerous*, while it can occur in stative sentences such as (2), where the degree that it binds originates inside the DP *apartment*.

*More<sub>inc</sub>* is attested inside *take  $\alpha$  time to* constructions with achievements and accomplishments, c.f. (4). However, *more<sub>inc</sub>* is not attested inside *in  $\alpha$  time* measure phrases, c.f. (5):

- (4) Michael solved the first puzzle in 5 minutes, and it took him 10 more minutes to solve the second one.
- (5) ?Michael solved the first puzzle in 5 minutes, and he solved the second one in 10 more minutes.

(4) has an incremental reading according to which Michael solved the second problem in 10 minutes. On the other hand, in so far as (5) is acceptable at all, it only has a comparative reading according to which Michael solved the second problem in 15 minutes.

In sections 6 and 7, we argue that *more<sub>inc</sub>* cannot combine with stative predicates and with *in  $\alpha$  time* measure phrases, because these expressions are inherently distributive in a way that is inconsistent with the pluractional meaning of *more<sub>inc</sub>*.

## 2 Incremental *more*

Consider the following sentence:

- (6) There were five beers on the kitchen table. There are two more in the fridge.

In its incremental reading, the second sentence asserts that there are two beers in the fridge. It also seems to presuppose that there are/were some other beers, possibly somewhere else – in this case, the presupposition is satisfied by the fact that the context entails the proposition that there were five beers on the kitchen table. This division of labor between assertion and presupposition is supported by classical tests. The proposition that there are two beers in the fridge can be denied by the addressee:

- (7) A: There are two more beers in the fridge.  
B: No, the only beers we had were on the kitchen table.

The proposition that there are/were some other beers somewhere (else) can be targeted by the ‘Hey, wait a minute!’ test, and projects from the antecedent of conditionals, among other environments:

- (8) A: There are two more beers in the fridge.  
B: Hey, wait a minute, I didn’t know that we had any other beers!
- (9) A: If there are two more beers in the fridge, Chuck will drink them.

B: Hey, wait a minute, I didn't know that we had any other beers!

*More<sub>inc</sub>* appears to contribute yet another element of meaning to the utterance in (6) beyond the assertion and the presupposition we just mentioned. (6) means that the number of beers that there are in the fridge has to be added to the number of beers that there are/were somewhere else, the sum of the two numbers being the total number of beers available. This is shown by the fact that (6) is not felicitous in the following context. There were exactly five beers on the kitchen table, I drank three of them, and then I put the two that were left in the fridge. There are no other bottles of beer in the fridge. In sum, the second sentence in (6) asserts that there are two beers in the fridge, presupposes that there are/were other beers somewhere (else), in this case that there were five beers on the kitchen table, and asserts that there is a total of at least seven beers on the kitchen table and in the fridge. Consider now this other example of *more<sub>inc</sub>*:

(10) I ran for two hours this morning and I ran for three more hours this afternoon.

Once again, the second sentence with *more<sub>inc</sub>* conveys three different propositions: it asserts that the speaker ran for three hours in the afternoon, it presupposes that the speaker ran for some time on some other occasion, and it asserts that these two events of running can be summed to form a plural event whose duration is the sum of the duration of the two simple events.

### 3 A formal analysis of *more<sub>inc</sub>*

#### 3.1 *More<sub>inc</sub>* as a pluractional additive operator

*More<sub>inc</sub>* is found inside nominal projections as in (6), repeated here as (11), and also in adverbial projection as in (10), repeated here as (12):

(11) There were five beers on the kitchen table. There are two more in the fridge.

(12) I ran for two hours this morning and I ran for three more hours this afternoon.

In order to analyze the meaning of *more<sub>inc</sub>* in (6) and in (10) in a unified way, we hypothesize that *more<sub>inc</sub>* is a function that applies to a relation between degrees and eventualities. In (6), the relation is between states *s* of being some beers and the cardinalities of the groups of beers in these states (degrees *d*) as in (13). In (10), the relation is between events *e* of the speaker running and the durations  $\tau(e) = d$  of these events as in (14):

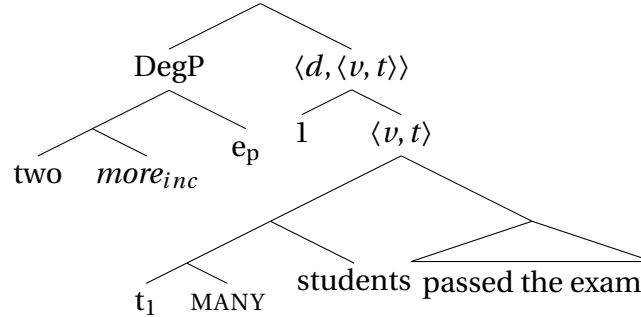
(13)  $\lambda d. \lambda s. \exists X [\text{beers}(s)(X) \wedge |X| = d \wedge \text{in the fridge}(X)]$

(14)  $\lambda d. \lambda e. [\text{run}(e) \wedge \text{agent}(e) = (\text{sp}_c) \wedge \tau(e) = d]$

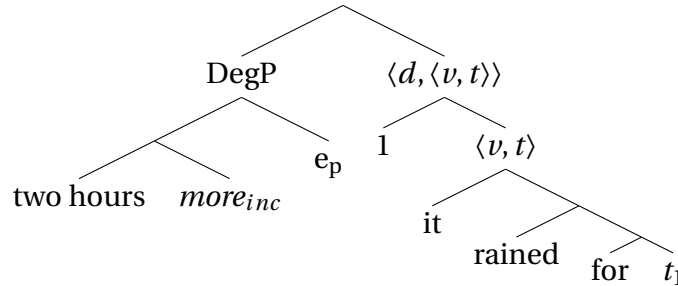
In both cases, *more<sub>inc</sub>* contributes an assertion that this relation holds between some event *e* and some degree *d*, a presupposition that a similar relation holds between some salient event *e'* and some degree *d'*, and an assertion that these two events can be summed to form an eventuality  $e \oplus e'$  that is realized to a degree  $d + d'$ .

Therefore, we argue that the semantic type of *more<sub>inc</sub>* is the same in nominal and in adverbial environments, and that in both cases, *more<sub>inc</sub>* applies to a relation between degrees and eventualities. We claim that such a relation is built in the syntax, along the following lines:

- (15) Two more students passed the exam.



- (16) It rained for two hours more.



We hypothesize that *more<sub>inc</sub>* heads a *Degree Phrase* (*DegP*) that originates inside a measure phrase. In the case of nominal *more<sub>inc</sub>*, this measure phrase is created by a covert *MANY* operator, that applies to an NP and returns a parametrized generalized quantifier (Hackl, 2001):

- (17)  $\llbracket \text{MANY} \rrbracket = \lambda d. \lambda P_{\langle e, t \rangle}. \lambda Q_{\langle v, \langle e, t \rangle \rangle}. \lambda e. \exists X [|X| = d \wedge P(X) = 1 \wedge Q(e)(X) = 1]$

In the case of adverbial *more<sub>inc</sub>*, we assume that a measure phrase relating to the verbal head as an adjunct is provided overtly (cf. the *for* phrase in (16)) or covertly. In both cases, the *Deg* head by *more<sub>inc</sub>* originates in a position where an element of type *d* (for degrees) is expected. Since the type of the *DegP* does not fit the local requirements, it raises to a position above the VP, leaving behind it a trace of type *d* that is abstracted over. This QR of *more<sub>inc</sub>* creates an argument of type  $\langle d, \langle v, t \rangle \rangle$  (a relation between degrees *d* and eventualities *v*) for *more<sub>inc</sub>* to apply to at the level of the VP.

Let us now consider the meaning we hypothesize for *more<sub>inc</sub>*. We assume a system of types including at least eventualities (type *v*), degrees (type *d*) and individuals (type *e*). We assume that the domain of eventualities and the domain of individuals come with part-whole structures (Krifka, 1998), with relations of sum  $\oplus$ , and part-of  $\leq$ . The following denotation for *more<sub>inc</sub>* is temporary and will be revised later on (the presupposition of *more<sub>inc</sub>* is underlined):

$$(18) \quad \llbracket \text{more}_{inc} \rrbracket^g = \lambda d. \lambda e'. \lambda D_{\langle d, \langle v, t \rangle \rangle}. \lambda e. \underline{\exists d' [D(d')(e')]} \wedge D(d)(e) \wedge D(d + \delta)(e \oplus e')$$

where  $\delta = \iota d' [D(d')(e')]$

Remember that in our analysis, *more<sub>inc</sub>* contributes the assertion that some relation of type  $\langle d, \langle v, t \rangle \rangle$  holds of a pair of degree and eventuality  $(d, e)$  (call them the asserted degree and eventuality) and triggers the presupposition that a similar relation holds of a degree  $d'$  and a contextually salient eventuality  $e'$ . As can be seen in the LF above, we assume that *more<sub>inc</sub>* first applies to the asserted degree. The resulting function then applies to the contextually salient eventuality mentioned in the presupposition. We represent it as  $e_p$  in our metalanguage. It is treated as a pronoun and is never bound in the semantic representation. The presupposed degree is existentially quantified in the presupposition of *more<sub>inc</sub>* and referred back to in the assertion using a definite description  $\delta$ . *More<sub>inc</sub>* together with its two innermost arguments forms a constituent that denotes a degree quantifier of type  $\langle \langle d, \langle v, t \rangle \rangle, \langle v, t \rangle \rangle$ , labeled DegP in the LF. This DegP is then merged with an expression denoting a function that expects a degree argument (MANY in the LF above), and undergoes QR. The complete semantic derivation of the sentence is as follows (presuppositions are underlined):

$$(19) \quad \begin{aligned} 1. & \llbracket \text{DegP} \rrbracket^g = \lambda D_{\langle d, \langle v, t \rangle \rangle}. \lambda e. \underline{\exists d' \wedge [D(d')(e_p)]} \wedge D(2)(e) \wedge D(2 + \delta)(e \oplus e_p) \\ & \text{where } \delta = \iota d' [D(d')(e_p)] \\ 2. & \llbracket \text{MANY} \rrbracket^g (\llbracket t_1 \rrbracket^g) = \\ & \quad \lambda P_{\langle e, t \rangle}. \lambda Q_{\langle v, \langle e, t \rangle \rangle}. \lambda e. \exists X [|X| = g(t_1) \wedge P(X) \wedge Q(e)(X)] \\ 3. & \llbracket \text{MANY } t_1 \rrbracket^g (\llbracket \text{students} \rrbracket^g) = \\ & \quad \lambda Q_{\langle v, \langle e, t \rangle \rangle}. \lambda e. \exists X [|X| = g(t_1) \wedge \text{students}(X) \wedge Q(e)(X)] \\ 4. & \llbracket \text{MANY } t_1 \text{ students} \rrbracket^g (\llbracket \text{passed the exam} \rrbracket^g) = \\ & \quad \lambda e. \exists X [|X| = g(t_1) \wedge \text{students}(X) \wedge \text{pass}(\text{the exam})(e) \wedge \text{agent}(e) = (X)] \\ 5. & \llbracket 1 \text{ MANY } t_1 \text{ students passed the exam} \rrbracket^g = \\ & \quad \lambda d. \lambda e. \exists X [|X| = d \wedge \text{students}(X) \wedge \text{pass}(\text{the exam})(e) \wedge \text{agent}(e) = (X)] \\ 6. & \llbracket \text{DegP} \rrbracket^g (\llbracket 1 \text{ MANY } t_1 \text{ students passed the exam} \rrbracket^g) = \\ & \quad \lambda e. \underline{\exists d' \exists X [|X| = d' \wedge \text{students}(X) \wedge \text{pass}(\text{the exam})(e_p) \wedge \text{agent}(e_p) = (X)]} \wedge \\ & \quad \underline{\exists X [|X| = 2 \wedge \text{students}(X) \wedge \text{pass}(\text{the exam})(e) \wedge \text{agent}(e) = (X)]} \wedge \\ & \quad \underline{\exists X [|X| = 2 + \delta \wedge \text{students}(X) \wedge \text{pass}(\text{the exam})(e \oplus e_p) \wedge \text{agent}(e \oplus e_p) = (X)]} \\ & \text{where } \delta = \iota d' [D(d')(e_p)] \end{aligned}$$

The interpretation of a sentence with adverbial *more<sub>inc</sub>* is similar, and we leave it to the reader.

The semantics we have given to *more<sub>inc</sub>* requires the asserted relation and the presupposed relation to be identical. This is clearly too restrictive. The relations between degrees and eventualities that are mentioned in the presupposition and the assertion of *more<sub>inc</sub>* are obviously allowed to differ, as illustrated in the following examples, with nominal and adverbial *more<sub>inc</sub>*:

- (20) A: How much did you exercise last week?  
 B: I ran for two hours and I biked for three more hours.
- (21) A: How many students are asking for a grant this year?

B: Five students submitted a proposal to the NSF and three more to the ELF.

In (20), the presupposed and asserted relation are as in (22) and (23) respectively:

$$(22) \quad \lambda d.\lambda e.run(e) \wedge agent(e) = (sp_c) \wedge \tau(e) = d$$

$$(23) \quad \lambda d.\lambda e.bike(e) \wedge agent(e) = (sp_c) \wedge \tau(e) = d$$

In order to make the semantics of *more<sub>inc</sub>* flexible enough to be consistent with such variation, we assume that a function *alt* is available, that generates the set of alternatives of an expression  $\alpha$ . We assume that this set is a contextually restricted subset of the set of expressions of the same type as  $\alpha$ . The revised semantics of *more<sub>inc</sub>* is:

$$(24) \quad \begin{aligned} \llbracket more_{inc} \rrbracket^{g,c} &= \lambda d.\lambda e'.\lambda D_{\langle d, \langle v, t \rangle \rangle}.\lambda e. \\ &\quad \frac{\exists d' \exists D' \in alt(D)[D'(d')(e')]}{\text{where } \delta = \iota d'[\exists D' \in alt(D)[D'(d')(e')]]} \wedge D(d)(e) \wedge \exists D'' \in alt(D)[D''(d + \delta)(e \oplus e')] \end{aligned}$$

This allows us to predict the following truth conditions for the second conjunct of (20):

$$(25) \quad \frac{\exists d' \exists D' \in alt(D)[D'(d')(e_p)]}{\text{where } \delta = \iota d'[\exists D' \in alt(D)[D'(d')(e_p)]]} \wedge \exists D(d)(e) \wedge \exists D'' \in alt(D)[D''(d + \delta)(e \oplus e_p)]$$

and  $D = \lambda d.\lambda e.run(e) \wedge agent(e) = (sp_c) \wedge \tau(e) = d$

The set of alternatives to a given relation between eventualities and degrees must of course be constrained in several respects. One that seems to be of theoretical interest is that in some sense, the degree arguments of the asserted relation and of the presupposed relation must stand for measures of the same kind of entity. Consider for instance (26):

$$(26) \quad ?I \text{ met two boys yesterday and I met two more girls today.}$$

(26) sounds odd, unless we are able to accommodate the information that I had met other girls before today, i.e. we are aware that there is a particular event of me meeting some girls that is relevant to the conversation at the point when I utter (26). This suggests that the presupposed eventuality to which *more<sub>inc</sub>* relates in (26) must be an event of interacting in some way with some girls. Why is that? The relational argument of *more<sub>inc</sub>* in (26) is:

$$(27) \quad \lambda d.\lambda e.\exists X[girl(X) \wedge meet(e)(X) \wedge agent(e) = (sp_c) \wedge |X| = d]$$

We have seen that the alternatives to (27) might be as (28), but cannot be as (29); else, the oddity of (26) would be unexpected:

$$(28) \quad \lambda d.\lambda e.\exists X[girl(X) \wedge P(e)(X) \wedge |X| = d]$$

where  $P \in alt(\lambda e.\lambda x.meet(e)(x) \wedge agent(e) = (sp_c))$

$$(29) \quad \lambda d.\lambda e.\exists X[P(X) \wedge met(e)(X) \wedge agent(e) = (sp_c) \wedge |X| = d]$$

where  $P \in alt(\lambda x.girl(x))$

We suggest that (29) is not a good alternative to (27) because the degrees in both relations are measures of potentially different kinds of entities. In (27), the degrees are

cardinalities of groups of girls. In (19) on the other hand, the degrees are cardinalities of groups of individuals having the property  $P$ , where  $P$  is an alternative to  $\lambda x.\text{girl}(x)$ .

In short, we suggest that the degree argument of the relational argument of *more<sub>inc</sub>* and the degree argument of its alternatives must stand for measures of the same kind of entity. How this constraint is to be implemented compositionally is left for further research.

### 3.2 Comparison with Greenberg (2009, 2010)

Greenberg (2009, 2010)'s analysis of incremental *more* and mine are very similar in their basic aspects. As we will see later, they differ in non trivial ways when it comes to explaining the various restrictions on the use of *more<sub>inc</sub>*. Additionally, the two analyses differ in their syntactic assumptions.

Greenberg (2009) argues that incremental or as she calls them additive readings of *more* come in two varieties, nominal *more<sub>add</sub>* and verbal *more<sub>add</sub>*, each corresponding to a different denotation of *more<sub>add</sub>*. Consider sentences (30) and (31):

(30) Three *more<sub>add</sub>* boys danced.

(31) John ran three kilometers *more<sub>add</sub>*.

Let us focus on nominal *more<sub>add</sub>* in (30) first. According to Greenberg, the truth conditions of (30) are:

(32) Assertion: There is a dancing eventuality  $e_1$ , whose agent is three individuals who are boys.

Presupposition: There is a  $P_2$  event,  $e_2$ , which is temporally not later than the reference time of the assertion, and whose agent is a group of boy with cardinality  $d_2$ . The eventualities  $e_1$  and  $e_2$  are in the denotation of a predicate  $P_3$ , and there is an eventuality  $e_3$  in the plural predicate  $*P_3$ , which is the sum of the dancing eventuality  $e_1$  and  $e_2$ , whose agents are the boys which are agents to  $e_1$  and of  $e_2$ , with cardinality of  $3 + d_2$ . Finally, this summed eventuality  $e_3$  is more developed than  $e_2$ .

The two analyses of nominal *more<sub>add</sub>* in (30)<sup>1</sup> are similar in that both assume that (30) contributes an assertion that there exists an event of three boys dancing, and a presupposition that there is an other event  $e_2$  of  $d_2$  other boys dancing. Both analyses also argue that these two events are summed to form a larger event  $e_1 \oplus e_2$  of  $3 + d_2$  boys dancing. In more general terms, nominal *more<sub>add</sub>* in both analyses relate eventualities of some sort to the cardinality of some (plural) individual participating in these eventualities. Both assert that a larger eventuality  $e_3$  is formed out of two eventualities  $e_1$  and  $e_2$ , such that the cardinality of a designated group of individuals participating in  $e_3$  equals the sum of the cardinality of a designated group of individuals participating

<sup>1</sup>In this section I will use Greenberg's notation for this so called incremental or additive use of *more*

in  $e_1$  and the cardinality of a designated group of individuals participating in  $e_2$ .

Yet the two analyses differ in important respects. Firstly, the division of labor between assertion and presupposition is different in each. In our analysis, the incremental clause (the statement about the sum eventuality  $e_1 \oplus e_2$ ) is argued to be an assertion. In Greenberg's analysis, it is argued to be part of a presupposition. In the next section, we give arguments that it is not a presupposition since it cannot project through operators such as negation and the antecedent of a conditional. Secondly, in our analysis sentences with nominal *more<sub>add</sub>* contain a measure function that measures the cardinality of a group of individual in a direct way. The DegP headed by *more<sub>add</sub>* is generated in the degree argument position of a parametrized determiner MANY, that applies a cardinality measure function to a plural individual in the extension of a NP. In Greenberg's analysis on the other hand nominal *more<sub>add</sub>* introduces a cardinality measure function in the logical metalanguage in which the truth conditions are represented, and no independent constituent denoting a measure function is introduced in the syntactic structure of the sentence. This measure function  $\mu$  then applies to the output of a function  $h$  that maps an event  $e$  to a group of individuals that participate in  $e$  (say, as the agents of  $e$ ). This can be seen in the formalization of the truth conditions (32) in (33) (I underlined the presupposition):

$$(33) \quad \begin{array}{l} \exists e_1 \exists x [\text{boy}(x) \wedge \text{dance}(e_1) \wedge \text{agent}(e_1) = x \wedge \mu(h(e_1)) = 3] \wedge \\ \exists e_2, e_3, P_2, P_3, d_2, y, z [P_2(y)(e_2) \wedge \text{boy}(y) \wedge \mu(h(e_2)) = d_2 \wedge \tau(e_2) \leq \tau(e_1) \wedge \\ \underline{\exists e_3, P_3, z [P_3(x)(e_1) \wedge P_3(y)(e_2) \wedge * P_3(z)(e_3) \wedge e_3 = e_1 \oplus e_2 \wedge \text{boy}(z) \wedge z = x \oplus y \wedge} \\ \underline{\mu(h(e_3))) = 3 + d_2 \wedge e_3 >_{\text{developed}} e_2}]] \end{array}$$

A conceptual disadvantage of measuring individuals indirectly by first mapping eventualities to individuals and then measuring the output of the mapping, is that the relation between the syntactic position of *more<sub>add</sub>* (either generated inside a DP or inside an adverbial projection) and the type of measure of the event that *more<sub>add</sub>* relates to has to be stipulated. Indeed, nothing prevents us *a priori* from interpreting  $h$  in (33) as a mapping from events to their temporal trace, and  $\mu$  as a function measuring durations in hours. In this case, the discourse in (34) would be interpreted as meaning that some students danced for 2 hours in the morning and some students danced for 3 hours in the afternoon, the two events being summed to form a larger eventuality of dancing for 5 hours. Since this interpretation of (34) is not available, we have to stipulate that the morphism  $h$  introduced by nominal *more<sub>add</sub>* can only be a mapping from events to individuals, and that the measure function  $\mu$  introduced by nominal *more<sub>add</sub>* can only be the cardinality function. Our analysis is more restrictive in that the fact that nominal *more<sub>add</sub>* can only relate events to cardinalities of individuals follows from independent syntactic assumptions, namely that the DegP headed by *more<sub>add</sub>* is generated in the position of the degree argument of MANY inside a DP. There is no semantic specificity to nominal *more<sub>add</sub>* as opposed to verbal *more<sub>add</sub>*. Any difference between the two follows from their structural position in a syntactic structure.

- (34) Two students danced in the morning. Three *more<sub>add</sub>* students danced in the afternoon.

We conclude this discussion of nominal *more<sub>add</sub>* by giving its denotation in Greenberg's analysis, using Greenberg's notation:

$$(35) \quad \llbracket more_{add} \rrbracket = \lambda d. \lambda Q. \lambda P. \lambda e_1. \exists x [Q(x) \wedge P_1(x)(e_1) \wedge \mu(h(e_1)) = d]$$

Presupposition:

$$\exists e_2, e_3, P_2, P_3, d_2, y, z [P_2(y)(e_2) \wedge Q(y) \wedge \mu(h(e_2)) = d_2 \wedge \tau(e_2) \leq t \wedge P_3(x)(e_1) \wedge P_3(y)(e_2) \wedge *P_3(z)(e_3) \wedge e_3 = e_1 \oplus e_2 \wedge Q(z) \wedge z = x \oplus y \wedge \mu(h(e_3)) = d_1 + d_2 \wedge e_3 >_{developed} e_2]$$

Verbal *more<sub>add</sub>* is given a similar analysis. Consider the truth conditions of (31) (presupposition underlined):

$$(36) \quad \exists e_1 [\text{ran}(e_1) \wedge \text{cardinality}(e_1) = 2 \text{ events} \wedge \text{agent}(e) = \text{John} \wedge \underbrace{\exists e_2, P_2, d_2 [P_2(e_2) \wedge \text{cardinality}(e_2) = d_2 \wedge \tau(e_2) \leq \tau(e_1) \wedge \exists e_3, P_3 [*P_3(e_3) \wedge e_3 = e_1 \oplus e_2 \wedge e_3 >_{developed} e_2 \wedge \text{cardinality}(e_3) = 2 \text{ events} + d_2]]}]$$

According to (36), (31) asserts that there is an event  $e_1$  that is the sum of two atomic events of running by John, and presupposes both that there is another event  $e_2$  preceding  $e_1$  such that  $e_2$  is the sum of  $d_2$  atomic events, and that there is an event  $e_3$  that is the sum of  $e_1$  and  $e_2$  and that is the sum of  $d_2 + 2$  atomic events. Greenberg (2010) argues that verbal *more<sub>add</sub>* has the following denotation:

$$(37) \quad \lambda d_1. \lambda P_1. \lambda e_1. [P_1(e_1) \wedge \mu(e_1) = d_1 \wedge \exists e_2, P_2, d_2 [P_2(e_2) \wedge \mu(e_2) = d_2 \wedge \tau(e_2) \leq \tau(e_1) \wedge \underbrace{\exists e_3, P_3 [*P_3(e_3) \wedge e_3 = e_1 \oplus e_2 \wedge e_3 >_{developed} e_2 \wedge \mu(e_3) = d_1 + d_2]]}]$$

Rather than discuss verbal *more<sub>add</sub>* in details as we did for nominal *more<sub>add</sub>*, I would like to point to a central part of Greenberg's analysis. In the formula above, we can see the clause  $e_3 >_{developed} e_2$ . This clause is read ' $e_3$  is more developed than  $e_2$ '. Greenberg's intuition is that the two events that *more<sub>add</sub>* sums to form  $e_3$  cannot be just any kind of events. They have to be related in a such a way that by summing  $e_1$  and  $e_2$ , one forms an event that is a development of  $e_2$ , in some sense to be made precise. Greenberg's intuition is meant first to explain the unacceptability of sentences such as (38) and (39):

(38) Mary ran for a while, # then she slept some more.

(39) I found 4 coins on the ground. # Then I lost two more.

According to Greenberg (38) and (39) are unfelicitous because adding an event of losing two coins to an event of finding four coins does not constitute a development of the latter event. I share Greenberg's intuition, but I would like to understand it as a general pragmatic constraint on question answer congruence. If *more<sub>add</sub>* is an additive particle, then sentences such as (38) and (39) are meant to be answers to questions such as 'How much did Mary ...' or 'How many coins did you ...'; not only this, but the two measures expressed in each conjunct are supposed to be added to one another so that (38) and (39) entail propositions of the form 'Mary ... for  $x$  hours in total' or 'I ...  $x$  coins in total'. I would like to suggest that the infelicity of sentences (38) and (39) boils down to the unavailability of plausible questions that (38) and (39) could answer, i.e. questions that are congruent with propositions of the form 'Mary ... for  $x$  hours in

total' or 'I ...  $x$  coin in total', where  $x$  is understood respectively as the sum of the duration of an event of sleeping and the duration of an event of running, or as the sum of the cardinality of a group coins that were found and the cardinality of a group of coins that were lost. While it is surely interesting to make notions of question answer congruence clear enough to capture the unacceptability of (38) and (39), it seems to me a mistake to encode a notion such as 'more developed' in the form of a primitive relation between events, built in the denotation of  $more_{add}$ . If anything, one would like to derive the requirement of 'development' from the interaction between the semantics of sentences with  $more_{add}$  and general principles of question answer congruence or discourse structure.

## 4 Some welcome consequences of this analysis

Consider the denotation of  $more_{inc}$  again:

$$(40) \quad \llbracket more_{inc} \rrbracket^{g,c} = \lambda d. \lambda e'. \lambda D_{\langle d, \langle v, t \rangle \rangle}. \lambda e. \\ \frac{\exists d' \exists D' \in alt(D)[D'(d')(e')]}{\text{where } \delta = \iota d' [\exists D' \in alt(D)[D'(d')(e')]]} \wedge D(d)(e) \wedge \exists D'' \in alt(D)[D''(d + \delta)(e \oplus e')]$$

The assertive component of  $more_{inc}$  contains two clauses. The first one ( $D(d)(e)$ ) asserts that the relational argument of  $more_{inc}$  is satisfied by a pair of eventuality and degree  $(d, e)$ . The second one asserts that some relation  $D'' \in alt(D)$  is satisfied by the sum of the pair  $(d, e)$  with a contextually salient pair of degree and eventuality  $(d', e')$ . Let us call the first clause the subjacent, and let us call the second clause the incremental clause. In this section, we present some consequences of our analysis of the incremental clause, and give arguments for its assertoric rather than presuppositional status.

As we argued in section 2, the incrementality of  $more_{inc}$  can be easily demonstrated with nominal  $more_{inc}$ . Consider (41):

- (41) Two customers bought a laptop yesterday, and one more bought a desktop today.

(41) is infelicitous in a context in which the customer who bought a desktop is one of the two customers who bought a laptop. In order for (41) to be felicitous, there must be three customers buying a computer. The following example shows that adverbial  $more_{inc}$  is also incremental:

- (42) It rained for two hours in Cambridge. (# In the same time span), it rained for two more hours in Somerville.

Sentence (42) is infelicitous with the adverbial *in the same time span*. This is expected if we require the two hours of raining in Cambridge to be added to the two hours of raining in Somerville to form the duration of a larger event of raining: if two raining events overlap in time, the duration of their sum cannot be equal to the sum of their durations. These facts are predicted by our analysis of  $more_{inc}$ . (41) is predicted to be

false in a context in which only two customers bought computers. As for (42), the use of the adverbial *at the same time* makes the sentence contradictory: the adverbial entails that the event of raining in Somerville was simultaneous to a salient event, while the semantics of *more<sub>inc</sub>* requires that this salient event must not temporally overlap with the asserted event. We might then argue that (42) is infelicitous because it is necessarily false.

Since the incremental clause is part of the assertoric components of *more<sub>inc</sub>*, it can be negated. This allows us to account for the behavior of *more<sub>inc</sub>* under negation. Nominal *more<sub>inc</sub>* can be negated as *no more*, c.f. (43). Both adverbial and nominal *more<sub>inc</sub>* can take the form *any more* when they are realized in the scope of negation, c.f. (44) and (45):

(43) No more students arrived.

(44) I didn't see any more students.

(45) It didn't rain any more.

(43) presupposes that some students arrived at a previous occasion, and asserts that no students arrived afterward. (44) presupposes that the speaker had previously seen some students, and asserts that she didn't see any students afterward. (45) presupposes that it was raining at a previous occasion, and asserts that it is not raining at the time of utterance. Note that in the three cases, the negated incremental clause can be directly denied and does not project from the antecedent of conditionals, showing that it is not a presupposition:

(46) A: No more students arrived.

B: It's false, Bill just arrived.

(47) If no more students had arrived, the class room should have been half empty.  
But it is full.

(48) A: I did not see any more students.

B: It's false, you're talking to one right now.

(49) If I had not seen any more students, I would have left. But I saw Jane and Michael in the hall.

(50) A: It is not raining any more.

B: It's false, it's pouring right now.

(51) If it were not raining any more, I would go to the grocery store. But it is still pouring.

The possibility to negate the incremental clause is expected in our analysis. The truth conditions we predict for (43), (44) and (45) respectively are as follows, were the subject and the incremental clause are conjoined and the conjunction is in the scope of a negation:

(52)  $\exists d' \exists D' \in alt(D)[D'(d')(\mathbf{e}_p)] \wedge \neg \exists d \exists e \exists X [\text{students}(X) \wedge |X| = d \wedge \text{arrived}(e)(X) \wedge$

- $$\begin{aligned} & \exists D'' \in alt(D)[D''(e \oplus e_p)(X \oplus \delta)] \\ & \text{where } \delta = \iota d'[\exists D' \in alt(D)[D'(d')(e_p)]] \\ & \text{and } D = \lambda d.\lambda e.\exists X[\text{students}(X) \wedge |X| = d \wedge \text{arrived}(e)(X)] \\ (53) \quad & \frac{\exists d'\exists D' \in alt(D)[D'(d')(e_p)] \wedge \neg \exists d\exists e\exists X[\text{students}(X) \wedge |X| = d \wedge \text{see}(e)(X) \wedge \text{agent}(e) = \text{sp}_c] \wedge \exists D'' \in alt(D)[D''(e \oplus e_p)(d \oplus \delta)]}{\text{where } \delta = \iota d'[\exists D' \in alt(D)[D'(d')(e_p)]] \\ & \text{and } D = \lambda d.\lambda e.\exists X[\text{students}(X) \wedge |X| = d \wedge \text{see}(e)(X) \wedge \text{agent}(e) = \text{sp}_c]} \\ (54) \quad & \frac{\exists d'\exists D' \in alt(D)[D'(d')(e_p)] \wedge \neg \exists d\exists e[\text{rain}(e) \wedge \tau(e) = d \wedge \exists D'' \in alt(D)[D''(d + \delta)(e \oplus e_p)]]}{\text{where } \delta = \iota d'[\exists D' \in alt(D)[D'(d')(e_p)]] \\ & \text{and } D = \lambda d.\lambda e.\text{rain}(e) \wedge \tau(e) = d} \end{aligned}$$

Note that if the incremental clause were part of the presupposition triggered by *more<sub>inc</sub>*, we would predict its projection under negation. It is not clear what the truth condition of (43)-(45) would then be. Furthermore, classical tests show that the incremental clause does not project, contrary to what we would expect if it were a presupposition:

- (55) We only had two beers. They were on the kitchen table and Chuck drank them both. If there were two more beers in the fridge, Chuck would drink them both.

The incremental clause in (55) is plausibly understood as the proposition that there have been four beers in our possession, two on the kitchen table and two in the fridge. If this proposition projected out of the antecedent of the conditional, we would expect (55) to be contradictory. The absence of contradiction shows that the incremental clause does not project, and hence is probably not a presupposition, *pace* Greenberg (2009, 2010).

## 5 Background assumptions on event semantics and measurement

The last two sections of the paper will be concerned with the analysis of the incompatibility of *more<sub>inc</sub>* with stative predicates and *in  $\alpha$  time* measure phrases. These sections will rely heavily on assumptions about event semantics and measurement in natural language that we introduce in this section.

### 5.1 Plurality and events

Sentences with multiple plural DPs are often ambiguous. (56) for instance, (from Kratzer, 2007) has at least three readings: cumulative, collective and subject distributive:

- (56) Two children lifted two boxes.

In its cumulative reading, (56) asserts that at least two boxes were lifted by at least two children, without imposing any requirement on who lifted which box beyond the fact that each child must have lifted at least one box. In its collective reading, (56) asserts

that two children were the collective agent of at least one event of lifting two boxes. This can be so for instance if the two boxes were stacked on top of one another, and the two children lifted the stack together. Lastly, under its subject distributive reading, (56) asserts that two children each lifted two boxes, meaning that up to four boxes might have been lifted in total. Kratzer suggests that these three readings should not be distinguished in logical form, i.e. that the same semantic representation should be used to generate each reading. Facts from VP ellipsis are invoked to support this claim. These tests come with an assumption that the elided VP in VP ellipsis must be structurally identical to its antecedent. Hence, if the two VPs can differ in their collective vs. cumulative vs. subject distributive readings, the source of such ambiguity is presumably not structural:

- (57) The two boys lifted the two boxes, and the two girls did to.  
 (58) The two chefs cooked a stew, and the two students did, too. The chefs were very experienced, so they each prepared a Moroccan tagine. The two students worked together on a Boeuf Bourguignon.

Kratzer argues that (57) is true in a situation in which the two boys jointly lifted each of the two boxes, but the two girls each lifted a different one of the two boxes on her own, showing that the same VP structure can generate cumulative and collective readings. Likewise, (58) show that the same VP structure can generate collective and subject distributive readings.

The source of these plural ambiguities, Kratzer argues, should then be traced to differences in the possible extensions of the VPs. In order to understand Kratzer's analysis of the plural ambiguities, we must therefore understand her analysis of the denotation of verbs and verb phrases. Two elements are crucial in this analysis. Firstly, Kratzer argues that the internal arguments of verbs are always introduced by the verbs themselves. By this, we mean that transitive and unaccusative verb heads denote relations between eventualities and individuals, where the individual position is reserved for the individual argument of the verb, as illustrated in the following examples:

- (59)  $\llbracket \text{lift} \rrbracket = \lambda e. \lambda x. \text{lift}(e)(x)$   
 (60)  $\llbracket \text{lift a box} \rrbracket = \lambda e. \exists x [\text{lift}(e)(x) \wedge \text{box}(x)]$

Secondly, Kratzer argues that verbs are inherently cumulative. That is, their extensions are closed under mereological sum-formation. Under different assumptions, the extension of the verb *lift* could be as in (61): it is a set of pairs of atomic events of lifting and things being lifted. According to Kratzer however, the extension of *lift* is never such a set but rather its closure under mereological sum formation, (62):

- (61)  $\{\langle e_1, t_1 \rangle, \langle e_2, t_2 \rangle, \langle e_3, t_3 \rangle\}$   
 (62)  $\{\langle e_1, t_1 \rangle, \langle e_2, t_2 \rangle, \langle e_3, t_3 \rangle, \langle e_1 \oplus e_2, t_1 \oplus t_2 \rangle, \langle e_1 \oplus e_3, t_1 \oplus t_3 \rangle, \langle e_2 \oplus e_3, t_2 \oplus t_3 \rangle, \langle e_1 \oplus e_2 \oplus e_3, t_1 \oplus t_2 \oplus t_3 \rangle\}$

Given these assumptions, the cumulative and the collective readings of a sentence such as (57) can be identified as the result of assigning different extensions to the VP

*lift two boxes*. Let us assume that there are two boxes in our universe of discourse,  $b_1$  and  $b_2$ . The extension of *lift two boxes* might be as follows:

$$(63) \quad \llbracket \text{lift two boxes} \rrbracket^g = \{\langle e_1, b_1 \rangle, \langle e_2, b_2 \rangle, \langle e_1 \oplus e_2, b_1 \oplus b_2 \rangle\}$$

$$(64) \quad \llbracket \text{lift two boxes} \rrbracket^g = \{\langle e_3, b_1 \oplus b_2 \rangle\}$$

$$(65) \quad \llbracket \text{lift two boxes} \rrbracket^g = \{\langle e_1, b_1 \rangle, \langle e_2, b_2 \rangle, \langle e_3, b_1 \oplus b_2 \rangle, \langle e_1 \oplus e_2, b_1 \oplus b_2 \rangle, \langle e_1 \oplus e_3, b_1 \oplus b_2 \rangle, \langle e_2 \oplus e_3, b_1 \oplus b_2 \rangle, \langle e_1 \oplus e_2 \oplus e_3, b_1 \oplus b_2 \rangle\}$$

If the extension of the VP happens to be as in (63), the only event of lifting two boxes that is available is a plural event consisting of the sum of two events of lifting a box. Asserting that two children are the agent of such an event can be understood in two ways. It might be the case that the children are agents both of  $e_1$  and  $e_2$ , in which case they are agent of  $e_1 \oplus e_2$  by virtue of the cumulativeness of the relation *agent*. We get a collective reading in which the two boxes were lifted one by one but collectively by the two children. It might also be the case that each child was the agent of one of these events, i.e. the first child was an agent of  $e_1$  and the second the agent of  $e_2$ , in which case the two children are still agents of  $e_1 \oplus e_2$  by virtue of the cumulativeness of the relation *agent*. In this case we get a cumulative reading, since no child lifted two boxes on its own but two boxes were lifted in total, and a total of two children lifted boxes. If the extension of the VP happens to be as in (64), the only possible reading is a collective one, according to which the two children lifted the two boxes collectively and at the same time. If the denotation of the VP is as in (65), all of these readings are possible. In all cases, the logical form of (56) is as follows<sup>2</sup>:

$$(66) \quad \exists e \exists x \exists y [\text{children}(x) \wedge \text{boxes}(y) \wedge |x| = 2 \wedge |y| = 2 \wedge \text{lifted}(e)(y) \wedge \text{agent}(e)(x)]$$

We still have to explain how the subject distributive reading of (56) can be generated. This reading is inconsistent with the LF in (66). Indeed, this LF imposes that the two children be agents of a single event of lifting two boxes, which is inconsistent with the subject distributive reading according to which the children could have lifted up to four boxes, i.e. two boxes each. In order to generate this reading, we need to pluralize the VP which is the sister constituent of the plural subject. Kratzer argues that plural DPs can pluralize their sister constituents, which accounts for the availability of subject distributive reading. We introduce a pluralization operator \*\*, in (67), from Beck (2001), although we apply it to relations of type  $\langle e, \langle v, t \rangle \rangle$ :

$$(67) \quad \begin{aligned} & \text{** is the function: } D_{\langle e, \langle e, t \rangle \rangle} \rightarrow D_{\langle e, \langle e, t \rangle \rangle} \text{ such that for any } R, x, t: \\ & \text{** } R(x)(y) = 1 \text{ iff } R(x)(y) = 1 \text{ or } \exists x_1, x_2, y_1, y_2 [x = x_1 \oplus x_2 \wedge y = y_1 \oplus y_2 \wedge \text{** } R(x_1)(y_1) \wedge \\ & \text{** } R(x_2)(y_2)] \end{aligned}$$

Now, compare the unpluralized VP in (68) and the pluralized VP in (69):

$$(68) \quad \lambda x. \lambda e. \exists y [\text{children}(x) \wedge \text{boxes}(y) \wedge |x| = 2 \wedge |y| = 2 \wedge \text{lifted}(e)(y) \wedge \text{agent}(e)(x)]$$

$$(69) \quad \text{**} (\lambda x. \lambda e. \exists y [\text{children}(x) \wedge \text{boxes}(y) \wedge |x| = 2 \wedge |y| = 2 \wedge \text{lifted}(e)(y) \wedge \text{agent}(e)(x)])$$

<sup>2</sup>It is assumed that the predicates *children*, *boxes* and *agent* are inherently cumulative, i.e. are closed under mereological sum formation.

(68) is a relation between events and individuals that holds of an individual  $i$  and an event  $e$  only if  $i$  is the agent of  $e$  and  $e$  is an event of lifting two boxes. Therefore, the subject distributive reading is impossible to generate. (69) on the other hand can hold of an individual  $i$  and an event  $e$  in case  $i$  is the sum of two individuals  $u$  and  $v$ , and  $e$  is the sum of two events  $e_1$  and  $e_2$ , such that  $u$  is the agent of  $e_1$ ,  $v$  is the agent of  $e_2$ , and  $e_1$  and  $e_2$  each are events of lifting two boxes. Since no constraints in (69) states that  $e_1$  and  $e_2$  should be events of lifting the same boxes, we get a reading in which two children have lifted two possibly different boxes each, which is the desired subject distributive reading. This closes our summary of Kratzer's treatment of plural ambiguities with event semantics.

## 5.2 Adjectives, degrees and states

Kratzer (2004) proposes to extend her analysis of plural ambiguities using events to the ambiguity of stative sentences such as (70). This part of Kratzer's analysis is going to be of primary importance to our analysis of *more<sub>inc</sub>*. Consider then (70) uttered in a context where I am pointing to a pile of 100 plates

(70) These 100 plates are light.

In its distributive reading, (70) is an assertion that each of the 100 plates are light. In its collective reading, it is an assertion that the pile of plate is light. Once again, Kratzer argues that this ambiguity is not rooted in the availability of two logical forms for (70), but that each reading correspond to a different extension of the predicate *light*. Kratzer assumes that gradable adjectives such as *light* are relations between states and individuals who find themselves in these states; *light* for instance is a relation between an individual and its state of lightness. Kratzer furthermore seems to assume that (what I will call) dimension states, e.g. states of lightness, are values on a scale and therefore can play the role of degrees in our ontology. That is, Kratzer presumably assumes that the denotation of *light* is:

(71)  $\llbracket \text{light} \rrbracket = \lambda s. \lambda x. \text{light}(s)(x)$

I will not adopt the latter part of Kratzer's proposal, and I will instead assume that gradable adjectives are relations between states, individuals and degrees, where the degree argument is identified as the result of measuring the state  $s$  with an appropriate measure function  $\mu$ , c.f. (72). The reason for this minor modification to Kratzer's proposal is that it seems to make the analysis of measure phrases with adjective somehow easier, c.f. (73) and (74):

(72)  $\llbracket \text{light} \rrbracket = \lambda d. \lambda x. \lambda s. \text{light}(s)(x) \wedge \mu(s) \leq d$

(73)  $\llbracket \text{long} \rrbracket = \lambda d. \lambda x. \lambda s. \text{long}(s)(x) \wedge \mu(s) \geq d$

(74)  $\llbracket 2 \text{ meters long} \rrbracket = \lambda x. \lambda s. \text{long}(s)(x) \wedge \mu(s) \geq 2 \text{ meters}$

Before we can understand Kratzer's explanation of the ambiguity of (70), we need to introduce additional concepts in the discussion. As we saw earlier, Kratzer accounts for the contrast between collective and cumulative readings of VPs by reducing these readings to different kinds of relations between eventualities and individuals. An event

of two boys collectively lifting two boxes is an event that has two boys as its agent and two boxes as its internal argument, and that has no subevent that has only one of the boys as an agent. On the other hand, an event of two boys cumulatively lifting two boxes is an event that has two boys as its agent and two boxes as its internal argument, and that has two subevents in which only one of the boys is lifting a single box. What distinguishes one reading from the other is not what kind of individuals are its agent, but how an event relates to a pair of a plural individual (two boys) and a plural object (two boxes). Kratzer suggests to extend this relational theory of collectivity and cumulativity to the analysis of collective nouns, such as *choir*. What distinguishes a choir of boy, as a collective entity, from the plurality of boys that compose it is that in the first case the boys are the possessor of (i.e. find themselves in) a state of being in a choir. The denotation of the noun ‘choir’ is therefore as in (75), and its extension might be as in (76), where  $s_1$  is a choir of three boys,  $s_2$  is a choir of three girls, and  $s_1 \oplus s_2$  is a plural individual consisting of the two choirs. On the other hand, the non collective noun *boy* might have the denotation in (77) and the extension in (78). Note that  $s_3 \oplus s_4 \oplus s_5$  is not a collective group of boys, but just a scattered plurality, since the plural possessor of  $s_3 \oplus s_4 \oplus s_5$ <sup>3</sup> is not also the possessor of each state that is a part of  $s_3 \oplus s_4 \oplus s_5$ . We can then give the following definition of a group or cohesive collection of individuals<sup>4</sup>: a plural individual forms a group with respect to a state  $s$  if and only if it is the single possessor of  $s$ . (79) defines single possessor of states<sup>5</sup>.

$$(75) \quad \llbracket \text{choir} \rrbracket = \lambda x. \lambda s. \text{choir}(s)(x)$$

$$(76) \quad \{ \langle s_1, b_1 \oplus b_2, \oplus b_3 \rangle, \langle s_2, g_1 \oplus g_2, \oplus g_3 \rangle, \langle s_1 \oplus s_2, b_1 \oplus b_2, \oplus b_3 \oplus g_1 \oplus g_2, \oplus g_3 \rangle \}$$

$$(77) \quad \llbracket \text{boy} \rrbracket = \lambda x. \lambda s. \text{boy}(s)(x)$$

$$(78) \quad \{ \langle s_3, b_1 \rangle, \langle s_4, b_2 \rangle, \langle s_5, b_3 \rangle, \langle s_3 \oplus s_4, b_1 \oplus b_2 \rangle, \langle s_3 \oplus s_5, b_1 \oplus b_3 \rangle, \langle s_5 \oplus s_6, b_2 \oplus b_3 \rangle, \langle s_3 \oplus s_4 \oplus s_5, b_1 \oplus b_2 \oplus b_3 \rangle \}$$

$$(79) \quad \textit{Single possessor constraint}$$

If  $s$  is a state, and  $x$  is the possessor of  $s$ , then  $x$  is the possessor of any substate of  $s$ .

How does this apply to the stative predication in (70)? Kratzer’s logical form for (70) is given in (80)<sup>6</sup>. Taking our modifications into account, (80) translates as (81), which asserts that the 100 plates are in the state of lightness  $s$  and that this state has a weight less than a contextual standard **pos**:

$$(80) \quad \text{light}(\text{the 100 plates})(s)$$

$$(81) \quad \text{light}(\text{the 100 plates})(s) \wedge \mu(s) \leq \mathbf{pos}$$

Kratzer’s analysis applies in both cases. The variable  $s$  is left free in (80) and (81). It might then take different values depending of what assignment function is used. In

<sup>3</sup>I.e.  $b_1 \oplus b_2 \oplus b_3$

<sup>4</sup>Neither this definition nor the examples in (75) to (78) are quoted from Kratzer (2004), although they follow Kratzer’s presentation of these notions in this book.

<sup>5</sup>Extrapolating on Kratzer’s explicit definition of single agent, Kratzer (c.f. 2004, chapter 4)

<sup>6</sup>Kratzer actually use a symbol to indicate that the predicate *light* is pluralized, although this symbol is redundant in her theory and shown purely for extra explicitness.

one possible assignment, the 100 plates are the single possessors of  $s$ , according to the definition in (79). This assignment produces the collective reading of (70). An extension of *light* that makes this reading true is given in (82). Under another assignment, the 100 plates are the possessor of the state of lightness  $s_1 \oplus \dots \oplus s_{100}$ , but this state is the sum of 100 substates of lightness that each have one of the different plates as their possessor. This accounts for the distributive reading of (70). An extension of *light* that makes this reading true is given in (83).

$$(82) \quad \{\langle s, p_1 \oplus \dots \oplus p_{100} \rangle\}$$

$$(83) \quad \{\langle s_1, p_1 \rangle, \dots, \langle s_{100}, p_{100} \rangle, \dots, \langle s_1 \oplus \dots \oplus s_{100}, p_1 \oplus p_{100} \rangle\}$$

Note that in our revision of the denotation of the adjective *light*, the extension in (83) entails that the measure function introduced by the adjective is applied to the sum of 100 different states. What is measured then? Not the sum of the weight of each plate, since this would then generate a collective reading. We assume that the output of the measure function is the measure of the heaviest weight among the 100 states:

$$(84) \quad \text{light}(\text{the 100 plates})(s_1 \oplus \dots \oplus s_{100}) \wedge \mu(s_1 \oplus \dots \oplus s_{100}) \leq \mathbf{pos}$$

$$(85) \quad \mu(s_1 \oplus \dots \oplus s_{100}) = \max(\{\mu(s_1), \dots, \mu(s_{100})\})$$

Note that the measure function must output the maximal weight because *light*, being a negative adjective, is upward entailing: if an object  $x$  weighs less than a weight  $w_1$ , and another weight  $w_2$  is greater than  $w_1$ , then  $x$  weighs less than  $w_2$ . With a downward entailing positive gradable adjective such as *long*, the measure function introduced by the adjective would have to select the smallest value among the measures of each state. Take as an examples the sentence (86), whose distributive reading can be represented by the formula in (87):

$$(86) \quad \text{These 2 ropes are 2 meters long.}$$

$$(87) \quad \text{long}(\text{the 2 ropes})(s_1 \oplus s_2) \wedge \mu(s_1 \oplus s_2) \geq 2 \text{ meters}$$

$$(88) \quad \mu(s_1 \oplus s_2) = \min(\{\mu(s_1), \mu(s_2)\}) \text{ meters}$$

We have made two claims about measurement and gradable adjectives. The first one is that gradable adjectives introduce a measure function that takes the state argument of the adjective as input and outputs a degree, which is the measure of the state. The second one is that measure functions applied to plural states output the smallest or greatest value (depending on the monotonicity of the adjective) among the set of measures of each of its substate with a unique possessor. These claims will be used in our account of the incompatibility of *more<sub>inc</sub>* with stative predicates.

## 6 On the incompatibility of *more<sub>inc</sub>* with stative predicates

*More<sub>inc</sub>* is not attested in predicative position with some stative predicates, as can be seen in (89) and (90). Although (89) and (90) are grammatical, their only attested interpretation is comparative. They have no attested incremental interpretation. These



$$(97) \quad \frac{\exists d' \exists D' \in alt(D)[D'(d')(s_p)] \wedge \exists s[\text{length}(s)(\text{rope}_1) \wedge \mu(s) \geq 2 \text{ meters} \wedge \exists D'' \in alt(D)[D''(\delta + 2)(s_p \oplus s)]]}{\text{where } D = \lambda d. \lambda s. \text{length}(s)(\text{rope}_1) \wedge \mu(s) \geq d \text{ meters}} \\ \text{and } \delta = \iota d' \exists D' \in alt(D)[D'(d')(s_p)]$$

Presumably, the presupposition of (97) is that  $s_p$  is a state of some other rope (call it  $\text{rope}_2$ ) being  $\delta$  meters long, and therefore the incremental clause in (98) is a proposition that the sum state  $s \oplus s_p$  is a state of the two ropes being  $\delta + 2$  meters long. As it turns out, this proposition is necessarily false:

$$(98) \quad \text{length}(s \oplus s_p)(\text{rope}_1 \oplus \text{rope}_2) \wedge \mu(s \oplus s_p) \geq \delta + 2 \text{ meters}$$

Indeed, measure functions applied to non collective states (i.e. states that do not satisfy the single possessor constraint) always distribute over their collective members (those substates that satisfy the single possessor constraints). Hence,  $\mu(s \oplus s_p)$  in (98) always equals the smallest member of  $\{\mu(s), \mu(s_p)\}$  i.e. the smallest member of  $\{\delta, 2\}$ . Their incremental clause being necessarily false, (89) and (90) themselves are contradictory and thus judged unacceptable<sup>7</sup>.

(91) on the other hand is not predicted to be contradictory. The truth conditions of (91) are:

$$(99) \quad \frac{\exists d' \exists D' \in alt(D)[D'(d')(s_p)] \wedge \exists s \exists x[\text{rope}(x) \wedge \text{in the garage}(s)(x) \wedge \mu(x) \geq 2 \text{ meters} \wedge \exists D'' \in alt(D)[D''(\delta + 2)(s_p \oplus s)]]}{\text{where } D = \lambda d. \lambda s. \exists x[\text{rope}(x) \wedge \mu(x) \geq 2 \text{ meters} \wedge \text{in the garage}(s)(x)] \text{ and } \delta = \iota d' \exists D' \in alt(D)[D'(d')(s_p)]}$$

Let us assume that  $s_p$  is a salient state of some rope being in the garden. Then the presupposition of (91) is the proposition that there is some rope  $x$  such that  $s_p$  is a state of  $x$  being in the garden, and  $x$  is  $\delta$  meters long. The incremental clause of (91) is the proposition that there is some rope  $z$  such that  $s \oplus s_p$  is a state of  $z$  being in the garage and in the garden, and  $z$  is  $2 + \delta$  meters long. This is true if we take  $z$  to be the concatenation of the rope in the garage and the rope in the garden.

Summing up,  $\text{more}_{inc}$  is unacceptable when it is generated in the position of the degree argument of a stative predicate. In these cases, the VP argument of  $\text{more}_{inc}$  ends up denoting a relation between states of dimension and their measure, and the distributivity of the measure function built in the relational argument of  $\text{more}_{inc}$  is inconsistent with its additive semantics. This analysis, if it is right, brings support to the theory of plural ambiguities developed by Kratzer, on which it is built. We rely in particular on Kratzer's distinction between collective states and (non collective) plural states, a distinction that stems from the single possessor constraint.

Let us compare this analysis with Greenberg's. Greenberg (2010) considers two potential yet unattested incremental readings of the sentence (100)

<sup>7</sup>Their negation, being tautological, is no better

- (100) # John was ill some more.

In the first reading, we want *more<sub>add</sub>* to relate states of illness to degrees of illness. (100) would then assert that there is a state  $s_1$  of John being  $d_1$  ill, and presuppose that there are two states  $s_2$  and  $s_3$  such that  $s_2$  is a state of John being  $d_2$  ill, and  $s_3$  is the sum of  $s_1$  and  $s_2$ , a state of John being  $d_1 + d_2$  ill. Greenberg argues that this interpretation of (100) is met with presupposition failure, because the incremental clause can never be true: *sadness* is assumed to be a non additive measure function, hence if  $s_3$  is the sum of  $s_1$  and  $s_2$ , it cannot be the case that  $s_3$  is a state that somehow cumulates the sadness of John in  $s_1$  and  $s_2$ . Intuitively, from the facts that I was a little ill yesterday and equally ill today, it does not follow that I was more ill in the time span covering these two days than I was on each day. In the second reading, (100) is intended to be synonymous with ‘John was ill for some more time’. Greenberg asks why a temporal additive reading of *more<sub>add</sub>* can be obtained in stative sentences when *more<sub>add</sub>* occurs inside an overt durational measure phrase, while it is not available in (100) when *more<sub>add</sub>* seems to modify the adjective directly. Greenberg recognizes that sentences such as (100) are judged more acceptable by speakers when interpreted with a temporal use of *more<sub>add</sub>* in mind. Greenberg argues that states are homogeneous down to instant and temporally unbounded by default, and that these properties are responsible for the relative unavailability of temporal readings of *more<sub>add</sub>* in (100). The homogeneity of states is observed in inferences such as (101). As for the second property, what is meant by claiming that stative predicates are temporally unbounded by default is that the eventuality time of stative predication is usually taken to overlap or include their reference time.

- (101) John was ill throughout the interval  $I_1$ .  $I_2 \subseteq I_1$ . Hence John was ill throughout the interval  $I_2$ .

Greenberg claims that this default temporal unboundedness of stative predicates makes it impossible to satisfy the additive presupposition of *more<sub>add</sub>* (i.e. makes it impossible for the incremental clause to be true). Since Greenberg’s argument with respect to (101) fits in a few lines, we can quote it in its entirety:

- (102) Roughly, this sentence asserts that there is some ill state of John, whose length is some time  $d_1$ , which overlaps yesterday afternoon (the reference time of the sentence), and presupposes that there is another state whose length is some time  $d_2$ , such that the length of the run time of the state  $e_3$  – the sum of  $e_1$  and  $e_2$  – is the time  $d_1 + d_2$ . Crucially, since the asserted and presupposed states  $e_1$  and  $e_2$  temporally overlap their reference times, they can also temporally overlap each other, or be temporally adjacent. In such a case, due to the homogeneity of states, we end up with one continuous ill state of John, and not with a state which has two distinguishable substates. Consequently, the run time of  $e_1$  is now also the run time of  $e_2$ , and vice versa, so summing the run times of these two states is vacuous. This, in turn, leads to the failure of the additive component in the presupposition, requiring that the length of  $\pi(e_1 + e_2)$  is the sum of the length of  $\pi(e_1)$  and the length of  $\pi(e_2)$ .

We have no alternative explanation for the infelicity of (101) in a temporal reading, and have no objection to this analysis for now. It seems that this analysis is also compatible with the semantics that we devised for *more<sub>inc</sub>*.

Note that Greenberg does not offer an explanation for the unavailability of non temporal uses of *more<sub>add</sub>*/*more<sub>inc</sub>* with states expressing additive measure functions, such as *long*. It is a basic fact of measurement theory that if two rods *x* and *y* are non overlapping (they are distinct rods), the length of their concatenation equals the sum of their length, showing that *length* is an additive measure function. Therefore Greenberg's explanation of the infelicity of non temporal reading of *more<sub>add</sub>*/*more<sub>inc</sub>* with non additive adjectives as in (101) does not extend to stative predications with adjectives such as *long*.

## 7 On the incompatibility of *more<sub>inc</sub>* with distributive durational measure phrases

*More<sub>inc</sub>* is unattested inside *in α time* measure phrases with achievements and accomplishments:

(103) #Bob found his keys in 5 more minutes.

(104) #Bob made the dessert in 20 more minutes.

Similar sentences with *take α time to* instead of *in α time* as an adverbial modifier have an incremental reading. This contrast suggest that what blocks the incremental reading in (103) and (104) is the adverbial *in α time* itself:

(105) It took Bob five more minutes to find his keys.

In this section we argue that the unavailability of *more<sub>inc</sub>* in sentences such as (103) and (104) is due to the distributivity of *in α time* measure phrases. More precisely, we argue that the distributivity of this measure phrase makes the incremental clause of (103) and (104) trivially true, which in turns renders these sentences infelicitous. *More<sub>inc</sub>* is attested in sentences such as (105) because *take α time to* measure phrases lack distributivity.

First, let us establish the contrast in distributivity between these two kinds of measure phrases. Consider the following pair of sentences:

(106) Mary built three houses in a month. Rothstein (from 2004)

(107) It took Mary a month to build three houses.

(106) has a collective reading according to which Mary built a total of at least three houses in a period of one month. It also has a distributive reading according to which Mary built at least three houses, each one in a month. (107) however only has a collective reading.

How does this contrast relate to the availability of *more<sub>inc</sub>*? The truth conditions of (103) and (104) in a hypothetical incremental reading would be as follows:

$$(108) \quad \frac{\exists d' \exists D' \in alt(D)[D'(d')(e_p)] \wedge \exists e[find(e)(Bob's keys) \wedge agent(e) = Bob \wedge in\ d\ minutes(e) \wedge \exists D'' \in alt(D)[D''(\delta + 5)(e_p \oplus e)]]}{\text{where } D = \lambda d. \lambda e. find(e)(Bob's keys) \wedge agent(e) = Bob \wedge in\ d\ minutes(e) \text{ and } \delta = \iota d' \exists D' \in alt(D)[D'(d')(e_p)]}$$

$$(109) \quad \frac{\exists d' \exists D' \in alt(D)[D'(d')(e_p)] \wedge \exists e[make(e)(dessert) \wedge agent(e) = Bob \wedge in\ 20\ minutes(e) \wedge \exists D'' \in alt(D)[D''(\delta + 20)(e_p \oplus e)]]}{\text{where } D = \lambda d. \lambda e. make(e)(dessert) \wedge agent(e) = Bob \wedge in\ d\ minutes(e) \text{ and } \delta = \iota d' \exists D' \in alt(D)[D'(d')(e_p)]}$$

We can assume that the alternatives to  $D$  in (108) and (109) all have the following form:

$$(110) \quad \lambda d. \lambda e. P(e) \wedge in\ d\ minutes(e) \quad \text{where } P \text{ is a property of events}$$

In particular, since the relation  $D''$  in the incremental clause  $\exists D'' \in alt(D)[D''(\delta + d)(e_p \oplus e)]$  has this form, the adverbial *in d time* is applied to the plural event  $e \oplus e_p$  in the incremental clause. We claim that (103) and (104) are judged to be unacceptable as a consequence.

The adverbial *in d time* is analyzed adapting a proposal by Rothstein (2004). (111) is the denotation of *in* in its temporal adverbial use (that we refer to as *in<sub>temp</sub>*) and (112) is the denotation of *in<sub>temp</sub>*:

$$(111) \quad \llbracket in_{temp} \rrbracket = \lambda d. \lambda P. \lambda e. P(e) \wedge \forall e' [(e' \in ATOM(P) \wedge e' \leq e) \rightarrow \tau(e') \leq d]$$

$$(112) \quad \llbracket in_{temp} \rrbracket (\llbracket one\ hour \rrbracket) = \lambda P. \lambda e. P(e) \wedge \forall e' [(e' \in ATOM(P) \wedge e' \leq e) \rightarrow \tau(e') \leq one-hour]$$

$$(113) \quad \begin{aligned} ATOM(P) \equiv \\ & \text{If } P \text{ is atomic then } ATOM(P) = P \\ & \text{If } P \text{ is a pluralization of an atomic set then } ATOM(P) = \{x : x \in P \wedge |x|_{\langle t, M \rangle} = 1\} \\ & \text{otherwise, } ATOM(P) \text{ is undefined} \end{aligned}$$

ATOM is a function from sets of individuals containing atoms to their maximal subset containing only atoms. In (111), *in<sub>temp</sub>* applies to (pluralized) atomic predicates of events, and selects the subsets whose atoms have a maximal duration time of less than  $d$ .<sup>8</sup> *In d time* applies to atomic predicates or plural atomic predicates, and selects the subsets whose atoms have a maximal duration time of less than  $d$  time. The semantics of any alternative to the  $\langle d, \langle v, t \rangle \rangle$  argument of *more<sub>inc</sub>* in (103) and (104) can now be made more precise as:

$$(114) \quad \lambda d. \lambda e. Q(e) \wedge agent(e) = \alpha \wedge \forall e' [(e' \in ATOM(Q) \wedge e' \leq e) \rightarrow \tau(e') \leq d] \\ \text{where } Q \text{ is a property of events and } \alpha \text{ is an individual}$$

<sup>8</sup>  $| \cdot |_{\langle t, M \rangle}$  is a measure function that depends on two contextual parameters: a time  $t$  and a measure statement  $M$ .

Let us consider again the truth conditions of (103):

$$(115) \quad \frac{\exists d' \exists D' \in alt(D)[D'(d')(e_p)] \wedge \exists e[find(e)(Bob's keys) \wedge agent(e) = Bob \wedge in_{temp}(P)(five\ minutes)(e) \wedge \exists D'' \in alt(D)[D''(\delta + 5)(e_p \oplus e)]]}{where\ D = \lambda d. \lambda e. find(e)(Bob's keys) \wedge agent(e) = Bob \wedge in_{temp}(P)(five\ minutes)(e) \\ and\ P = \lambda e. find(e)(Bob's keys) \\ and\ \delta = \iota d' \exists D' \in alt(D)[D'(d')(e_p)]}$$

Given the possible forms of the alternatives to  $D$ , the incremental clause in (115) will be satisfied only if some property of events  $Q$  can be found that satisfies the following conditions:

$$(116) \quad Q(e \oplus e_p) \wedge agent(e) = \alpha \wedge \forall e' [(e' \in ATOM(Q) \wedge e' \leq e \oplus e_p) \rightarrow \tau(e') \leq (\delta + 5) minutes] \\ \text{c.f. (114)} \\ where\ \delta = \iota d' \exists D' \in alt(D)[D'(d')(e_p)] \\ and\ Q \in alt(\lambda e. find(e)(Bob's keys)) \\ and\ \alpha \in alt(Bob)$$

In the case of (116), this entails that the incremental clause is true iff all parts of  $e \oplus e_p$  that are atomic parts of  $P$  are events whose duration is less than  $\delta + 5$  minutes. However, we know that  $\tau(e_p) \leq \delta$  minutes and  $\tau(e) \leq 5$  minutes, and hence that  $\tau(e \oplus e_p) \leq \delta + 5$  minutes. Moreover, the duration of an event is necessarily greater than the duration of its parts. Therefore, for all atomic event  $e'$  in  $Q$  that are part of  $e \oplus e_p$ , it is necessarily true that  $\tau(e') \leq (\delta + 5)$  minutes. In other words, the incremental clause is trivially satisfied, and contributes no information.

We hypothesize that (103) and (104) are unacceptable because their incremental clause is uninformative. These sentences have the same assertoric content as their minimal pair without *more*:

(117) Bob found his keys in five minutes.

(118) Bob made the dessert in twenty minutes.

We might therefore expect that the two pairs of sentences enter in competition, and that the members of each pair that is the most economical wins the competition.

This part of our analysis agrees with Greenberg's intuitions in Greenberg (2010). Greenberg suggests that the incompatibility of *more<sub>inc</sub>* with achievements and accomplishments inside *in  $\alpha$  time* is due to the non additivity of the measure function, rather than to the aspectual type of the predicate:

(119) This data seems to indicate, then, that what is relevant for the felicity of verbal *more<sub>add</sub>* is not the (a)telicity of the predicate by itself, but rather the interaction of (a)telicity with the (non)additivity of the measure function. Telic predicates are incompatible with verbal *more<sub>add</sub>* if this particle denotes a temporal measure function (which cannot be additive in this case), and are compatible

with telic predicates with other measure functions, which can be additive.

Note however that Greenberg does not offer a precise analysis of *in  $\alpha$  time* as a non additive measure function. We have suggested that it is indeed the semantics of *in  $\alpha$  time* that is responsible for the unavailability of *more<sub>inc</sub>* in sentences such as (103) and (104). However, we claim that the property of the measure function that is incompatible with *more<sub>add</sub>* is its distributivity, rather than some form of anti-additivity.

## 8 Conclusion

I have presented an analysis of *more<sub>inc</sub>* as a pluractional additive operator. We have seen that the analysis of this expression is a fertile ground for the application of theories of plurality that make use of events, such as Kratzer (2004), thus bringing indirect support to these analyses. This analysis also lays the ground for future research on different aspects of the semantics of *more<sub>inc</sub>* and similar pluractional or additive constructions.

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Guillaume Thomas  
Massachusetts Institute of Technology  
[gthomas@mit.edu](mailto:gthomas@mit.edu)

# ‘Nearly free’ control as an underspecified *de se* report

Wataru Uegaki\*

## 1 Introduction

One of the long-standing questions in the syntax and semantics of English is how the CONTROLLER in control constructions is determined, and why it is determined in that manner. In literature, there are generally two lines of approaches to this issue: a syntactic approach based on Minimal Distance Principle (MDP; Rosebaum 1967), which states that the controller is the closest c-commanding NP with respect to PRO, and the lexicalist approach (e.g., Chierchia 1984, Dowty 1985) that seeks an account in terms of the specific lexical semantics of each control verb. However, although both of these theories basically assume a dichotomy between obligatory and nonobligatory control, there is actually a control pattern in which the restriction on the controller selection lies somewhere intermediate between obligatory and nonobligatory control: a control pattern which Jackendoff and Culicover (2003) call NEARLY FREE CONTROL, exemplified in (1).<sup>1</sup>

- (1) a. John<sub>i</sub> talked to Sarah<sub>j</sub> about PRO<sub>il/j/i+j/gen</sub> taking better care of himself<sub>i</sub>/herself<sub>j</sub>/themselves<sub>i+j</sub>/oneself<sub>gen</sub>.
- b. \*Amy<sub>k</sub> knows that John<sub>i</sub> talked to Bill<sub>j</sub> about PRO<sub>k</sub> taking care of herself<sub>k</sub>.
- c. \*Brandeis<sub>i</sub> is in a lot of trouble. John talked to Sarah about PRO<sub>i</sub> firing the football coach. (Jackendoff and Culicover 2003: (17))

In this type of control, any NP in the local<sup>2</sup> clause (indexed as *i* or *j*), their sum (*i + j*), as well as a generic individual (*gen*) can be the controller, while NPs long distance away from the complement (1b), or those in different sentences (1c) cannot. As will

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<sup>1</sup>Throughout this paper, I indicate the understood subject of a subjectless complement with the index attaching to PRO, following the standard notation in syntactic literature. However, I use PRO here just for expository purposes without making any theoretical commitments to its existence.

<sup>2</sup>In this paper, I use the terms LOCAL/LONG DISTANCE in control sentences in the following way. I refer to the co-arguments of the complement selected by a control verb as LOCAL NPs of the relevant complement or of PRO. On the other hand, NPs are LONG DISTANCE away from the complement or from PRO if they are outside the clause headed by the control verb.

be argued in Section 2.2, existing theories of control, whether MDP-based or lexical, cannot be easily extended so that it can account for this peculiar control pattern.

In this paper, I propose a novel view on controller selection that can account for nearly free control as well as other control patterns. In this view, controller selection is determined by two independent factors: one is the obligatoriness of *de se* interpretation (e.g., Lewis 1979, Chierchia 1989), and the other is the argument-oriented lexical semantics of each control verb. According to this proposal, control constructions are semantically classified into the following four types: those having (i) obligatory *de se* reading and argument-oriented lexical semantics, (ii) no obligatory *de se* reading and argument-oriented lexical semantics, (iii) obligatory *de se* reading and unspecified lexical semantics, and (iv) no obligatory *de se* reading and unspecified lexical semantics. In Section 3, I will argue that it is the interaction of these two semantic factors that determines the different control patterns. Specifically, it will be shown that the nearly free control pattern straightforwardly follows from the semantic features of the third type of control in this typology—those having obligatory *de se* reading but underspecified lexical semantics—while the first two types and the fourth type respectively induce the obligatory control and the nonobligatory control pattern.

The rest of the paper is structured in the following way. In Section 2, together with well known obligatory control (OC) and nonobligatory control (NOC), I introduce the phenomenon of nearly free control (NFC), and show why existing theories of control cannot account for NFC. Section 3 proposes a novel semantics of control, where NFC is analyzed as a *de se* attitude report which is underspecified as to the property ascription target. In Section 4, I formalize and provide an empirical basis for the proposal in Section 3 based on Farkas's (1992) analysis of obligatory control. Finally, Section 6 concludes.

## 2 Nearly free control

### 2.1 The data

It is widely known that control phenomena are divided into two general types, namely obligatory control (OC) and nonobligatory control (NOC). In OC, the NP which denotes the understood subject of the subjectless complement, namely the CONTROLLER, is *uniquely* determined as a particular argument of the control verb. Thus, in the case of (2), the understood subject of the complement *to take better care of X-self* can only be identified with the *subject* of the control verb *promise*, and no other choice of controller is possible, as seen from the unacceptable sentences in (2).

- (2) a. Sally<sub>i</sub> promised Ben<sub>j</sub> PRO<sub>i/\*j/\*i+j/\*gen</sub> to take better care of herself<sub>i/\*himself<sub>j</sub>/\*themselves<sub>i+j</sub>/\*oneself<sub>gen</sub></sub>.
- b. \*Amy<sub>k</sub> thinks that Ben<sub>i</sub> promised Fred<sub>j</sub> PRO<sub>k</sub> to take better care of herself<sub>k</sub>.  
(long distance control)
- c. \*Amy<sub>k</sub> is not in good shape now. Ben<sub>i</sub> promised Fred<sub>j</sub> PRO<sub>k</sub> to take better care of herself<sub>k</sub>.  
(discourse antecedent control)  
(Jackendoff and Culicover (2003): (19) modified)

In OC, the lexical property of the control verb uniquely determines which argument becomes the controller. For example, for a SUBJECT CONTROL verb like *promise*, the controller is the subject (as in (2)) while for an OBJECT CONTROL verb like *ask* or *persuade*, the controller is the object.<sup>3</sup>

NOC, on the other hand, is a type of control where there is arguably no grammatical restriction on the choice of a controller. As seen in (3), the understood subjects of the infinitives/gerunds can be any (pragmatically plausible) individual. Thus, in NOC, the controller can be either a discourse antecedent (as in (3a)) or an NP separated long-distance from the infinitive/gerunds (as in (3b)).

- (3) a. John's<sub>i</sub> strange behavior has been a concern to everybody. Apparently, [PRO<sub>i</sub> undressing himself<sub>i</sub> in public] has caused a serious scandal.  
(discourse antecedent control)
- b. John<sub>i</sub> is afraid that [[PRO<sub>i</sub> undressing himself<sub>i</sub> in public] has caused a serious scandal].  
(long distance control)  
(J&C: (12, 13) modified)

In the literature, these two types of control are often taken to exhaust the possible control patterns in English. However, in actuality, there is an intermediate case: Jackendoff and Culicover (2003, J&C) note the existence of a type of control, which they call NEARLY FREE CONTROL (NFC), where the restriction on the possible controller is stricter than NOC ('free control' in J&C's term), but freer than OC. J&C give (4-5) below as examples of sentences which exhibit the relevant control pattern. Example (4) is a case involving the three place predicate *talk to* and (5) is a case involving the two place predicate *think*.

- (4) a. John<sub>i</sub> talked to Sarah<sub>j</sub> about PRO<sub>i/j/i+j/gen</sub> taking better care of himself<sub>i</sub>/herself<sub>j</sub>/themselves<sub>i+j</sub>/oneself<sub>gen</sub>.  
b. \*Amy<sub>k</sub> knows that John<sub>i</sub> talked to Bill<sub>j</sub> about PRO<sub>k</sub> taking care of herself<sub>k</sub>.  
(long distance control)  
c. \*Brandeis<sub>i</sub> is in a lot of trouble. John talked to Sarah about PRO<sub>i</sub> firing the football coach.  
(discourse antecedent control)
- (5) a. John<sub>i</sub> thought about PRO<sub>i/gen</sub> taking better care of himself<sub>i</sub>/oneself<sub>gen</sub>.  
b. \*Amy<sub>k</sub> knows that John<sub>i</sub> is thinking about PRO<sub>k</sub> taking care of herself<sub>k</sub>.  
(long distance control)  
c. \*John always thinks about the future of his daughter<sub>i</sub>. Today, John thought about PRO<sub>i</sub> going to a college.  
(discourse antecedent control)

In (4a) and (5a), we see that the understood subject of the complement *taking care of X-self* can be (i) an individual denoted by any argument in the local clause, (ii) any group of individuals denoted by the arguments in the local clause (split controller), or (iii) a generic individual (generic controller). On the other hand, the unacceptable examples

<sup>3</sup>An apparent exception to this basic picture is the well known 'controller shift' examples (Hust and Brame 1976), as in (i). See Uegaki (2010) for how the proposal in this paper is extended to these cases.

- (i) a. John<sub>i</sub> was promised by Mary<sub>j</sub> PRO<sub>i</sub> to be allowed to perjure himself<sub>i</sub>.  
b. John<sub>i</sub> asked Mary<sub>j</sub> PRO<sub>i</sub> to be allowed to perjure himself<sub>i</sub>.

in (4b-d) and (5b-d) show that the controller cannot be (i) an NP in a nonlocal clause or (ii) an NP in the preceding discourse.<sup>4</sup>

As seen above, NFC exhibits a peculiar control pattern where the restriction on the controller choice lies somewhere between OC and NOC: unlike OC as in (2), where only a single argument in the local clause can be a controller, NFC allows *any* argument in the local clause to be a controller, as well as split and generic controllers. On the other hand, NFC allows neither nonlocal NPs nor the speaker or hearer to be a controller. This behavior contrasts with NOC, where there is arguably no restriction on the possible controller.

Another important characteristic of NFC is that the predicates whose complements show this type of control are restricted to those having a certain type of lexical semantics. According to J&C, the verbs whose complements exhibit NFC are generally ‘verbs of communication’ or ‘verbs of thought’ as in (6).

- (6) a. **three place predicates (‘verbs of communication’)**  
*talk to, speak to, mention, discuss, tell NP about V-ing, ask NP about V-ing, etc.*
- b. **two place predicates (‘verbs of thought’)**  
*think about, consider, ponder over, etc.*

Before leaving the presentation of the data, I have to note here that NFC cannot be characterized in purely syntactic terms. The subjectless complement in NFC does not have to be selected by *about*, since there exist NFC examples where the complement is directly selected by verbs like *mention* or *discuss*, as in the following example:

- (7)  $I_k$  believe John<sub>i</sub> mentioned PRO<sub>*ijl*\*<sub>k</sub></sub> defending himself<sub>i</sub>/herself<sub>j</sub>/ \*myself<sub>k</sub> to Mary<sub>j</sub>.

Moreover, involving a gerundive complement is not a sufficient condition of NFC since there are also OC sentences with gerundive complements, as in (8). This fact makes it impossible to distinguish between OC and NFC solely by the syntactic form of the complement.

- (8) Mary<sub>i</sub> thinks that John<sub>j</sub> {forgot / enjoyed / stopped} PRO<sub>*jl*\*<sub>i</sub>\*<sub>gen</sub></sub> reading the book.

## 2.2 The problem

In this section, I show that a simple treatment of NFC is impossible in existing theories of controller selection, either in the SYNTACTIC ANALYSIS which argues that the controller is determined according to a purely structural principle called the Minimal Distance Principle (MDP) (cf. e.g., Chomsky 1981, Larson 1991), or in the LEXICALIST ANALYSIS which argues that the controller selection is determined by the lexical semantic nature of the control verb (cf. e.g., Chierchia 1984, Dowty 1985, Sag and Pollard 1991).

<sup>4</sup>At least some speakers find long distance control ((4b) and (5b)) more acceptable than discourse antecedent control ((4c) and (5c)). However, in this paper, I exclude this relative acceptability difference from consideration, and leave its investigation to future works.

## 2.2.1 Problems with a syntactic analysis

Since Rosenbaum (1967), a syntactically-based analysis of the controller selection in the GB/Minimalist framework (e.g., Chomsky 1981, Larson 1991, Hornstein 1999) has employed the syntactic principle MDP in accounting for control patterns.<sup>5</sup> The MDP can be stated as follows:

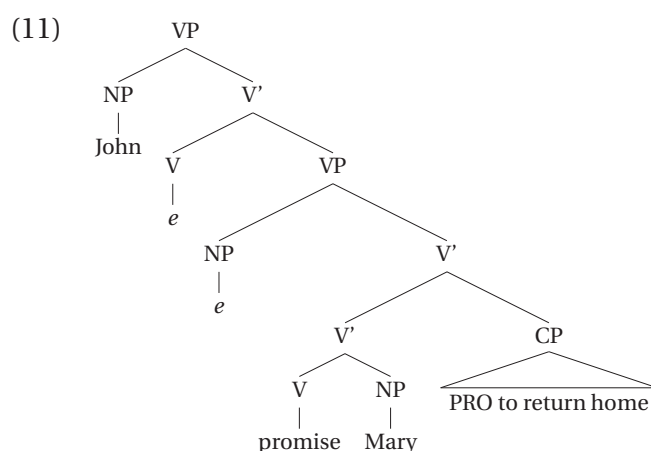
### (9) Minimal Distance Principle (MDP)

The structurally closest c-commanding NP with respect to PRO is the controller.

According to the MDP, the controller of three place control verbs should always be the object, since it is the NP closest to PRO. Therefore, it should be clear that NFC sentences are (at least apparent) counterexamples to the MDP, along with *promise*-type subject control. The most notable analysis of *promise*-type subject control in an MDP-based theory is that of Larson's (1991), in which it is argued that subject control actually obeys the MDP given the special kind of syntactic structure for the relevant sentences. Here I consider a possible analysis of NFC in terms of MDP along the lines of Larson (1991).

Larson (1991) argues that the verb *promise* is a double object verb, and that sentence (10) therefore has the underlying structure in (11), assuming Larson's (1988) analysis of double object constructions.

(10) John<sub>i</sub> promised Mary PRO<sub>i</sub> to return home.



According to Larson, the MDP should apply to underlying structures. In (11), the object NP *Mary* does not c-command PRO, so the closest NP c-commanding PRO is *John*. Therefore, it is correctly predicted that the subject, and not the object, is the controller in (10). On the other hand, verbs like *ask* are treated as non-double-object verbs, and hence predicted by the MDP to exhibit the object control pattern, as usual.

Under this view, one possibility of analyzing NFC is to argue that NFC sentences are structurally ambiguous between a double object structure like (11) and a non-double-object structure. In this analysis, the subject control pattern is predicted to arise in the double object structure, and the object control pattern in the non-double object structure.

However, an obvious empirical problem with this analysis is that it cannot account for the split and generic control cases of NFC, such as in the following examples.

<sup>5</sup>In the movement-based theory of control in Hornstein (1999), the MDP is reduced to the Minimal Link Condition, a more general principle governing movement.

- (12) John<sub>i</sub> talked to Mary<sub>j</sub> about PRO<sub>i+j/gen</sub> taking good care of themselves<sub>i+j</sub>/oneself<sub>gen</sub>.

Given that both subject and object control are derived as an obligatory consequence of the different underlying structures, it is unclear how ‘subject + object’ control, namely split control, and generic control are derived in structural terms in this analysis.

Another problem with an analysis of NFC along these lines is that it is not clear how NFC sentences are syntactically distinguished from other control sentences, nor why they are ambiguous between two structures. There is no independent motivation for assigning NFC predicates, such as *talk to ... about ...*, double-object/non-double-object ambiguous thematic structures.

### 2.2.2 Problems with a lexicalist analysis

An important fact that poses a significant challenge to a syntactic analyses is that NFC predicates are restricted to those having a certain lexical semantics. Thus, let us next consider possible analyses in the other tradition of the theory of control, namely lexicalist analyses, which take into account the lexical semantics of control verbs in analyzing control patterns. In lexicalist accounts of OC, it is argued that a control relation is specified in the lexical entry of, or in a meaning postulate associated with, the relevant control verb. For example, the lexical entry of *promise* is associated with a specification that its subject is identified with the understood subject of the complement. One way of implementing this specification is to posit a meaning postulate along the lines of (13).

- (13)  $\forall w \forall x \forall y \forall P \in D_{\langle s, et \rangle} [\textbf{promise}(x, y, P, w) \leftrightarrow \forall w' \in W^{\text{PROM}(\langle x, y, w \rangle)} [P(w')(x)]]$   
 $(W^{\text{PROM}(\langle x, y, w \rangle)})$  is the set of worlds compatible with what  $x$  promises  $y$  in  $w$ .

What (13) says is the following:  $x$  promises  $y$  to do  $P$  in  $w$  if and only if the subject  $x$  does  $P$  in all worlds where all  $x$ 's promises to  $y$  in  $w$  are fulfilled. Thus, (13) captures the fact that the matrix subject is the understood (embedded) subject in a sentence with *promise*.

A simple lexicalist account of NFC would stipulate that the NFC pattern itself is associated with the relevant verbs of communication and thought. However, this is obviously not an analysis, but a mere description of the fact. A stipulation that the control relation in question is associated with the relevant communication/thought verbs does not answer the question of *why* only the verbs in this particular semantic class show the peculiar control pattern and *why* this pattern must be as it is.

In fact, this kind of account of NFC lacks the conceptual advantage in the lexicalist account of OC, and is somewhat against the spirit of this approach. In the case of OC verbs like *try*, it is plausible to say that the understood subject of the complement must be the subject of the embedding verb since it is inherent in the situation of ‘trying’, and thus in the lexical semantics of *try*, that the trier can only try his/her own action but no one else's, as originally argued by Jackendoff (1972). On the other hand, in the situation of communication or thought as described by *talk to* or *think*, the communicator or thinker in fact *can* talk about or think about some other person's action or experience. Therefore, it is counterintuitive to say that, for example, the lexical semantics of *think* determines that the thinker must be the understood subject of the complement (or a generic individual). In other words, there seems to be no lexical semantic connection

between any argument of an NFC verb like *talk to* or *think* and the understood subject of its complement. This lack of conceptual appeal makes an attempt to assimilate NFC to OC in a naive lexicalist account still less plausible.

Given that there is no lexical semantic connection between the understood subject of a complement and the other arguments of NFC predicates, a lexicalist who relies on the lexical semantics of a control verb would have to argue that NFC predicates are *totally* unspecified for the controller selection. This is exactly the analysis of J&C, who first noticed this phenomenon. Although this idea is incorporated into my analysis to be presented in Section 3, this assumption alone would fail to distinguish NFC from NOC, and overgenerate allowable patterns. This is because, control by expressions other than local arguments is empirically impossible in NFC, as shown in (4b-4c, 5b-5c), contrary to the prediction of this analysis.

Summarizing Section 2.2, simple analyses of NFC in existing theories of OC are not promising. The only existing analysis of this particular control pattern, namely that by J&C, is not an exception: it wrongly predicts that NFC should pattern like NOC.

### 3 Analyzing nearly free control

In this section, I propose a novel analysis of NFC making use of the notion of *de se* attitude reports (Lewis 1979) and controller underspecification. The basic idea of the proposal is the following: What makes NFC more restricted than NOC is the obligatoriness of a *de se* attitude interpretation, while what makes NFC less restricted than OC is the fact that NFC predicates lack the controller specification inherent in the lexical semantics of OC predicates. Below, I start by briefly introducing the notion of *de se* attitudes and *de se* attitude reports.

#### 3.1 A semantics for *de se* attitude reports

##### 3.1.1 *De se* attitude reports

Since the notion of *de se* is hard to grasp using only theoretical terms, let me begin the illustration with an example: In the described situation in (14), sentence (14a) can be judged as true, but sentence (14b) is not (e.g., Morgan 1970, Chierchia 1989).

- (14) Situation: John is an amnesiac who does not remember what he has done yesterday. He reads a newspaper article about someone saving a baby yesterday and expects that the man who did so will be rewarded, without realizing that he himself is that man.
- a. John<sub>i</sub> expects that he<sub>i</sub> will be rewarded.
  - b. #John<sub>i</sub> expects PRO<sub>i</sub> to be rewarded.

What this contrast suggests is the following: in order for sentence (14b) to be true, it has to be the case that John expects *of himself* that he will be rewarded. In other words, the understood subject of the infinitival complement of *expect* must be identified as himself *by the expecter*. In contrast to this, there is no such restriction on the interpretation of (14a): for (14a) to be true, John does not have to recognize that the person whom John expects to be rewarded is he himself.

In other words, (14b) has to be interpreted as reporting John's attitude involving a first person perspective, as represented in the sentence in (15a), whereas (14a) does not have to be: (14a) can be interpreted as reporting either of the two attitudes in (15).

- (15) a. 'I will be rewarded.' (de se)  
 b. 'This guy will be rewarded.' (non-de-se)

Attitude *de se* (Lewis 1979) refers to the kind of attitude that involves the first person perspective, as represented by (15a).<sup>6</sup> What the example in (14) suggests is that a control sentence, such as (14b), must be interpreted as reporting an attitude *de se* of the subject, namely John in the case of (14b).

### 3.1.2 Analysis of attitudes *de se* based on Lewis (1979)

In the standard analysis of attitudes *de se*, as originally proposed by Lewis (1979), the content of an attitude is not a proposition but a property, and the holder of the attitude *de se* self-ascribes the relevant property. Here, the notion of SELF (embedded in the notion of self-ascription) is introduced as a primitive component in the analysis of attitudes, around which people's attitudes are 'centered'. For example, in (15a), the content of the attitude is the property of being rewarded as shown in (16), and the attitude holder self-ascribes this property.<sup>7</sup>

- (16)  $\lambda w \lambda x. \mathbf{rewarded}(w)(x)$

Thus, in this case, the one who is to be rewarded, as believed by the attitude holder, cannot fail to be the attitude holder himself.

On the other hand, in the non-*de-se* attitude in (15b), the content of the attitude is not the property in (16). In such a non-*de-se* attitude content, the 'subject' argument of **rewarded** is saturated explicitly with the individual John. In Lewis's (1979) view of attitudes where all attitude contents are properties, the relevant non-*de-se* attitude content here is the property in (17) ('the property of inhabiting a world where John is rewarded').

- (17)  $\lambda w \lambda x. \mathbf{inhabit}(w)(x) \wedge \mathbf{rewarded}(w)(j)$

The important point here is that the self of the attitude holder has no direct connection with the 'subject' argument of **rewarded** in (17), i.e. the one who is to be rewarded. This is so, because the subject of **rewarded** is explicitly specified independently as John. Thus, in this analysis of a non-*de-se* attitude, it is correctly captured that the attitude holder need not expect that the one who is to be rewarded is he/she him/herself.

The crucial reason why propositions will not do as the contents of attitudes *de se* is that propositions fail to distinguish between *de se* and non-*de-se* attitudes. For instance, if contents of attitudes were propositions, the contents of both attitudes represented in (15) would end up as the single proposition, as in (18).

<sup>6</sup>This notion of attitude *de se* will be generalized to that incorporating second-person oriented attitudes, as will be discussed shortly.

<sup>7</sup>I ignore tense throughout this paper.

(18)  $\lambda w.\text{rewarded}(w)(j)$

Note, on the other hand, that the difference between *de se* and non-*de-se* attitudes is rightly captured in the analysis presented above. The contents of attitudes are different between the two kinds of attitudes, as in (16) vs. (17).

### 3.1.3 Chierchia (1989): control and *de se* reports

The notion of *de se* attitude reports has been introduced to the semantic analysis of control at least since Chierchia (1989). Chierchia's first assumption is that infinitives/gerunds denote properties, as shown below.

(19)  $[[\text{PRO to be rewarded/being rewarded}]] = \lambda w \lambda x.\text{rewarded}(w)(x)$

In order to ensure that infinitives/gerunds denote properties as in (19), PRO in the syntax must either be viewed as syntactically nonexistent,<sup>8</sup> interpreted as an identity function i.e.  $\lambda P.P$ , or it must be viewed as a special variable always lambda-abstracted in the semantics, as Chierchia (1989) argues.

Assuming that infinitive/gerundive complements denote properties, Chierchia analyzes the non-*de-se* interpretation of (14a) and the *de se* interpretation of (14b), both repeated below, as having the logical translations in (20a) and (20b), respectively.

- (14) a. John<sub>i</sub> expects that he<sub>i</sub> will be rewarded.  
       b. John<sub>i</sub> expects PRO<sub>i</sub> to be rewarded.
- (20) a. **expect**<sup>\*</sup>( $\lambda w.\text{rewarded}(w)(j)$ )(j) (non-*de-se*)  
       b. **expect**( $\lambda w \lambda x.\text{rewarded}(w)(x)$ )(j) (*de se*)

What is crucial here is that the non-*de-se* interpretation arises when an individual stands in a relation with a *proposition* while the *de se* interpretation arises when an individual stands in a relation with a *property*. Building on the insight of Lewis's analysis of attitudes *de se*, Chierchia argues that a *de se* interpretation arises, i.e. an individual is interpreted as self-ascribing an intensional property, whenever the individual stands in a relation with a property. This principle can be stated as follows.

(21) **Principle of *de se* interpretation (two place predicates) (prelim.)**

Whenever an individual  $x$  stands in a relation  $R$  of type  $\langle\langle s, et \rangle, et \rangle$  with an intensional property  $P$ ,  $x$  is interpreted as holding an attitude *de se* to  $P$ , i.e. as ascribing  $P$  to  $x$  him/herself as the first person of the attitude context.<sup>9</sup>

In the case of (20b),  $R$ ,  $x$  and  $P$  correspond to **expect**, **j** and **rewarded**, respectively. Thus, given this principle, (20b) must be interpreted as involving a *de se* attitude. On the other hand, (20a) does not have to be interpreted as involving a *de se* attitude since

<sup>8</sup>Of course, if we are to defend the thesis that PRO does not exist in the syntax, we have to assume a nonstandard mechanism for checking the agreement features of anaphoric items in infinitival/gerundive complements, about which I have nothing to say in this paper.

<sup>9</sup>The terms 'first person' and 'second person' here and below do not refer to the grammatical person (as in agreement). Rather, they refer to the agent and the addressee of the relevant communication or attitude being reported.

it involves a relation holding between an individual and a proposition, instead of a property.

It should be noted in this connection that a *de se* interpretation is not available in sentences with *extensional* OC verbs, such as *succeed in*. In example (22) from Chierchia (1989), John does not have to be aware that the winner is himself. As such, (22a) and (22b) have equivalent entailments.

- (22) a. John succeeded in PRO winning a lottery.  
b. John succeeded in bringing about a situation where he wins a lottery.

This is as expected by the principle in (21) since, in the case of extensional OC sentences, intensionality is not involved, and hence no kind of attitude is being reported. Other extensional OC verbs as listed in (23) show the same pattern.

- (23) *force, make, begin, finish* etc. (Chierchia 1989: (25) modified)

Thus, the principle in (21) is central to the semantic account of *de se* interpretation of control sentences. However, it turns out that the principle in (21) is not enough to account for all cases of *de se* readings in control sentences, since a *de se* reading is also obligatory in the case of *three place* attitude relations such as *promise*, as the following examples in (24) suggest, while the principle in (21) only targets the cases of *two place* attitude relations. In (24b), unlike (24a), John must be understood as ascribing the property of leaving to himself.

- (24) Situation: John, an amnesiac who does not remember his own name, is a manager of a company. He heard a rumor among the employees that 'John' should leave the company since he is responsible for a devastating deficit. Hearing the rumor, John promises to the employees that John will leave the company, without realizing that John is no one other than himself.  
a. John promised the employees that he would leave.  
b. #John promised the employees to leave.

Furthermore, importantly, if we turn to an object control sentence involving a control verb such as *tell*, we see a slightly different pattern. Object control must be interpreted as involving a *second-person-oriented* attitude. For example, in the situation in (25), where John does not know that the person he is talking to is Mary, the situation cannot be reported using the object control version of the verb *tell*, as in (25b).

- (25) Situation: At a party, John is told that 'Mary' is being particularly obnoxious. He tells the person he is having a conversation with that 'Mary should leave'. But that person is no one other than Mary herself.  
a. John told Mary that she should leave.  
b. #John told Mary to leave. (Schlenker 2003:61)

In other words, (25b) must be interpreted as reporting John's saying to Mary 'You should leave', 'Leave!' or its equivalent. Thus, here we have a second-person-oriented version of an attitude *de se*. In what follows, to incorporate this kind of attitude also as a sub-case of attitudes *de se*, I generalize the notion of *de se* to attitudes that are sensitive to,

or refer back to, any component of the context of the attitude itself, whether or not it is the first person. Thus, an attitude *de se* must be divided into at least two subtypes, one an attitude toward the attitude holder him/herself, and the other an attitude toward the second person, i.e. the addressee of the attitude holder.<sup>10</sup> I refer to the former as an ATTITUDE *de me*, and the latter as an ATTITUDE *de te*.

Whether a *de me* or a *de te* reading arises correlates with the verb's lexical subject/object control specification. Subject control verbs induce *de me* readings while object control verbs induce *de te* readings.<sup>11</sup> Examples (24) and (25) above have shown this point. If a sentence involves a subject control verb like *promise*, the subject (i.e. the attitude holder) must be interpreted as having an attitude *de me*. On the other hand, if a sentence involves an object control verb like *ask* or *tell*, the subject must be interpreted as having an attitude *de te*.

If we adopt a Chierchia-style analysis, another principle of *de se* interpretation along the lines of (21) that takes care of the three place attitude relations must be stated as follows:

(26) **Principle of *de se* interpretation (three place predicates) (prelim.)**

Whenever individuals  $x$  and  $y$  stand in a relation  $R$  of type  $\langle\langle s, et \rangle, \langle e, et \rangle\rangle$  with an intensional property  $P$ , the attitude holder  $x$  is interpreted as holding an attitude *de se* to  $P$ , i.e. as ascribing  $P$  to either  $x$  him/herself as the first person (*de me*), or to  $y$  as the second person of the attitude context (*de te*).

In the case of (24) (*John promised the employees to leave*),  $R$ ,  $x$ ,  $y$  and  $P$  correspond to the promising relation, John, the employees, and the property of leaving, respec-

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<sup>10</sup>This terminology is different from standard terminology, where an attitude *de se* only refers to a first person-sensitive attitude. It should also be noted that the current notion of an attitude *de se* can be generalized also to time/space-sensitive attitudes such as the following (where a time-sensitive attitude is sometimes referred to as attitude *de nunc* in the literature).

(i) It is raining *now/here*.

<sup>11</sup>Caution is in order here. Although verbs such as *persuade* and *convince* are classified as object control verbs, they are 'psychological causatives', in which the attitude holder is the object rather than the subject, as pointed out by Chierchia (1989). This is shown by the unacceptability of sentences such as (i), and the acceptability of sentences such as (ii), in which the subject is inanimate (see also Anand 2006:16).

(i) ?? John persuaded/convicted Mary to leave, but Mary couldn't hear.

(ii) The constant noise from the upstairs apartment finally convinced John to leave.

These psychological causatives entail that the object has a relevant *de me* attitude, instead of subject's having a relevant *de te* attitude. This can be seen by the intuitive falsity of the following example from Anand (2006:16), in the situation where John has watched a video of his winning a diver competition, and thought that he should be a professional diver, without knowing that the winner is he himself.

(iii) John's<sub>i</sub> winning the best diver competition convinced him<sub>i</sub> PRO<sub>i</sub> to become a professional diver.

Nevertheless, verbs such as *ask* and *tell* in fact entail that the subject, rather than the object, has a relevant *de te* attitude, as can be seen from the acceptability of (iv).

(iv) John told/asked Mary<sub>i</sub> PRO<sub>i</sub> to leave, but Mary couldn't hear.

The fact that (iv) can be true regardless of Mary's attitude shows John has the relevant *de te* attitude toward Mary.

In the remainder of this paper, I ignore psychological causatives such as *persuade* or *convince* in the main text for the sake of simplicity.

tively. Furthermore, let us simply assume at this point that *promise* is lexically specified as a subject control verb. Given this lexical specification, the promising relation chooses the *de me* option, rather than the *de te* option. Thus, the obligatoriness of a *de me* reading in (24) is correctly captured by the principle in (26). (I spell out how the lexical semantics of each predicate correlates with the *de me/de te* interpretation in Section 4.)

### 3.1.4 A formalization

Although the principles of *de se* interpretation in (21) and (26) presented in the previous section are empirically adequate, several problems remain unsolved. One such problem is that they are just descriptive generalizations about the semantic environments in which a *de se* interpretation arises, and that they take the notion of ascription towards the first/second person as a primitive.<sup>12</sup> Another problem is about the correlation between a verb's lexical subject/object control specification and the *de me/de te* reading. In the previous section, it is just stipulated that subject control goes with a *de me* reading while object control goes with a *de te* reading without any explanation. The formulation in the previous section again needs explanation regarding this point. In this section, I provide a formal implementation of the semantics of *de se* reports that overcome the first problem. The second problem will be taken up in Section 4.

Regarding the formal analysis of *de se* reports, for two-place predicates, Schlenker (1999, 2003) provides a Kaplanian two-dimensional formulation of *de se* reports based on his theory of (Kaplanian) context shifting. In Schlenker's formulation, infinitives generally denote intensional properties, while each verb is specified to be associated with a *de se* interpretation as in the following denotation.

- (27)  $[[\text{expect}^{de\ se}]]^{w,c} = \lambda P \in D_{\langle s,et \rangle} \lambda x. \forall c' \in C^{\text{EXP}(\langle x,w \rangle)} [P(w_{c'})(I_{c'})]$   
 $(C^{\text{EXP}(\langle x,w \rangle)})$  is the set of Kaplanian contexts compatible with  $x$ 's expectation in  $w$ ;  $I_c$  and  $w_c$  are the first person and the world of the context  $c$ .<sup>13</sup>

According to (27), *expect* takes as arguments an intensional property  $P$  and an individual  $x$ , and returns true iff  $P$  is ascribed to the first person of the context (in Kaplan's 1989 sense) of the expectation, i.e. the expecter, in each context compatible with  $x$ 's expectation. Thus, in (27), it is properly formulated that the expecter ascribes the intensional property to the first person of the expectation context, who cannot fail to be the expecter him/herself as believed by the expecter. Note that this condition is (correctly) not satisfied in the situation in (14), since in that situation the amnesiac expecter is not ascribing the relevant property to him/herself.

In this paper, I adopt this analysis of *de se* attitude reports along the lines of Schlenker with a small modification: I analyze infinitives/gerunds to denote a set of contexts instead of a simple property. The modification is made in order to make a conceptual

<sup>12</sup>Chierchia (1989) actually suggests several ways to analyze self-ascription, among which is one in terms of speaker-centered worlds isomorphic to the context sets employed in the proposal of the current paper (Chierchia 1989: 7-9). However, in his conclusion, Chierchia stays neutral as to the actual analysis of self-ascription, focusing more on the *de se*-related empirical consequences of his property theory of control.

<sup>13</sup>A context COMPATIBLE with  $x$ 's expectation is a member of the set of contexts that represent  $x$ 's expectation, which consists of the individual who  $x$  expects him/herself to be, and the world which  $x$  expects him/herself to inhabit.

connection between the set of contexts compatible with an attitude on the one hand, and the property denoted by the complement on the other.

First, I introduce two different semantic types for contexts as in (28):

- (28) a. SINGLE-CENTER CONTEXT:  $\langle I_c, w_c \rangle \in D_c$  b. DOUBLE-CENTER CONTEXT:  $\langle I_c, 2_c, w_c \rangle \in D_{\mathbb{C}}$

Single-center contexts (which are of type  $c$ ) are contexts that involve only the first person, while double-center contexts (type  $\mathbb{C}$ ) are those that involve both the first and the second person. In the context-shifting theory that I am proposing, the former appears in denotations of two place attitude verbs, while the latter appears in denotations of three place attitude verbs. Note further that any context is a tuple consisting of an individual (or individuals) and a world, and hence contexts here are sub-sorts of individual(s)-world tuples. Based on this modified type definition, I assume that subjectless infinitives and gerunds denote (characteristic functions of) sets of single-center contexts (of type  $\langle c, t \rangle$ ), and that control verbs take as an argument a set of contexts, as shown in (29) and (30).<sup>14</sup> Note again that any set of single-center contexts (of type  $\langle c, t \rangle$ ) is formally equivalent to an intensional property (of type  $\langle s, et \rangle$ ). Given these components, The truth conditions of the sentence *John expects to leave* are computed as in (31).

- (29)  $[[\text{PRO to leave/leaving}]] = \lambda \langle x, w \rangle \in D_c. \text{leave}(w)(x)$

- (30)  $[[\text{expect}]]^{w,c} = \lambda P \in D_{\langle c,t \rangle} \lambda x. \forall c' \in C^{\text{EXP}(\langle x,w \rangle)} [P(c')]$

- (31)  $[[\text{expect}]]^{w,c} ([[ \text{PRO to leave} ]]) ([[ \text{John} ]]) = 1$   
 iff  $\forall \langle I_{c'}, w_{c'} \rangle \in C^{\text{EXP}(\langle j, w \rangle)} [\text{leave}(w_{c'})(I_{c'})]$   
 iff for all contexts compatible with John's expectation in  $w$ , the first person of the context leaves at the world of the context

Under this formulation, the principle can be viewed as a general requirement for the denotation of verbs that denote relations between individuals and context sets. I formalize this general requirement in the case of two place attitude relations as in the following meaning postulate.<sup>15</sup>

<sup>14</sup>Therefore, Kaplan contexts appear in three places in the current formulation. They (i) appear as the context of utterance itself, (ii) are quantified over by the denotation of attitude verbs, and (iii) appear as a member of the denotation of infinitival/gerundive complements. An intuitive way to capture these three levels at which contexts are at play in the current analysis is to paraphrase attitude reports with direct quotations and regard the contexts at each level (i-iii) above as the (traditional) Kaplan context-of-utterance of (i) the matrix utterance, (ii) the first quoted utterance, and (iii) the embedded quoted utterance. For example, the three levels of contexts that are at play in the meaning of (iv) below are the contexts-of-utterance of the matrix, quoted and doubly-quoted utterances in (v), which is a paraphrase of (iv) using a (doubly-embedded) direct quotation.

(iv) John promised Mary to leave.

(v) John promised to Mary the following: 'I promise you the following: "I will leave"'

<sup>15</sup>The meaning postulate applies in the following way. Control verbs such as *expect* have the lexical entry as in (i). The logical constant of type  $\langle ct, et \rangle$  involved in (i) (i.e. **expect**) will be in turn subject to an instantiation (given in (ii)) of the meaning postulate in (32).

(i)  $[[\text{expect}]] = \lambda P \in D_{\langle c,t \rangle} \lambda x. \text{expect}(P)(x)$

(ii)  $\forall w \forall P \forall x [\wedge \text{expect}(w)(P)(x) \rightarrow \forall c' \in C^{\text{EXP}(\langle x,w \rangle)} [P(c')]]$

Hence, eventually the verb *expect* is assigned the denotation given in (30).

(32) **Principle of *de se* interpretation (two place predicates) (final)**

$$\forall w \forall R \in D_{\langle ct, et \rangle} \forall P \forall x [\wedge R(w)(P)(x) \rightarrow \forall c' \in C^{R^*(\langle x, w \rangle)} [P(c')]]$$

where  $C^{R^*(\langle x, w \rangle)}$  is the set of contexts compatible with  $x$ 's attitude  $R$  at  $w$ .

This meaning postulate roughly says that whenever an individual ( $x$ ) stands in an attitude relation ( $R$  of type  $\langle ct, et \rangle$ ) with a context set ( $P$ ), the context set contains all the contexts compatible with the relevant attitude. It follows from this meaning postulate that the first person of the attitude context is always identified as the subject of the action denoted by the subjectless complement.<sup>16</sup> What (32) states is equivalent to the following: whenever an individual stands in an attitude relation with a content of some centered attitude, the content is interpreted as having the attitude holder him/herself as the center. It is conceptually plausible to assume that this is the interpretation to which any relation holding between individuals and a context set is 'dedicated' i.e. lend itself to no other interpretation.

Let us turn to the case of three place control verbs. In the case of verbs like *promise* or *ask*, I propose the denotations shown in (33) and (34).<sup>17</sup> The truth conditions of the sentence *John asked Mary to leave* are computed as in (35).

$$(33) \quad [[\text{promise}]]^{w,c} = \lambda P \in D_{\langle c, t \rangle} \lambda y \lambda x. \forall c' \in C^{\text{PROM}(\langle x, y, w \rangle)} [P(\langle I_c, w_{c'} \rangle)]$$

$$(34) \quad [[\text{ask}]]^{w,c} = \lambda P \in D_{\langle c, t \rangle} \lambda y \lambda x. \forall c' \in C^{\text{ASK}(\langle x, y, w \rangle)} [P(\langle 2_c, w_{c'} \rangle)]$$

$$(35) \quad [[\text{ask}]]^{w,c} ([[ \text{PRO to leave} ]]) ([[ \text{Mary} ]]) ([[ \text{John} ]]) = 1$$

iff  $\forall c' \in C^{\text{ASK}(\langle j, m, w \rangle)} [\text{leave}(w_{c'})(2_{c'})]$

iff for all contexts compatible with what John asks Mary to do, the second person of the context leaves at the world of the context.

Importantly, in contrast to the case of two place predicates, the context that is quantified over in the denotations of three place attitude predicates is a *double-center* context, which involves both the first and the second persons, while complements invariably denote sets of *single-center* contexts. Thus, in the denotation of three place control predicates, a double-center context is related to a single-center context. For example, in the denotation of *promise* in (33), a double-center context is related to a single-center context consisting of the first person and the world of the original double-center context. On the other hand, in the denotation of *ask*, a double-center context is related to a single-center context consisting of the second person and the world of the original context. If we represent the ways of 'squeezing' a double-center context into a single-center context using functions, we can conceive of the following three functions:

$$(36) \quad \text{a. } \lambda \langle I_c, 2_c, w_c \rangle. \langle I_c, w_c \rangle \quad \text{b. } \lambda \langle I_c, 2_c, w_c \rangle. \langle 2_c, w_c \rangle \quad \text{c. } \lambda \langle I_c, 2_c, w_c \rangle. \langle I_c \oplus 2_c, w_c \rangle$$

<sup>16</sup>A necessary assumption here is that any subjectless complement of the form  $\lceil \text{PRO VP} \rceil$  denotes  $\lambda \langle x, w \rangle \in D_c. [[\text{VP}]](w)(x)$  for any infinitival/gerundive VP, and not  $\lambda \langle x, w \rangle \in D_c. \text{inhabit}(w)(x) \wedge [[\text{VP}]](w)(y)$  for some  $y$ , nor does it involve vacuous  $\lambda$ -abstraction of  $\langle x, w \rangle$ .

<sup>17</sup>The denotation of the psychological causative verb *persuade* looks like (i) below.

$$(i) \quad [[\text{persuade}]]^{w,c} = \lambda P \in D_{\langle c, t \rangle} \lambda y \lambda x. \forall c' \in C^{\text{PERS}(\langle x, y, w \rangle)} [P(\langle I_{c'}, w_{c'} \rangle)]$$

where  $C^{\text{PERS}(\langle x, y, w \rangle)}$  is the set of contexts that are compatible with what  $y$  is *persuaded* by  $x$  in  $w$ , where  $y$  corresponds to the first person.

Note that the peculiarity of psychological causatives is captured here in the definition of  $C^{\text{PERS}(\langle x, y, w \rangle)}$ , in which the object of the original persuasion corresponds to the first person.

In other words, the first person in the resulting contexts in (36) becomes the target of the property ascription in the relevant *de se* attitude ascription. Specifically, in (36), it is the first person, the second person and the sum of the first and the second persons, respectively, of the original attitude context that correspond to the target of property ascription. This PROPERTY-ASCRPTION TARGET becomes the semantic subject of the complement.

As I will defend in detail in Section 4, I assume that the lexical semantics of OC verbs determines the specific way (among the choices in (36)) in which the verb's denotation relates a double-center context to a single-center context, i.e. to which participant they specify that the relevant property be ascribed. In the case of a subject control verb such as *promise*, we construct a new single-center context by picking up the first person and the world from the original double-center context, as in (36a), and input it as the argument of the infinitive/gerund. In other words, the property is ascribed to the first person of the attitude context. On the other hand, in the case of an object control verb such as *tell* or *ask*, we construct a new single-center context by picking up the second person and the world, as in (36b).

Thus, in this formulation, the principle of *de se* interpretation that the denotation of any intensional three place OC verb is subject to (i.e. (26) in the previous section) can be restated as in (37) below, where  $\mathcal{F}$  resolves the type mismatch between the relevant double-center context associated with  $R$  and the single-center context that  $P$  requires.

(37) **Principle of *de se* interpretation (three place predicates) (final)**

$$\forall w \forall R \in D_{\langle ct, \langle e, et \rangle \rangle} \forall P \forall x \forall y [\wedge R(w)(P)(y)(x) \rightarrow \exists \mathcal{F} \forall c' \in C^{R^*(\langle x, y, w \rangle)} [P(\mathcal{F}(c'))]]$$

where  $\mathcal{F}$  is one of the functions in (36)

It follows from (37) that, in the case of intensional three place control predicate, either the first person of the relevant attitude context, the second person of the context, or the sum of those two becomes the understood subject of the complement. Again, note that this principle is conceptually plausible in that it essentially says that whenever an attitude holder stands in an attitude relation with a second person and a centered attitude content, that content is interpreted as having as the center some individual(s) among the participants of the attitude relation.

Lastly, regarding extensional OC predicates such as *succeed in* and *force*, the principles above do not apply to them since these verbs are assumed to denote relations between extensional properties and individuals (of type  $\langle et, et \rangle$  or  $\langle et, \langle e, et \rangle \rangle$ ), as in (38), whereas the principles above apply only to intensional OC verbs (which, in the current formulation, are of type  $\langle ct, et \rangle$  or  $\langle ct, \langle e, et \rangle \rangle$ ).

$$(38) \quad [[\text{succeed in}]] = \lambda Q \in D_{et} \lambda x. \text{succceed-in}(Q)(x)$$

I assume that infinitives/gerunds are extensionalized by Montague's (1973) down operator ( $\vee$ ) to combine with extensional OC verbs.

Abstracting away from the specific adicity of attitude relations, we can generalize the principles of *de se* interpretation as a polymorphic meaning postulate in (39).

(39) **Principle of *de se* interpretation (general)**

$$\forall w \forall R \forall P \forall x_1 \dots \forall x_n [\wedge R(w)(P)(x_n) \dots (x_1) \rightarrow \exists \mathcal{F} \forall c' \in C^{R^*(\langle x_1, \dots, x_n, w \rangle)} [P(\mathcal{F}(c'))]]$$

where  $\mathcal{F}$  is a function from a context to another context such that any component of an output context is a subpart of the sum of all components of the input context;

$R$  is of type  $\langle ct, et \rangle, \langle ct, \langle e, et \rangle \rangle, \langle ct, \langle e, \langle e, et \rangle \rangle \rangle \dots$

This meaning postulate says that whenever  $n$  individuals stand in an ( $n$ -ary) attitude relation with a set of contexts, the set contains all the contexts which are  $\mathcal{F}$ -mapped from the relevant (shifted) attitude contexts. The  $\mathcal{F}$ -mapping is defined in such a way that it can construct an output context only with the resources contained in the input. Furthermore, it is assumed independently of (39) that the specific lexical semantics of an OC verb determines what kind of  $\mathcal{F}$  is chosen in its denotation (cf. Section 4). Thus, it is the interaction of the general principle of *de se* interpretation and the particular lexical semantics of each verb that determines the ultimate denotation of OC verbs.

### 3.2 NFC as an underspecified *de se* report

In this section, based on the semantics for *de se* attitude reports proposed in the previous section, I argue that a *de se* interpretation is invariably obligatory in NFC sentences. I further argue that the ascription target of the property is underspecified in NFC. From these two points, the peculiar control pattern of NFC follows immediately.

#### 3.2.1 Obligatoriness of a *de se* interpretation

First of all, a *de se* interpretation is empirically obligatory in NFC. To see this, suppose, for example, that John was completely drunk at the party last night. He does not remember (or know) that he himself undressed, but has heard from his friend Mary that somebody undressed himself last night. In this situation, sentence (40a) can be true in the reading where *his* is read non-*de-se* (i.e. *his* refers to John regardless of whether John himself identifies this person as himself) while (40b) is false.<sup>18</sup>

(40) Situation: as described above

- a. John<sub>i</sub> talked to Mary about his<sub>i</sub> undressing himself.
- b. #John<sub>i</sub> talked to Mary about PRO<sub>i</sub> undressing himself.

This contrast parallels the pattern we observed in (14), showing that the *de me* interpretation is obligatory in the NFC sentence in (40b). A parallel thing can be said about a *de te* interpretation. This is illustrated by the following object control example. In

<sup>18</sup> Some native speakers prefer the reading of (40b) where John talked to Mary about his *future* undressing to the reading where he talked her about his *past* undressing. However, even for these speakers, a contrast parallel to (40) arises in the following sentences in which the complements explicitly refer to the past event, and thus my point here still holds.

(i) Situation: the same as (40)

- a. John<sub>i</sub> talked to Mary about his<sub>i</sub> having undressed himself.
- b. #John<sub>i</sub> talked to Mary about PRO<sub>i</sub> having undressed himself.

the given situation, (41a) can be true, but (41b) cannot. This suggests that the object control NFC sentence in (41b) requires a *de te* reading.<sup>19</sup>

- (41) Situation: John was completely drunk at the party last night. He does not remember that Mary undressed herself yesterday, but has heard from his friend that somebody undressed him or herself last night. Now, John has told this story to Mary, without knowing it is Mary who undressed herself.
- a. John talked to Mary<sub>j</sub> about her<sub>j</sub> undressing herself.
  - b. #John talked to Mary<sub>j</sub> about PRO<sub>j</sub> undressing herself.

Furthermore, a parallel pattern obtains in the split control cases. As a way of describing the situation in (42), (42a) can be true, but (42b) cannot. Here, the kind of attitude that is required for the interpretation of (42b) is an attitude toward 'ourselves' (John and Mary in the case of (42)), i.e. the joint group of the first and the second person. I call this type of attitude an ATTITUDE *de nos*.

- (42) Situation: John was completely drunk at the party last night. He does not remember that he and Mary danced with each other last night, but has heard from his friends that some two people were dancing together. Now, John has told this story to Mary, without knowing it is John and Mary themselves who were dancing with each other.
- a. John<sub>i</sub> talked to Mary<sub>j</sub> about their<sub>i+j</sub> dancing with each other.
  - b. #John<sub>i</sub> talked to Mary<sub>j</sub> about PRO<sub>i+j</sub> dancing with each other.

Now, note that the obligatoriness of a *de se* interpretation in NFC discussed above is already predicted by the semantics for *de se* reports proposed in the previous section. This is because, the revised principles of *de se* interpretation in (32) and (37) hold also in the case where the relevant attitude relation is one denoted by a predicate appearing in NFC, a verb of communication or thought, which invariably involves an attitude relation between an individual and a context set (of type  $\langle c, t \rangle$ ) denoted by its complement. For example, the NFC sentence *John talked to Mary about dancing* involves the talking-to relation holding between the individuals John, Mary, and the context set of dancing. Thus, in the proposed semantics, an NFC predicate such as *talk to* is predicted by the principle in (37) to have the following denotation:

$$(43) \quad [[\text{talk to}]]^{w,c} = \lambda P \in D_{\langle c, t \rangle} \lambda y \lambda x. \exists \mathcal{F} \forall c' \in C^{\text{TALK-TO}(\langle x, y, w \rangle)} [P(\mathcal{F}(c'))]$$

That the predicates appearing in NFC are intensional, and that they thus take as an argument a context set rather than an extensional property, can be shown by the failure of substitution *salva veritate* of coextensive referring expressions in their complement:

- (44) John talked to Mary about beating Superman.  $\not\equiv$  John talked to Mary about beating Clark Kent.

<sup>19</sup>NFC object control is not psychological causatives. This can be shown by the acceptability of the following sentence.

(i) John<sub>i</sub> talked to Mary<sub>j</sub> about PRO<sub>j</sub> undressing herself<sub>j</sub>, but Mary<sub>j</sub> couldn't hear.

On the other hand, in the case of sentences with gerundive complements that have explicit subject arguments, such as (40a) repeated below, it is correctly predicted that they do not have to be read *de se*.

(40a) John<sub>i</sub> talked to Mary about his<sub>i</sub> undressing himself.

This is so because gerundive complements with explicit subjects denote (untensed) propositions under normal circumstances, and thus the meaning postulates are not applicable. Furthermore, I assume that the grammar is equipped with a general mechanism of abstracting over a variable corresponding to a pronoun (à la Jacobson 1999). Thus, when *his* in (40a) is abstracted over, the complement ends up denoting a property rather than a proposition, and thus the *de se* reading is predicted to arise by the principle. Therefore, the optional *de se* reading of (40a) is also accounted for.

However, there is one question that is yet to be considered here. The question is this: what is the value of  $\mathcal{F}$  in the denotation of NFC predicates such as (43)? In other words, to whom do verbs of communication/thought such as *talk to* specify that the intensional property be ascribed? I consider this question in the next section.

### 3.2.2 Underspecification of the property-ascription target

The answer to the question posed in the previous section lies in the lexical semantic difference between OC and NFC verbs. I argue that the verbs of communication or thought appearing in NFC are *underspecified* regarding whom the property is to be ascribed to. That is, in the case of NFC, a double-center context can be related to a single-center context in any way, and hence either the first person or the second person, as well as their sum, can be the target of property ascription. As such, I will argue, predicates such as *talk to* can be either interpreted *de me* like the subject control verb *promise*, or as *de te* like the object control verb *ask*, or both simultaneously, depending on the pragmatic context. In the semantics that I proposed in the preceding section, this means that the value of  $\mathcal{F}$  can be identified as any of the three possible functions according to the pragmatic context. Hence, I propose the following denotation for the predicate *talk to*:

$$(45) \quad [[\text{talk to}]]^{c,w} = \lambda P \lambda y \lambda x. \exists \mathcal{F} \forall c' \in C^{\text{TALK-TO}(\langle x,y,w \rangle)} [P(\mathcal{F}(c'))]$$

where  $\mathcal{F}$  is one of the functions in the following set:

$$\{\lambda \langle 1_c, 2_c, w_c \rangle. \langle 1_c, w_c \rangle, \lambda \langle 1_c, 2_c, w_c \rangle. \langle 2_c, w_c \rangle, \lambda \langle 1_c, 2_c, w_c \rangle. \langle 1_c \oplus 2_c, w_c \rangle\}$$

My claim here that NFC predicates are invariably underspecified as to their property-ascription target can be supported conceptually in the following way (a formal implementation of as well as empirical support for this claim will be given in Section 4): in the case of OC predicates such as *promise* or *ask* (NP to V), it is inherent in the lexical semantics of the predicate that a particular participant of the described event must be the semantic agent of the complement. I assume, following Jackendoff (1972), Farkas (1988) and Sag and Pollard (1991), that these argument-oriented entailments associated with the lexical semantics of OC predicates determine the controller specification, i.e. the value of  $\mathcal{F}$  in our formulation. However, in a communication or thought event described by verbs like *talk to* or *think*, there is no inherent connection between a participant of the described communication/thought and the understood subject of the

*content* of that communication/thought, as was already discussed in Section 2.2. That is, we can potentially talk/think about anyone else's action or experience. This fact—the lack of an inherent connection between a communication/thought participant and the agent of the communication/thought content—is, I claim, the reason why the kind of predicate appearing in NFC is underspecified as to the property-ascription target, the specific value of the function  $\mathcal{F}$  in the case of three place predicates.

This point, together with the obligatoriness of a *de se* reading, accounts for the possibility of any semantic argument of an NFC verb being the controller: since an NFC verb is underspecified as to the property-ascription target, any participant of the relevant communication context, as well as their sum, can be the target of property ascription, i.e. the controller. On the other hand, the obligatoriness of a *de se* interpretation in NFC accounts for the impossibility of NPs other than the local arguments being a controller. This is because, if any NP other than the local arguments were taken as the controller, no participant of the communication would be ascribed the property denoted by the complement, hence violating the requirement for a *de se* interpretation. Thus, the peculiar control pattern of NFC (except for generic control) comes out as a natural consequence of the obligatoriness of a *de se* reading, together with the underspecification of the property-ascription target coming from the lexical semantics of the verbs of communication/thought.

### 3.3 Generic control

In the analysis proposed in the preceding sections, the possibility of generic control in NFC was left unaccounted for. Regarding generic control, I propose a separate analysis in this section: the generic control interpretation of an NFC sentence as in (46) is a case where the gerundive complement is interpreted as a type *e* INDIVIDUAL CORRELATE of the relevant property (along the lines of Chierchia 1984).

- (46) a. John talked to Mary about  $\text{PRO}_{gen}$  undressing oneself.  
b. John thought about  $\text{PRO}_{gen}$  undressing oneself.

That is, I argue that predicates like *talk to* or *think* also have the lexical entries in (47), which take a type *e* argument corresponding to the content of the relevant communication, and that a generic control interpretation arises when this content argument is filled by an individual correlate of the property denoted by the gerundive complement.

- (47) a.  $[[\text{talk to}_{indiv}]] = \lambda x \in D_e \lambda y \lambda z. z \text{ talks to } y \text{ about } x$   
b.  $[[\text{think}_{indiv}]] = \lambda x \in D_e \lambda y. y \text{ thinks about } x$

In this analysis, the gerundive complement *undressing oneself* in (46) denotes an abstract (type *e*) individual, namely of the self-undressing activity, which is obtained by applying Chierchia's (1984) nominalization ('down') operator to the property (of type  $\langle s, et \rangle$ , which is equivalent to the context set of type  $\langle c, t \rangle$ ) originally denoted by the complement. Since such a property understood *qua* individual is a 'pure' individual abstracting away from any specific person's having the corresponding property, the relevant NFC sentence is interpreted as involving communicating/thinking about 'having the relevant property in general'. In other words, a generic interpretation arises when

an individual correlate of a property fills the content argument because it is impossible to ascribe the individual correlate to any specific person.<sup>20</sup>

It should be emphasized here that the need for the lexical entries in (47) is supported by the existence of cases where the content argument is filled by an ordinary NP, such as *Bill* or *the desk* in the following examples.

- (48) a. John talked to Mary about {Bill/the desk}.  
 b. John thought about {Bill/the desk}.

Summarizing Section 3, I have analyzed NFC based on a semantics for *de se* attitude reports proposed in Section 3.1. NFC is analyzed as involving *de se* attitude reports underspecified as to the target of property ascription, and it is shown that the NFC control pattern, with the exception of generic control, comes out automatically from this analysis. However, in the analysis presented in this section, I have only characterized the underspecified nature of the NFC predicates on conceptual grounds. Providing independent empirical support and a formal implementation of this characterization will be my task in the next section.

## 4 Lexical semantics of OC/NFC predicates

In this section, examining the lexical semantics of OC and NFC verbs, I provide a formal as well as an empirical foundation for the lexical semantic difference between OC and NFC verbs that I have argued for in the previous section.

### 4.1 OC: The existence of a RESP relation

The purpose of this section is to show how the lexical semantics of three place OC verbs determines the target of property ascription, which is to become the semantic subject of the complement, drawing on an observation and proposal by Farkas (1988).

Farkas (1988) analyzes the lexical semantics of OC verbs as necessarily involving an assignment to the controller argument of ‘responsibility’ of bringing about the situation associated with the complement, using a version of situation semantics. According to Farkas, what it means to have responsibility of bringing about a situation is to be an INTENTIONAL INITIATOR (‘initiator’ for short) of the situation.

Incorporating Farkas’s analysis, I argue that the lexical semantics of OC verbs such as *promise* and *ask* involves a RESP relation as in (49) and (50), where I redefine Farkas’s original RESP relation as in (51).

$$(49) \quad \forall w \forall P \forall x \forall y [\wedge \text{promise}(w)(P)(y)(x) \rightarrow \text{RESP}(x, P)]$$

$$(50) \quad \forall w \forall P \forall x \forall y [\wedge \text{ask}(w)(P)(y)(x) \rightarrow \text{RESP}(y, P)]$$

<sup>20</sup>One might argue that the specific controller can be fixed *before* the down operator applies, and thus the generic interpretation does not necessarily arise as a consequence of nominalizing the property. However, in the view on controller selection put forth here, control only surfaces as an epiphenomenon of the semantic composition of the verb and the intensional complement, and does not involve assigning an individual as the index of PRO. Thus, there is no possibility of determining a specific controller before the semantic relationship between the verb and the complement is settled.

$$(51) \text{ RESP}_{R^*(c)}(x, P) \stackrel{\text{def}}{=} \forall \langle x', w' \rangle \in f^{R^*(c)}_{\langle x, w \rangle} [\exists e [P_E(e)(w') \wedge \textbf{Initiate}(x', e, w')]]$$

where

- $P_E$  is the event predicate corresponding to  $P$  such that  $\forall e \forall w [P_E(e)(w) \rightarrow [\exists x [P(\langle x, w \rangle)] \leftrightarrow e \text{ occurs at } w]]$
- $f^{R^*(c)}_{\langle x, w \rangle}$  is the set of individual-world pairs such that if  $\langle x, w \rangle$  is the pair of  $n$ th and  $m$ th participant/world of the context  $c$ , then  $\langle x', w' \rangle \in f^{R^*(c)}_{\langle x, w \rangle}$  is the pair of  $n$ th and  $m$ th participant/world of each member of  $C^{R^*(c)}$  (i.e. the set of contexts compatible with  $R$  w.r.t.  $c$ )

The definition of the RESP relation in (51) states roughly that a participant of the original attitude context is RESPonsible for  $P$  if and only if the corresponding participant in each of the shifted contexts compatible with the original attitude is the initiator of some event described by  $P_E$  (at the world of that shifted context). Thus, for example, if the person RESPonsible for  $P$  is the first person of the original attitude context, as entailed by the lexical semantics of *promise* in (49), the first person in each context compatible with the original attitude context becomes the initiator of some event described by  $P_E$  (at the world of the shifted context).

Farkas's empirical motivation for involving the RESP relation in the lexical semantics of OC verbs comes from the fact that complements of OC verbs must always be intentional (note the letter 't'). As observed by Lasnik and Fiengo (1974) and many others including Farkas as well as Jackendoff and Culicover (2003), OC verbs are incompatible with complements that describe nonintentional situations, such as being tall or getting hungry, which one cannot intentionally carry out, as the unacceptability of (52) shows.<sup>21</sup>

(52) ?? John {promised/asked} Mary PRO to {be tall/resemble Sue/get hungry}.

Following Farkas, I argue that this behavior of OC verbs can be accounted for as a consequence of the RESP relation involved in their lexical semantics. Since the RESP relation in these verbs requires a particular participant to be the intentional initiator of the event associated with the complement, the complement must be intentional. Here, intentionality of a predicate can be independently tested with respect to phenomena such as the acceptability patterns of imperatives and the distribution of adverbs such as *intentionally*: only intentional predicates are compatible with imperatives and the adverb *intentionally*. In (53) and (54) below, we see that predicates such as *be tall*, *resemble* or *get hungry* are incompatible with imperatives or the adverb *intentionally*.

(53) Run! / Kill him! / ??Be tall! / ??Resemble Sue! / ??Get hungry!

(54) John intentionally {ran/killed him/??resembled Sue/??got hungry}.

<sup>21</sup>A *prima facie* exception to this generalization is the controller shift examples such as the following.

- (i) a. John<sub>i</sub> was promised by Mary<sub>j</sub> PRO<sub>i</sub> to be allowed to perjure himself<sub>i</sub>.
- b. The pupils<sub>i</sub> asked/persuaded the teacher<sub>j</sub> PRO<sub>i</sub> to leave early.

However, in Uegaki (2010), I argue that the complements in (i) too are intentional since they can be intentionally carried out by the 'permission giver'. The only difference between the ordinary cases and these cases is that the initiator role does not correspond to the syntactic subject position of the complement.

Thus, OC verbs are incompatible with nonintentional complements, and this suggests that OC verbs lexically entail the controller's responsibility of bringing about the event described by the complement. My proposal is that this RESP relation determines whether the first person or the second person of the relevant attitude context becomes the understood subject of the complement (i.e. which function is chosen as  $\mathcal{F}$  in (37)) in the denotation of three place OC verbs.

An important assumption behind my proposal is that an intentional initiator of some event in  $P_E$  must be the first person of some context contained in the context set  $P$ , as stated below.

(55) **Initiator-first person principle**

$$\forall \langle x, w \rangle [\exists e [P_E(e)(w) \wedge \mathbf{Initiate}(x, e, w)] \rightarrow P(\langle x, w \rangle)]$$

Intuitively, this means that if an individual intentionally initiates a certain event, he/she must be the 'center' of the context set describing that event. For example, in the sentence *John asked Mary to leave*, Mary (as the person whom John identifies as the second person in the relevant asking) is the initiator of the relevant leaving event, and thus Mary must be understood as the center of the context set of leaving, which corresponds to the attitude content of what John asked to Mary.

Given (55) and the RESP relation involved in the lexical semantics of each OC verb, we can predict whether the first person or the second person becomes the understood subject of the complement with three place OC verbs. Let me illustrate this taking *ask* as an example.<sup>22</sup> First, from the definition of RESP in (51) and (55), we can derive the following general requirement, which roughly says that if a participant is responsible for  $P$ , he or she must correspond to the first person of the contexts contained in  $P$ .

$$(56) \quad \forall R \forall P \forall x \forall c [\text{RESP}_{R^*(c)}(x, P) \rightarrow \forall \langle x', w' \rangle \in f^{R^*(c)}_{\langle x, w \rangle} [P(\langle x', w' \rangle)]] \quad (\text{By (51) \& (55)})$$

Now, the lexical semantics of the control verb *ask* (50) entails that the object is responsible for the bringing about of  $P$ . Then, by (50), together with (56), we can conclude (57), which says that the second person ( $y'$ ) in each context compatible with the original asking context is the first person of  $P$  at  $w'$ .

$$(57) \quad \forall w \forall P \forall x \forall y [\wedge \mathbf{ask}(w)(P)(y)(x) \rightarrow \forall \langle y', w' \rangle \in f^{\text{ASK}(\langle x, y, w \rangle)}_{\langle y, w \rangle} [P(\langle y', w' \rangle)]]$$

Given the definition of  $f$  and  $C^{\text{ASK}}$ , the consequent of the conditional statement in (57) is equivalent to the denotation of *ask* I gave in the previous section ((34) repeated below) as shown in (58).

$$(58) \quad \forall w \forall P \forall x \forall y [\forall \langle y', w' \rangle \in f^{\text{ASK}(\langle x, y, w \rangle)}_{\langle y, w \rangle} [P(\langle y', w' \rangle)] \leftrightarrow \forall c' \in C^{\text{ASK}(\langle x, y, w \rangle)} [P(\langle 2_{c'}, w_{c'} \rangle)]]$$

$$(34) \quad [[\text{ask}]]^{w, c} = \lambda P \in D_{\langle c, t \rangle} \lambda y \lambda x. \forall c' \in C^{\text{ASK}(\langle x, y, w \rangle)} [P(\langle 2_{c'}, w_{c'} \rangle)]$$

As such, it follows from the RESP relation involved in the lexical semantics of *ask* that the second person in each of the attitude contexts compatible with the original asking becomes the ascription target of the relevant property, i.e. the understood subject of the complement. In general, the RESP-related lexical semantics of an OC verb

<sup>22</sup>The denotation of the psychological causative verb *persuade* in footnote 17 of Section 3 can be derived in the same manner, given the following lexical semantics of *persuade*.

(i)  $\forall w \forall P \forall x \forall y [\wedge \mathbf{persuade}(w)(P)(y)(x) \rightarrow \text{RESP}_{\text{PERS}(\langle x, y, w \rangle)}(y, P)]$

determines the way in which its denotation relates a double-center context to a single-center context (i.e. the choice of the function  $\mathcal{F}$ ): from the double-center context, the individual corresponding to the 'responsible participant' is chosen as the first person of the single-center context. Thus, the 'inherent lexical semantic connection between a participant and the semantic subject of the complement' that I argued to exist in OC verbs in the previous section is here implemented with the RESP relation involved in each OC verb.

## 4.2 NFC: The lack of a RESP relation

Next, let us turn to the case of NFC predicates. In the case of NFC predicates, non-intentional complements like *being tall* or *resembling Sue* are perfectly acceptable, as shown in the following examples (cf. Jackendoff and Culicover 2003:527 for the same observation).

- (59) a. John talked to Mary about PRO {being tall/resembling Sue/getting hungry}.  
 b. John thought about PRO {being tall/resembling Sue/getting hungry}.

This suggests that the responsibility meaning in the sense of Farkas (1988) is lacking in the lexical semantics of NFC predicates like *talk to* or *think about*. If a RESP relation were involved in the lexical semantics of NFC verbs, nonintentional complements as in (59) would have been impossible.

Accordingly, in the lexical semantics of NFC verbs, since no one is responsible for the event described by the complement, no specific individual is required (by the assumption in (56)) to be the first person, i.e. the understood subject of the complement. Thus, the underspecified nature of NFC predicates, which I have argued for in the previous section, is implemented as a lack of the RESP relation in their lexical semantics, which can be empirically tested by the compatibility with nonintentional complements.

It follows from the above that the denotations of NFC verbs such as *talk to* are restricted only by the general meaning postulate of *de se* interpretation in (37), which states that the relevant attitude context must be 'used' as an argument of (the characteristic function of) the context set denoted by the complement (without specifying *how*). Thus, although the RESP-related lexical semantics of OC verbs determines how the relevant attitude context is to be used (e.g., the lexical semantics of *promise* entails that it chooses  $\lambda\langle I_c, 2_c, w_c \rangle. \langle I_c, w_c \rangle$  as a value of  $\mathcal{F}$ ), the lexical semantics of NFC verbs does not specify how the relevant attitude context is to be used. Therefore, any of the three possible functions can be chosen as  $\mathcal{F}$  in the denotation of an NFC verb.

## 5 Conclusions and remaining issues

This paper has proposed an analysis of English nearly free control (NFC) (Jackendoff and Culicover 2003) as an underspecified *de se* report. The proposed analysis of NFC enables a new view on control where control constructions are classified into four types depending on two parameters: (i) whether the relevant control verb has an

argument-oriented lexical entailment, and (ii) whether a *de se* interpretation of the described attitude relation is obligatory. The proposed typology of control constructions is represented in the following table.

| control pattern | argument-oriented entailment | <i>de se</i> obligatory | example predicates                         |
|-----------------|------------------------------|-------------------------|--------------------------------------------|
| OC (int.)       | specified                    | YES                     | <i>try, promise, ask</i> (NP <i>to</i> ) V |
| OC (ext.)       | specified                    | NO                      | <i>make, force, succeed in</i>             |
| NFC             | unspecified                  | YES                     | <i>talk to, speak to, think</i>            |
| NOC             | unspecified                  | NO                      | <i>intrigue, be, entail</i>                |

Within the two parameters, an argument-oriented lexical semantic entailment of a control verb derives the controller selection in OC. In Section 4, the argument-oriented entailment of intensional OC verbs is analyzed as deriving from the RESP relation (Farkas 1988) that connects the semantic initiator of the event described by the complement with a particular participant of the attitude relation denoted by the verb. Although the idea of relating controller selection to lexical semantics is far from new (cf. Jackendoff 1972), the originality of the current proposal consists in distinguishing it from the requirement for a *de se* interpretation that intensional control verbs in general are subject to.

The general principle of *de se* interpretation requires that a *de se* interpretation is obligatory in the interpretation of any relation holding between individuals and intensional properties, the latter of which is recast as a set of contexts in the current formulation. The relevant principle can be stated as in (39) in Section 3.1.4. Because of this principle, the controller of any intensional control verb must be a participant of the attitude context associated with the verb. It is the interaction of this principle and the particular argument-oriented entailment associated with the control verb that determines the actual interpretation of intensional control verbs.

Independent of intensional OC and NFC, extensional OC is analyzed as a case where only the lexical semantic entailment of the control verb determines the control relation, further investigation of whose nature must await future study. NOC is analyzed as a case where neither of the two parameters apply, and thus no grammatical restriction on the controller selection is at work. That a *de se* reading is nonobligatory in NOC might need an explanation. This point is accounted for by the fact that NOC does not involve an attitude relation holding between individuals and an intensional property. That is, I argue that the principle of *de se* interpretation is not applicable in the case of NOC because of the semantic type of the relation denoted by the control verb. For example, in NOC as in (3), the denotation of the infinitive does not stand in an attitude relation with any NP.

Thus, the current view enables an adequate analysis not only of NFC, but also of other kinds of control constructions. Furthermore, in Uegaki (2010), it is shown that the current approach to control can be extended to the controller-shift examples such as *John asked Mary to be allowed to leave*, by assuming the complements of these examples to be a set of double-center contexts, rather than of single-center contexts (cf. (28)).

Nevertheless, the current analysis by no means provides an answer to the whole

range of issues concerning control. The remaining issues include the problem of feature-agreement of anaphoric pronouns in the controlled complement, the distinction between partial and non-partial control (Landau 2000), and a cross-linguistic investigation of the validity of the proposed classification of control sentences. These issues have to be left to future investigation.

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Wataru Uegaki  
University of Tokyo  
wuegaki@gmail.com