Proceedings of LFG08

Miriam Butt and Tracy Holloway King (Editors)

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1 Editor's Note

The program committee for LFG'08 were Kersti Börjars and Martin Forst. We would like to thank them again for putting together the program that gave rise to this collection of papers. Thanks also go to the executive committee and the reviewers, without whom the conference would not have been possible. The local organizing committee consisted of Avery Andrews, Wayan Arka, Rachel Nordlinger, and Jane Simpson, who worked together to put on yet another successful conference. We would like to thank Linguistics RSPAS ANU, Linguistics The Faculties ANU, University of Melbourne, and University of Sydney.

The table of contents lists all the papers presented at the conference. Some papers were not submitted to the proceedings. For these papers, we suggest contacting the authors directly.

A THEORY OF STRUCTURE-SHARING: FOCUSING ON LONG-DISTANCE DEPENDENCIES AND PARASITIC GAPS

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Proceedings of the LFG08 Conference

Miriam Butt and Tracy Holloway King
(Editors)

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1 Introduction

As is common practice in LFG, the term *Long-Distance Dependencies* (LDD, for short) refers to those constructions that in other frameworks are referred to as unbounded dependencies, filler-gap dependencies, wh-movement, A'-movement, A' dependencies, etc. In LFG, LDD are characterized by the presence of a structure-sharing relation in the f-structure, in which a within-clause grammatical function (GF) such as a subject or an object has the same f-structure as its value as an information-structure GF. Standard treatments of LDD in LFG currently assume that this structure-sharing relation is licensed by a control equation, specifically, a functional uncertainty control equation, as in Kaplan and Zaenen (1987). So far, all theories assuming such treatments have failed to give an account of *multiple gap* (or *parasitic gap*) constructions, constructions in which two different within-clause GFs share their value with the same information-structure GF (in other words, constructions in which a single filler corresponds to two different gaps).

One of the goals of this paper is to propose a theory of LDD that successfully accounts for multiple gap constructions, allowing LDD to involve multiple gaps, while excluding ungrammatical instances of those constructions. Another of the goals of this paper is to integrate the treatment of LDD with that of raising as part of a larger theory of structure-sharing. Both LDD and raising are assumed to involve structure-sharing in their f-structure representation in all current versions of LFG. By extracting what these two classes of constructions have in common, this paper proposes a set of constraints—the theory of structure-sharing—accounting for the facts of both LDD and raising. Thus, a simpler and more general theory is achieved.

An assumption that plays an important role in the present theory is the idea that there is a class of GFs that groups the subject with the information-structure GF involved in LDD (from Bresnan 2001). The constraints on structure-sharing make crucial appeal to this class of GFs. Another important assumption that is implied by this theory is the claim that there are no functional control equations (equations expressing the functional identity of two different GFs), whether these are the control equations involved in raising constructions or the functional uncertainty equations posited in other theories for LDD. The well-formedness constraints that make up the theory of structure-sharing define which structure-sharing relations are possible and which are not. A consequence of dispensing with control equations is that we also have to give up the idea that all information in the f-structure is encoded as functional annotations: at least some f-structure information is. This naturally leads to the idea that no f-structure information is encoded by

† The work described in this paper has been supported in part by research project HUM2007–61916FILO. I thank Mary Dalrymple, George Aaron Broadwell and participants in LFG08 for useful comments.

means of annotations: instead, we have well-formedness constraints, including constraints on the mapping between structures, which rule out ill-formed c- and f-structures and ill-formed pairings of these two structures.

Section 2 outlines the proposed approach to LDD. Section 3 presents the main constraint of the theory of structure-sharing and illustrates some of its effects. Section 4 provides evidence for one of its most significant claims: that there is no structure-sharing between a filler and a subject in the same clause. The locality and binding conditions complete the theory in section 5.

2 What drives LDD?

LDD arise in various types of constructions including interrogative clauses, as in examples (1)–(2), relative clauses, as in (3), and topicalizations, as in (4). The commonly accepted assumption is that a dependency is created between the clause-initial constituent, shown in Italics, in such examples, and a GF in either the same clause or a clause embedded in it. The latter GF is represented in these examples and subsequent ones by means of a dash in the position that this GF would occupy (in an unmarked order of constituents) were it not identified with the Italicized clause-initial constituent. This dash should not be taken to have any theoretical correlate as a null constituent, empty category, or trace, since the present theory assumes no such categories, following much work within LFG (such as Kaplan and Zaenen 1987, Alsina 1996, Dalrymple 2001, Dalrymple, Kaplan, and King 2007, among others) and within HPSG (Pollard and Sag 1994, Sag 1997, among others).

(1) *Which book* did Kim read ___?

(2) *Which book* did Kim suggest that I should read ___?

(3) This is the book *which* Kim asked you to read ___.

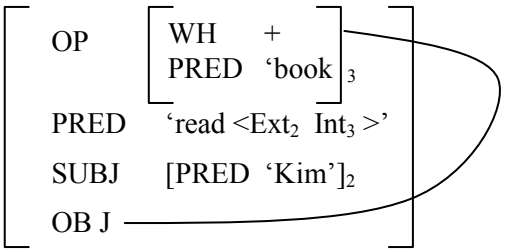
(4) *That book*, Kim should not talk about ___.

Following standard practice in LFG, LDD are represented at f-structure as structure-sharing of an information-structural function and a within-clause function (such as SUBJ, OBJ, OBL) in either the same or a subordinate f-structure. In most existing versions of LFG, there are two information-structural functions: TOPIC and FOCUS, and both are used in LDD. However, since the distinction between these two GFs has to do with information packaging, it seems more appropriate to make this distinction at the level of information-structure and have a single GF at the level of f-structure that correlates with the information-structural notions of topic and focus. Therefore, in what follows, instead of TOPIC and FOCUS, we will use a single GF: OP(ERATOR). Having one theoretical construct instead of two is a simplification of the formal framework and, therefore, a desirable goal.[1]

[1] If the distinction standardly made between TOPIC and FOCUS should be shown to be of a syntactic nature (not only of an information-structure nature), it could be

As an example of an f-structure of a clause involving LDD, the f-structure of example (1) is given in (5) (omitting irrelevant information):

(5)



This structure shows that the OP and the OBJ of the clause are structure-shared: they have the same f-structure as their value. Coindexing signals correspondence between elements at different levels of structure: In this case, it signals correspondence between arguments in the argument-structure and GFs (e.g., the external argument corresponds to the subject). The OP and the structure-shared within-clause GF need not be in the same clause, as shown by examples like (2) and (3), where the within-clause GF is in a clause embedded in the clause where the OP is. In fact, the distance in terms of embeddedness between the two GFs is unlimited (hence the term "long-distance dependencies" used even when the two GFs are in the same clause).

A question that needs to be addressed is what requires this link, or structure-sharing relation, to arise between two GFs. The principle that requires an OP to link to a within-clause GF is the Extended Coherence Condition, posited by Zaenen (1980) and assumed by many researchers within LFG, including Fassi Fehri (1988), Bresnan and Mchombo (1987), Bresnan (2001), Dalrymple (2001), and Falk (2001), among others, which we can formulate as follows:[2]

(6) **Extended Coherence Condition (ECC)**: An OP must link to a th-role bearing GF, either through structure-sharing or anaphoric binding.

We are not concerned here with the possibility of satisfying the ECC through anaphoric binding. This is the situation that occurs with resumptive pronouns, where an OP binds a pronoun, an option that English makes little use of, but other languages use quite freely. We will only be concerned with the possibility of satisfying the ECC through structure-sharing.

The ECC requires the value of an OP to fill another GF as well, which accounts for the contrast between (1) and (7):

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maintained, and the GF OP, which is used in the rest of this paper, could be taken to be a class of GFs comprising TOPIC and FOCUS.

[2] An alternative formulation might say that an OP must link to a within-clause GF. The crucial difference between the two formulations is that there are athematic within-clause GFs, such as expletive *there* and *it*. Since these athematic GFs cannot link to an OP, the formulation of the ECC in (6) seems preferable to this alternative.

(7) * Which book did Kim read *Barriers*?

In (1), the OP *which book* is structure-shared with the object of *read*, thus satisfying the ECC, as well as all other applicable constraints, including the completeness requirement that all th-role bearing GFs have a PRED value. In (7), on the other hand, the OP cannot satisfy the ECC without violating some other constraint: If it is structure-shared with the subject or the object of *read*, it violates consistency (or uniqueness), as the f-structure will have two PRED values; it cannot be structure-shared with an adjunct, as it does not satisfy the semantic and morphosyntactic requirements of an adjunct.[3]

The ECC rules out all structures with an OP that is not structure-shared with a th-role bearing GF: We do not need additional principles (such as functional uncertainty equations) enforcing this structure-sharing relation. However, we do want to constrain this relation because certain structure-sharing relations are not possible. Stating these constraints is the job of the theory of structure-sharing, which is presented in what follows.

3 The nonthematic constraint on structure-sharing

The theory of structure-sharing builds on the claim that structure-sharing relations have enough properties in common across constructions to warrant a theory that constrains these relations in whatever constructions they may arise. Raising and LDD are two classes of constructions that have consistently been treated as involving structure-sharing in LFG; the same can be said about HPSG and GB/MP, taking movement to be the analogue of structure-sharing in frameworks that use movement. In a raising-to-subject sentence such as (8), the matrix subject is structure-shared with the subject of the embedded clause:

(8) Kim seems to resist temptation.

SUBJ SUBJ

The first property that structure-sharing relations have in common in both raising and LDD is that one of the GFs involved in these relations is always a nonthematic GF. If we take a nonthematic GF to be a GF that is not licensed by its mapping to a semantic participant, whether argument or adjunct, it is clear that both raising and LDD involve a nonthematic GF in their structure-sharing relation. The OP in a LDD does not show the local relation of an argument or an adjunct with its predicate, since the dependency relation between the OP and the predicate with which it is interpreted is unbounded,

[3] Notice that, if, instead of *which book*, the OP were an NP such as *which year* or *which way*, it would satisfy the semantics and the morphosyntactic requirements of a temporal or a manner adjunct. Such OPs would be able to be structure-shared with a th-role bearing GF, namely, an adjunct, thus satisfying the ECC and not violating any other constraint.

and it is always the other GF structure-shared with the OP that is licensed as an argument or an adjunct. In raising, by definition, one of the GFs in the structure-sharing relation does not bear a thematic role in its clause: in (8), for example, the matrix subject *Kim* is not a semantic argument of *seems*; if it appears to bear a thematic role, it is because the structure-shared subject of the embedded clause is a semantic argument of *resist*. This observation holds both for raising-to-subject constructions such as (8) or examples like *Kim strikes me as lacking the necessary enthusiasm*, where the matrix subject is nonthematic, and for raising-to-object constructions like *I believe Kim to be a good candidate*, where the matrix object is nonthematic.

The second property common to structure-sharing relations is the claim that the nonthematic GF in this relation is always structurally more prominent than the other GFs involved in the relation. In raising, the nonthematic GF of the raising predicate is always in a less embedded f-structure than the other GF structure-shared with it. In (8), for example, the nonthematic GF is in the matrix clause, whereas the thematic GF structure-shared with it is in the embedded clause. The nonthematic SUBJ or OBJ of a raising predicate is structure-shared with a GF in a subordinate f-structure; never vice versa. In LDD, the thematic GF structure-shared with an OP is either in an f-structure subordinate to that in which the OP appears or, if it is in the same f-structure, is lower in the GF hierarchy than the OP. The contrast between (9) and (10) illustrates the claim that the OP cannot be in an f-structure subordinate to that in which the structure-shared thematic GF appears.

(9) a. Which book do you think [Kim will read ___]?

b. Which book do you hope [___ will amuse Kim]?

(10) a. * ___ announced [who (that) the car broke down]?

(Who announced that the car broke down?)

b. * Kim told ___ [(that) she thought [who (that) Fred could go]]?[4]

(Who did Kim tell that she thought that Fred could go?)

We can capture these two characteristic properties of structure-sharing relations—the nonthematicity and greater syntactic prominence of one of the GFs involved—as a well-formedness condition on f-structures. For this, we need to define the relevant concept of syntactic prominence, which we will call *f-prominence*. This definition combines the notions of *f-command* and the hierarchy of grammatical functions or *GF hierarchy*. The notion of f-

[4] As noted by a reviewer, a sentence like *Kim told who that she thought that Fred could go?* is essentially ok, but that is because it can be taken to contain an in-situ *wh*-phrase and therefore is not an instance of LDD.

command, from Bresnan 1982, defined in (11), is similar to the notion of c-command, only based on f-structure, rather than on c-structure, relations.

(11) **F-command**: GF α f-commands GF β iff the value of α does not contain β and every f-structure that contains α contains β.

Existing versions of the GF hierarchy, of which there are several in the literature, often only include within-clause functions and place the subject in the highest position and oblique functions in the lowest, with objects in an intermediate position. However, since we need to refer to the OP function in order to determine whether it is more or less prominent than other GFs, we must include the OP function in the GF hierarchy. Given the proposal in Bresnan (2001) and Falk (2001), schematized in (12), that OP and SUBJ constitute a class of GFs, called DF (Discourse Function) in Bresnan (2001), it seems logical to assume that the natural position of the OP in the GF hierarchy is together with its classmate SUBJ, as DF, at the top of the hierarchy, as in (13).[5] And, so, we can define f-prominence as in (14).

(12) DF (Discourse Function) = {OP, SUBJ}

(13) **GF Hierarchy**: DF > OBJ > OBL

(14) **F-prominence**: GF α is more f-prominent than GF β iff α f-commands β and either β does not f-command α or α is higher than β in the GF Hierarchy.

With this asymmetrical relation we can state the main principle of the theory of structure-sharing—the Nonthematic Condition on Structure-Sharing:

(15) **Nonthematic Condition on Structure-Sharing**: In every f-structure containing structure-sharing, one of the structure-shared GFs is nonthematic and more f-prominent than any GF identified with it.

This condition gives the right results in raising constructions such as (8), where, of the two structure-shared GFs, one is nonthematic and more f-prominent than the other one. The raising function, whether a subject or an object, is nonthematic and asymmetrically f-commands the GF structure-shared with it. These properties of raising follow from condition (15) and don't have to be stipulated in the lexical entries of raising verbs, as control equations or in any other way, as argued in Alsina (to appear).[6]

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[5] Bresnan (2000:349, 356) also assumes that the information-structural GFs (TOP and FOC) occupy the highest position in the GF hierarchy, with the subject being in the second position. The present theory is an argument for placing these GFs (OP and SUBJ) in the same position in the hierarchy.

[6] A consequence of Condition (15) is that the null subject of the complement of equi control constructions is not structure-shared with its controller, as the controller is thematic in such constructions. Here, the null subject is assumed to be a null pronominal coindexed with the controller, as argued convincingly in Pollard and Sag 1991 and assumed in much of GB/MP, HPSG (Pollard and Sag 1991, 1994), and

As for LDD, condition (15) predicts contrasts such as those illustrated in (9) vs. (10). In (9), the OP—a nonthematic GF—is more f-prominent than the other GF in the structure-sharing relation as the former asymmetrically f-commands the latter. In (10), on the other hand, the structural relation is reversed and it is the thematic GF that is more f-prominent than the OP, which is in a clause embedded in that where the thematic GF belongs. So, structures like (10) are ruled out by the nonthematic condition (15).

In addition, a theory like the present one allows structures in which a single OP is structure-shared with two thematic GFs, which we may call *multiple gap* constructions, also known as *parasitic gap* constructions. The following, from Engdahl (1983:69), are examples of this type:

(16) a. Which articles did John file ___ without reading ___?

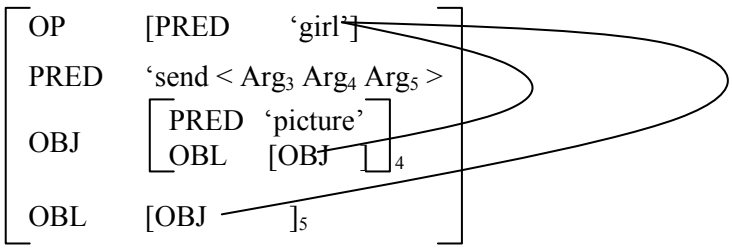
b. This is the kind of food you must cook ___ before you eat ___.

c. Which girl did you send a picture of ___ to ___?

d. Which boy did Mary's talking to ___ bother ___ most?

In these examples, a single filler (or OP) is structure-shared with two gaps or thematic GFs. The ECC is satisfied because the OP is linked, by structure-sharing, with a thematic GF, and the fact that it is linked with two thematic GFs is not excluded by this condition. Also, the structure-sharing relation satisfies the Nonthematic Condition (15) because a nonthematic GF—the OP—is involved in it in all cases and it is more f-prominent than all of the GFs structure-shared with it. In (16a), for example, the OP is structure-shared with the object of the same f-structure, whose predicate is *file*, and with the object of an f-structure in the adjunct introduced by *without*: it is higher in the GF hierarchy than the former structure-shared GF and asymmetrically f-commands the latter. A schematic f-structure representation of example (16c) will serve to illustrate how this sentence satisfies the two relevant conditions:

(17)

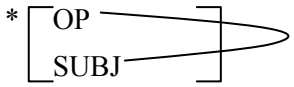


4 The same-clause OP-SUBJ ban

One of the corollaries of the Nonthematic Condition on Structure-Sharing (15) is what we may call the "same-clause OP-SUBJ ban." Since, by (15), the

LFG (Dalrymple 2001). See Alsina (to appear) for details. Similar observations apply to the null subject of adjuncts.

nonthematic GF in a structure-sharing relation must be more f-prominent than any other GF in the relation, it follows that an OP cannot be structure-shared with a SUBJ in the same f-structure: the two GFs are equal in f-prominence, as they f-command each other and they occupy the same position in the GF hierarchy. Thus, any f-structure containing the feature structure shown in (18) is ruled out by the Nonthematic Condition (15):

(18) 

A consequence of (18) is that a *wh*-phrase filling the subject of the main clause of an interrogative or relative clause is not an OP, but simply a SUBJ. In other words, there is no LDD in sentences like *Who ate the cookies?* or *I saw the girl who ate the cookies*: There is just a subject that has the appropriate features as an interrogative or relative pronoun.

This section presents some of the empirical consequences of the same-clause OP-SUBJ ban: the facts of *do*-support in matrix interrogatives, the facts of coordination of clauses with a topicalized constituent, the facts of *that*-less non-*wh* relative clauses, and the implications for multiple gaps, all of these facts from English, and the distribution of French interrogative *que*.

4.1 Do-*support*

The generalization about the distribution of supportive *do* in English is that, in a direct question with a clause-initial *wh*-phrase, an auxiliary must immediately follow this phrase, except if this *wh*-phrase is the matrix subject. Auxiliary *do* appears in this context, when no other auxiliary is semantically appropriate and it makes no semantic contribution. Hence the term *do-support*. The presence of *do* in (19) compared with its absence in (20) illustrates the generalization (examples from Grimshaw 1997:383–388):

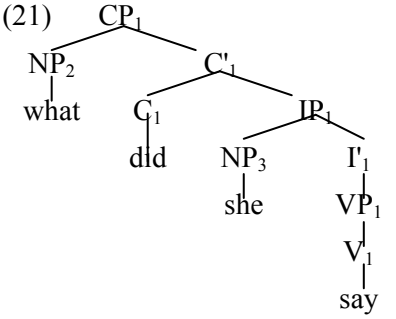
(19) What did she say? (cf. **What she said?*, **What said she?*)

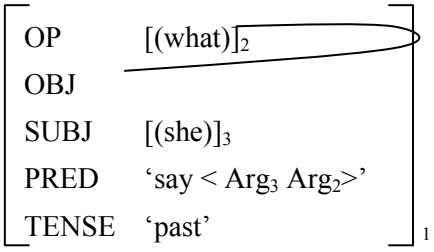
(20) Who saw it? (cf. **Who did see it?* with unstressed *did*)

In (19), the *wh*-phrase fills the object function and an auxiliary is required following it; in (20), it fills the subject of the matrix clause and no auxiliary is required. The main hypotheses that can be used to explain the distribution of *do* are the following: (a) IP and CP are the categories of tensed clauses, as assumed in much work in GB/MP and, within LFG, in Bresnan (2001), Dalrymple (2001), Falk (2001), among others; (b) In English, auxiliaries, unlike non-auxiliary verbs, can occupy the I and C positions (they belong to both categories); (c) By Economy of Expression (Bresnan 1998, 2001), c-structure nodes are used only if necessary; (d) A question phrase in Spec-CP maps onto OP, and a phrase in Spec-IP maps onto SUBJ (principles of c-to-f-structure mapping); and (e) a matrix CP has an obligatory X^0 head.

Given these hypotheses, the c-structure and f-structure of example (19) would be as shown in (21):

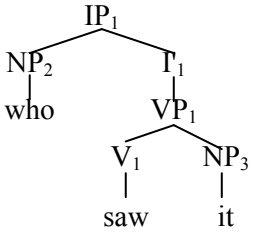
(21)

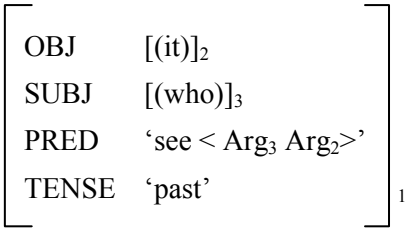




The interrogative phrase *what* appears in Spec-CP and maps onto an OP; as there is a CP and it is a matrix CP, it must have an X^0 head; auxiliary *did* satisfies this requirement. On the other hand, when the interrogative phrase fills the subject function, as in (20), it cannot be in Spec-CP, as it would then map onto an OP creating the ill-formed configuration in (18). If, however, this phrase is in Spec-IP, it does not map onto an OP, but onto a SUBJ, and no principle is violated, as in the structures in (22) corresponding to (20):

(22)





Since there is no CP in (22), as there is no Spec-CP, there is no head C either. Consequently, there is no position for auxiliary *do*. Thus, the contrast between (19) and (20) is explained in a way that crucially depends on the same-clause OP-SUBJ ban. If it weren't for this, nothing would prevent having the *wh*-phrase in (20) in Spec-CP, mapping onto an OP and being structure-shared with the SUBJ of the same clause. We would then expect supportive *do* to appear in (20), as it does in (19).

4.2 Topicalization and coordination

Topicalization is an LDD construction in which a non-wh phrase in clause-initial position satisfies a GF either in the clause where the topicalized phrase appears or in a clause indefinitely embedded in it, as in (23):

(23) a. Dogs, Fred is scared of ___.

b. Dogs, I've always known Fred is scared of ___.

Here, *dogs* is both OP, as required by the position it occupies, and the OBJ of the preposition *of*, with an unbounded distance between the two GFs. If there were no restriction against an OP being structure-shared with the SUBJ of the same f-structure, we might expect an example like (24) to have an analysis in

which *dogs* is both the OP and the SUBJ of the same clause, as an alternative to the analysis in which *dogs* is simply the SUBJ.

(24) Dogs drive me crazy.

The evidence that it is not possible to analyze *dogs* as an OP in an example like (24) comes from coordination of clauses involving topicalization. It is possible to coordinate two sentences with a shared topicalized phrase, as shown by examples like (25), but this coordination is not possible if the topicalized phrase has to fill the subject function of the main clause in one of the two conjuncts (and not in the other), as in (26).

(25) a. Dogs, Fred is scared of ___ and Kim adores ___.

b. Dogs, Fred is scared of ___ and I know ___ can be dangerous.

(26) a. * Dogs, Fred is scared of ___ and ___ drive me crazy.

b. * Dogs, ___ drive me crazy and Fred is scared of ___.

If it were possible to have an OP structure-shared with the SUBJ of the same f-structure, the examples in (26) should be fine. The ungrammaticality of (26) follows from the same-clause OP-SUBJ ban and from standard assumptions about topicalization and coordination. These assumptions are: (a) a topicalized phrase is adjoined to IP and a phrase adjoined to IP maps onto OP (see Bresnan 2001, Dalrymple 2001, among others); (b) coordinated constituents map onto a set of f-structures; and (c) a constituent that maps onto a GF in a set is a GF in each of the set's f-structures (see Bresnan, Kaplan, and Peterson 1985, Kaplan and Maxwell 1996, Dalrymple 2001, Peterson 2004, among others). It follows from these assumptions that, if a phrase like *dogs* in (25)–(26) is an OP, it is an OP in each of the f-structures of the set corresponding to the conjoined clauses. As an OP, it can be structure-shared with any GF in each f-structure, except for the subject at the top level. In (25a), the OP *dogs* is the object of an oblique in the first conjunct and the object of the verb in the second one; in (25b), it is the object of an oblique in the first conjunct and the subject of an embedded clause in the second one. In contrast, in (26), whereas it is the object of an oblique in one conjunct, it is the subject at the top level in the other conjunct, violating the OP-SUBJ ban. In (26b), if we chose to analyze the clause-initial NP as a subject, the second conjunct would be incomplete, as the required object of the oblique would be missing.

4.3 That-*less non*-wh *relative clauses*

Relative clauses in English, bracketed in (27) and subsequent examples, can be formed without any clause-initial *wh*-phrase or complementizer:

(27) a. This is the book [I read ___].

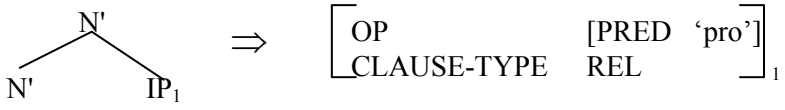
b. This is the book [I hoped ___ would sell like hot cakes].

As in all relative clauses, there is a missing or relativized GF, which is generally assumed to be structure-shared with an OP at the top level of the relative clause. However, there is one restriction in this type of relative clause: the missing or relativized GF cannot be the subject at the top level of the relative clause:

(28) a. * This is the book [___ is selling like hot cakes].

b. * This is the book [___ makes me laugh].

The relativized GF can be an object, as in (27a), the subject of an embedded clause, as in (27b), but not the subject of the relative clause, as shown in (28). In order to explain this fact, let us assume that a relative clause is a CP or an IP adjoined to N' (see Dalrymple 2001), that a *that*-less non-*wh* relative clause is an IP, and that an IP adjoined to N' licenses an OP in the f-structure of the IP, as expressed in the following mapping principle, where the feature [CLAUSE-TYPE REL] marks the structure as a relative clause:

(29) 

The OP introduced by this mapping principle has to satisfy the ECC by being in a structure-sharing relation with another GF. This structure-sharing relation has to satisfy the Nonthematic Condition (15), which means, among other things, that it cannot involve an OP and a SUBJ at the same level of structure. This explains the contrast between (27) and (28): in (28), the OP introduced by rule (29) would have to be structure-shared with the subject of the same clause, violating condition (15), whereas in (27) this condition is not violated because the OP is structure-shared with GFs other than the subject of the same f-structure.

It is worth noting that the presence of the complementizer *that* introducing the relative clauses in (28) makes the examples grammatical:

(30) a. This is the book [that is selling like hot cakes].

b. This is the book [that makes me laugh].

We can assume that this complementizer optionally licenses a pronominal DF in the relative clause it introduces. Since a DF is either OP or SUBJ, this means it either licenses a pronominal OP, as in (29), or a pronominal SUBJ. The latter option makes the examples in (30) grammatical.[7]

4.4 No parasitic gap structure-shared with a higher subject

Another consequence of the same-clause OP-SUBJ ban is that a wh-phrase filling a subject function cannot fill another GF in a structurally less

[7] Alternatively, one could assume that, as well as a complementizer, *that* is a subject *wh*-phrase, as proposed in Sag (1997) and Hudson (1990).

prominent position. This is because the *wh*-phrase cannot be an OP: if it were, it would have to be structure-shared with the subject at the same level creating the ill-formed OP-SUBJ configuration. As the *wh*-phrase has to be a SUBJ, being a thematic GF it cannot be structure-shared with a less prominent GF without incurring a violation of the Nonthematic Condition (15). Relevant examples corresponding to the ill-formed structures are the following (from Engdahl 1983:84):

(31) a. * Which articles got filed by John without him reading ___?

b. * Who sent a picture of ___?

c. * Which articles did you say [___ got filed by John without him reading ___]?

In (31a–b), the *wh*-phrase is the subject of the matrix clause and therefore cannot be the OP of the matrix clause as well. As a subject and a thematic argument, if it were structure-shared with a less f-prominent GF, it would violate the Nonthematic Condition (15). Therefore, the GFs signaled by a dash don't have any features and, so, result in a violation of completeness. In (31c), the *wh*-phrase is the OP of the matrix clause and the SUBJ of the embedded clause. However, as the Nonthematic Condition (15) has to be satisfied in every f-structure containing structure-sharing, it also has to be satisfied in the embedded clause, signaled by brackets in (31c), but here the structure would violate this condition as the structure-sharing relation would not involve a nonthematic GF.

The contrast between (32) and (33), from Engdahl (1983:89), follows from this condition and from the difference in structure between the two examples. In (32), the f-structure complement of *say* does not satisfy (15) because there is no nonthematic GF involved in the structure-sharing relation. In (33), on the other hand, neither of the embedded clauses contains structure-sharing and condition (15) is satisfied in the matrix f-structure.

(32) * Which caesar did Cleopatra say
[___ was impressed [by her singing to___]]?
OP [SUBJ [OBJ]]

(33) Which caesar did Brutus imply
[___ was senile] [by mimicking ___ in public]?
OP [SUBJ] [OBJ]

4.5 Interrogative que *in French*

A superficial comparison between the interrogative elements *qui* and *que* in French might suggest that the difference is merely semantic: *qui* is animate

and *que* is inanimate. The following examples seem to suggest that the two elements have a similar syntactic distribution:[8]

(34) Qui / Qu' est-ce que tu as vu ___ ?
who what is-it that you have seen
'Who/What have you seen?'

(35) Qui / Qu' est-ce qui ___ te dérange?
who what is-it that you annoys
'Who/What annoys you?'

In (34) and (35), both *qui* and *que* can be either the object or the subject of a verb. However, the structure of these examples is biclausal, with the OP licensed by the interrogative element being in the matrix clause and the within-clause GF structure-shared with it being in the embedded clause that follows the matrix verb *est-ce*. An alternative interrogative structure exists that does not use this dummy verb, as in the following examples. In (36), the interrogative elements fill the object function of the matrix verb, but in (37)–(38), where they fill the subject function of the matrix verb, the structure is good with *qui* and bad with *que*.

(36) Qui / Que vois-tu?
who what see-you 'Who/What do you see?'

(37) a. *Que te dérange?
what you annoys 'What annoys you?'

b. Qui te dérange?
who you annoys 'Who annoys you?'

(38) a. *Qu' est tombé en terre?
what is fallen on floor 'What fell on the floor?'

b. Qui est tombé en terre?
who is fallen on floor 'Who fell on the floor?'

All that needs to be assumed in order to explain these facts is that interrogative *que* is required to map onto an OP. In contrast, *qui* is not restricted as to the GF that it can map onto: it is an ordinary interrogative NP, and as such it can occupy any NP position and map onto any GF that an NP can map onto. Both *qui* and *que* map onto OP in (34)–(36): as such, they can also satisfy the object or the subject function of the embedded clause, as in (34) and (35) respectively, or the object function of the same clause, in (36). The contrast in (37) and (38) follows from the claim that *que* must map onto OP, whereas *qui* is not restricted in this way: in (37b)–(38b), *qui* maps onto the subject function (not onto the OP function) and the structures satisfy all available constraints; in (37a)–(38b), *que* maps onto the OP function and

[8] The relevance of the facts that follow to the theory of structure-sharing presented here was suggested by Anna Gazdik's talk at the LFG08 Conference.

cannot be structure-shared with the subject of the same clause because of the same-clause OP-SUBJ ban, which means that the structures lack a subject.

The ungrammaticality of (37a)–(38a) cannot follow from a restriction against *que* satisfying a subject function because *que* can satisfy a subject function, provided the subject is in a clause embedded in the clause introduced by *que*, as shown by example (35a) and by (39):

(39) Que crois-tu qui est tombé en terre?
what think-you that is fallen on floor
'What do you think fell on the floor?'

In support of the claim that *qui* is not restricted as to the GF it can map onto, unlike interrogative *que*, note that *qui* can appear as an object of a preposition or as an *in situ* object of a verb, whereas *que* lacks this distribution: *de qui* 'of whom' vs. **de que* 'of what', *avec qui* 'with whom' vs. **avec que* 'with what', or *tu connais qui?* 'you know whom' vs. **tu connais que?* 'you know what', etc. The form *quoi* 'what' can appear in these contexts.

5 Locality and f-binding

Although the theory of structure-sharing presented so far accounts for significant restrictions in both raising and LDD constructions, there are still some facts that the Nonthematic Condition (15) alone cannot account for. This condition does not account for two observations about the relation between structure-shared GFs in raising: (a) given any two structure-shared GFs, there must be a GF in this structure-sharing relation in every clause containing only one of the two structure-shared GFs, and (b) the less prominent of the two is a SUBJ. In other words, the less prominent of any two structure-shared GFs in raising is always a SUBJ and there is a GF structure-shared with it not more than one level up. The following are ungrammatical examples in which the structure-sharing relation either skips a clause (involves GFs at non-adjacent clauses), as in (40), or does not involve a SUBJ in the lower clause, as in (41):

(40) a. * Mary seemed [that I thought [to be impatient]].
SUBJ [[SUBJ]]

b. * I believed Fred [that it was likely [to arrive late]].
OBJ [[SUBJ]]

(41) a. * Kim appeared [for a new sweater to please].
SUBJ [OBJ]

b. * I believed Fred [that I should invite to stay].
OBJ [OBJ]

These examples satisfy the Nonthematic Condition on Structure-Sharing (15) and yet they are ungrammatical. In all of them, the matrix GF indicated in the schematic representation beneath the example is nonthematic (e.g., the subject of *seem* or the object of *believe*) and it is more f-prominent than the GF they are structure-shared with.

In order to rule out these examples, we need to further constrain the structure-sharing relation. In the case of raising, we want the structure-sharing relation to involve a SUBJ in every f-structure containing the lower of two structure-shared GFs. This requirement can be generalized so that it is also valid for LDD by requiring the presence of a DF (the class of GFs that includes OP, as well as SUBJ), as in the following principle:

(42) **Locality of Structure-Sharing**: If f-structure F contains a GF G structure-shared with a GF that f-commands F, F has a DF structure-shared with G.

By this principle, every f-structure that contains the less f-prominent of two structure-shared GFs has a DF (a SUBJ or an OP) involved in this structure-sharing relation. This principle makes the representations indicated in (40)–(41) ill-formed. However, if we assume that a GF, such as an OP, can be freely included in a structure, provided its presence serves to satisfy a principle, such as (42),[9] then Locality (42) by itself does not exclude examples (40)–(41), as there are alternative representations that satisfy this principle, such as the following:

(43) a. * Mary seemed [that I thought [to be impatient]].
SUBJ [OP [SUBJ]]

b. * I believed Fred [that it was likely [to arrive late]].
OBJ [OP [SUBJ]]

The OP in these structures would allow these structures to satisfy Locality, as every f-structure containing the lower of two structure-shared GFs has a DF (in this case, an OP) involved in the structure-sharing relation.

It is clear that, whereas in raising only a SUBJ can be chosen as the DF referred to by Locality (42), in LDD only an OP can be chosen for this purpose. The choice of one or the other depends on the "binding" conditions that follow. For example, in order to rule out the structures in (43), we need to assume that only a subject can be "bound" by a non-OP (i.e., only a subject can be "bound" by a GF other than an OP). The statement of these binding conditions depends on the definition of the relevant notion of "binding", which we will call *f-binding*, to distinguish it from the notion of binding used

[9] This can be done by generalizing Bresnan's (1998, 2001) Economy of Expression to apply not only to c-structure categories, but also to features in the f-structure: elements of structure (categories in c-structure, GFs in f-structure) can be used only if their presence serves to satisfy some principle (or is required for semantic reasons).

in anaphoric relations. F-binding is defined as follows:

(44) **F-binding**: α f-binds β iff

a. α and β are different GFs with the same value, and

b. there's an argument in α's f-structure that is equal to β or has β as a feature and is not higher than α in the GF hierarchy.

In other words, in order to say that there is an f-binding relation between two structure-shared GF, one of them has to be an argument or a feature of an argument in the f-structure where the other structure-shared GF is a feature and the latter cannot be lower than said argument in the GF hierarchy. This notion is relevant to both raising and LDD, as we will see. The first f-binding condition to be presented is the Non-SUBJ Binding Condition:

(45) **Non-SUBJ Binding Condition (NON-SUBJ)**: a non-SUBJ can only be f-bound by an OP.

This principle rules out the representations given under the examples in (43), since the OP shown there (a non-SUBJ) is f-bound by a GF other than an OP—a SUBJ in (43a) or an OBJ in (43b). Thus, Locality (42) and NON-SUBJ (45) together rule out the examples in (40)–(41).

These two principles also rule out well-known ungrammatical instances of multiple (or parasitic) gaps:

(46) a. * Which slave did Cleopatra give ___ to ___?

b. * Which slave did Cleopatra give ___ ___? (Engdahl 1983:87)

(47) a. * Who did you inform ___ that you disliked ___?

b. * Who did you show ___ pictures of ___?

c. * Robin wasn't someone who I was able to persuade ___ to (allow Terry to) talk about ___. (Levine and Hukari 2006:40, 43)

These sentences are ruled out by NON-SUBJ (45).[10] The following schematic representations of examples (46b) and (47c) show this:

(48) a. * Which slave did Cleopatra give ___ ___ ?

OP OBJ OBJ

b. * Robin wasn't someone [who I was able
[to persuade ___ [to allow Terry [to talk [about ___]]]]]]
[OP [OP OBJ [OP [OP OBJ]]]]]]

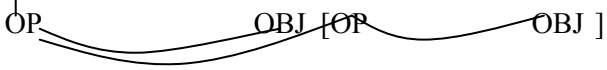
The dotted line in these representations shows the part of the structure-sharing relation that violates NON-SUBJ (45). In (48a), each OBJ is f-bound by the other OBJ; in (48b), the OP in the f-structure corresponding to the

[10] In other theories (e.g., Engdahl 1983) they are ruled out by an anti-c-command condition, which does not allow a gap to be c-commanded by a coindexed gap.

clausal complement of *persuade* is f-bound by the OBJ of this verb. The crucial difference between ill-formed instances of multiple gaps like (48b) and well-formed ones like (16a–b) is that the clausal f-structure following the object gap is an argument in the former, but an adjunct in the latter. Given the definition of f-binding (44), an adjunct and any GF of its f-structure is not f-bound; consequently, condition (45) is always satisfied with respect to the relation between a GF in a clause with an adjunct and a GF in that adjunct.

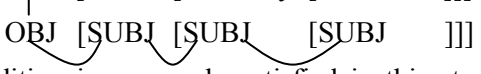
The Locality condition (43), together with NON-SUBJ (45), requires an OP structure-shared with the gap to appear in every f-structure containing a gap and f-commanded by the overt OP, except in an f-structure with a subject gap. Thus, long-distance dependencies are decomposed into a sequence of local dependencies.[11] Example (16a) would have an OP in the f-structure of the adjunct introduced by *before*, to satisfy Locality:

(49) Which articles did John file __ [without reading __]?



Needless to say, raising can also involve a dependency across several clauses, provided all relevant conditions are satisfied, in particular, the Nonthematic Condition (15), Locality (42), and NON-SUBJ (45), as in example (50):

(50) I consider Kim [to be [unlikely [to finish]]]



The NON-SUBJ condition is vacuously satisfied in this structure, because there is no f-bound non-SUBJ, but it prevents the appearance of an OP structure-shared with the raised GFs in any of the embedded clauses.[12]

Certain additional facts about raising and LDD still need to be accounted for. In the first place, raising is restricted to occur out of complements: it does not occur out of subjects or adjuncts. Relevant ill-formed examples of these types of structures are the following:

(51) a. * [To have missed the train] was believed Kim.

b. * There seemed [after being a storm] that Kim would come.

[11] Notice that this resembles the standard GB/MP analysis of LDD (since Chomsky 1973), where a constituent moves into the closest Spec-CP and subsequently to higher positions, the standard GPSG and HPSG analysis (since Gazdar 1981), where every phrase containing a gap up to the phrase containing the filler has a SLASH feature specified with the syntactic features of both the filler and the gap, and even some LFG analyses, such as Sells (2000), Berman (2003), and Asudeh (2004), although there are significant difference with all of these proposals.

[12] A consequence of NON-SUBJ (45) is that in raising only a subject may be structure-shared with a more f-prominent GF (see Alsina to appear). This encounters a problem in the claim that some languages have raising of an object by Seiter (1983), but the evidence is compatible with an analysis as a *tough*-construction.

(51a) satisfies the relevant conditions: as the object *Kim* is nonthematic and more f-prominent than the structure-shared subject of the subject clause, it satisfies the Nonthematic Condition (15); as the structure-shared subject of this clause is a DF, it satisfies Locality (42); and, as there is no f-bound non-SUBJ, NON-SUBJ (45) is satisfied as well. Similar observations can be made about (51b), only here the embedded clause is an adjunct.

In the second place, extraction of subjects can only occur out of complements: there is no subject extraction out of subjects and adjuncts, as the following examples illustrate:

(52) a. * Those politicians, who [that ___ came] bothers me, …

b. * Who did you enter the room [once ___ started talking]?

In (52a), there is an extraction of a subject out of a subject clause and, in (52b), there is an extraction of a subject out of an adjunct clause. Again, the corresponding structures satisfy all relevant conditions proposed so far.

In the third place, raising can only occur out of tenseless clauses, as the contrast in (53) illustrates. The main difference in structure is that (53a) has a tensed clausal complement and (53b) has a tenseless clausal complement: whereas raising is possible in the latter, it is not in the former

(53) a. * Kim seems (that) has missed the train.

b. Kim seems to have missed the train.

These facts can be accounted for by the fourth and last principle of the theory of Structure-Sharing:

(54) **SUBJ Binding Condition (SUBJ Bind)**: A SUBJ that is structure-shared with a more f-prominent GF is

a. f-bound in a non-SUBJ f-structure and

b. in a tenseless f-structure if its closest f-binder[13] is not OP.

Clause (a) of this condition rules out examples (51) and (52). Structure-sharing into an adjunct implies no f-binding into the adjunct, accounting for (51b) and (52b). An object does not f-bind into the subject, accounting for (51a). In (52a), the extracted subject is f-bound, but not in a non-SUBJ f-structure, as clause (a) of (54) requires, as it is in a SUBJ f-structure. Clause (b) rules out example (53a), as the structure-shared subject is in a tensed f-structure and its closest f-binder is not OP, but SUBJ, and accepts example (53b), where the structure-shared subject is in a tenseless f-structure.

An additional consequence of SUBJ Bind (54) is that it rules out instances of multiple gap constructions not ruled out so far, such as the following, where there is a subject gap whose closest f-binder is an object:

[13] We can define *closest f-binder* as follows: Given two or more f-binders of γ, of which α is one, α is the closest f-binder of γ if α does not f-bind any f-binder of γ.

(55) *Who did you inform ___ [___ should submit the abstract as soon as possible]?

The structure-shared subject of the embedded clause has a non-OP as its closest f-binder (the object of *inform*), but it is in a tensed f-structure and thus violates SUBJ Bind (54), clause (b).

6 Conclusion

The theory presented here unifies the treatment of LDD and raising through a small set of principles governing structure-sharing. Regarding LDD, it captures significant restrictions about the relation between the filler and the gap, it allows for multiple gap constructions (such as parasitic gaps), it excludes ungrammatical instances of multiple gaps, and it appropriately constrains possible structure-sharing relations in raising. It dispenses with functional control equations (e.g., functional uncertainty) as a means of expressing one-to-many mappings between c- and f-structure. It requires abandoning the idea that everything in the f-structure is encoded through annotations on the c-structure. This calls for a new conception of the mapping between c-structure and f-structure, one in which general well-formedness conditions—on each structure and on their mapping—govern this correspondence, doing away with the additional level of annotated c-structure.

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NOT ALL OBJECTS ARE BORN ALIKE
– accessibility as a key to pronominal object shift in Swedish and Danish

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Abstract

This paper presents results from a corpus investigation of written Swedish and Danish. The results show that pronominal objects with clausal or VP antecedents appear relatively more seldom before sentence adverbials, i.e. are more seldom shifted, than referents with NP antecedents. I argue that this is due to a difference in cognitive status (cf. Gundel, Hedberg & Zacharski 1993), where pronouns with clausal or VP antecedents that appear in +FACTIVE environments and pronouns with NP antecedents are easier to process, which licenses object shift as well as an unstressed pronunciation. Pronominal objects with clausal or VP antecedents in –FACTIVE environments are harder to process and appear after sentence adverbials. For the LFG architecture the relation between cognitive status and information packaging gives rise to the need for a more fine grained value of the i-structure ACTVN feature introduced by O'Connor (2006).

The paper also raises the question on whether research about the underlying mechanisms of object shift should be limited to two syntactic positions, i.e. object placement in relation to the sentence adverbial. Preliminary results show that the initial position in V2 clauses also need be investigated.

1 What is pronominal object shift?

The Scandinavian languages are similar in many respects. Their mutual history has resulted in the lexicon and the syntactic structures being very similar. These similarities provide an environment where the study of the differences come to resemble a laboratory situation, and the variation can be studied in the backdrop of the major part of the grammatical system being constant. This paper deals with one of these small syntactic differences, namely pronominal object shift. Object shift is a phenomenon that has attracted the interest of many linguists over the years and it is consequently well described in the literature, just a few examples are: Holmberg (1986, 1999), Hellan & Platzack (1995), Josefsson (1992; 2003), Sells (2001), Svenonius (2002) and Vikner (1994, 1997).

Holmberg's generalization (Holmberg 1986; 1999) says that pronominal objects in the Scandinavian languages normally appear before sentence adverbials, see example (1a) where *honom*/*ham* appear before the sentential negation *inte*/*ikke*. This position will be called *shifted* throughout this paper. It is only possible for a pronominal object to appear in the shifted position when the lexical verb is in the V2 position, see the ungrammatical (1b) where the lexical verb *sett*/*sedt* is in VP.

(1) a. Agnes såg *honom* inte. [SW]
Agnes så *ham* ikke. [DA]
Agnes see-PST him not
'Agnes didn't see him.'

† I thank the audience of LFG08 at the University of Sydney, in particular George Aaron Broadwell, the colleagues at the University of Aarhus and at the NORMS Grand Meeting, Kersti Börjars and Elisabet Engdahl for helpful comments.

b. *Agnes har *honom* inte sett. [SW]
*Agnes har *ham* ikke sedt. [DA]
Agnes have-PRS him not see-PSTP
'Agnes hasn't seen him.'

Full NP objects appear after sentence adverbials in all Scandinavian languages except Icelandic, also when the lexical verb is in the V2 position, see example (2a) and the ungrammatical (2b). The object position after the sentence adverbial will be called *in situ* throughout this paper.

(2) a. Agnes såg inte *nallen*. [SW]
Agnes så ikke *bamsen*. [DA]
Agnes see-PST NEG teddy-bear-DEF
'Agnes didn't see the teddy bear.'
b. *Agnes såg *nallen* inte. [SW]
*Agnes så *bamsen* ikke. [DA]
Agnes see-PST teddy-bear-DEF NEG
'Agnes didn't see the teddy bear.'

In Icelandic full NP objects may also appear before a sentence adverbial when the lexical verb is in V2, see (3) (from Vikner 2005). Shift of full NPs is not discussed in this paper.

(3) a. Af hverju las Pétur aldrei *þessa bók*? [ICE]
what read-PST Peter never this book
'Why did Peter never read this book'
b. Af hverju las Pétur *þessa bók* aldrei. [ICE]
what read-PST Peter this book never
'Why did Peter never read this book?'

One feature of pronominal objects that has been seen as the key to why the objects appear before sentence adverbials is the fact that only pronouns without stress – so called "weak" objects – may appear in the shifted position. In example (4) these unstressed pronouns are marked with a superscripted zero.

(4) Agnes letade efter David, men hon såg ^{0}*honom* inte. [SW]
Agnes søgte efter David, men hun, så ^{0}*ham* ikke. [DA]
Agnes look-PST after David but she see-PST him not
'Agnes was looking for David, but she didn't see him.'

If a pronoun has a contrastive interpretation it is pronounced with contrast intonation, here marked with superscripted double apostrophes and it cannot shift, see (5), where *honom*/*ham* is contrasted with *Agnes* in the preceding sentence.

(5) David såg Agnes, men hon såg inte "*honom*. [SW]
David så Agnes, men hun så ikke "*ham*. [DA]
David see-PST Agnes, but she see-PST not him
'David saw Agnes, but she didn't see him.'

In Swedish, the non-stressed pronominal objects may also marginally appear in situ, see example (6). This word order may also be found in Norwegian and Danish dialects (cf. Pedersen 1993). However, all further reference to Danish in this paper is about standard Danish.

(6) Agnes letade efter David, men hon såg inte ^{0}*honom*. [SW]
*Agnes søgte efter David, men hun så ikke ^{0}*ham*. [DA]
Agnes look-PST after David but she see-PST NEG him
'Agnes was looking for David, but she didn't see him'

A factor that is often left out in investigations of object shift is the fact that the shifted and in situ positions are not the only possible positions for pronominal objects in the Scandinavian languages. Pronominal objects are also very frequent in the first position, immediately before the finite verb in V2 sentences, see (7), where the object *den* appears as the first element of the clause. This is a position where both contrasted and non-contrasted objects appear.

(7) Det var en nalle i väskan, men *den* såg hon inte. [SW]
Der var en bamse i tasken, men *den* så hun ikke. [DA]
it/there be-PST a teddy-bear in bag-DEF but it saw she not
'There was a teddy bear in the bag, but she didn't see it.'

We will not deal with this position in this paper, but, as we will see later, some preliminary results indicate that the initial position is indeed of relevance for the analysis of the factors that trigger object placement, and hence object shift, in the Scandinavian languages.

Most analyses of pronominal object shift deal only with pronouns with NP antecedents, as those discussed in the examples so far, even if this does not seem to be a deliberate delimitation. In this paper these kinds of objects are called pron$_{<e>}$, where <*e*> = 'entity'. The possible positions for pron$_{<e>}$ in Swedish and Danish in relation to contrast are summarised in figure 1, below.[1]

[1]The phenomenon of so called long object shift (cf. Josefsson 1992, 2003), where an object appears after the finite verb, but before the subject (as in *I år gav mig$_{obj}$ Anders$_{subj}$ inte någon julklapp*, 'This year Anders did not give me any christmas gift') is not included here and will not be discussed in this paper.

SWEDISH	*1st position*	*shifted*	*in situ*
non-contrasted	✓	✓	✓
contrasted	✓	*	✓

DANISH	*1st position*	*shifted*	*in situ*
non-contrasted	✓	✓	*
contrasted	✓	*	✓

FIGURE 1: *Positions for pronominal objects with NP antecedents, pron$_{<e>}$, in Swedish and Danish*

Nevertheless, not all pronouns "are born alike" and this paper deals mostly with the distribution of pronominal objects with non-NP antecedents. This category of objects has not received much attention in the object shift literature (however see Lødrup 1994). Example (8a) shows a pronominal object with a clausal antecedent, while the object in example (8b) has a VP antecedent.

(8) a. [Agnes är söt.]$_i$ Tycker du inte *det$_i$*? [SW]
[Agnes er smuk.] Synes du ikke *det$_i$*? [DA]
Agnes be-PRS cute think-PST you NEG that
'Agnes is cute. Don't you think so?'

b. David har [sett brevet i din väska]$_i$. *Det$_i$* har
David har [sedt brevet i din taske]$_i$. *Det$_i$* har
David have-PRS see-PPRT letter-DEF in your bag that have-PRS
jag också. [SW]
jeg også. [DA]
I also
'David has seen the letter in your bag. So have I.'

In example (8a) the antecedent of the object pronoun *det* is the entire preceding clause and in (8b) it is the VP of the preceding clause that is the antecedent of *det*. Throughout this paper, these objects are labelled pron$_{<t>}$ for pronominal objects with clausal antecedents, and pron$_{<e,t>}$ for pronominal objects with VP antecedents.

2 The investigation and the project

This paper reports results from an investigation of the relative order of the negation *inte/ikke* and *det$_{<t>}$/det$_{<e,t>}$* in corpora of written Swedish and Danish. The Swedish corpus *GP04* consists of about 19 million words, one year's edition of the newspaper *Göteborgs-Posten*. The Danish corpus *Korpus 2000* (here: *K2000*) con-

sists of about 28 million words of different genres.[2] The overall aim of the study is to investigate the underlying factors that trigger the shifted or in situ placement of pron$_{<t>}$ and pron$_{<e,t>}$ although comparative studies of pron$_{<e>}$ (the pronouns *honom*/*ham* 'him', *henne*/*hende* 'her' and *det*$_e$ 'it') have also been performed. The study has been both quantitative and qualitative. For a more thorough description of the investigation and the corpora, see Andréasson (in preparation).

In the corpora, searches were made for the strings *det inte*/*inte det* for Swedish, and the strings *det ikke*/*ikke det* for Danish. There are 9111 hits for the word order *det inte* in GP04. A systematic sample of 2076 were investigated and in 157 of these *det* turned out to be an object in a sentence with object shift. In K2000 there are 12.000 hits for the string *det ikke*, and, since there was no possibility of getting a systematic sample of all hits, all the 4999 hits that were possible to excerpt from the web interface were investigated. The disambiguation shows that in 191 cases *det* is an object in a sentence with object shift.

Since the sample sizes of differ, estimates of the numbers for the entire corpus for the word orders where *det* precede the negations have been made by multiplying the numbers for *det inte* by 4,4 and for *det ikke* with 2,5. All estimated numbers and percentages building on estimated numbers are marked with a star (*) in the tables throughout the paper.[3]

All the 1457 strings with the word order NEG < OBJ and all the 1913 strings with *ikke det* in GP04 and K2000 were investigated. For *inte det* 290 and for *ikke det* 177 of these are sentences where *det* is an object in the in situ position in a sentence where object shift would have been syntactically possible.

3 Distributional differences: pron$_{<e>}$ vs. pron$_{<t>}$/ pron$_{<e,t>}$

In table 1 numbers for third person singular pronouns for 'him' and 'her' combined with the negations *inte*/*ikke* in GP04 (Swedish) and K2000 (Danish) are presented.

[2]GP04 available in Språkbanken at http://spraakbanken.gu.se/konk/ and K2000 is available at http://korpus.dsl.dk/korpus2000/faq.php?lang=dk

[3]The estimated numbers are intended as approximations. Nevertheless, they are made from a reasonably large sample and the numbers they indicate must be considered as fairly robust. Also, it is rather the fact that the there are so many examples of *det* following the negation that is the most interesting result of the investigation.

SWEDISH	*shifted*		*in situ*	
honom (‘him’)	77		10	
henne (‘her’)	38		2	
Total	115	91%	12	9%

DANISH	*shifted*		*in situ*	
ham (‘him’)	218		20	
hende (‘her’)	107		4	
Total	325	93%	24	7%

TABLE 1: *Distribution of pron$_{<e>}$ (*honom/henne *and* ham/hende *’him’/’her’) + negation (*inte/ikke*) in Swedish and Danish*

Table 1 shows that over 90% of the pron$_{<e>}$ for ‘him’ and ‘her’ are shifted, both in Swedish and in Danish. The 24 in situ hits in Danish all seem to be contrasted, with an overt alternate set as in (9a) or an implicated alternate set as in (9b).

(9) a. Men uanset Jörg Haider, så er det ikke *ham*, men den
but irrespective Jörg Haider so be-PRS it NEG him but the
østrigske regerings politik vi må forholde os til, når
Austrian government-POSS politic we must relate us to when
landet skal bedømmes. [DA]
country-DEF shall judge
‘But, irrespective of Jörg Haider, it is not him, but the Austrian government’s politic we must relate to when we judge the country.’

b. Jalabert, nej han er for gammel. Det bliver ikke *ham*. [DA]
Jalabert no he bePRS for old it becomePRS NEG him
‘Jalabert, no, he’s too old. It not going to be him.’

Among the 12 hits where the Swedish pronouns *honom*/*henne* are in situ, only 5–6 are contrasted, see (10a), and the rest are non-contrasted, see (10b). Since also non-contrasted pronominal objects may appear in situ in Swedish, see example (6) above, this is not surprising.

(10) a. Mister Whitworth verkar inte tycka om fotografer, och
Mister Whitworth seem-PRS NEG like PART photographer-PL and
fotograferna gillar inte *honom*.[SW]
photographer-PL like-PRS NEG him
‘Mister Whitworth seems not to like photographers, and the photographers seem not to like him.’

b. Jag pressade inte *honom* och det är alltid kul att få komma
I pressure-PST NEG him and it is always fun to get come
i mål som vinnare utan att ha en jättetrött häst, sade
in goal as winner without to have a very-tired horse say-PST
Kihlström. [SW]
Kihlström
'I didn't put any pressure on him and it is always nice to finish with a horse that is not completely exhausted.'

Nevertheless, the numbers in the table indicate that it is very rare for pron$_{<e>}$ to appear in the in situ position. This corresponds very well with the common opinion that weak objects shift obligatorily in standard Danish and optionally in Swedish (cf. Holmberg 1986, Josefsson 1992, Togeby 2003).

When it comes to pronominal objects with clausal or VP antecedents, pron$_{<t>}$ and pron$_{<e,t>}$, the investigation shows that these remain in situ to a greater extent than those with NP antecedents, pron$_{<e>}$. In table 2 the percentages of sentences with pron$_{<t>}$ and pron$_{<e,t>}$ in shifted or in situ position are compared with the percentages for sentences with the 3rd person singular masculine and feminine objects that were presented in table 1.

SWEDISH	*shifted* total (estim*)	%	*in situ* total	%	total
honom/henne<e> ('him/her')	115	91%	12	9%	127
<t> & <e,t>	129 (568*)	69% *	260	31%	828

DANISH	*shifted* (estim*)	%	*in situ* total	%	total
ham/hende<e> ('him/her')	325	93%	24	7%	349
<t> & <e,t>	156 (390*)	71% *	158	29%	548

*All numbers and percentages marked with a star are estimated.

TABLE 2: IN SITU *vs.* SHIFTED *placement of* det *with sentential/VP antecedents vs. entity antecedents in Swedish and Danish: Total.*

Both in Swedish and in Danish about 30% of the pron$_{<t>}$ and pron$_{<e,t>}$ appear in situ, and – as opposed to pron$_{<e>}$ – almost none of these turn out to be contrasted. So for this type of pronouns it does not seem to be contrast that makes them appear in situ.

Nevertheless these pronouns do not seem to be unstressed when they appear in situ. In this investigation I deal with written sources, but Danish informants note that a pron$_{<t>}$ or pron$_{<e,t>}$ in an in situ position is necessarily stressed.[4] But they

[4]The Danish informants are colleagues at the university of Aarhus. I also noted this when presenting sentences of this kind to non-linguist informants in Western Jutland in January 2008 (Andreasson, in preparation).

also agree that this stress does not give rise to the implication that there exists an alternate set, i.e. it is not contrastive (cf. Rooth 1992). For Danish, it seems to be obligatory with some kind of stress for *det* in this position, and for Swedish it seems optional.

So it seems that for Danish, it is more or less ungrammatical for an unstressed, weak, object to appear in situ in sentences where object shift is possible and that all objects that appear in situ have some type of stress. For pron$_{<e>}$ this stress is due to the referents being contrasted, but for pron$_{<t>}$ and pron$_{<e,t>}$ the stress needs not be related to a contrastive interpretation. In Swedish also weak objects marginally appear in situ.

4 Accessibility and pronominal reference

The analysis I suggest for pronominal object shift builds on the so called givenness hierarchy of Gundel, Hedberg & Zacharski (1993) presented in Figure 2.

in focus	activated	familiar	identifiable	referential	type identifiable
it	this/that/ this N	that N	the N	indefinite this N	a N

FIGURE 2: *Givenness hierarchy of Gundel, Hedberg & Zacharski (1993).*

In the givenness hierarchy, Gundel et al. (1993) relate the choice of referring expressions in English to different cognitive statuses, so that referents that have not been previously mentioned or implicated in the context are called TYPE IDENTIFIABLE. Reference to these is made with an indefinite NP, *a N*. When the speaker refers to a particular referent its cognitive status is REFERENTIAL and it is possible to use the indefinite *this N*. A referent that is possible to uniquely identify for the listener when hearing the nominal expression has the cognitive status IDENTIFIABLE and reference with a definite NP *the N* may be used. FAMILIAR referents are assumed to be already represented in the listener's memory and reference may be made with for example definite demonstratives. The cognitively most accessible referents, are ACTIVATED or IN FOCUS. Both these statuses include referents that are active in the context and assumed to be represented in the listener's short time memory. Of these, those that are assumed to be on the top of both speaker's and hearer's attention are at the leftmost end of the scale and are said to be IN FOCUS and reference can be made with a pronoun, for example *it* (Gundel et al. 1993:275–280).[5]

Gundel, Borthen & Freiheim (1999; see also Borthen, Fretheim & Gundel 1997) show that for Norwegian the choice between the two highest cognitive levels

[5]Please note that this use of IN FOCUS has nothing to do with information structural FOCUS (as in the GROUND/FOCUS partition), prosodic focus or contrastive focus (in the sense of Rooth 1992).

in the givenness hierarchy does not always correspond to different lexical entities, but to a difference in stress. Pronouns that are IN FOCUS are unstressed, while those that are only on the second highest level – ACTIVATED – are stressed.

This difference in stress corresponds very well with the prosodic difference that was reported for pron$_{<t>}$ and pron$_{<e,t>}$ in section 3. There is one unstressed and shifted *det* and one slightly more stressed *det* in situ. If this difference in prosody and position for pronominal objects corresponds to a difference in cognitive status, the common observation that "in mainland Scandinavian, only weak objects shift" may be reformulated as a statement about the cognitive status of shifted pronominal objects: "in mainland Scandinavian, only objects that have the cognitive status IN FOCUS shift".

4.1 Accessibility and pron$_{<e>}$

Gundel et al. (1999) show that a referent introduced into the context by an NP is generally easy to process and that immediate reference with the expression matching the highest cognitive level is possible. To illustrate this, they present the example in (11), below, where the pronoun *it* necessarily refers to the snake introduced by the NP in the previous sentence, and not to the situation of a snake being on the desk introduced by the entire preceding clause.

(11) There was a snake on my desk. *It* scared me. [Gundel et al. 1999]

a. There was [a snake]$_{<e>}$ on my desk. It$_{<e>}$ scared me.

b. #[There was a snake on my desk.]$_{<t>}$ It$_{<t>}$ scared me.

The observation that an NP antecedent licenses an immediate reference with a pronoun at the highest level on the givenness hierarchy matches very well the numbers for shifted or in situ placement of pron$_{<e>}$ in Swedish and Danish, see table 1 above. Pronouns with NP antecedents, pron$_{<e>}$, appear in the shifted position in over 90% of the occasions both for Swedish and for Danish.

4.2 Accessibility and pron$_{<t>}$/pron$_{<e,t>}$

Gundel et al. (1999) also found that pronouns with clausal or VP antecedents, pron$_{<t>}$/pron$_{<e,t>}$, fall into one of two groups, eventualities (i.e. activities, events, states; cf. Asher 1993) and "purely abstract objects" (facts, propositions and situations). Eventualities resemble pron$_{<e>}$ in that they are easy to process and they are directly promoted to the highest cognitive level, *in focus*.

Pronouns that refer to "purely abstract object", on the other hand, are harder to process and immediate reference with a pronoun matching the highest cogntitive level is not possible. Instead the first pronominal reference is made with *that*, a pronoun matching the second highest level, ACTIVATED. Only after that, is it possible to refer to a "purely abstract object" with *it*. Figure 3 shows how pronominal reference to pron$_{<t>}$ and pron$_{<e,t>}$ with "purely abstract objects" antecedents is

made. The antecedent is called *mention 1* or *m1*, the first pronominal reference with *mention 2*, *m2* and so on.

mention 1^{m1}	mention 2^{m2}	mention 3^{m3}
clause/VP	*that/this*	*it*
	activated	in focus

FIGURE 3: *Reference to* $< t >/< e, t >$ *"purely abstract objects"*

Gundel et al. (1999) illustrate this with the example in (12) where *that* (*m2*) in the second sentence refers to the situation in the previous sentence (*m1*). Once reference has been made with a pronoun, reference to the situation may be made with *it* (*m3*), as in the third sentence .

(12) [^{m1}There was a snake on my desk.]$_{<t>}$ ^{m2}*That/*It*$_{<t>}$ scared me;
^{m3}*it*$_{<e>/<t>}$ scared my office mate too. [Gundel et al. 1999]

According to Hegarty (2003; see also Gundel, Hegarty & Borthen 2003), there is also another factor that makes clauses and VPs less or more abstract and hence easier or harder to process, namely factivity. Hegarty shows that if a fact is introduced in the complement position to a factive predicate it gets promoted immediately to the highest level of accessibility *in focus* and immediate reference with *it* is possible. If it is introduced in the complement position of a non-factive predicate, it is harder to process and immediate reference with *it* is not possible.

Also when it comes to object pronouns with clausal or VP antecedents, pron$_{<t>}$ and pron$_{<e,t>}$, the numbers for shifted or in situ placement indicate that accessibility is indeed involved. Table 3 shows that in situ placement of pron$_{<t>}$ and pron$_{<e,t>}$ is dominant in non-declarative – and hence –FACTIVE – sentence types.[6]

[6]The non-declarative sentence types where pronominal object shift may appear are questions (both V2 and V1 questions), imperatives and V1 conditionals.

SWEDISH sentence type	*shifted* total (estim*)	%	*in situ* total	%	total
declarative	123 (541*)	75% *	177	25%	718*
non-declarative	6 (26*)	24% *	83	76%	109*
total:	129 (568*)	69% *	260	31%	828/827**

DANISH sentence type	*shifted* total (estim*)	%	*in situ* total	%	total
declarative	149 (373*)	94% *	23	6%	396*
non-declarative	7 (31*)	19% *	135	81%	153*
total:	156 (390*)	71% *	158	29%	548

*All numbers and percentages for *det inte/ikke* marked with a star are estimated.

**The difference is due to the estimated numbers being presented without decimals.

TABLE 3: IN SITU *vs.* SHIFTED *placement of* det *with sentential and VP antecedents (pron$_{<t>}$ and pron$_{<e,t>}$) in Swedish and Danish: Comparison of declarative and non declarative sentence types.*

In non-declarative sentences as much as 76–80% of the pron$_{<t>}$ and pron$_{<e>}$ appear in situ in both languages. This is an especially interesting result for Danish, where object shift of non-contrasted objects with NP antecedents, pron$_{<e>}$, is more or less obligatory, but also for Swedish, where almost all non-contrasted pron$_{<e>}$ shift, see table 1.

Please note that in the non-declarative sentences, the initial position – the third option for object placement mentioned earlier – is not available, since this position is blocked, either by a question element, as *hvorfor* 'why' in (13a) or by the sentence type having V1 word order as in the V1 question in (13b), the imperative in (13c) and the V1 conditional in (13d).

(13) a. Hvorfor ved du ikke det? [DA]
why know-PRS you NEG it
'Why don't you know that?'

b. Vidste du ikke det? [DA]
know-PRT you NEG it
'Didn't you know that?'

c. Glem ikke det! [DA]
forget-IMP NEG it
'Don't forget that!'

d. Og forstår man ikke det, forstår man ingenting.[DA]
and understand-PRS one NEG it understand-PRS one nothing
'And if you don't understand that, you don't understand anything.'

For declarative sentences there is no dominance for pron$_{<t>}$ or pron$_{<e,t>}$ in situ. Table 3 shows that in sentences of this type as much as 69% of the hits in Swedish and 94% in Danish have a shifted pron$_{<t>}$ or pron$_{<e,t>}$. Interestingly, the investigation reveals that factivity also plays a role in this sentence type; there is a significant difference in distribution between pron$_{<t>}$ sentences with +FACTIVE and –FACTIVE matrix verbs, see table 4.

SWEDISH matrix verb	*shifted* total (estim*)	%	*in situ* total	%	total
factive	61 (268*)	91%*	28	9%	296*
non-factive	7 (31*)	28%*	78	72%	109*
	68(299*)		106		405

DANISH matrix verb	*shifted* total (estim*)	%	*in situ* total	%	total
factive	91 (228*)	100%*	0	0%	228*
non-factive	20 (50*)	94%*	3	6%	53*
	111 (278*)		3		281*

*All numbers and percentages for *det inte/ikke* marked with a star are estimated.

TABLE 4: *Distribution of pron$_{<t>}$ in Swedish and Danish matrix verbs taking* ±FACTIVE *complements, declarative clauses*

In Swedish 91% and in Danish 100% of all pron$_{<t>}$ that are complements to a +FACTIVE matrix verb appear in the shifted position. The factivity of the matrix verb seems to make these pronouns easy to process and reference with a shifted and hence weak pronoun is possible. It is not surprising that some complements of +FACTIVE matrix verbs appear in situ, since also unstressed pron$_{<e>}$ appears in this position, see example (6).

The examples in (14) and (15) show that immediate reference with a shifted pron$_{<t>}$ is possible in sentences with a factive matrix verb:

(14) Han [^{m1}fälldes för en kriminell handling] men avslöjade
he condemn-PST-PASSIVE for a criminal action but reveal-PST
[^{m2}det] inte. [SW]
it NEG
'He was condemned for a violation, but he never revealed it.'

In (14) the fact that a person was condemned for a violation is mentioned for the first time in the *m*1 sentence. The factive verb *avslöja*, 'reveal', licenses immediate reference with *det* in a shifted position.

(15) Men [^{m1}i Danmark er Carlsberg altså nu på vej til at overtage
but in Denmark be-PRS Carlsberg thus now on way to that overtake
ca. 90 procent af markedet]. Jeg forstår [^{m2}det] ikke[...] [DA]
apx. 90 percent of market-DEF I understand-PRS it NEG
'But in Denmark, Carlsberg is therefore now about to take over about 90 percent of the market. I don't understand it.'

In (15) the situation of Carlsberg being about to take over the market for beer sales is mentioned for the first time in the *m*1 sentence and the +FACTIVE matrix verb *forstå*, 'understand', licences immediate reference with *det* in a shifted position.

When it comes to the pron$_{<t>}$ that are complements to –FACTIVE matrix verbs, as much as 75% of these are in situ for Swedish, while it seems that Danish prefer to place also these in the shifted position. We will return to this difference in distribution in section 4.3 below.

Even though it is possible for unstressed pronouns to appear in the in situ position in Swedish, it is not possible for pronouns with any kind of stress to appear in the shifted position in any of the languages. If complements to –FACTIVE matrix verbs are indeed harder to process, how come some of them appear in the shifted position?

One of the answers is that they have already been promoted to a higher level of accessibility by previous pronominal mention. When a shifted pron$_{<t>}$ appears in a sentence with a non-factive matrix verb, there is often an intermediate pronoun between the sentential antecedent and the shifted pron$_{<t>}$ as in (16) and (17), (cf. example (12) above).

(16) a. Context:
På frågan om [^{m1} de lugnande medel och andra mediciner som fanns på hotellrummet i Rimini där Pantani upptäcktes död i lördags, kan ha något med 34-åringens död att göra], svarar Fortini: – Det finns inga tecken på [^{m2}det],
'When asked if [^{m1}the sedatives that were found at the hotel room in Rimini, where Pantani was found dead last Saturday, may have something to do with the death of the 34 year old] Fortini replies: – There is no sign of [^{m2}that],'

b. men vi utesluter [^{m3}det] inte heller.
but we exclude it NEG either
'But we don't consider [^{m3}it] impossible either.'

Example (17) shows a Danish sentence with a non-factive matrix verb, shifted pron$_{<t>}$ and another pronominal reference in an intermediate clause.

(17) [...] såfremt Salvesen er klar over, *[^{m1}hvad det er for*
[...] if Salvesen be-PRS clear over what it be-PRS for
noget], bør han fortælle alle os andre *[^{m2}det]*, for vi aner
something must he tell-PRS all us other-PL that for we know-PRS
[^{m3}det] ikke.
it not
'If Salvesen knows what it is, he needs to tell all of us, because we haven't got a clue.'

For Swedish all the 6 hits of pron$_{<t>}$ with a non-factive matrix verb that appear in shifted position have an intermediate pronominal mention. In Danish, not all hits where a complement of a –FACTIVE matrix verb appears in the shifted position have an intermediate pronominal reference that brings the referent IN FOCUS. However, the fact that the pronouns are considered to be "weak" leads to the assumptions that there are other factors that contribute to the accessibility of the referents. These examples will be investigated further.

4.3 Objects in initial position

In table 4 above the proportions of complements of -FACTIVE matrix verbs in a shifted position seems to be higher in Danish than in Swedish. On the other hand, the proportion of complements of +FACTIVE vs. –FACTIVE verbs in this position is very similar in Swedish and in Danish. The seven hits for –FACTIVE in Swedish constitutes 10% of the total shifted hits, and the 20 hits for –FACTIVE in Danish constitutes 18% of the total shifted hits. The question is then where the complements of -FACTIVE matrix verbs – which are harder to process – appear in Danish.

A small pilot study shows that Danish seems to choose this third option for object placement for these kinds of complements, placing *det* complements of –FACTIVE matrix verbs in the initial position, see table 5.

verb	*1st*		*shifted*		*in situ*		total
tycka (SW)	20	67%	0	0	10	33%	30
synes (DA)	22	85%	4	15%	0	0	26

TABLE 5: *Distribution of* det*, including 1st position, verbs* tycka/synes *with case marked pronominal subjects*

In this pilot study, searches were performed for strings where the verbs *tycka*, [SW], and *synes*, [DA], 'think, consider' were combined with a case marked pronominal subject, the complement *det* and the negations *inte*/*ikke* in declarative clauses. In Swedish, the object pronouns appear in the initial or in the in situ position, while in Danish, the object pronouns appear in the initial or in the shifted position. This may indicate that in declarative sentence types, where the initial position of the clause is available for these elements, Danish seems to prefer this position for *det* when

it has the cognitive status ACTIVATED, but not IN FOCUS. The numbers in table 5 might indicate that Swedish prefers this position for *det* when it is IN FOCUS. In non-declarative sentence types (–FACTIVE), where the initial position is blocked, see table 3 above, also Danish prefers pron$_{<t>}$ and pron$_{<e,t>}$ in situ.

As far as we have seen there are clear indications that pronominal object shift is related to cognitive status. The prosodic features of pronominal objects, but also the syntactic position of the shifted object, must be considered as information packaging (cf. Vallduví & Engdahl 1996) for referents that have the cognitive status IN FOCUS in Swedish and in Danish. There is therefore reason to believe that pronominal objects that are IN FOCUS shift obligatory in Danish and optionally in Swedish.

5 Consequences for the LFG architechture

Cognitive status affects information packaging, and this notion therefore belongs in the i-structure. O'Connor (2006) shows that an ACTVN (*activation*) feature with a ± value within the i-structure (O'Connor's *d-structure*) is sufficient to cover the facts about prosody in Serbo-Croatian in his investigation. O'Connors notion of *activation accent* (2006:33) also fits very well with the intuitions that pron$_{<t>}$ and pron$_{<e,t>}$ in situ are normally not unstressed, and if the ACTVN feature would only relate to the mapping between i-structure and prosodic structure, a ± value might be sufficient also for the analysis of object shift.

But, as O'Connor mentions in his overview of possible further research (2006: 192), this feature is also of relevance for the mapping between i-structure and other structures in the LFG architecture, as for instance c-structure. The shifted position seems to be reserved for object referents that are IN FOCUS and placing a pronominal object in this position signals the referent's cognitive status. This indicates that the ACTVN feature must map also to c-structure. Furthermore, the choice of referring expressions (different kinds of pronouns, definite NPs, indefinite NPs) depends on the accessibility of a referent in the context, so there seems to be need for a further fine grained scale of ACTVN values building on the givenness hierarchy. How this scale should be designed must be subject to further investigation, but for the purposes of this paper, the scale in Figure 4 is sufficient.

in focus	activated	familiar/identifiable/referential/type identifiable
0	+1	+2...

FIGURE 4: *ACTVN values related to the Givenness hierarchy of Gundel, Hedberg & Zacharski (1993).*

In example (18) repeated from (8a), *det* refers to the statement that Agnes is cute. The pronoun is a complement of a non factive matrix verb and does hence not reach the highest cognitive status at the first pronominal mention. The option to

place the object in the 1st position is not available in the following V1 question and *det* appears in situ both in Swedish and in Danish.

(18) [Agnes är söt.]$_i$ Tycker du inte *det*$_i$? [SW]
[Agnes er smuk.] Synes du ikke *det*$_i$? [DA]
Agnes be-PRS cute think-PST you NEG that
'Agnes is cute. Don't you think so?'

An i-structure of this sentence looks like Figure 5, where the value of the ACTVN feature is +1 for ACTIVATED, the second highest level on Gundel's et al. (1993) scale.[7] The negation and the verb *tycker/synes* receive a higher value, since they represent new information and the pronoun referring to the addressee, *du*, receive the value +1 (cf. the suggestion in Gundel et al. 1993:278 that the speech-participants, being present in the extralinguistic context, are ACTIVATED; cf. also Erteschik-Shir 2007:16f, *stage topics*).

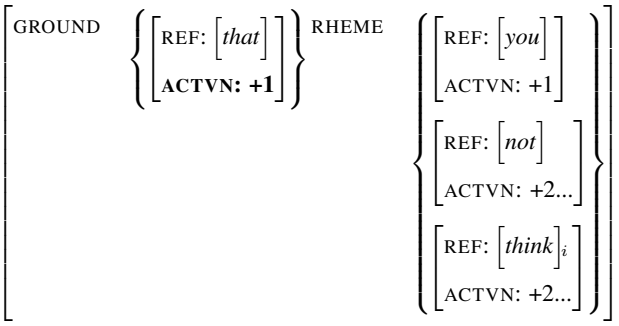

FIGURE 5: *I-structure, example (18):* Tycker/Synes du inte/ikke det?

In example (19), the object pronoun *det* – here a complement to a factive verb *förstå/forstå* 'understand' – is more accessible than the object pronun in example (18) and is licensed in a shifted position.

(19) Jag kan se [hur viktigt det är]$_i$. Andra förstår *det*$_i$
Jeg kan se, [hvor vigtigt det er]$_i$. Andre forstår *det*$_i$
I can-PRS see how important it be-PRS others understand-PRS it
inte. [SW]
ikke. [DA]
NEG
'I can see how important this is. Others don't understand it.'

Figure 6 shows an i-structure of the sentence in (19). The value of the ACTVN feature is here 0 for IN FOCUS, the highest level on Gundels et al. (1993) scale in Figure 2 above.

[7] The i-structures are simplified and contain only the relevant features.

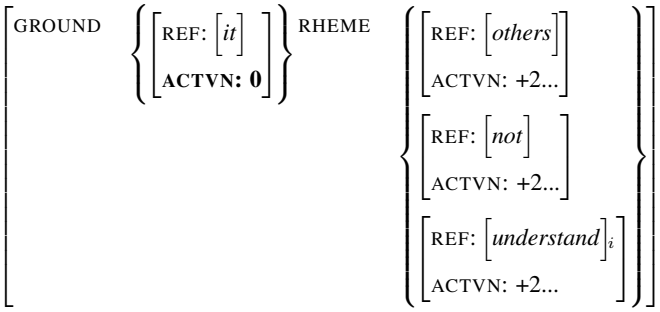

FIGURE 6: *I-structure, example (19):* Andra/Andre förstår/forstår det inte/ikke.

The values of the activation feature may be related to different types of information packaging in different languages. In English, they may be related to the choice of referential expressions (i.e. *it* vs. *that*) and in Swedish and Danish mapped to c-structure and/or p-structure.

6 Summary and further research

In this paper I have discussed the fact that pronominal objects with clausal or VP antecedents, pron$_{<t>}$ and pron$_{<e,t>}$, shift more seldom than referents with NP antecedents, pron$_{<e>}$, in Swedish and Danish. This seems to be due to a difference in cognitive status, where pron$_{<t>}$/pron$_{<e,t>}$ in +FACTIVE environments and pron$_{<e>}$ are easier to process, which licenses pronominal reference in a shifted position as well as an unstressed pronounciation. Pronominal objects in –FACTIVE environments are harder to process and immediate reference in a shifted position seems not to be possible. For the LFG architecture the relation between cognitive status and information packaging gives rise to the need for a more fine grained value of the ACTVN feature introduced by O'Connor (2006).

It is also important not to see object shift as an isolated phenomenon, a binary choice between two positions, shifted or in situ, but as a dynamic part of the greater notion of object placement – or even of the overall notion of word order and to which extent there is "free word order" in Scandinavian languages.

This investigation has been performed within a one year post doc project funded by NORMS (Nordic Center of Excellence in Microcomparative Syntax). Further research includes a similar study of Norwegian, an investigation of pron$_{<e,t>}$ in relation to cognitive status and other factors (cf. Lødrup (1994)), object shift in copular clauses (cf. Mikkelsen under revision) and object shift in relation to type anaphora (cf. Borthen 2004). Also the possibility of placing pronominal objects in the initial position will be part of the further investigations.

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THE ROLE OF PRED IN LFG+GLUE

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Abstract

In this paper, I argue that standard, co-descriptional glue semantics provides no clear and satisfactory role for the traditional PRED-features of LFG, due to the fact that the linear logic of glue semantics does the work of the Completeness and Coherence Constraints. But then I show that a reduced but significant role for PRED-features can be found in an alternative 'Description-by-Analysis' (DBA) formulation, proposed in Andrews (2007a).[1] The DBA formulation is argued to be superior in various respects, and some constraints are proposed to cause the DBA approach to approximate some of the empirically justifiable aspects of the behavior of the co-descriptional formulation.

The standard way to combine LFG with glue-semantics has been with a 'co-descriptional' architecture in which lexical entries introduce the usual grammatical features in the usual way, together with 'meaning-constructors' that account for the meanings, both of the PRED-feature associated with the lexical item, and any semantically intepretable grammatical features that it might introduce, either inherently or due to the inflectional morphology. Typical examples would be the following entries for the verb form *went* and the noun-form *feet*:[2]

(1) a. *went*:V, $(\uparrow\text{PRED}) = \text{'Go}_{motion}\text{<}(\uparrow \text{SUBJ})\text{>'}$, $(\uparrow\text{TENSE}) = \text{PAST}$,
$\lambda x.go(x) \quad : \quad (\uparrow \text{SUBJ})_e \multimap \uparrow_p$,
$\lambda P.Past(P) \quad : \quad \uparrow_p \multimap \uparrow_p$

b. *feet*:N, $(\uparrow\text{PRED}) = \text{'Foot'}$, $(\uparrow\text{NUM}) = \text{PL}$,
$\lambda x.Foot(x) \quad : \quad \uparrow_p$,
$\lambda P.Past(P) \quad : \quad \uparrow_p \multimap \uparrow_p$

Co-description was introduced and motivated in Halvorsen and Kaplan (1988) as an alternative to the earlier (and overall more often used) 'description-by-analysis' (DBA) architecture, in which the f-structure is the primary input to the semantics.[3]

Although the norm in glue-semantics, co-description raises a puzzle with respect to the role of PRED-features, namely, why they are there at all. The problem is that, as pointed out in Kuhn (2001), the linear logic resource management employed in glue is in itself sufficient to account for the phenomena of Completeness, Coherence, and Predicate Uniqueness, which comprise the major special properties of PRED-features. This leaves us with no clear reason why these features couldn't just be omitted from the lexical entries of (1). Even if absence of the PRED-features caused some

[1] And, independently developed for XLE (Crouch, p.c.), although no longer used.

[2] Using p 'proposition' for the type of propositions rather than the usual t, and a clearly oversimplified Priorian operator treatment for tense.

[3] See for example Halvorsen (1983), Wedekind and Kaplan (1993), Frank and Semecky (2004), Crouch and King (2006), Crouch (2006).

subtle problems, putting them back in would still constitute an explanatory problem, since there isn't any principle that requires LFG lexical entries to introduce PRED-values. If the benefits of co-description were sufficiently impressive, one could presumably deal with this issue, but I will first show that the original motivation for it is insufficient, and point out that it creates various problems, one of which was noted by Andrews (2007a). Then I will describe a DBA architecture for glue, and show it it provides a role for PRED-features. But this is not the same as in pre-glue LFG, since glue will be doing the work of Completeness and Coherence (but not Predicate Uniqueness). So the last step is to propose some constraints which will cause meaning-constructors in the DBA architecture to act in a way that is similar in certain empirically justifiable respects to standard PRED-features controlling Completeness and Coherence, but avoiding the problems with co-description.

1 Problems and Non-benefits of Co-Description

The main proposed benefit of co-description was that it could make available for semantic interpretation information not present in f-structure (Halvorsen and Kaplan 1988:284, 1995 version).[4] But this ignores the fact that, thanks to the inverse of the ϕ projection, anything accessible from c-structure is also accessible from f-structure. Andrews (2007b), for example, proposes constraints involving c-structure in a DBA glue framework. However, it might still be the case that co-description is the best approach, either for all, or only for some, kinds of linguistic phenomena. Here I will argue that it isn't best for what would be traditionally regarded as the interpretation of features and lexical items (by contrast, co-description seems very well suited for the properties of information-structure, c.f. Mycock (2006)).

Perhaps the most immediate problem, pointed out in Andrews (2007a), is that it becomes an accident that the occurrences of features and their traditionally ascribed meanings are quite closely correlated, with only limited exceptions, such as *pluralia tantum*, which I'll discuss later. There would for example be nothing obviously wrong with a variant of (1b) in which the plural meaning-constructor was present but not the plural feature-equation. But this doesn't happen, even with the exotic plurals that English is so fond of borrowing from other languages:

(2) a. These seraphim are annoyed

b. This seraph is annoyed

c. *This seraphim is annoyed (plural meaning, singular syntax)

[4] "Every interpretation scheme based on description-by-analysis requires that all semantically relevant information be encoded in the functional structure."

But agreement, the main motivation for having features at all, leads to a further problem with the meaning-constructors.

This is that one has to decide which of the various lexical entries introducing a given feature-value occurrence is the one that is introducing the constructor. Consider an Italian example such as:

(3) (le ragazze) vengono
the(FEM.PL) girl(FEM.PL) come(3.PL)
The girls/they are coming

If the subject is present, one would presumably want the noun to introduce the plural meaning-constructor, and the verb not to (since not all NPs are in positions where there is a verb to agree with them and provide their number constructors), but if the subject is omitted, then the verb would presumably be the provider of the constructor. It is certainly not impossible to come up with grammars that will work properly, but it involves delicate choices with considerable scope for stipulation, which it would be good to reduce to the greatest extent possible.

Another problem resides in the overlapping powers and responsibilities of the PRED-features, with their argument-lists, and those of the meaning-constructors that refer to grammatical functions. This is that, although the PRED-features control what governable grammatical functions can and must appear, they no longer say anything about what their semantic contributions are, since this is done by the meaning-constructors. But, left unconstrained, meaning-constructors can do all sorts of peculiar things in the way of rearranging the semantics of the grammatical functions. Below, for example, (a) interchanges the semantic role of subject and object, while (b) creates an unspecified causee agent causative:

(4) a. $\lambda Pxy.P(y,x) : ((\uparrow \mathrm{OBJ})_e \multimap (\uparrow \mathrm{SUBJ})_e \multimap \uparrow_p) \multimap (\uparrow \mathrm{SUBJ}) \multimap (\uparrow \mathrm{OBJ}) \multimap \uparrow_p$

b. $\lambda Px.(\exists z)(Cause(x, P(z,y))) : ((\uparrow \mathrm{SUBJ})_e \multimap \uparrow_p) \multimap (\uparrow \mathrm{SUBJ})_e \multimap \uparrow_p$

Without some further constraints, these meaning-constructors could be introduced by inflections or grammatical particles, thereby undoing the kinds of work people have been trying to accomplish with Lexical Mapping Theory and its competitors over the last several decades.

The most obvious and direct solution to the overlap problem is to drop the PRED-features entirely, since, as noted above, the resource management provided by linear logic can do all of the syntactic work of the PRED-features, and of course the meaning constructors also take over their informal role of encoding the meaning. Therefore, the natural consequence of adopting co-description is to abandon PRED-features. This might of course be the right thing to do, but I will argue in the remainder of the paper that glue-by-DBA would be a good thing to try first for certain aspects of semantic

interpretation, especially, morphology and the lexicon. However, note that the use of meaning-constructors introduced by the PS rules, for example by Asudeh and Crouch (2002) and Sadler and Nordlinger (2008), is not implicated in any of the problems raised here, and is consistent with what I will be proposing.

2 Glue by DBA

The basic idea of DBA glue is to introduce meaning-constructors on the basis of what is in the f-structure. A fundamental requirement is that this be done in a resource-sensitive manner, so that the semantically interpretable aspects of an f-structure be interpreted once, and once only. For example if we have a [POLARITY NEG] feature in a negative sentence, we must be prevented from reading the sentence as non-negative by either failing to interpret the feature at all, or interpreting it twice.

Most implementations of DBA semantics in LFG are conceptually 'destructive', in that aspects of f-structure are removed and replaced by semantic material. This is explicit in the f-structure rewriting approach described by Crouch and King (2006) and Crouch (2006), where f-structure facts are deleted as semantic information is added, and also in the restriction-based proposal of Wedekind and Kaplan (1993).

Andrews (2007a) proposes a conceptually different, correspondence-based view (which however might well not be empirically distinct), in which semantic information is added monotonically to the structure. An essential component of this system is that the functions of the standard LFG lexicon are split between two distinct ones, a 'Morphological Lexicon' that is essentially equivalent to the standard one, but with a reduced role for PRED-features, and a 'Semantic Lexicon' which is responsible for giving the meanings of interpretable features and their combinations, including PRED-values.

Semantic Lexicon Entries (SLEs) pair f-descriptions with meaning-constructors. Here are some sample SLEs, using the more readable and compact 'f-structure fact' notation from XLE rather than the equations originally used by Andrews:

(5) a. $\text{TENSE}(f, \text{PAST}) \Leftrightarrow \mathit{Past} : f_p \multimap f_p$

b. $\text{PRED}(f, \text{'Go'}), \text{SUBJ}(f, g) \Leftrightarrow \mathit{Go} : g_e \multimap f_p$

c. $\text{PRED}(f, \text{'Marvin'}) \Leftrightarrow \mathit{Marvin} : f_e$

The bidirectional $\Leftrightarrow$ symbol is used because the relationship is meant to be conceived of as inherently bi- or a- directional; note that it is *not* a linear bi-implication, because an SLE can be used as often as desired (it needs to consume a resource, but is not itself consumed).

A possibly more readable notation for the f-structure side is to use AVMs with labels:

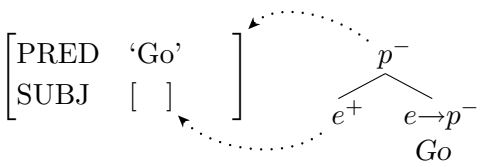
(6) a. $f{:}\left[\text{TENSE} \quad \text{PAST}\right] \;\Leftrightarrow\; \mathit{Past} : f_p \multimap f_p$

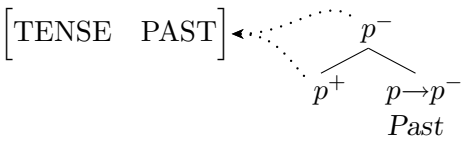
b. $f{:}\begin{bmatrix}\text{SUBJ} & g{:}[\ ] \\ \text{PRED} & \text{`Go'}\end{bmatrix} \;\Leftrightarrow\; \mathit{Go} : g_e \multimap f_p$

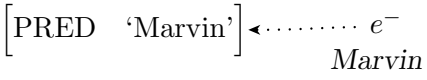
c. $f{:}\left[\text{PRED} \quad \text{`Marvin'}\right] \;\Leftrightarrow\; \mathit{Marvin} : f_e$

The f-structure labels in the meaning-constructors are to be thought of as defining a 'reversed semantic projection' (essentially Kaplan's (1987) σ going from the semantic representation to the f-structure rather than in the opposite direction, as usually assumed). Later we'll propose constraints that give some significance to the AVM notation.

This idea can be made more vivid, and some other structural relationships usefully exposed, by representing the meaning-constructors in the 'prefab glue' notation introduced in Andrews (2007b), which is essentially the dynamic graph of de Groote (1999), supplemented with one additional kind of arc, which we'll introduce when we need it. The labels are replaced with dotted arrows depicting the reversed semantic projection, and the way in which the trees are built from the meaning-constructors, and the $+/-$ polarities assigned, is discussed in Andrews (2007b). In the prefab notation, we will also replace the $\multimap$ -symbol with $\rightarrow$, since these are supposed to represent functional semantic types, for which $\rightarrow$ is one of the standard symbols. So the SLEs above become:

(7) a.


b.


c.


The meaning-constructors in this notation can be regarded as pieces of the logical forms into which the meaning-sides are to be inserted (with predicates on the right), supplemented with syntactic correspondence information.

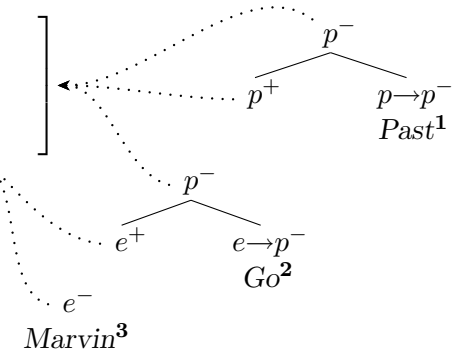
So the next step is to explain how SLE's and an f-structure can be used to produce a collection of meaning-constructors, suitable for assembly. The

method will need to account for the resource-sensitivity discussed at the beginning of this section. Andrews (2007a) proposes to use a correspondence relation, implemented by co-indexing, subject to some constraints.[5] Suppose that, when an SLE is chosen from the Semantic Lexicon, the feature value(s) (we'll soon see that there is in general more than one) that it mentions get an index, unique to that instantiation (similar to the instantiation of PRED-features, but happening at a different place, following slightly different rules).

Then, when the instantiated SLE is used, we can suppose that its index is applied to the feature-values in the part of the f-sturcture that it's applying to. Now, a principle that each 'interpretable' feature must receive a unique index will account for the resource-sensitivity. We need the qualification 'interpretable', because there appear to be some features, such as structural case, that don't get interpreted by meaning-constructors in this way (topic and focus markers might well be the same, if they are taken to reflect the presence of inherently meaningful GFs, without introducing further explicit content of their own). And these indexes can also be applied to the meaning-constructors themselves, implementing a correspondence relation (which, unfortunately, does not appear to be a function in either direction).

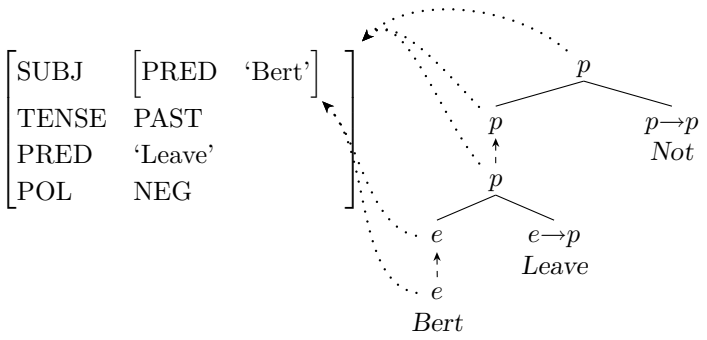
Consider for example the f-structure for *Marvin went*. Selecting, instantiating, and 'applying' some SLEs to the f-structure will produce a result like this:

(8)
$$\begin{bmatrix} \text{TENSE} & \text{PAST}^{\mathbf{1}} \\ \text{PRED} & \text{'Go'}^{\mathbf{2}} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'Marvin'}^{\mathbf{3}} \end{bmatrix} \end{bmatrix}$$

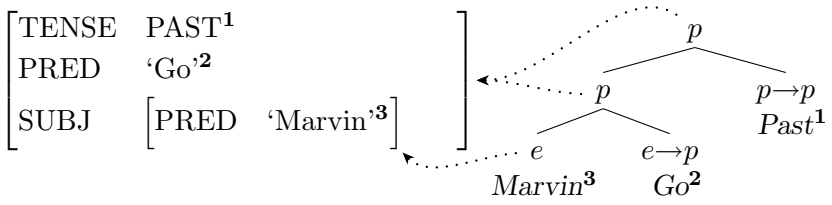


Each meaning-constructor has correspondence relations going from its atom-labelled nodes ('literals') to f-structures, as mandated by the SLEs. Then, assembly of the logical form is achieved by connecting these atomic nodes with 'axiom-links', subject to the proof-net rules as discussed in Andrews (2007b), and the constraint that axiom-linked nodes share their f-structure correspondent. The only acceptable assembly is then:

[5] Crouch and van Genabith (1999) and Asudeh and Crouch (2002) make use of a correspondence of this nature, without saying much about its properties.

(9)


If we 'contract' along the axiom-links, the logical form becomes completely banal:

(10)


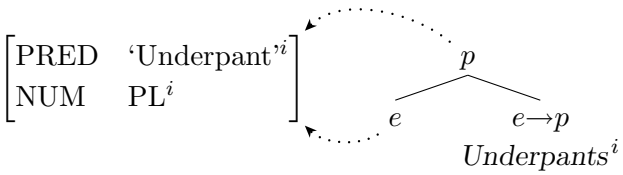
One might hope that the correspondence relation expressed by the features could be a function, but a reason for not trying to do this in the f-structure-to-meaning direction is provided by various kinds of idioms, including *pluralia tantum* and similar phenomena that create issues for the idea that intepretable features are always intepreted.

The problem of *pluralia tantum* is that there appears to be a syntactically active plural feature (inducing agreement), which is not semantically interpreted:

(11) These underpants/bikini bottoms are clean [said holding one intact piece of cloth]

The agreement shows that a syntactic plural feature is present in f-structure, so what permits it to escape interpretation?

What I propose is that it does not actually escape intepretation, but rather is jointly interpreted with the PRED. An SLE to do this is:[6]

(12)


To suppress independent interpretation of the NUM-feature, we can simply have it share the semantic instantiation index with the PRED-value and the meaning-side, as indicated by the superscripting in (12).

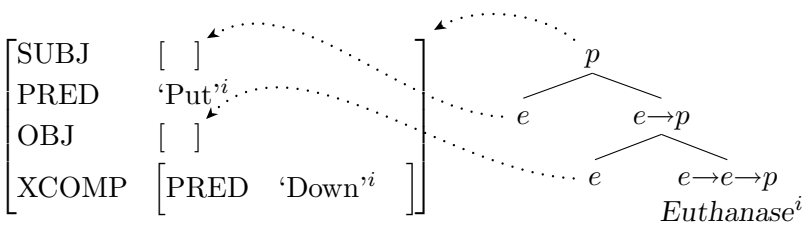
[6]Assuming the standard glue analysis of common nouns as properties applying to type *e*. The possibly unsettling absence of VAR and RESTR attributes will be discussed below.

Therefore, the co-superscripting does not define a function in the meaning-to-f-structure direction, and the evidence in Dalrymple (2001) that adjectives introduce two meaning-constructors (originally due to Kasper 1995) suggests that it doesn't in the opposite direction either, although this possibility deserves further consideration. Putting the superscript somewhere in the meaning-constructor allows for various kinds of scope-related constraints to be formulated, as discussed in Andrews (2007b) and Andrews (2007a), and the meaning-specification seems like the most obvious place to put it.

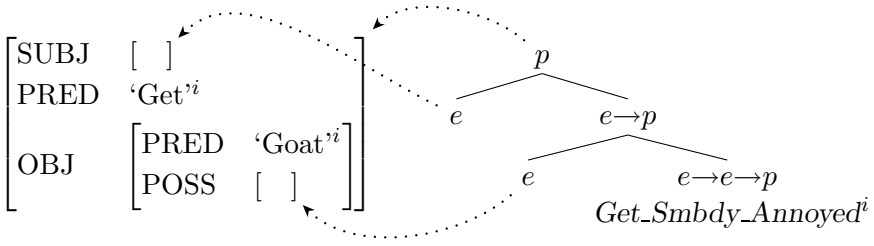
Pluralia tantum may in fact be seen as a sort of idiom composed of a lexical stem and an inflectional feature that are normally each interpreted independently, but here fail to be, since they are instead interpreted jointly. A similar analysis can be applied to grammatical gender features, which are usually interpreted 'idiomatically' with their stems, but sometimes not, such as with third-person pronouns.

This general approach seems to extend smoothly to more traditional types of idioms, of the type that Egan (2008) calls CHUNKS, such as *put* [some animal] *down*, or *get* [somebody] *'s goat*. These consist of two or more parts with at least some degree of syntactic autonomy, but which appear to be intepreted jointly. They can be given SLEs such as these:

(13) a.



b.



We will henceforth omit the superscripts, since they are managed by general convention. The idiom *get up X's nose*, meaning 'annoy X' appears to combine the directional XCOMP of (a) and the possessive of (b) in a single construction, with an unusually long path to the semantic argument.

Our treatment so far leaves us with a general question, which is whether there is really any reason to retain the PRED-features. If a wide range of features can be interpreted, why not instead have meaningful elements introduce a variety of features, such as perhaps KIND for nouns, EVENT_TYPE for dynamic verbs, SITUTION_TYPE for stative verbs, etc., whose values encode the meaning? In the following sections, we will try to answer this question

and defend (a version of) the PRED-feature by proposing and motivating a variety of constraints in which it plays a special role.

3 The Properties and Role of PRED

A first argument is that in the DBA glue system, we will still need feature-value instantiation to implement uniqueness (that is, inability for values introduced in different places to unify) for the features representing the meanings of open-class items. For, without uniqueness, such a feature could be introduced multiple times, and then unified, just as does happen with number features and others that participate in agreement (and 'concord', for those who postulate a difference between these). This is something that isn't needed in a co-descriptional architecture, since resource sensitivity will account for the data, but it is needed in DBA.

It is then reasonable to suggest that full, open class lexical meanings must be expressed by PRED-feature values, and that these are by default instantiated (there may be limited exceptions, as discussed in Andrews (1990); Tariana 'repeaters' (Aikhenvald 2003) might well be an interesting example).

One potential exception is FORM-features, as used in the standard LFG analysis of idioms, but we have already dispensed with these. Another, suggested by an abstract-referee, might be the PCASE or PFORM features that are sometimes used for the analysis of oblique arguments, but it can be argued that it is only a relatively small collection of prepositions that are actually used in this way, as opposed to constituting semantic cases. Furthermore, it seems quite plausible to reanalyse these as involving oblique grammatical functions together with PRED-features. But the treatment of oblique arguments raises various issues that I can't go into here. I should also point out that in some languages, the PRED features for parts of speech such as Verb and Adjective are not an open set (Dixon 1977, Pawley 2006).

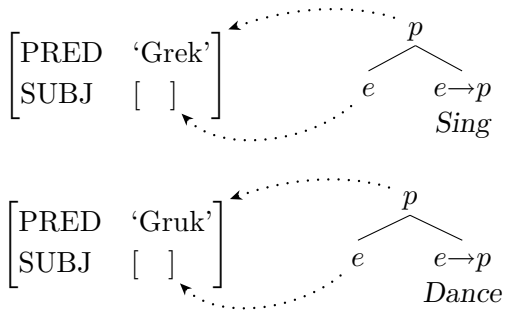
Another characteristic of PRED-features, pointed out in Andrews (2007a), is that they seem to have a special role in inflectional morphology, that of designating what might be called the 'stem'. For example, when an irregular verb has multiple meanings and/or participates in multiple idioms, it normally preserves its irregularities across all of its different senses. Triggering stem selection therefore appears to be another distinctive function for PRED-features.

A more complex kind of motivation from PRED comes from the fact that we need to impose some constraints on SLEs, in which the PRED-feature appears to play a special role.

4 A Need for Constraints

Consider the following SLE, which allows a pair of PRED-values to be jointly interpreted if and only if both appear somewhere in the same structure, with no constraints on their relationship:

(14)



This is theoretically quite undesireable, and it is to the credit of the co-descriptional approach that it is at least difficult to get effects like this (although some fairly strange things can be done by playing around with constraining equations and (io)fu designators).

A plausible program for ruling such things out would be to impose constraints requiring that the effects of SLEs be quite similar to those of standard lexical entries with their PRED-features, combined with additions such as constraining equations for FORM and other feature values. After all, this mechanism has seemed largely adequate from the beginning of LFG, appearing to meet only rather localized difficulties with complex predicates (e.g., Alsina (1996), Andrews and Manning (1999) and work cited there), and remain on the whole satisfactory for purely syntactic work.

It is a property of the kinds of lexical entries that have been proposed in standard LFG that the feature-values they fix all seem to involve short, determinate (and therefore downward; upward paths would involve uncertainty) paths composed of governable GFs from the f-structure designated by ↑ in the lexical entry (potential exceptions, such as negative polarity environments, clearly involve semantico-logical factors that can't be adequately captured by f-descriptional constraints). This provides motivation for an 'Arboriform Constraint' on SLEs:

(15) Arboriform Constraint: the set of f-(sub)structure labels in an SLE for which the SLE specifies an atomic feature-value must form a tree, with governable GF's (from source to target of the GF) as the links (oriented down the tree, so that all tree members are accessible by a path from the root).

(15) immediately excludes (14), while allowing all of the SLEs which we have proposed so far., and explains why the AVM notation is useful, since it directly reflects the tree-structure.

It also accounts for why conventional lexical entries work pretty well, since a conventional LFG lexical entry can specify the values of all of the features mentioned in the SLE by downward paths of the usual kind, from a c-structure node corresponding to an f-structure node at or above the SLE 'root'.

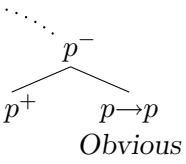
But there is a terminological issue with calling this node a 'root' of the SLE, which is that, as we will see shortly, SLEs can involve f-structures for which they don't specify any feature-values, which appear to be subject to different constraints, as we shall see. So we instead use the term 'center':

(16) Center: the center of an SLE is the unique f-structure label serving as the root of the tree mandated to exist by (15).

A further constraint emerges from the fact that there appears to have been very little pressure in the development of LFG to allow any features other than PRED to 'subcategorize' for arguments. A proposition such as 'only PRED-values subcategorize' is not really empirical, since LFG workers are trained to deploy PRED-values in situations where subcategorization seems to be a useful idea, but it is significant that following this training doesn't seem to lead to serious problems, except perhaps in the previously-mentioned area of complex predicates and serial verb constructions, where there certainly are problems with PRED-features, but merely allowing other features to subcategorize doesn't solve them.

A first attempt to formulate a constraint to capture this apparent restriction might be to say that the f-substructures of an SLE that correspond to 'argument' positions on the semantic side must be accessible by deterministic paths made of governable GFs from the center. The SLEs we've looked at so far obey this constraint, but there are important examples that don't. A relatively simple one is this constructor for sentence-adverbials such as *obviously*:

(17)
$$\left[\text{ADJUNCTS}\left\{\left[\text{PRED}\quad \text{'Obvious'}\right]\right\}\right]$$



The meaning introduced by this constructor applies not at the center, but at something gotten by following a iofu path from the center: if the center is designated as $*$, then the meaning applies at (ADJUNCT $\in *$).

It is possible that this example might be dissolved by the use of constructors introduced by the PS rules, which have been proposed by Asudeh and Crouch (2002), and recently used by Sadler and Nordlinger (2008). But the issues involved here are complex, and it is probably best to set up the theory to allow SLEs such as (17).

Especially because harder-to-avoid examples are provided by quantifiers, in which the scope is not only above the center, but, in general, unboundedly so. The general nature of quantifier constructors needs some preliminary discussion. Originally, quantifiers constructors were supposed to involve universal linear quantifiers, but these have sometimes been omitted (for example by Fry (1999) and Lev (2007)), on the basis that they are implicit for free variables. This gives us a format like this:

(18) $\lambda P.Every(x, Person(x), P(x))\ :\ (g_e \multimap H) \multimap H$

The idea here is that H can be instantiated (by UI in the glue-derivation) as any literal, and the constraints on glue derivations will suppress various kinds of absurd readings that naive quantifier scope assignment mechanisms tend to allow (Dalrymple et al. 1997).

But there needs to be a restriction that these variables can only instantiate to type p. In the correspondence-based DBA system proposed here, a straightforward way to achieve this is to think of the variable as being an LFG local name (Dalrymple 2001:146-148), accompanied by a type-subscript, so that the variable instantiation is LFG instantiation rather than linear UI. This can be viewed as a further development of Kokkonidis' (2008) First Order Glue system, simplifying it to merely propositional rather than quantificational linear logic, as discussed further in Andrews (2008).

On this basis, we can formulate a sample quantifier constructor for *everybody* as follows, using the AVM notation for the f-structure side, and a standard meaning-constructor format on the glue side:

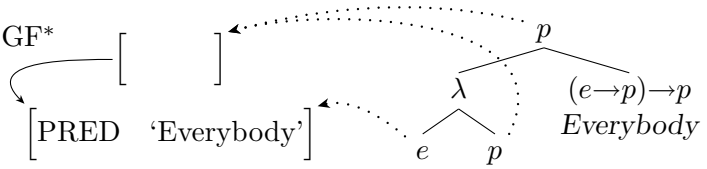
(19) $h{:}\Big[\quad\Big]\ \xrightarrow{\text{GF}^*}\ g{:}\begin{bmatrix}\text{QUANT} & \text{'Every'}\\ \text{PRED} & \text{'Person'}\end{bmatrix} \quad\Leftrightarrow\quad Everybody : (g_e \multimap h_p) \multimap h_p$

To express the f-structure side as a formula in the f-structure fact notation, we'd need to add some sort of functional uncertainty predicate, or else just admit equations such as $(h\,\text{GF}^*) = \text{g}$ as such.

And to express the glue-side in the prefab format, we need to know what to do with an argument that is an implication rather than a basic type. In the procedure for converting standard format meaning-constructors to the prefab format, these arguments become positive polarity implications, which are expanded into a (left) 'pseudo-daughter' of negative polarity, labelled with the antecedent of the mother, and connected to it with a dotted arc, and a (right) daughter of positive polarity, connected to it with a solid line. And, since the formula labelling the implicational argument is so easily readable from those of its daughters, and is essentially a lambda-abstraction (corresponding to an implication introduction in the Natural Deduction ver-

sion of the glue proof), it is convenient just to label the node with λ. The resulting structure is:

(20)



It is clear from this structure that not every f-structure linked to a positive literal needs to be accessible by a determinate path from the center.

However, the positions in the SLE that are problematic for our proposed constraint turn out to have the property of being connected to 'modifier' rather than 'skeleton' literals in the meaning-constructor, in the sense of Gupta and Lamping (1998). This distinction can be relatively easily explained in terms of the prefab format we have introduced, using the formulation of the Correctness Criterion for proof-nets presented in de Groote (1999). This can be concisely expressed in terms of the notion of 'dynamic graph', which is constituted by the tree-links in the meaning-constructors that we've been writing as solid lines, oriented upwards, together with the axiom-links, in the direction of the arrows.

The Correctness Criterion for implicational intuitionistic proof-nets can then be formulated as:

(21) a. The dynamic graph must form a tree.

b. where every path that starts at the left daughter of a λ-node (positive implication) must pass through that node (or equivalently, its right daughter).

(a) is basically a constraint that the assembly be a single coherent structure (and is similar in spirit to the standard Coherence Constraint), while (b) amounts to the requirement that variables be properly bound.

With this in place, we can define the concept of 'skeleton' and 'modifier' literal in a meaning-constructor, as follows:

(22) a. A 'modifier' literal is one that occurs in a pair (in an instantiated meaning-constructor) that satisfies the type and polarity restrictions for being axiom-linked, but can't be so-linked, without producing a violating the Correctness Criterion.

b. A 'skeleton' literal is any non-modifier literal.

If we look at the proposed constructors for tense or number, quantifiers, or the sentence adverb *obviously*, we see that they have only modifier positions, because connecting their (top) negative to one of their argument positions would prevent an assembly of constructors from forming something whose dynamic paths would be a tree.

But in the SLE's for various verbs discussed earlier, all of the literals in the meaning-constructors are skeleton. Regular noun SLEs are also skeleton, because the two literals are of different semantic types (e and p). On the other hand, the positions associated with normal 'subcategorized' arguments are all skeleton, because they fail to match in either f-structure correspondence or semantic type with anything else in them, so no dynamic path loops can be formed.

We can now formulate a proposed constraint on the f-structure side positions in an SLE that skeleton literals can correspond to under σ:

(23) Skeleton literal constraint: The f-structure correspondent of a skeleton literal must be on a deterministic governable GF-path (in the f-description of the SLE) from the center.

The center of the quantifier constructor (19) is the f-structure labelled g, while that of the adverbial constructor (17) is the set-member with the PRED-value. The positions in the f-description that aren't accessible from the center by a deterministic governable GF-path correspond to modifier rather than skeleton positions, so that (23) is obeyed.

Adjectival and the other adverbial meaning-constructors as discussed in Dalrymple (2001:ch.11) also obey (23), but space forbids going through them all here. There are however some potential counterexamples to (23), such as the English 'Verb X's way' construction discussed in Asudeh et al. (2008). Discussion of these will have to be left for some other occasion; suffice it to say that (a) such constructions don't appear to be very common (b) there are a variety of possibilities for analysing them, such as with a lexical rule.

A further property that meaning-constructors plausibly have is that if the 'Final Output' (literal node at the top of the tree) as defined in Andrews (2007b) is a skeleton position, then it is linked to the center. Verb meanings, for example, appear to always provide a semantic predication for the f-structure that their top PRED-value is an attribute of. It might be possible to extend this to all skeleton negative polarity literals, but obligatory control verbs in Serbo-Croation as analysed by Asudeh (2005:496) provide a counterexample. In the present approach, a functional control verb such as *pokušao* 'try' would require a meaning-constructor of the following form:

(24) $\lambda Px.Try(x, P(x)) \ : \ (i_e \multimap \ h_p) \multimap \ g_e \multimap \ f_p$
where $(f \text{ XCOMP SUBJ}) = i$ and $g \neq i$

The fact that the matrix and complement subjects aren't the same f-structure prevents the positive and negative type e terms from being modifiers.

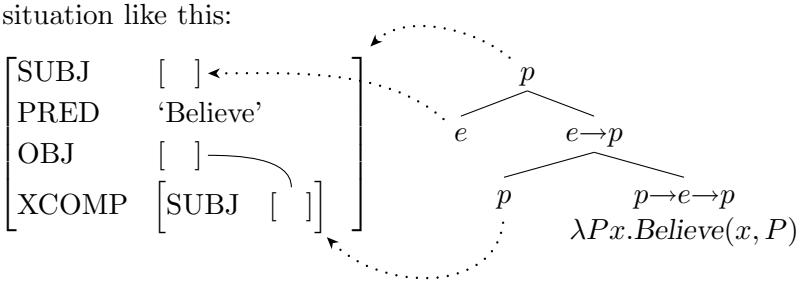
We now have a constraint on the handling of skeletal positions in SLEs which makes them function very similarly to the argument-lists and traditional informal semantic interpretation of PRED-features, But we still don't have anything that requires the PREDs to be there, leaving us without an

account of why subcategorization appears to be a property of PRED-features (since, so far, any feature could have a meaning-constructor with skeleton SLE positions).

For this, I propose the following constraint:

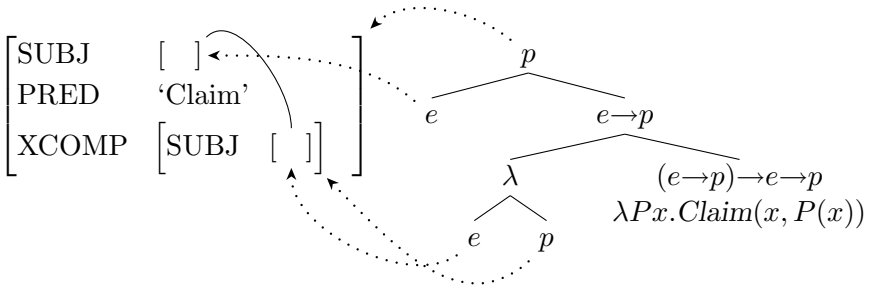
(25) Argument Path PRED-Constraint: If a skeleton literal is positive, it can be gotten to from the center by a governable GF-path such that for each $<f_i, \mathrm{GF}, f_{i+1}>$ in that path, the SLE specifies a PRED-value for f_i.

It is worth working through how (24) applies to functional control verbs, as analysed by Asudeh (2005). When the controller is not an argument, we get a situation like this:

(26)


No PRED-value is mentioned as sister to SUBJ in the <XCOMP SUBJ> path, but the constraint is not violated because this path does not lead to something corresponding to a literal in the meaning-constructor.

When the controller is an argument, we get a situation like this:

(27)


Here, the <XCOMP SUBJ> path does lead to something corresponding to a literal, but to a negative rather than a positive one, so the constraint is still not violated. Note that the f-structure identity of the two SUBJ-values is required by the 'Functional Consistency' principle of Andrews (2007b). This might well lead to a contradiction with the interesting proposals of Alsina (2008), which would need to be sorted out.

5 AVMs and Part-of-Speech-based Constraints

The constraints introduced above can be used to motivate the AVM-based notatation, with limited extensions connected to the system of Part-of-Speech categories. In particular, the arboriform constraint (15) implies that

the skeletal positions of the meaning-side will be linked to a tree-structure that can be represented as an AVM, which the argument-path constraint (25) requires to be populated with PRED-features, if the constructor specifies any argument GFs. (Note, however, that if there are no arguments, we don't have any principle to require there to be a PRED, if the Part of Speech is not open in the language. This could be correct, but in any event is something that needs more work.)

All of the conventional 'subcategorization' phenomena are connected to this structure, which can be called the 'central tree', because it is rooted to the center. What else is there? One thing that there appears to be is functional control, which involves a limited range of additional path equations.

The rest of what there is appears to be a limited range of additional material, closely linked to the Part-of-Speech system. This material seems able to be described as the (not necessarily atomic) 'final conclusion' of a meaning-constructor, constrained to involve certain kinds of upward paths from the center. For sentence-adverbs, for example, the final conclusion and constraints appear to be:

(28) $(< g_e \multimap > f_p) \multimap \ < g_e \multimap > f_p$
$<g = (f\,\mathrm{GF}),> f \in (\mathrm{ADJ}\uparrow)$

where $\uparrow$ is used to refer to the center, and the angle brackets enclose material that may be present or absent (all simultaneously, as in SPE phonology). Without the brackets, the result is the final conclusion (and entire glue side) of *obviously*, with them, *skillfully*, as analysed in Dalrymple (2001:270-274).

A sentence adverb with no complement (the majority) would then have a central tree of the form [PRED 'X'], with $\uparrow$ in the meaning-constructor automatically linking to the outer brackets, while those few adverbs that take complements (*unfortunately for us*; *skillfully for an undergraduate*) will take additional material in the central tree, such as for example:

[PRED 'Unfortunate', OBL [PRED 'For', OBJ h:[ ]]]

where h will link to an antecedent of the final conclusion of the form h_e. Given Dalrymple's account of attributive adjectives, the same constructors that work for sentence adverbs will also work for those modifying adjectives (*an obviously insane proposal*). Scoping adjectives such as *former*, and other kinds of adverbs such as degree adverbs will be different, but it seems likely that the range of variety is limited.

The details of how to treat the other parts of speech are uncertain, but it seems clear that only a limited number of options for the material other than the central tree will be required. Possibly for example just p for nouns, adjectives and verbs (leaving the sorts of differences pointed out for example by Wierzbicka (1986) and Baker (2003) unexplained, for now). The association between different types of parts of speech and different forms

of final conclusion is a somewhat unexpected feature in the DBA scheme, although it is natural in co-description, but this needs to be set against the other problems with the co-descriptional approach. Such relationships can be stated using inverse projections.

An important consequence of the constraints is that if an SLE involves only one PRED-feature, its syntactic effects can be simulated with a conventional PRED-feature with an argument-list, obeying the Completeness and Coherence Constraints. Furthermore, if additional features are involved, as with idioms and *pluralia tantum*, the effects can be simulated with FORM-features and constraining equations, in a compileable way. This does not constitute a reason for reverting to co-description, due to the problems discussed earlier in the paper, but it does mean that even if the proposals made here are correct in all respects, there's no reason to drop conventional PRED-features from LFG implementations, as long as they support efficient processing.

Another point that is worth making is that SLEs are well-suited to serve as inputs to lexical rules, under various kinds of formulations, such as OT-LFG (Andrews 2007a), conventional LMT, or classic LFG grammatical function reassignment, as in the original LFG analysis of the passive (Bresnan 1982). They furthermore would not seem to create any gratuitous obstacles to formulating inheritence-based accounts of phenomena such as idiomatic preposition selection in English or case-frame determination in Icelandic, as proposed in construction grammar. For example, a partial SLE such as [SUBJ g:[CASE ACC], OBJ j:[CASE ACC]] for verbs expressing 'lacking' in Icelandic is not significantly different from the form of representation for case-frames used in Barðdal (2001). We can therefore follow Asudeh et al. (2008) in using lexical inheritance to get some very useful properties of Construction Grammar within the formalism of LFG.

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CONSTRUCTIONS WITH LEXICAL INTEGRITY: TEMPLATES AS THE LEXICON–SYNTAX INTERFACE

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Abstract

LFG differs from Construction Grammar (CG) in assuming a strict separation between the lexicon and the syntax. The LFG architecture and the principle of Lexical Integrity dictate that fully inflected words are 'inserted' one by one into the c-structure, which does not seem to permit the blurring of the boundary between words and larger syntactic units that CG advocates. This paper addresses the question of how the intuitions behind constructions (in the CG sense) can be formalized within LFG, without rejection of the foundational assumptions behind the LFG framework. The key insight in our approach is the use of LFG templates (Dalrymple et al. 2004, Crouch et al. 2008) to factor out grammatical information in such a way that it can be invoked either by lexical items or by specific c-structure rules. C-structure rules that invoke specific templates are thus the equivalent of constructions in our approach, but Lexical Integrity and the separation of lexicon and syntax are preserved.

1 Introduction

The principle of Lexical Integrity is central to LFG. It can be formulated as follows:

(1) **Lexical Integrity**
The terminal nodes of c-structures are morphologically complete words.

This clearly has consequences for word formation, but it also has consequences for the analysis of so-called 'constructions', by which we mean multi-word expressions that are not analyzed compositionally. The lexicon provides c-structure with (fully inflected) individual words, not multi-word phrasal expressions.

Idioms may appear to pose a problem for Lexical Integrity, but these can often be accounted for by having one lexical item explicitly 'call for' another word when it is associated with a specific meaning. An example is provided by Kaplan and Bresnan's (1982) analysis of the idiom *keep tabs on*. They posit the following lexical entry (Kaplan and Bresnan 1982:67):

(2) *kept* V $(\uparrow \text{TENSE}) = \text{PAST}$
$(\uparrow \text{PRED}) = \text{'observe}\langle(\uparrow \text{SUBJ})(\uparrow \text{ON OBJ})\rangle\text{'}$
$(\uparrow \text{ON OBJ FORM}) =_c \text{TABS}$

However, in the Construction Grammar (CG) framework, it has long been argued that constructions are more general than idioms (Fillmore 1988, Goldberg 1995, Kay and Fillmore 1999). According to that literature, there are multi-word expressions that are less frozen in form than prototypical idioms, but that nevertheless correspond non-compositionally to a specific meaning. Crucially, it is claimed that the syntactic frame of the multi-word expression itself corresponds to some meaning; that is, the syntactic frame itself, perhaps along with some specifications on what words are permitted, invokes an interpretation. Expressions such as (3–5) have been used to argue for this construction grammatical point:

(3) The more the merrier; the bigger the better, etc. (Fillmore et al. 1988, Culicover and Jackendoff 1999)

(4) What's that koala doing sleeping in the corner? (the 'What's X doing Y' construction: Kay and Fillmore 1999)

(5) Smithy drank his way through university. (Jackendoff 1990, Goldberg 1995)

Most words in the expressions above are exchangeable for other words, so they seem more flexible than prototypical idioms. Yet their form and associated interpretation must be learned by English speakers, as these constructions do not, it is argued, follow from general compositional principles of English grammar. CG posits that all combinatorial morpho-syntactic units (morphemes, words, phrases) are constructions, where these units can be specified to a greater or lesser extent for form and meaning.

[†]We thank the audience at LFG08, in particular Kersti Börjars, Dag Haug, Helge Lødrup, Marie-Elaine van Egmond, and Nigel Vincent, for helpful discussion and comments.

Expressions such as the ones in (3–5) instantiate relatively specific phrasal multi-word constructions, as opposed to, e.g., the general intransitive construction, which is not very detailed in its specifications.

This paper addresses the question of how the intuitions behind constructions (in the CG sense) can be formalized within LFG without rejection of the foundational assumptions behind the LFG framework. Unlike CG, we will not adopt the position that all grammatical entities (phrases, words, morphemes) are constructions. Instead, we consider how to incorporate into LFG specific types of phrasal constructions for which it has been argued that part of the interpretation does not seem to be directly contributed by any of the individual words. The paper will specifically deal with the English *way*-construction and a related construction in Swedish, the *Directed Motion Construction*.[1]

The key insight in our approach is the use of LFG templates (Dalrymple et al. 2004, Crouch et al. 2008) to factor out grammatical information in such a way that it can be invoked either by lexical items or by construction-specific c-structure rules. C-structure rules that invoke specific templates are thus the equivalent of constructions in our approach, but Lexical Integrity and the separation of lexicon and syntax are preserved. However, there is a potentially deep consequence for the theory of the lexicon, because verbs in our approach specify default subcategorization through template calls in such a way that the subcategorization can be constructionally overridden. Thus, subcategorization is moved to the template component, which in our system is the interface between the lexicon and syntax.

2 Case study: Traversal constructions

2.1 English

It has been argued that the English *way*-construction in (6) deserves a constructional analysis rather than a compositional one, since the construction implies directed motion even though none of the individual words in *way*-examples necessarily denotes motion (Jackendoff 1990, Goldberg 1995). The action denoted by the verb *elbow* does not normally involve traversal, though in example (6) this meaning is present.

(6) Sarah elbowed her way through the crowd.

In such cases, some properties of the construction – either the phrasal configuration, some combination of words in the construction, or both – are responsible for its meaning.

Since the various manifestations of the English construction have in common the word *way*, our analysis attributes the special syntactic and semantic properties of the construction to the presence of this word. Specifically, we propose that the lexical entry for the word *way* is associated with a particular template which overrides the default subcategorization requirements and semantics of the verb in the construction, replacing them with the syntax and semantics of the *way*-construction. Thus, our treatment of the English *way*-construction involves lexical specification of the properties of the word *way*. Crucially, however, the same specifications can be associated with a phrase structure rule rather than a word, as we will see in our analysis of the Swedish Directed Motion Construction, a construction with similar meaning to the *way*-construction but with idiosyncratic phrase structure properties.

In fact, for most English speakers the English *way*-construction has two closely related meanings, one involving means and one involving manner (Jackendoff 1990:215, Goldberg 1995:202–212), though Goldberg (1995:202–203) points out that the manner interpretation is not available for all speakers. Examples (7) and (8) both involve an event denoted by the main verb (whistling or elbowing) and its relation to a second event of traversal of a path. The verb *elbowed* in example (7) specifies the means by which Sarah managed to traverse the crowd: the traversal was made possible by the elbowing action. For those who allow the manner interpretation, the verb *whistled* in example (8) specifies the manner in which the traversal of the room took place: Sarah whistled while crossing the room.

[1] This paper does not treat periphrastic morphology or complex verbs, which are also examples of expression larger than single words that one might want to store in the lexicon. For discussions of periphrasis in LFG, see Sadler and Spencer (2004) and for LFG analyses of complex verbs, see Alsina (1993) and Butt (1995).

(7) Means: Sarah elbowed her way through the crowd. (traversed the crowd by means of elbowing)

(8) Manner: Sarah whistled her way across the room. (traversed the room while whistling)

The use of templates in our analysis allows us to specify what these meanings have in common and how they differ, as well as allowing the statement of cross-linguistic similarities and differences in similar constructions in other languages.

Jackendoff (1990:216) and others have claimed that the possessor in the English *way*-construction must be coreferential with the subject, and indeed, in an overwhelming number of cases, this generalization holds. However, we have found examples which counterexemplify this claim:

(9) He had bought his son's way into an exclusive military academy normally reserved for the gentry and had outfitted him in style. (www.samizdat.com/hero7.html)

(10) As ambassador, Chesterfield negotiated Britain's way into the Treaty of Vienna in 1731. (www.aim25.ac.uk/cgi-bin/frames/fulldesc?coll_id=2117&inst_id=86)

Furthermore, the noun *way* in the *way*-construction can be modified (Jackendoff 1990:217, Goldberg 1995:206):

(11) In these last twenty years Richard Strauss has flamed his meteoric way into our ken — and out of it. (Buchanan 1918)

Our analysis of the construction must be able to derive a meaning for these examples as well.

2.2 Swedish

Toivonen (2002) discusses the Swedish Directed Motion Construction, exemplified in (12).

(12) Sarah armbågade sig genom mängden.
S. elbowed SELF through crowd.DEF
∼ 'Sarah elbowed her way through the crowd.'

The Swedish DMC is very similar in meaning and use to the English *way*-construction, but the DMC does not include any word such as *way* to flag the construction. Instead, the construction is distinguished by the strict requirement for the presence of certain constituents, restrictions on the individual constituents, and perhaps most interestingly, by a word order quirk at odds with the rest of Swedish grammar (Toivonen 2002). Consider (13a–b):

(13) a. Jonas knuffade sig in i mängden.
J. pushed SELF in inside crowd.DEF
'Jonas pushed his way into the crowd.'

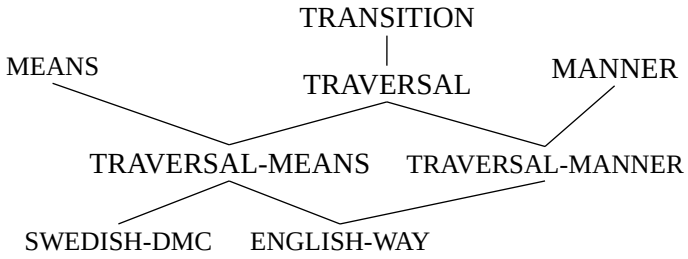
b. Jonas knuffade in dig i mängden.
J. pushed in you inside crowd.DEF
'Jonas pushed you into the crowd.'

Verbal particles (such as *in*) are normally required to precede the direct object in Swedish, as in (13b). However, in the DMC, the particle follows *sig*, as in (13a). Toivonen's (2002) analysis makes use of a lexical redundancy rule which alters the verb's lexically specified argument structure and semantics, relating a 'regular' verb, e.g. *knuffa* 'push', to a DMC version of that verb. We propose a different analysis here: the special configurational properties of the example are accounted for by a special phrase structure rule which is associated with a template like the one proposed for the analysis of the English *way*-construction. The English and Swedish constructions have a number of syntactic and semantic attributes in common, which are captured by very general templates in the template hierarchy; differences between the two constructions are captured by associating them with different specific templates in the hierarchy, as we now describe.

3 Encapsulating generalizations: Transition Template Hierarchy

We propose a single theory of constructions that uses existing LFG mechanisms to capture commonalities between the English *way*-construction and the Swedish DMC. Our theory preserves the intuition that the *way*-construction is driven by lexical specifications for *way* together with general phrase structural facts about English, as well as the intuition that the DMC is driven by a specific phrase-structural configuration. The template hierarchy we assume is represented in (14):

(14)



This diagram represents the relations among the templates: information from templates high in the hierarchy is passed down via the lines connecting the templates, so that the templates at the bottom of the hierarchy include all of the information from higher templates that they are directly or indirectly connected to. In (14), the template TRAVERSAL contains material that is common to the Swedish DMC and the English *way*-construction. Templates are just packages of grammatical information, and can be defined in terms of other templates. The TRAVERSAL template is defined in terms of the more general TRANSITION template, as represented by the line connecting them, which means that TRAVERSAL incorporates all of the information associated with the TRANSITION template while also contributing some information specific to TRAVERSAL. TRAVERSAL in turn appears as a part of the definition of both the TRAVERSAL-MEANS template and the TRAVERSAL-MANNER template.

The templates TRAVERSAL-MEANS and TRAVERSAL-MANNER provide different ways of adding information to the TRAVERSAL template, supplying the information that the main verb denotes either the means or the manner in which the path traversal is achieved. The Swedish DMC has the means interpretation (Toivonen 2002:318), and so we treat it as associated with the TRAVERSAL-MEANS template; the manner interpretation may be available dialectally, but we do not treat this variation here. Finally, the templates SWEDISH-DMC and ENGLISH-WAY contribute additional language-specific information to these templates, as we will see.

4 Formal Analysis

4.1 Phrase structurally flagged constructions

4.1.1 The phrase structure rule

Turning first to the Swedish DMC, we propose that this construction is most elegantly analyzed with the following construction-specific phrase structure rule, which makes crucial use of a call to the template SWEDISH-DMC:

(15)

V′	→	(V^0)	NP		PP
		$\uparrow = \downarrow$	$(\uparrow \text{OBJ}) = \downarrow$		$(\uparrow \text{OBL}) = \downarrow$
			$(\downarrow \text{PRONTYPE}) = \text{SIMPLEX-REFLEXIVE}$		
			@SWEDISH-DMC($(\uparrow \text{PRED FN})$)		

The template call appears on the NP node. By convention, template calls are marked by the at sign '@'. The SWEDISH-DMC template takes a single argument, the value of the PRED FN of the V′; we provide more information about this template in 4.1.2.

We observe four important properties of our treatment of the SWEDISH-DMC. First, associating the template for this construction with a special phrase structure rule reflects the fact that only this particular configuration has the special meaning associated with the DMC.

Second, the NP and PP daughters of V′ in (15) are obligatory. Our theory assumes that optionality must be explicitly marked in phrase structure rules, as in computational LFG treatments (e.g. Crouch et al. 2008) and in contrast to theoretical positions that allow generalized optionality (e.g. Bresnan 2001). The V^0 node is optional, since the verb need not appear there: the Swedish finite verb appears in I rather than V.

Third, we must explicitly state the fact that the NP is a simplex reflexive, such as *sig*, and not just any kind of NP or even a complex reflexive (e.g. *sig själv*).

Fourth, the construction requires an OBL phrase, which must be realized as a post-object PP.

4.1.2 The SWEDISH-DMC template

Semantically, the Swedish DMC and the English *way*-construction involve an event characterised by the main verb in the construction and a second event involving traversal of a path. The basic template TRANSITION is defined as follows:

(16) $\text{TRANSITION} = \lambda R \lambda x \lambda e \lambda e'.R(e) \wedge agent(e) = x \wedge cause(e') = x :$
$(\uparrow_\sigma \text{REL}) \multimap (\uparrow \text{SUBJ})_\sigma \multimap (\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma$

Templates encoding syntactic information and expressing syntactic generalisations are defined as sets of functional equations, as described by Dalrymple et al. (2004). However, since our concern is the syntax-semantics interface and meaning differences among constructions, we define this template with a *meaning constructor* (Dalrymple 1999, 2001, Asudeh 2004), which provides part of the common meaning for the English *way*-construction and the Swedish DMC. This meaning constructor requires:

- a REL meaning R specifying the nature of the event e, which is provided by the verb in the construction; for *Bill elbowed his way through the crowd*, e is required to be an event of elbowing, and so R is the predicate *elbow*
- a meaning x for the subject of the main verb, which will be interpreted as the agent of e and as the causer of the transition event e'
- two event variables e and e', associated with the semantic attributes, EVENT1 and EVENT2, representing the event denoted by the verb and the transition event.

This basic meaning is augmented by other meaning constructors in the template hierarchy. Our characterisation of the subject of the main event as an agent of the event e and a causer of the transition event e' follows Goldberg (1995:212–213), who claims that the motion in the way-construction must be self-propelled. However, Jackendoff (1990:216) suggests that although the means interpretation is necessarily tied to deliberate action, the manner interpretation is also compatible with action that is not deliberately performed. Examples such as (17), which has a manner and not a means interpretation, indicate that the issue of whether the subject is always interpreted as an agent needs to be investigated further; in this example, e is an event of bleeding and does not seem to be associated with an agent:

(17) Baxter's wife said her son bled his way into the ambulance painlessly.
(http://newvoices.org/humor/the-slice-man-cometh.html)

We leave this issue for future research.

The template hierarchy in (14) encodes the fact that the template TRAVERSAL calls the template TRANSITION, with the effect that TRAVERSAL incorporates all of the information in TRANSITION as well as specifying some additional information. The TRAVERSAL template is defined in (18):

(18) $\text{TRAVERSAL} = \text{@TRANSITION}$
$\lambda P \lambda e'.P(e') \wedge traversal(e') :$
$[(\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma] \multimap [(\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma]$

The first line in the definition of TRAVERSAL contains the call to the template TRANSITION, marked as in (15) with the at sign '@'. The second line adds the information that e' is a traversal event. In

technical terms, this meaning constructor behaves as a modifier on the predication associated with the transition event.

In turn, the TRAVERSAL-MEANS template is defined simply by calls to the TRAVERSAL template and the MEANS template:

(19) TRAVERSAL-MEANS = @TRAVERSAL
@MEANS

The MEANS template is given in (20):

(20) MEANS = $\lambda P \lambda e \lambda e'.P(e)(e') \ \wedge \ means(e', e)$:
$[(\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma] \ \multimap \ [(\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma]$

The MEANS meaning constructor specifies that the event e represents the means of achieving the event e'. With respect to TRAVERSAL-MEANS, this means that the main verb's event e is the means of achieving the event e' of traversing the path, as in an English example like *Sarah elbowed her way through the crowd* or the Swedish equivalent, where the traversal through the crowd is achieved by elbowing.

The SWEDISH-DMC template, specific to the Swedish Directed Motion Construction, is defined by reference to the template TRAVERSAL-MEANS. It also calls the syntactic subcategorization template TRANSITIVE-OBLIQUE, to be described in Section 4.2, and provides some additional material specific to the Swedish construction:

(21) SWEDISH-DMC(FN) = @TRANSITIVE-OBLIQUE(FN)
@TRAVERSAL-MEANS
$\lambda Q \lambda P \lambda y. \exists e. \exists e'. \exists z. P(e)(e') \ \wedge$
$theme(e') = y \ \wedge \ path(e') = z \ \wedge \ Q(z)$:
$[((\uparrow \text{OBL})_\sigma \text{PATH}) \multimap (\uparrow \text{OBL})_\sigma] \ \multimap$
$[(\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma] \ \multimap$
$(\uparrow \text{OBJ})_\sigma \ \multimap \uparrow_\sigma$

The argument of the SWEDISH-DMC template is called "FN" in this definition; it is passed as an argument to the TRANSITIVE-OBLIQUE template, which is defined in (24). Besides the two template calls, SWEDISH-DMC also contributes a meaning constructor to complete the meaning of the Swedish construction, which requires the following:

- a meaning Q depending on the OBL phrase, specifying the nature of the path traversed; for (12) ($\sim$'Sarah elbowed her way through the crowd'), the path is required to go through the crowd.
- a meaning P, contributed by the main verb, specifying the nature of the event e denoted by the main verb and its relation to the transition event e'; for (12) ($\sim$'Sarah elbowed her way through the crowd'), e is an elbowing event and is the means enabling the traversal event e'.
- a meaning y for the object of the main verb, which is required to be a reflexive and hence to corefer with the subject of the main verb; y is the theme of e', the traversal event.

Our analysis produces the meaning in (22) for *Sarah armbågade sig genom mängden* 'Sarah elbowed SELF through the crowd'.

(22) $\exists e. \exists e'. \exists z. elbow(e) \ \wedge \ agent(e) = sarah \ \wedge \ cause(e') = sarah \ \wedge \ means(e', e) \ \wedge$
$traversal(e') \ \wedge \ theme(e') = sarah \ \wedge \ path(e') = z \ \wedge \ through(z, \iota x.[crowd(x)])$

A full proof of the derivation of this meaning is given in the Appendix.

4.2 Verb lexicon and basic subcategorization templates

We have seen that the SWEDISH-DMC template provides a PRED specification with subcategorization frame and semantic specifications for the construction. This in turn means that the lexical entry for a verb must supply a default PRED and semantics which can be overridden when the verb is used in a

construction like the *way*-construction.[2] We assume that the verb *elbowed/armbågade*, which appears in (6) and (12), is specified as follows:

(23) elbowed/armbågade V $\lambda e.elbow(e) : (\uparrow_\sigma \text{REL})$

$$\left(\begin{array}{l} \text{@TRANSITIVE(elbow)} \\ \lambda R \lambda x \lambda y \exists e.R(e) \ \wedge \ agent(e) = x \ \wedge \ theme(e) = y: \\ (\uparrow_\sigma \text{REL}) \multimap (\uparrow \text{SUBJ})_\sigma \multimap (\uparrow \text{OBJ})_\sigma \multimap \uparrow_\sigma \end{array} \right)$$

The first line of the entry specifies its s-structure semantic REL(ATION). The second part of the entry specifies a default semantic contribution and subcategorization information, encoded by the template TRANSITIVE and the meaning constructor in the third line. This material effectively serves as a default, because unless some other part of the system specifies an alternative, constructional GF template, there is no way to check Completeness and Coherence and the structure will fail.

The TRANSITIVE template takes a single argument, here 'elbow'. The definition of TRANSITIVE is stated with respect to an arbitrary argument FN:[3]

(24) TRANSITIVE(FN) = (↑ PRED) = 'FN⟨(↑ SUBJ),(↑ OBJ)⟩'
TRANSITIVE-OBLIQUE(FN) = (↑ PRED) = 'FN⟨(↑ SUBJ),(↑ OBJ),(↑ OBL)⟩'

The argument FN of the TRANSITIVE template appears in parentheses after the template name, and also appears in the definition of the template as the FN of the semantic form. Notice that FN is not itself a semantic form, but rather part of a semantic form; the attribute FN and argument designators such as ARG1 allow reference to the components of a semantic form (Crouch et al. 2008) according to the following pattern:

(25) [PRED 'FN⟨ARG1,ARG2,...⟩']

The specifications in (26) are equivalent:

(26) a. (f PRED) = 'elbow⟨(↑ SUBJ),(↑ OBJ)⟩'

b. (f PRED FN) = elbow
(f PRED ARG1) = (↑ SUBJ)
(f PRED ARG2) = (↑ OBJ)

For the verb *elbow*, the call to the TRANSITIVE template passes in the argument 'elbow'. The template call @TRANSITIVE(elbow) is exactly equivalent to the following equation:

(27) (↑ PRED) = 'elbow⟨(↑ SUBJ),(↑ OBJ)⟩'

We now turn to the default meaning constructor for *elbow* given in (23), repeated here:

(28) $\lambda R \lambda x \lambda y \exists e.R(e) \ \wedge \ agent(e) = x \ \wedge \ theme(e) = y$:
$(\uparrow_\sigma \text{REL}) \multimap (\uparrow \text{SUBJ})_\sigma \multimap (\uparrow \text{OBJ})_\sigma \multimap \uparrow_\sigma$

This meaning constructor requires a REL R which is supplied by the verb (the REL for the verb *elbow* is specified above as $\lambda e.elbow(e)$), a meaning x for the SUBJ, and a meaning y for the OBJ. For a sentence like *Bill elbowed Fred*, the meaning that is produced is, as desired:

(29) $\exists e.elbow(e) \ \wedge \ agent(e) = Bill \wedge \ theme(e) = Fred$

When the verb *elbowed* is used in the traversal construction, these default specifications are overridden by the specifications imposed by the construction, and the special constructional specifications are used instead.

[2] Our analysis of the Swedish DMC and the English *way*-construction involves **replacing** rather than **modifying** the default semantic form of the main verb with the specifications provided by the construction. In the analysis of other constructions, it may be preferable to modify the semantic form via restriction or other operators, as proposed for the analysis of complex predicates by Butt et al. (2003) (see also Butt and King 2005 on causatives).

[3] For ease of explication, (24) specifies an active subcategorization frame for the verb, simplifying away from mapping theory issues and the possibility for passivization of this verb. We return to a discussion of the interaction of mapping theory and our theory of constructions in Section 6 below, where we propose a revised TRANSITIVE template which refers to argument structure roles rather than grammatical functions and which interacts appropriately with mapping theory.

4.3 Lexically flagged constructions

The English *way*-construction relies on many of the same templates as the Swedish DMC. It is different in that it is completely regular in terms of phrasal structure, so no exceptional phrase structure rule is required. Rather, we assume the standard V′ rule for English, which already permits an NP OBJECT and a PP OBLIQUE. Evidence that the PP is an argument of the main verb and not a modifier of *way* comes from adverb placement: it is possible for an adverb to intervene between *way* and the PP, while this is not possible if the PP is associated with the object:

(30) Sarah elbowed her way quickly through the crowd.

(31) *Sarah elbowed a friend quickly of her mother's.

The locus of the English *way*-construction is the word *way*, which receives the following specification:

(32) way N $(\uparrow \text{PRED}) = \text{'way'}$
$\lambda x.way(x) : (\uparrow_\sigma \text{VAR}) \multimap (\uparrow_\sigma \text{RESTR})$
(@ENGLISH-WAY((OBJ $\uparrow$) PRED FN))

According to this lexical entry, *way* contributes a semantic form 'way' and a standard noun meaning $\lambda x.way(x)$ on every occasion of its use, even in the *way*-construction. As we will see, our analysis equates the path specified in the ENGLISH-WAY template with the path denoted by *way*. Retaining the standard semantics for *way* allows us to provide a satisfactory analysis of modification of *way* and specification of possessors of *way* other than the subject, as discussed in Section 2.1; the relevant examples are:

(33) a. As ambassador, Chesterfield negotiated **Britain's way** into the Treaty of Vienna in 1731.

b. In these last twenty years Richard Strauss has flamed **his meteoric way** into our ken — and out of it.

The ENGLISH-WAY constructional template appears in parentheses, since it is an optional contribution of the word *way*. Its argument is ((OBJ $\uparrow$) PRED FN): this expression uses inside-out functional uncertainty to refer to the f-structure in which *way* is an OBJ, (OBJ $\uparrow$), and passes the PRED FN of that f-structure as an argument to the template.

The definition of the ENGLISH-WAY template is:

(34) ENGLISH-WAY(FN) = @TRANSITIVE-OBLIQUE(FN)
{@TRAVERSAL-MEANS | @TRAVERSAL-MANNER}
$\lambda Y \lambda Q \lambda P \lambda x.\exists e.\exists e'.\exists z.P(e)(e') \wedge$
$theme(e') = x \wedge path(e') = z \wedge$
$Q(z) \wedge z = Y(x) :$
$[(\uparrow \text{SPEC})_\sigma \multimap \uparrow_\sigma] \multimap$
$[(((\text{OBJ} \uparrow) \text{OBL})_\sigma \text{PATH}) \multimap ((\text{OBJ} \uparrow) \text{OBL})_\sigma] \multimap$
$[((\text{OBJ} \uparrow)_\sigma \text{EVENT1}) \multimap ((\text{OBJ} \uparrow)_\sigma \text{EVENT2}) \multimap (\text{OBJ} \uparrow)_\sigma] \multimap$
$(\uparrow \text{SPEC})_\sigma \multimap (\text{OBJ} \uparrow)_\sigma$

As shown in (14), this definition calls the TRANSITIVE-OBLIQUE template and passes in the FN of the main verb, providing the semantic form and subcategorization specification for the construction. The second line contains a disjunction: either the TRAVERSAL-MEANS or the TRAVERSAL-MANNER template is called. This is because the English *way*-construction allows either a means interpretation for the construction or a manner interpretation. The TRAVERSAL-MANNER template is defined in (35) in terms of template calls to the TRAVERSAL and MANNER templates:

(35) TRAVERSAL-MANNER = @TRAVERSAL
@MANNER

The MANNER template is similar to the MEANS template defined in (20), except that it specifies that a relation R is the manner by which the event e' is achieved, rather than the means:

(36) MANNER = $\lambda P \lambda R \lambda e'.P(R)(e') \ \wedge \ manner(e', R)$:
$[(\uparrow_\sigma \text{REL}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma] \ \multimap \ [(\uparrow_\sigma \text{REL}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma]$

Besides the template calls in the first two lines, the ENGLISH-WAY template contributes the following meaning constructor:

(37) $\lambda Y \lambda Q \lambda P \lambda x.\exists e.\exists e'.\exists z.P(e)(e') \ \wedge$
$theme(e') = x \ \wedge \ path(e') = z \ \wedge$
$Q(z) \ \wedge \ z = Y(x)$:
$[(\uparrow \text{SPEC})_\sigma \multimap \uparrow_\sigma] \multimap$
$[(((\text{OBJ} \ \uparrow) \text{OBL})_\sigma \text{PATH}) \multimap ((\text{OBJ} \ \uparrow) \text{OBL})_\sigma] \multimap$
$[((\text{OBJ} \ \uparrow)_\sigma \text{EVENT1}) \multimap ((\text{OBJ} \ \uparrow)_\sigma \text{EVENT2}) \multimap (\text{OBJ} \ \uparrow)_\sigma] \multimap$
$(\uparrow \text{SPEC})_\sigma \multimap (\text{OBJ} \ \uparrow)_\sigma$

This meaning constructor requires:

- a meaning Y for the *way* NP, which provides additional information about the path z that is traversed
- a meaning Q for the oblique phrase; for the example *Sarah elbowed her way through the crowd*, this is the meaning of *through the crowd*, which characterizes the path z
- a meaning P, contributed by the main verb, specifying the nature of the event e and its relation to the traversal event; for (12) (*Sarah elbowed her way through the crowd*), e is required to be an elbowing event and is the means enabling the traversal event
- a meaning x for the possessor of *way*, which plays the role of the theme of the traversal event e'.

This analysis produces the meaning in (38) for *Sarah elbowed her way through the crowd*:

(38) $\exists e.\exists e'.\exists z.elbow(e) \ \wedge \ agent(e) = sarah \ \wedge$
$cause(e') = sarah \ \wedge \ means(e', e) \ \wedge \ traversal(e') \ \wedge \ theme(e') = sarah \ \wedge$
$path(e') = z \ \wedge \ through(z, \iota x.[crowd(x)]) \ \wedge \ z = \iota y.[way(y) \ \wedge \ R_c(sarah, y)]$

The main difference between this meaning and the meaning of its Swedish counterpart *Sarah armbågade sig genom mängden* is that the English *way*-construction provides a more detailed specification of the path z. We follow Partee (1983/1997) and Partee and Borschev (1998) in treating the genitive construction as involving reference to a unique individual who bears some contextually specified relation R_c to a possessor. The possessive pronoun in the phrase *her way* is resolved to the subject *Sarah*, and the meaning of *her way* is analyzed as $\iota y.[way(y) \ \wedge \ R_c(sarah, y)]$, the unique y that is a way and that bears the relation R_c to Sarah. This analysis enables us to treat cases in which *way* is modified or possessed by an individual other than the subject of the construction. A full proof of the meaning of *Sarah elbowed her way through the crowd* is given in the Appendix.

5 Traversal constructions across the Germanic languages

Many Germanic languages have traversal constructions comparable to the English *way*-construction and the Swedish DMC. It is likely that all Germanic languages have traversal constructions of some kind.

5.1 Dutch

Van Egmond (2006) shows that Dutch has two constructions that indicate traversal of a path. One construction contains the word *weg* 'way' (39), and the other does not (40).

(39) Wij worstelen ons een weg door de menigte. Dutch
we wrestle ourselves a way through the crowd
'We are wrestling our way through the crowd.'

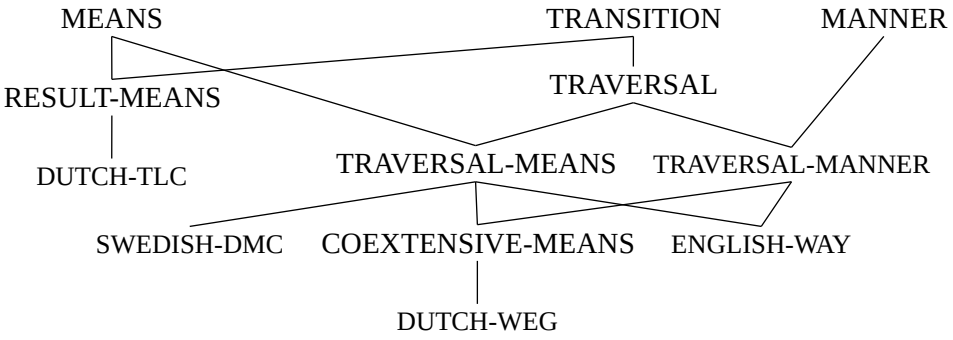
(40) Janneke bluft zich uit de benarde situatie.
J. bluffs SELF out the awkward situation
'Janneke bluffs her way out of the awkward situation.'

The *weg*-construction exemplified in (39) is also discussed in Verhagen (2003).

Although the two Dutch constructions are similar in meaning, van Egmond (2006) shows that they nevertheless have distinct interpretations. She calls the type with *weg* (39) the '*weg*-construction' (DUTCH-WEG), and the type with a reflexive (40) the 'Transition to Location' (DUTCH-TLC) construction. The *weg*-construction describes an incremental traversal of a path by means of (or while) performing the activity denoted by the verb. The traversal and the activity denoted by the verb are coidentified: the construction describes a simple event. The TLC, on the other hand, describes a transition to a stative location by means of performing the activity denoted by the verb, without necessarily traversing a path. The traversal and the activity denoted by the verb are two subevents that are not necessarily coextensive. For example, in (40), the bluffing event can take place at a preceding point in time than the second event, in which the subject gets out of the awkward situation.

We propose the following additions to the template hierarchy in (14) for Dutch:

(41)



This template hierarchy includes several new templates. COEXTENSIVE-MEANS specifies that the event denoted by the main verb and the traversal event are coextensive:

(42) COEXTENSIVE-MEANS = {@TRAVERSAL-MEANS | @TRAVERSAL-MANNER}
$\lambda P \lambda e \lambda e'.P(e)(e') \wedge coextensive(e, e')$:
$[(\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma] \multimap$
$[(\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma]$

This template is used in the definition of the DUTCH-WEG template, which, like English, allows either a means or a manner interpretation.

The TLC construction is defined in terms of the RESULT-MEANS template, defined as:

(43) RESULT-MEANS = @TRANSITION
@MEANS
$\lambda P \lambda e \lambda e'.P(e)(e') \wedge result(e, e')$:
$[(\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma] \multimap$
$[(\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma]$

RESULT-MEANS involves a transition but not necessarily a traversal, and so is defined in terms of the TRANSITION template. It specifies a means interpretation (and disallows a manner interpretation), and so incorporates the MEANS template in its definition. Besides incorporating information from these templates, RESULT-MEANS specifies that the event denoted by the verb results in a transition to a state e' specified by the oblique phrase.

5.2 German

German also has two traversal constructions (Ludwig 2005). Ludwig provides the following two examples:

(44) Der Song stampft sich seinen Weg ins Unterbewusstsein. German
the song stomps self its way into.the subconscious
'The song stomps its way into the subconscious.'

(45) Er bettelt sich durchs Land.
he begs self through.the country
'He begs his way through the country.'

Ludwig points out that the construction in (44) is less productive or common than (45). She also notes that the possessive pronoun can be replaced by an indefinite or definite article. Since the two Dutch constructions were shown to differ in interpretation (van Egmond 2006), it would be interesting to investigate whether the German constructions differ as well.

5.3 Norwegian

Seland (2001) and Sveen (2002) discuss Norwegian examples which are very similar to Swedish DMC examples. Example (46) is Seland's example (4b).

(46) Hun har skutt seg til sommer-OL. Norwegian
she has shot herself to summer-Olympics
'She has shot her way to the Summer Olympics.'

Verbal particles behave quite differently in Swedish and Norwegian. Norwegian does not display a word order difference between traversal and resultative examples. However, Norwegian speakers indicate that a difference in intonation may serve to differentiate between the two (Øystein Nilsen and Helge Lødrup, p.c.).

We expect that investigation of these constructions in the Germanic languages will turn up interesting differences and similarities with English, Swedish, and Dutch, and will likely lead to augmentations and refinements to the template hierarchy that we have proposed. For example, van Egmond proposes that the English way-construction is in fact ambiguous between the traversal meaning of the Dutch way-construction and the transition meaning of the Dutch TLC, and this is not reflected in our hierarchy. In addition, there may well be distinctions and generalizations that have not yet been discovered.

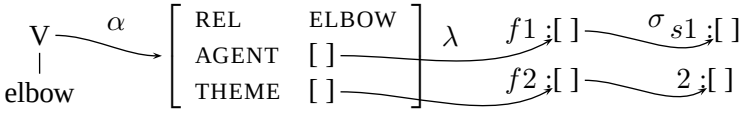
6 Linking

We now return to the definition of syntactic subcategorization requirements in the templates that appear as defaults in verbal lexical entries and as specifications of subcategorisation requirements in the *way*- and DMC constructions. Recall that for simplicity, we assumed that the relation between semantic roles and grammatical functions is fixed by the construction or by information in the lexical entry of a predicate. For example, the default subcategorization for a verb like *elbowed/armbågade* was given by the TRANSITIVE template, defined in (24) as:

(47) TRANSITIVE(FN) = $(\uparrow \text{PRED}) = \text{'FN}\langle(\uparrow \text{SUBJ}),(\uparrow \text{OBJ})\rangle\text{'}$

This is overly inflexible; the correct analysis would specify argument structure information for the predicate or construction rather than a specific set of grammatical functions, and would appeal to some version of Mapping Theory (Bresnan and Zaenen 1990, Alsina 1993, Butt 1995, Butt et al. 1997) to derive the syntactic subcategorization frame for the predicate from argument structure. We sketch here how this would work for the lexical specifications for the verb *elbow*, following the approach of Butt et al. (1997).

Butt et al. (1997) assume the following projection architecture:

(48)


Argument structure is represented as an attribute-value matrix reachable from the c-structure via the α projection. The familiar ϕ projection is defined as the composition of the α projection to argument structure and the λ projection from argument structure to f-structure.

The lexical entry for *elbowed/armbågade* can now be stated as:

(49) elbowed/armbågade V $\lambda e.elbow(e) : (\uparrow_\sigma \text{REL})$

$$\left(\begin{array}{l} (\uparrow \text{PRED FN}) = \text{elbow} \\ \lambda R \lambda x \lambda y \lambda e.R(e) \ \wedge \ agent(e) = x \ \wedge \ theme(e) = y\text{:} \\ (\uparrow_\sigma \text{REL}) \multimap (\widehat{*}_\alpha \text{AGENT}) \lambda \sigma \multimap (\widehat{*}_\alpha \text{THEME}) \lambda \sigma \multimap (\uparrow_\sigma \text{EVENT}) \multimap \uparrow_\sigma \end{array} \right)$$

Instead of specifying the grammatical functions SUBJ and OBJ, this lexical entry specifies that the argument structure of the verb contains an AGENT and a THEME. These will be linked to the appropriate grammatical functions according to mapping theory.

The English *way*-construction and the Swedish DMC construction could be treated similarly, with argument structure roles specified in the templates for the construction, and the mapping from argument structure roles to grammatical functions provided by mapping theory. However, these constructions do in fact seem to be syntactically inflexible, and cannot undergo passivization or other argument alternations:

(50) *Bill's way through the park was elbowed (by him).

Given this, we propose to leave the templates appearing in those constructions in their current form, since we believe that specifying particular grammatical functions and disallowing argument alternations such as passive is the right treatment for these.

7 Conclusion

Our approach captures the intuitions of CG in LFG without giving up Lexical Integrity and without in any sense admitting constructions as first-class entities in the theory (unlike, e.g., the HPSG approach of Sag 1997 and certain subsequent HPSG work). LFG templates, which have been independently motivated for reasons of expediency in grammar writing, now play a crucial theoretical role: templates serve as the locus of grammatical information that can be either lexically or structurally invoked and thus formalize one aspect of the lexicon–syntax interface. In order to accommodate this view of constructions, the verbal lexicon needs to be modified such that subcategorization is now strictly governed by the template component.

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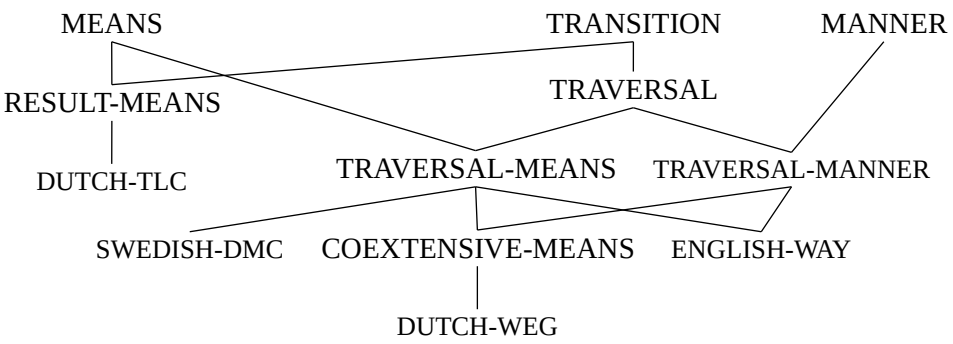
Appendices

A Template Hierarchy

(51)



B Templates

(52) TRANSITION = $\lambda R\lambda x\lambda e\lambda e'.R(e) \wedge agent(e) = x \wedge cause(e') = x$:
$(\uparrow_\sigma \text{REL}) \multimap (\uparrow \text{SUBJ})_\sigma \multimap (\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma$

(53) MEANS = $\lambda P\lambda e\lambda e'.P(e)(e') \wedge means(e', e)$:
$[(\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma] \multimap [(\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma]$

(54) MANNER = $\lambda P\lambda R\lambda e'.P(R)(e') \wedge manner(e', R)$:
$[(\uparrow_\sigma \text{REL}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma] \multimap [(\uparrow_\sigma \text{REL}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma]$

(55) TRAVERSAL = @TRANSITION
$\lambda P\lambda e'.P(e') \wedge traversal(e')$:
$[(\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma] \multimap [(\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma]$

(56) TRAVERSAL-MEANS = @TRAVERSAL
@MEANS

(57) TRAVERSAL-MANNER = @TRAVERSAL
@MANNER

(58) SWEDISH-DMC(FN) = @TRANSITIVE-OBLIQUE(FN)
@TRAVERSAL-MEANS
$\lambda Q\lambda P\lambda y.\exists e.\exists e'.\exists z.P(e)(e') \wedge$
$theme(e') = y \wedge path(e') = z \wedge Q(z)$:
$[((\uparrow \text{OBL})_\sigma \text{PATH}) \multimap (\uparrow \text{OBL})_\sigma] \multimap$
$[(\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma] \multimap$
$(\uparrow \text{OBJ})_\sigma \multimap \uparrow_\sigma$

(59) ENGLISH-WAY(FN) = @TRANSITIVE-OBLIQUE(FN)
{@TRAVERSAL-MEANS | @TRAVERSAL-MANNER}
$\lambda Y \lambda Q \lambda P \lambda x. \exists e. \exists e'. \exists z. P(e)(e') \wedge$
$theme(e') = x \wedge path(e') = z \wedge$
$Q(z) \wedge z = Y(x)$:
$[(\uparrow \text{SPEC})_\sigma \multimap \uparrow_\sigma] \multimap$
$[(((\text{OBJ} \uparrow) \text{OBL})_\sigma \text{PATH}) \multimap ((\text{OBJ} \uparrow) \text{OBL})_\sigma] \multimap$
$[((\text{OBJ} \uparrow)_\sigma \text{EVENT1}) \multimap ((\text{OBJ} \uparrow)_\sigma \text{EVENT2}) \multimap (\text{OBJ} \uparrow)_\sigma] \multimap$
$(\uparrow \text{SPEC})_\sigma \multimap (\text{OBJ} \uparrow)_\sigma$

(60) COEXTENSIVE-MEANS = {@TRAVERSAL-MEANS | @TRAVERSAL-MANNER}
$\lambda P \lambda e \lambda e'. P(e)(e') \wedge coextensive(e, e')$:
$[(\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma] \multimap$
$[(\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma]$

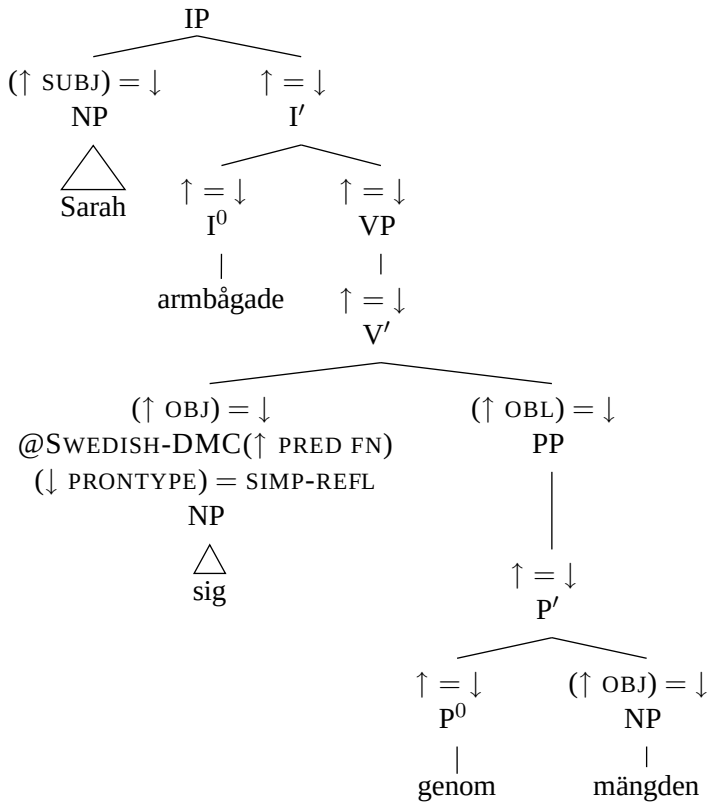
(61) RESULT-MEANS = @TRANSITION
@MEANS
$\lambda P \lambda e \lambda e'. P(e)(e') \wedge result(e, e')$:
$[(\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma] \multimap$
$[(\uparrow_\sigma \text{EVENT1}) \multimap (\uparrow_\sigma \text{EVENT2}) \multimap \uparrow_\sigma]$

C Examples

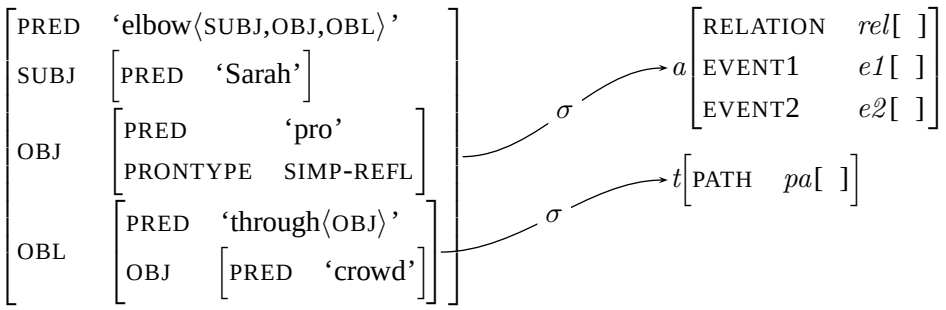
C.1 Swedish

(62) Sarah armbågade sig genom mängden.
S. elbowed SELF through crowd.DEF

(63)



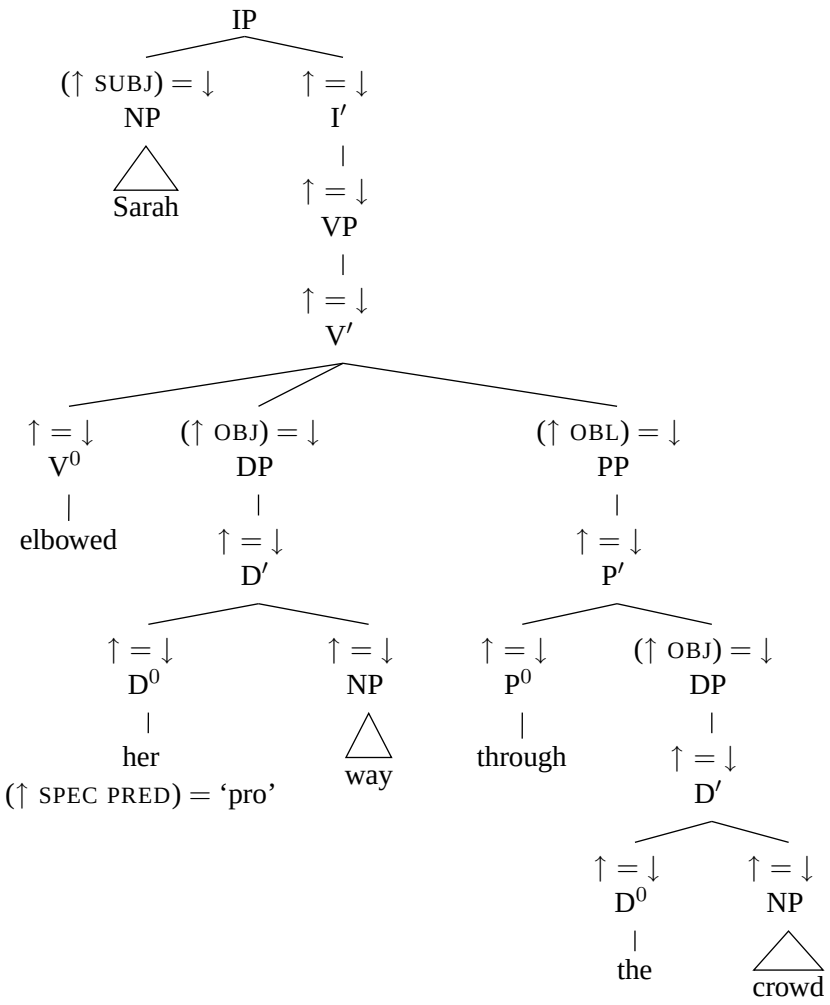
(64)



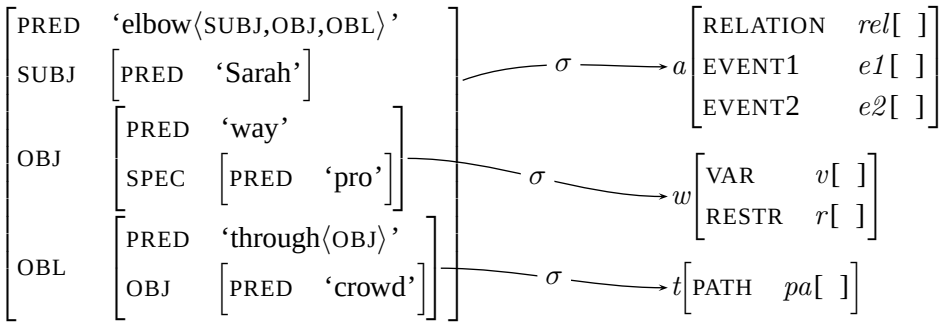
C.2 English

(65) Sarah elbowed her way through the crowd.

(66)



(67)



C.3 Glue Proofs

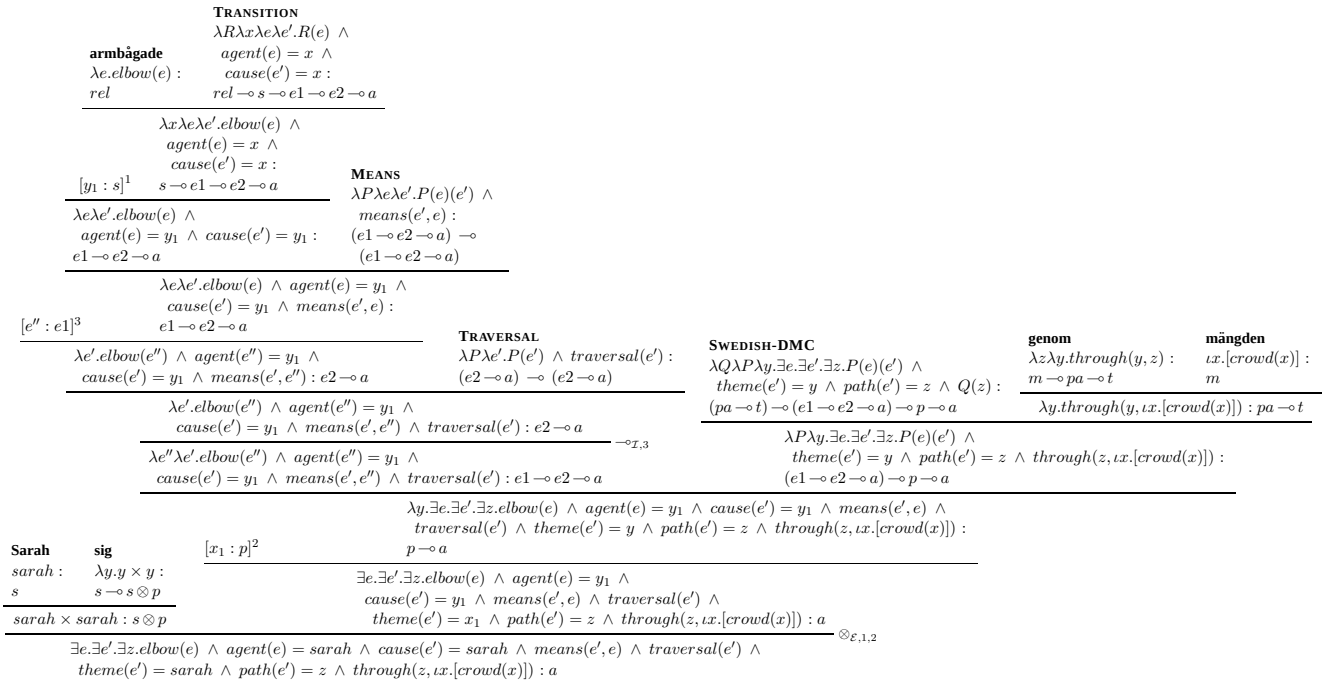


Figure 1: Glue proof for (62), Swedish Directed Motion Construction

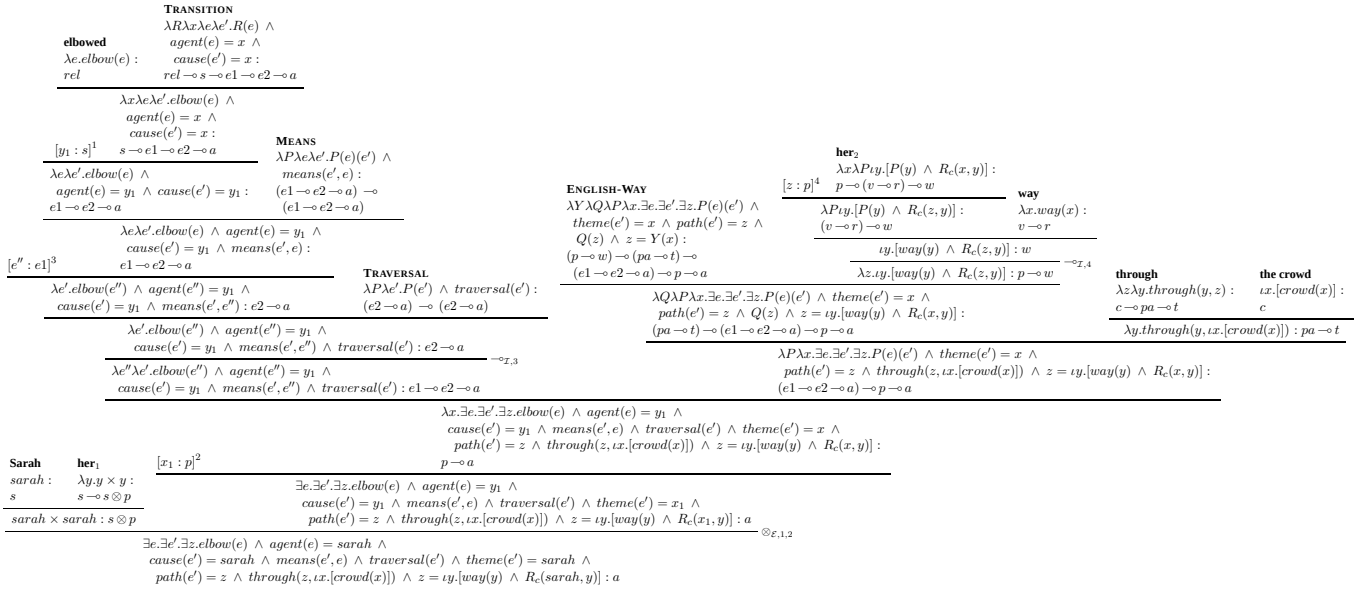


Figure 2: Glue proof for (65), English *Way* Construction (means interpretation)

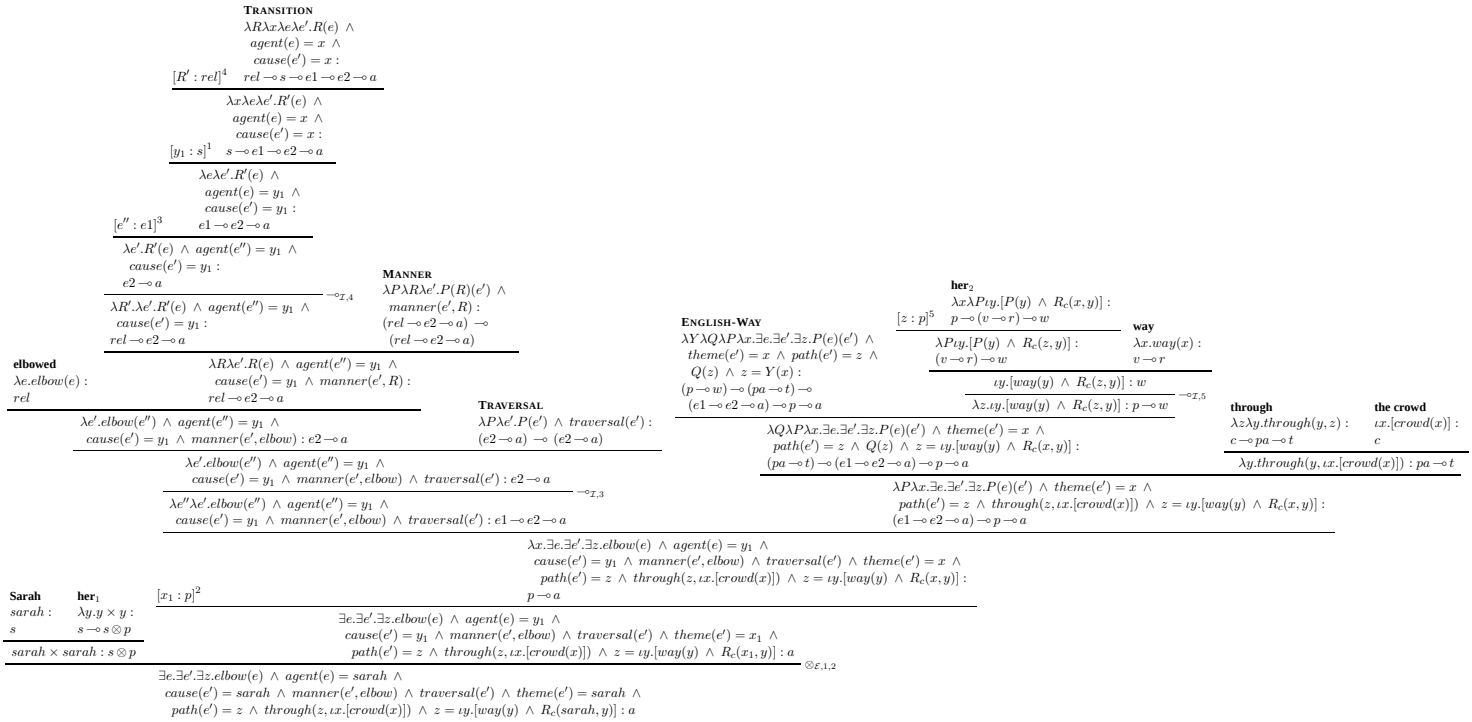


Figure 3: Glue proof for (65), English *Way* Construction (manner interpretation)

(68) Chesterfield negotiated Britain's way into the Treaty of Vienna.

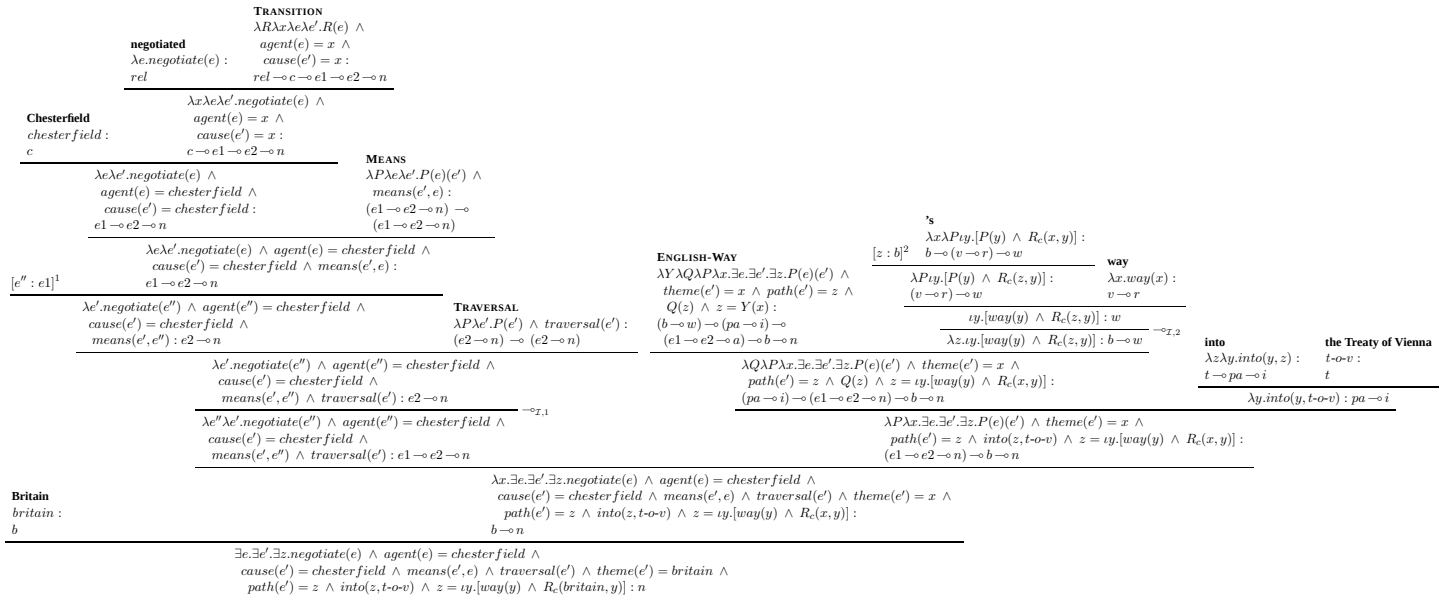


Figure 4: Glue proof for (68), English *Way* Construction (means interpretation)

A UNIFIED ANALYSIS OF COPULA CONSTRUCTIONS IN LFG

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Abstract
In this paper we maintain that a unified analysis of the copula constructions in LFG is necessary to capture syntactic generalizations. We discuss the various options available in the LFG literature and investigate their feasibility in order to arrive at the most appropriate representation. In doing so, we make use of the concepts and mechanisms already available in the framework of LFG without violating any fixed conditions or breaking with any established conventions. The conclusion we reach is that the different strategies employed in the predicational structures are language-specific variations that basically express the same grammatical function. We assume that the copula complement is a closed function, i.e. PREDLINK, which can account for almost all the different constituents that can occupy the predicate position.

1 Introduction

In this introduction we give a quick review of the three strategies used in LFG to represent copula constructions. Section 2 launches the discussion by explaining why a unified analysis is motivated. Section 3 examines the typological differences in the use of copula constructions in five languages, and surveys the interesting variety in the choice of strategies used in expressing the predicational relationship. Section 4 points out the implications of adjectives in the copula constructions. Then we proceed into a detailed account of each strategy and provide our reasons for choosing only one analysis.

Although there is no controversy regarding the c-structure analysis of copula constructions in LFG, different strategies have been proposed for the f-structure representation of these constructions, as shown by Figure 1. The treatment of copula constructions in LFG has been outlined by Nordlinger and Sadler (2006), Dalrymple et al. (2004), Butt et al. (1999) and Rosén (1996).

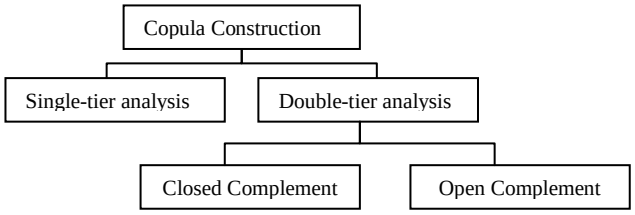

Figure 1. Possible Analyses of Copula Constructions in LFG

One possibility for analysing copula constructions, as outlined by Nordlinger and Sadler (2006), is to use the “single-tier analysis” where the predicate functions as the sentential head and selects for a subject. The example they mentioned is from Russian. It is reproduced in (1) and the corresponding f-structure is in Figure 2.

(1) Ona vrač.
3sg.fem.nom doctor.sg.nom
`She is a doctor.'

$$\begin{bmatrix} \text{PRED} & \text{'doctor<(↑ SUBJ)> '} \\ \text{CASE} & \text{nom} \\ \text{NUM} & \text{sg} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{NUM} & \text{sg} \\ \text{GEND} & \text{fem} \\ \text{PERS} & 3 \\ \text{CASE} & \text{nom} \end{bmatrix} \end{bmatrix}$$

Figure 2. F-structure of a Russian copula sentence

The double-tier analysis is another possibility for representing the copula construction. In this approach both the subject and the predicate function as arguments within the structure. Dalrymple et al. (2004) presented a more detailed discussion of this type by dividing it into two significantly different variants. The first is to consider the predicate as a closed complement PREDLINK (Butt et al. 1999), and the second is to consider it as an open complement XCOMP.

In the closed complement analysis, the main predicate of the sentence is provided by the copula. Figure 3 shows the double tier, closed function analysis of the English sentence in (2).

(2) She is a doctor.

$$\begin{bmatrix} \text{PRED} & \text{'be<(↑SUBJ) (↑PREDLINK)>'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{NUM} & \text{sg} \\ \text{GEND} & \text{fem} \\ \text{PERS} & 3 \end{bmatrix} \\ \text{PREDLINK} & \begin{bmatrix} \text{PRED} & \text{'doctor'} \\ \text{NUM} & \text{sg} \end{bmatrix} \end{bmatrix}$$

Figure 3. A double-tier, closed-complement f-structure representation

For languages with no overt copula the main predicate is provided by special annotations on phrase structure rules. For the Russian example in (3a), the phrase structure rules in (3b) produce the f-structure in Figure 4, all adapted from Dalrymple et al. (2004).

(3) a. On student.
he student
'He is a student.' (Russian)

b. Phrase structure rule

$$\begin{array}{lccc} S \rightarrow & NP & \varepsilon & NP \vee AP \vee PP \\ & (\uparrow \text{SUBJ})=\downarrow & (\uparrow \text{PRED})=\text{'null-be<SUBJ,PREDLINK>'} & (\uparrow \text{PREDLINK})=\downarrow \\ & & (\uparrow \text{TENSE})=\text{present} & \end{array}$$

$$\begin{bmatrix} \text{PRED} & \text{'null-be<(↑SUBJ) (↑PREDLINK)> '} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{NUM} & \text{sg} \\ \text{GEND} & \text{masc} \\ \text{PERS} & 3 \end{bmatrix} \\ \text{PREDLINK} & \begin{bmatrix} \text{PRED} & \text{'student'} \\ \text{NUM} & \text{sg} \end{bmatrix} \end{bmatrix}$$

Figure 4. F-structure of a verbless copula construction

The second variant of the double-tier analysis of the copula construction is the open complement analysis where the structure is subject to functional control. In this analysis the predicate selects for a subject which is controlled by the main subject of the sentence. The French example in (4) has the f-structure in Figure 5, both from Dalrymple et al. (2004).

(4) Elle est petite.
she.F.SG is small.F.SG
'She is small.' (French)

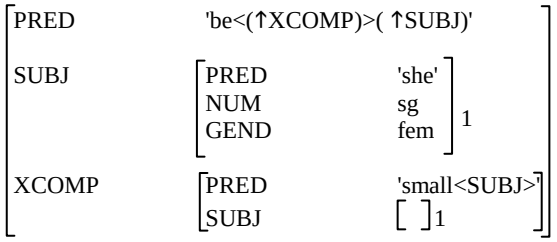

Figure 5. Open function analysis of copula constructions

However, the findings reached by Dalrymple et al. (2004) were not conclusive. They said that the XCOMP analysis is appropriate for some copular constructions but not for others, even within the same language. They pointed out that more syntactic tests need to be identified in order to determine the status of a copula complement both within and across languages. However, this research left the general perception that the open function is the preferred analysis. XCOMP has effectively replaced PREDLINK in the XLE English grammar and the DCU LFG-based probabilistic parser.

Nordlinger and Sadler (2006), on the other hand, state that the default structure is the single-tier analysis for copula-less languages because it is more economical as it assumes less structure, while languages which use overt copulas can choose a version of the double-tier analysis. Their focus was on emphasising the flexibility of the LFG framework rather than searching for a unified analysis.

2 Motivation for a Unified Analysis

A critical point in the syntactic analysis of copula constructions in the LFG literature is that it provides more questions than answers. The conclusion Dalrymple et al. (2004) reached is that a unified analysis of copula constructions is not possible either cross-linguistically or inside the same language.

> The fact that different constituents can behave differently in copular constructions means that the full range of copular constructions must be examined within a language in order to analyze it completely. That is, the fact that one type of constituent requires a certain analysis of copular constructions does not guarantee that other, superficially similar constructions will be amenable to the same analysis. (Dalrymple et al. 2004, p. 191)

Nevertheless, when talking about Russian, where the copula is null in the present tense but overt in the past and future tenses, they argued for the desirability of a unified analysis.

> For such languages, there does not appear to be any evidence that the copula-less constructions have different syntax (or semantics) from the ones with copulas. As such, a unified analysis is desirable. However, a unified analysis is possible for all languages in which the occurrence of the copula is (partially) governed by tense. (Dalrymple et al. 2004, p. 192)

Similarly Nordlinger and Sadler (2006) expressed their conviction that there is no *a priori* reason for copula constructions cross-linguistically to have the same syntactic structure and that it should be left as an empirical issue. However, they could not help raising the question again after surveying the typological differences in copula constructions:

> The fact that the choice of strategy in a given language can be influenced by superficial matters of grammatical encoding raises the interesting question as to whether the alternative strategies are externally distinct but correspond to the same f-structure. (Nordlinger and Sadler 2006)

The indeterminacy in the LFG literature regarding copula constructions constitutes practical and theoretical challenges. The practical challenge is that for the task of grammar writing it is

hard to make a choice to adopt a representation without clear-cut, well-defined criteria. Instead, a grammar writer is advised to examine the full range of copula constructions and observe the behaviour of different constituents in the predicate position to check whether the copula is overt or non-overt, obligatory or optional, and whether the agreement between subject and predicate is manifested morphologically or not. Nevertheless, these criteria are considered as clues rather than measurable and definite tests.

The theoretical challenge is that with three acceptable f-structure representations, generalizations about the predicational syntactic structures are not captured either cross-linguistically or inside the same language. Although we acknowledge that this divergence is motivated at the c-structure level, we think that this divergence is not justified at the f-structure level which is supposed to provide a deeper representation. The presence vs. absence of a copula and the presence vs. absence of morphological features denoting agreement can be considered as parameters of variation across languages that do not warrant functional variation. We propose that it is preferred to provide a unified analysis of the predication relations cross-linguistically, so that functional parallelism among functionally equivalent constructions can be maintained. Dyvik (1999) emphasised the idea that f-structures abstract away from constituent order typical of c-structures, and even assumed that f-structures are universal "in the sense that translationally corresponding expressions across languages are assigned the same (or closely similar) f-structures".

The concept of parallel levels of representation is one of the basic tenets in LFG where the c-structure variations do not affect the status of grammatical functions, and semantic roles are distinct from grammatical functions. For example, the subject can be expressed in various ways in c-structure, it can be an NP clause, a CP clause, an affix on the verb or a zero-pronoun with no node in the c-structure, yet the grammatical function of SUBJ is assigned to all these variations as the f-structure represents a deeper level of representation. Furthermore the SUBJ can be assigned different semantic roles, as pointed out by the examples in (5) from Lødrup (2006).

(5) a. He ran home (agent SUBJ)
    b. He fell down (theme SUBJ)
    c. He fantasized (experiencer SUBJ)
    d. There is a problem (non-thematic SUBJ)

The distinction between c-structure and f-structure has been maintained, to a great extent, in most syntactic structures, but with the obvious exception of the predicational constructions. Predicational structures are fundamentally similar, crosslinguistically, and yet they receive divergent f-structure analyses in LFG.

The subject-predicate relationship is a universal grammatical relationship that is found cross-linguistically. Typological studies of copula constructions never reported the absence of this clause type in any given language. Pustet (2003) reported that "serious arguments against the universality of the predicate function have never been proposed." Therefore we propose that the predicational structures receive a default f-structure analysis that expresses the existence of subject (SUBJ) and predicate (PREDLINK) as primitive grammatical functions and to consider the encoding of the relationship as a matter of typological differences or "paradigmatic alternations" (Nordlinger and Sadler 2006). It is a parameter of variation across languages to decide how to delimit the subject and predicate, perhaps only by juxtaposing the two elements or by inserting a pronominal or by using a copula verb. In his typological study of copula constructions Curnow (2000) points out that the choice of strategy for encoding the copula construction is conditioned by various factors.

> The choice of construction in these cases depends upon discourse and grammatical factors such as tense and aspect, polarity, the status of the clause as main or subordinate, the person of the

> Copula subject, and the semantic relation expressed (identification or classification). (Curnow 2000, p. 2)

Another point in favour of our argument is that some other syntactic theories have tended to recognize the copula constructions and treat them in a somewhat uniform way. Within the framework of HPSG, Avgustinova and Uszkoreit (2003) identified six types of copula constructions in Russian, only one of them (short adjectives, or adjectives which are lexically predicative) being given a marked analysis, while the rest receive the same representation, regardless of whether the copula is present or not, obligatory or not. The same tendency is expressed in the Minimalist approach by Adger and Ramchand (2003) where they analyzed the various copula constructions in Scottish Gaelic as having the underlying representation of Predicate Phrase (PredP).

The distribution of copulas varies crosslinguistically. We consider this distribution as a language-specific variation. Some languages use them along semantic lines, others along morpho-syntactic lines, others along lexical lines, etc., as will be shown in the next section.

3 Typological Divergences of Copula Constructions

Many languages have a copula verb that heads a copula construction, yet in many other languages constituents are merely juxtaposed and no copula verb is used. Typological studies (Curnow 2000, Pustet 2003) show that between these two poles there is a large spectrum of variation in the strategies used and constraints applied in the use of copula constructions. We will avail ourselves here of the increased attention the copula constructions have garnered in LFG and other syntactic theories, as well as typological studies. In this section we study the copula constructions in five languages in order to gain a better understanding of the phenomenon and observe the interesting variety in the choice of strategies used in this relationship.

The languages we choose to analyse are Arabic, Russian (Avgustinova and Uszkoreit 2003), Irish (Carnie 1997), Chinese (Tang 2001), and Scottish Gaelic (Adger and Ramchand 2003). These languages use divergent strategies and set various conditions on the construction of copula clauses. The main point we want to make in this section is that copula constructions use different strategies to encode essentially one and the same grammatical function.

Arabic uses different strategies to express the predicational relationship. The two elements (subject and predicate) are merely juxtaposed to express predicative and locational relations in the present tense, as in (6). When the predicate is an adjective it agrees with the subject in number and gender, as in (7)–(8).

(6) الرجل في الدار
ar-rağulu fī ad-dāri
the-man in the-house
'The man is in the house.'

(7) الرجل كريم
ar-rağulu karīmun
the-man.sg.masc generous.sg.masc
'The man is generous.'

(8) المرأة كريمة
al-marʾatu karīmatun
the-woman.sg.fem generous.sg.fem
'The woman is generous.'

A pronominal must be inserted between the subject and the predicate in the equative relationships when both elements are definite, as in (9).

(9) أخي هو الطبيب
ʾaḫ-ī hwa aṭ-ṭabību
brother-my he the-doctor
‘My brother is the doctor.’

A copula verb is used in the past and future tenses, and also in the negated present, as shown in the examples in (10), (11) and (12) respectively.

(10) كان الرجل كريما
kāna ar-rağulu karīman
was the-man generous
‘The man was generous.’

(11) سيكون التقرير جاهزا
sayakūnu at-taqrīru ğāhizan
will-be the-report ready
‘The report will be ready.’

(12) ليس الرجل كريما
laisa ar-rağulu karīman
is-not the-man generous
‘The man is not generous.’

Russian (examples from Avgustinova and Uszkoreit 2003) also employs various strategies. The Russian short adjective can only be used predicatively while its attributive use is not allowed. In the present tense the copula is not allowed with these adjectives, as in (13a), but must be used in the past and future tenses, as shown in (13b).

(13) a. On gord rezul’tatami.
he.NOM.SG.M proud.PRD-ADJ.SG.M results.INST.PL
‘He is proud of the results.’
b. On ne byl gord rezul’tatami.
he.NOM.SG.M not was proud.PRD-ADJ.SG.M results.INST.PL
‘He was not proud of the results.’

In the examples in (14) ordinary adjectives and nouns are used in predicative (ascription) constructions. The use of a copula verb in the present is unnatural while a copula must be used in the past and future tenses.

(14) a. On durak | tolstyj
he.NOM.SG.M fool.NOM.SG.M | fat.NOM.SG.M
‘He is a fool | fat.’
b. On byl durak | tolstyj
he.NOM.SG.M was fool.NOM.SG.M | fat.NOM.SG.M
‘He was a fool | fat.’

In the equative (identificational) construction, as shown in (15), an overt copula can be used in the present tense. But in the absence of a copula the left periphery must be separated from the right periphery intonationally by a pause and orthographically by a dash. Still the past and future must use overt copulas.

(15) a. On est’ brat Maksima.
he.NOM.SG.M is brother.NOM.SG.M Maxim.GEN
‘He is Maxim’s brother.’
b. On – brat Maksima.
he.NOM.SG.M brother.NOM.SG.M Maxim.GEN
‘He is Maxim’s brother.’

In the localization (locational and temporal), as shown in (16), predicational constructions the copula is unnatural in the present and is required in the past and future.

(16) Boris na sobranii.
Boris.NOM at meeting.LOC
'Boris is at a meeting.'

In predicational constructions denoting existence and possession, as shown in (17), the use of the copula is optional.

(17) a. Za uglom (est') magazine.
behind corner.SG.M.INST (is) store.NOM.SG.M
'There is a store around the corner.'
b. U Kati (est') samovar.
at Katia.GEN (is) samovar.NOM.SG.M
'Katia has a samovar.'

In modern Irish (examples from Carnie 1997) there are two types of copula constructions according to whether the relation is predicative or equative. In the predicative construction, as shown in (18a), the copula verb is followed by the predicate which is followed by an optional agreement morpheme, and the subject comes in the final position. In the equative construction, as shown in (18b), the copula is followed by an obligatory agreement morpheme which is followed by the subject and the predicate comes last.

(18) a. Is dochtúir (é) Seamus.
COMP doctor (AGR) Seamus
'Seamus is a doctor.'
b. Is é Seamus an captain.
COMP AGR Seamus the captain
'Seamus is the captain.'

From the above examples we notice that Irish has two different strategies (word order and the agreement morpheme) for encoding the copula construction according the two different semantic domains. The semantic distinction between equative and predicative gives a straightforward explanation of the differences in word order and obligatory vs. optional presence of the agreement morpheme in Irish.

In Chinese (examples from Tang 2001) the copula verb *shi* is optional in predicative sentences, as in (19), and obligatory in specificational and equative sentences, as in (20).

(19) Zhangsan (shi) Zhongguoren.
Zhangsan be Chinese
'Zhangsan is a Chinese.'
(20) Wo mai de *(shi) zhe duo hua. (specificational)
I buy DE be this Cl flower
'What I bought is this flowers.'

Moreover, predicative copula constructions are constrained by more detailed pragmatic considerations. In the example in (21) the predicate expresses the speaker's opinion or attitude and the clause is grammatical. Contrastively, the example in (22) expresses a fact and, therefore, the clause is considered unnatural or incomplete.

(21) Zhangsan shagua.
Zhangsan fool
'Zhangsan is a fool.'

(22) ??Zhangsan xuesheng.
Zhangsan student
'Zhangsan is a student.'

There are certain conditions that must be realized to make the predicate in (22) more natural. For example the predicate can be modified by an evaluative adjective, as in the example (23),

or specified by a noun in a compounding construction to make the predicate more complete, as shown in (24).

(23) Zhangsan hao xuesheng.
Zhangsan good student
'Zhangsan is a good student.'

(24) Zhangsan daxue sheng.
Zhangsan university student
'Zhangsan is a university student.'

Scottish Gaelic (examples from Adger and Ramchand 2003) shows, as well, interesting variations. A copula construction is formed from an AP or PP in the predicate position, as shown by the examples in (25) and (26) respectively.

(25) Tha Calum faiceallach.
Be-PRES Calum careful
'Calum is (being) careful.'

(26) Tha Calum anns a'bhùth.
Be-PRES Calum in the shop
'Calum is in the shop.'

However, when an NP is placed in the position of the predicate the construction is ungrammatical, as shown in (27), and a preposition is needed, as in (28), to make it grammatical. The preposition incorporates a pronoun which agrees with the subject. This is explained by Adger and Ramchand by the fact that APs and PPs denote eventuality (stage level), while NPs lack eventuality (individual level). This is why an expletive preposition is needed.

(27) *Tha Calum tidsear.
Be-PRES Calum teacher
'Calum is a teacher.'

(28) Tha Calum 'na thidsear.
Be-PRES Calum in+3sg teacher
'Calum is a teacher.'

In predicative constructions Scottish Gaelic can use an inverted structure where the predicate precedes the subject, as in (29).

(29) Is mòr an duine sin.
COP big that man
'That man is big.'

In equative constructions where a DP is used as a predicate, a third person masculine pronoun must be inserted after the copula, as in (30).

(30) 'S e Calum an tidsear
COP 3sg Calum (DP1) the teacher (DP2)
'Calum is the teacher.'

Adger and Ramchand (2003) assumed that the different forms of copula construction have essentially one underlying structure. They attribute the divergence in structure to the particular semantic specification of the predicate.

This survey shows how the interplay of syntax and semantics in the predicational constructions leads to the use of divergent strategies in the formation of copula clauses. Semantic considerations are significantly involved in the choice of the strategies employed in expressing the copula construction in many languages, or as Pustet (2003) puts it, "semantics conditions linguistic form". This tight relationship between syntax and semantics is also observed by Adger and Ramchand (2003):

> … there is an extremely tight relationship between the syntax and semantics of predication, and that semantic predication always feeds off a syntactic structure containing a predicational head. (Adger and Ramchand 2003, p. 325)

It also shows that the distribution of copulas varies crosslinguistically. This is a language-specific variation. Some languages use them along semantic lines, others along morpho-syntactic lines, others along lexical lines, etc.

4 Adjectives as a Hybrid Category

With regard to the predicational construction, adjectives have received more attention in LFG, as well as other theoretical frameworks, than any other constituent to the extent of blurring the predicational relationship itself. The short form predicative adjectives in Russian have been considered as predicators (Avgustinova and Uszkoreit 2003). They are also considered as the main head of the copula construction by Adger and Ramchand (2003). Similarly Nordlinger and Sadler (2006) draw evidence for the single-tier analysis of copula construction in LFG mainly from the behaviour of adjectives in some languages where they carry verbal morphology such as Abkhaz. Nevertheless they also emphasise that nominal predicates in some languages (such as Bininj Gun-wok) show verbal morphology.

Dalrymple et al. (2004) follow this trend and make a clear dichotomy between adjectives and other constituents in the predicate position by assuming that Japanese adjectives (where a copula is optional) function as the main head and subcategorize for the clausal subjects, whereas nouns (where a copula is always required) function as closed complements. Moreover they use agreement between predicative adjectives and subjects, as in the French examples in (31), as the main argument for the open complement analysis.

(31) Elle est petite.
she.fem.sg is small.fem.sg
'She is small.'

Therefore, we think that a special section on adjectives is motivated to account for the peculiar behaviour of adjectives and to put them in perspective to other constituents. We emphasise that adjectives have a special affinity to nouns within constructions whether they are used attributively or predicatively. This affinity does not obliterate their syntactic functions in the predicate position, or allow them to subcategorize for a subject.

Syntactic and typological studies have viewed adjectives as a category that falls in the middle between nouns and verbs. Bresnan (1995) proposed a set of tests to distinguish adjectives from verbs, and discussed the semantic and syntactic constraints that govern the conversion of verbs into adjectives. Beyssade and Dobrovie-Sorin (2005) on the other hand contrasted adjectives to nouns, stating that nouns denote sets of individuals while adjectives denote properties instantiated in individuals. Pustet (2003), in her typological study of the copula constructions, has viewed adjectives as a hybrid category, with both verbal and nominal characteristics.

To put adjectives in perspective, we need to view the relationship between the subject and the prototypical predicate as the relationship between a slot and filler, or analogically between a host and a guest. A host (analogous to the subject) can invite many guests (predicates), as illustrated in Table 1.

Host (subject)	Copula	Guest (predicate)
the idea	is	a shamble good out of date in my head that we need more time affording more money

Table 1. The host-guest relationship between the subject and the predicate

One of the guests (the adjective) shows a special affinity with the host. This affinity is revealed as they have matching qualities (agreement) and they are sometime seen together without an intruder (short adjectives in Russian forbid the use of a copula verb). This,

however, neither means that all other guests should be entangled in this affinity nor that the special guest is not a "guest". This analogy means that the predicational relationship must be viewed across the board. All predicates stand in a functional predicational relationship to the subject as they all say something about the subject.

5 The single-tier analysis

We now turn to the details of the different approaches to dealing with copula constructions in LFG, and we are going to question their validity one by one. The first approach is the single-tier analysis. In this approach the predicate (or the copula complement) is taken to be the head of the construction that subcategorizes for a SUBJ. Dalrymple et al. (2004) stated that this is the chosen analysis for Japanese adjectives in the predicate position where a copula is optional. In this case the adjective is considered the head whether the copula is overt or non-overt. The examples in (32) both have the same f-structure as shown in Figure 6.

(32) a. hon wa akai
book red
'The book is red.'
b. sono hon wa akai desu
this book red is
'This book is red.' (Dalrymple et al. 2004)

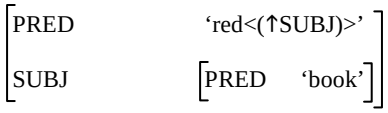

Figure 6. Single-tier analysis of a Japanese copula sentence

On the other hand, with Japanese nouns the copula is required and therefore the copula complement cannot function as a subcategorizing head.

Dalrymple et al.'s (2004) argument for this analysis is that, as the copula is optional, the adjective provides the main PRED for the clause. They assumed that an adjective has a subcategorization power comparable to a verb.

> … the adjective is the syntactic head of the predicate phrase. If this is not considered a sufficient criterion for assuming that it subcategorizes for the (prototypical) subject of the sentence, then even the assumption that ordinary verbs subcategorize for subjects may be called into question. (Dalrymple et al. 2004, p. 191)

The main argument for the single tier-analysis in the case of Japanese sentences is that if the copula can be omitted then the complement is the head, and if the copula is required then the copula is the head. However, there are many reasons to counter this argument. First, this hypothesis fails to capture the generalization of the copular structure, and allows c-structure variations to penetrate into f-structure, which is supposed to give a deeper representation of the structure. We believe that it is important to view the syntactic position of the predicate in its totality. This position can be filled by an adjective, noun, preposition, adverb, or complement clause. Some constituents may have certain requirements, but the syntactic function is still the same.

Second, in our view, the presence vs. absence of a copula is not enough to motivate a divergent analysis for the same syntactic function. Copula use is conditioned in many languages according to numerous contexts; even in English the presence of the copula is not required in small clauses, such as the examples in (33).

(33) a. I consider him a monster.
b. I consider him to be a monster.

Predicates require overt/non-overt copulas depending on various criteria, such as the type of the constituent (adjective or noun, Japanese), tense (Arabic, Hebrew and Russian require an overt copula in the past and future), or formality (Japanese polite forms involve a copula). This shows that the requirement of an overt copula is triggered according to different conditions in different languages. So posing different syntactic representation fails to capture the generalization shared across these languages.

Third, while it is true that the adjective is a hybrid category (Pustet 2003), the verb has a deeply ingrained power to project onto the sentence structure in such a way that cannot be rivalled by any other lexical item. Verbs are the "inherent predicators" (Avgustinova and Uszkoreit 2003), and they are the uncontested predicators in the general case (Bresnan 1995). Moreover, verbs and adjectives function in basically different relationships. In the subject–predicate clauses the predicate gives information about the subject, while in the verb–subject clauses, there is a different set of relationships (e.g. agent, experiencer, theme, etc.) between the subject and the action.

Fourth, the predicate cannot be the head because it does not operate on the subject nor does it assign case to it. The evidence for this comes from Arabic. In Arabic, the verb assigns the nominative case to the subject and the accusative case to the object, and no other operator can override its power. Similarly, the preposition assigns the genitive case to the object, and no other operator can override its power either. However, in copula constructions the subject and predicate take the default case, i.e. the nominative case, as in (34). If the sentence is introduced by an affirmative particle, the subject takes the accusative case and the predicate remains unchanged, as in (35). When the sentence is introduced by the copula verb كان *kāna* 'was' the predicate takes the accusative case and the subject remains unchanged, as in (36). So, even though the subject and predicate remain adjacent, external operators can change their cases, which is not possible in any other governable relationship.

(34) الرجل كريم
ar-rağulu karīmun
the-man.nom generous.nom
'The man is generous.'

(35) إن الرجل كريم
ʾinna ar-rağula karīmun
indeed the-man.acc generous.nom
'The man is indeed generous.'

(36) كان الرجل كريما
kāna ar-rağulu karīman
was the-man.nom generous.acc
'The man was generous.'

Nordlinger and Sadler (2006) pose a more powerful motivation for the single-tier analysis, that is the case of predicates which carry verbal morphology. In some languages the predicates carry morphological features (such as tense, mood and aspect) that are normally indicated on verbs, but not on nouns. This is shown by the example from the Abkhaz language in (37) from Nordlinger and Sadler (2006).

(37) Də-psə́-w-p'.
3SG.SBJ-dead-PRES.DEL
'He is dead.'

Avgustinova and Uszkoreit (2003), in their HPSG analysis of the copula constructions in Russian, present an attitude that is similar to the single-tier analysis in LFG. They assume that Russian short adjectives are "lexically predicative non-verbal categories" that subcategorize for a subject. Short adjectives are distinct from all other constituents in two ways. First they are exclusively used as predicates, and their attributive use is ungrammatical. Second, an

overt copula is not allowed with short adjectives in the present tense. This is shown by the example from Russian in (38) from Avgustinova and Uszkoreit (2003).

(38) On gord rezul'tatami.
he.NOM.SG.M proud.PRD-ADJ.SG.M results.INST.PL
He is proud of the results.

Unlike Avgustinova and Uszkoreit (2003) who analysed the predicate as a subcategorizing head in a single case only (short adjectives) while giving a different analysis to all other copula constructions, Nordlinger and Sadler (2006) took the existence of verbal morphology on adjectives and nouns as evidence of the single-tier analysis in general, without restricting it to certain constituents or conditions.

In principle we need to allow grammatical functions to be expressed differently in different languages and in different contexts where there is a real motivation. For example, objects in one language can be rendered as obliques in another. Therefore we don't ague against Nordlinger and Sadler's (2006) analysis of the Abkhaz predicates which carry verbal morphology. The existence of verbal morphology on the predicate can be considered as enough motivation in our estimation to trigger a single-tier analysis. In this case we say that the predicate expresses itself in a specific language and in specific conditions as a subcategorizing head, while for the rest of the constituents the relationship is expressed as a subject-predicate binary relationship.

Regarding Avgustinova and Uszkoreit's (2003) analysis of short adjectives, we can counter their analysis with two arguments. First, the justification that short adjectives are used predicatively but not attributively may be motivated by semantic or pure lexical idiosyncrasies. Pustet (2003) points out that in English there are adjectives that cannot be used attributively, as in (39), as well as adjectives that cannot be used predicatively, as in (40).

(39) a. The man is ready.
b. * a ready man

(40) a. the former president
b. * The president is former.

In English also there is a whole class of adjectives that are restricted in their use. A participial adjective can serve in the attributive position but not the predicative position, as shown in the examples in (41) and (42). This can be explained as restrictions in the lexical properties of certain adjectives or structural constraints related to adjectival derivation, rather than representing different syntactic functions.

(41) a. an escaped prisoner
b. * the prisoner is escaped

(42) a. a fallen leaf
b. * the leaf is fallen

Second, the copula is used with short adjectives in the past and future tenses, as shown in (43) from Avgustinova and Uszkoreit (2003). This means that the short adjective's power as a main predicator is contested.

(43) On byl | budet gord rezul'tatami.
he.NOM was | will-be proud.PRD-ADJ.SG.M results.INST.PL
'He was | will be proud of the results.'

The strongest argument against the validity and general applicability of the single-tier analysis is put forward by Nordlinger and Sadler (2006), that is the case of tense stacking in languages such as Tariana, where there are two sets of tense affixes: one marking independent nominal tense, and the other marking propositional tense, as shown in (44).

(44) Pi-ya-dapana-miki-Ri-naka.
2SG-POSS-house-PST-NF-PRES.VIS
'This is what used to be your house (I can see it).'
(Tariana: Nordlinger and Sadler 2006 citing Aihkenvald 2003)

Nordlinger and Sadler (2006) emphasise that a single-tier analysis of such constructions will result in a conflict in the tense feature, and that it must be analysed as a double-tier construction where there are two levels of f-structure: one level stands as the locus of the nominal tense and the other level the locus of the propositional tense.

6 The double-tier open function analysis

Now we are going to investigate the second approach for analysing the copula constructions. The double-tier analysis is different from the single-tier analysis, as noted earlier, in that in the double-tier analysis the predicate is not considered as the clausal head, or main predicator. The predicator is either the copula, when it is present, or a higher structure (dummy predicate) when no copula is used. The open complement analysis assumes that the structure is subject to functional control. In this analysis the predicate selects for a subject which is controlled by the main subject of the sentence.

Dalrymple et al. (2004) consider that the open function XCOMP analysis is the chosen representation for languages where the predicate shows agreement with the subject, and cite the French example in (45) for which they proposed the f-structure reproduced as Figure 7.

(45) Elle est petite. (Dalrymple et al. 2004)
she.F.SG is small.F.SG
'She is small.'

$$\begin{bmatrix} \text{PRED} & \text{'be<(↑XCOMP)>(↑SUBJ)'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'she'} \\ \text{NUM} & \text{sg} \\ \text{GEND} & \text{fem} \end{bmatrix} 1 \\ \text{XCOMP} & \begin{bmatrix} \text{PRED} & \text{'small<(↑SUBJ)>'} \\ \text{SUBJ} & [\ ] 1 \end{bmatrix} \end{bmatrix}$$

Figure 7. An open complement f-structure of a French copula sentence

Dalrymple et al. argue that the motivation for this analysis is first that "the adjective simply agrees with its own SUBJ, in the same way as verbs do." Second, the XCOMP analysis allows us to write simple and standard control equations, as in (46) on the lexical entry of the adjective to specify the agreement features.

(46) petite (↑ PRED) = 'small <SUBJ> '
(↑ SUBJ NUM) =c sg
(↑ SUBJ GEND) =c fem

They maintained that the closed complement PREDLINK analysis, shown in Figure 8, will result in non-standard inside-out control equations, shown in (47).

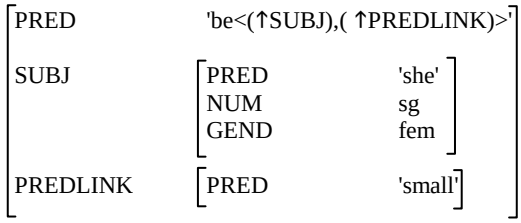

Figure 8. A closed complement f-structure of a French copula sentence

(47) petite (↑ PRED) = 'small'
((PREDLINK ↑) SUBJ NUM) =c sg
((PREDLINK ↑) SUBJ GEND) =c fem

Third, they assumed that "the XCOMP analysis allows for a much simpler analysis and one which is similar to that of other cases of subject-predicate agreement, such as subject-verb agreement."

Unfortunately, all of these motivations are questionable. First French adjectives do not agree in the same way as verbs. French verbs agree in person with their subjects while adjectives do not. Nevertheless, in our view, agreement alone is not enough to justify the claim that the predicate subcategorizes for the subject. Agreement is a relation that holds between a verb and subject, and also between a noun and adjective, a noun and relative pronoun, a noun and demonstrative pronoun, etc. Dalrymple et al. themselves questioned the feasibility of relying solely on agreement to justify an open function.

> In other languages, however, some considerations may weaken the status of agreement as an argument for assuming an XCOMP analysis. In languages like Norwegian, for example, there is no subject-verb agreement, so that subject-adjective agreement must be treated differently from subject-verb agreement in any case. Another issue is that predicative adjective agreement may be governed by semantic rather than syntactic features. (Dalrymple et al. 2004, p. 196)

It is quite reasonable to maintain that agreement between subject and predicate is governed by the semantics rather than the syntax. This is why the English example in (48b) is ungrammatical while the others are acceptable. This shows that agreement here is not captured merely through grammatical rules.

(48) a. They are doctors.
b. *They are a doctor.

(49) a. They are the cause of our trouble.
b. They are a big problem.

Second, simple standard equations can be written to specify the agreement relation without the inside-out non-standard ones, though we believe that how equations are written should not be a deciding factor in preferring a syntactic representation. However, the equation need not be written in the lexical entry of the adjective, as it is practically and theoretically implausible to say that the lexical entries of all adjectives and nouns subcategorize for subjects and that they agree with the subject. We adhere to Rosén's (1996) view that the relation between the subject and predicate is governed by the structure and so the agreement specifications must be written in the phrase structure rules.

> In Maori, the first NP is the predicative complement and the second is the subject. Since this information comes from the syntax and not from the lexicon, it might seem natural to let the phrase structure rule for this sentence type introduce a PRED that could subcategorize for these functions. (Rosén 1996)

As we adopt a constructional approach to the copula clauses, we believe that the agreement equation should be placed in the phrase structure instead, as in (50). In this rule the

disjunction "VCop ∨ ε" means that a copula sentence can have an overt or non-overt copula verb.

(50)

S →	NP	VCop	∨	ε	NP ∨ AP
	(↑ SUBJ)=↓	↑=↓		(↑ PRED)='null-be<SUBJ,PREDLINK>'	(↑ PREDLINK)=↓
				(↑ TENSE)=pres	(↓ GEND)=(↑ SUBJ GEND)
					(↓ NUM)=(↑ SUBJ NUM)

Third we do not need to analyse copula constructions in the same way as subject–verb constructions as they are syntactically, semantically and typologically different. They use different syntactic structures, cross-linguistically, to denote different sorts of relationships and semantic roles. We need to formalise the analysis of the predicational constructions instead of making them a subset of the subject–verb constructions. Subject–predicate constructions are fundamentally different from subject–verb constructions in the following ways.

1. They express relations rather than actions or events.
2. They are usually shorter.

> Verbless [copula-less] clauses differ from verbal clauses (apart from the use of the verb) chiefly in the number of constituents used. Verbal clauses often have, beside the verb and its subject, several constituents which modify the verb, and are related to each other only through their relationship to the verb. Verbless clauses are typically composed only of two constituents, which are in some way equated by the structure. (Revell 1989, p. 1)

3. They use a semantically void copula verb or no verb at all.

It has been the tradition of generative grammar to treat copula verbs as raising verbs (Adger and Ramchand 2003, Carnie 1997). However, we maintain that copula constructions are significantly distinct from raising constructions, and we even argue against the traditional treatment of raising verbs in LFG. We adopt Lødrup's (2006) distinction between raising verbs that can have verbal complements, such as *He seems to go*, and those that have non-verbal complements *He seems happy*. We further maintain that the two types of predications are totally different. While the verbal complement naturally selects for a subject and it is quite logical to treat it as a raising construction, it is hard to show that ADJPs, ADVPs, NPs and PPs can subcategorize for a subject. Our proposed analysis for raising verbs is to treat *seem* with non-verbal complements as a quasi-copula that links a subject and a predicate. The difference between *he seems to go* and *he seems happy* is the same as the difference between *he goes* and *he is happy* which are completely different syntactic structures. The first is a verbal construction while the second is a predicational construction.

The most compelling evidence against the general applicability of the open function comes from Dalrymple et al. (2004) who maintained that a closed complement analysis is mandated when the predicate already has a verb, such as the *that*-clauses, (51a); gerunds, (51b); and infinitival clauses, (51c) (examples from Dalrymple et al. 2004). In these instances the predicate already has a subject distinct from the subject of the main clause.

(51) a. The problem is that they appear.
b. The problem is their appearing.
c. The problem is (for them) to leave before 6.

They show that the XCOMP analysis requires the subject of the main clause to be the subject of the predicate, and this results in a clash, as shown in Figure 9.

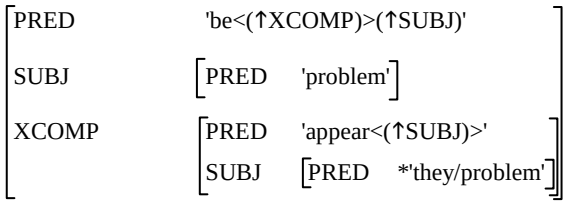

Figure 9. F-structure with a conflicting subject (Dalrymple et al. 2004)

Therefore a closed complement analysis, as shown in Figure 10, is compulsory to avoid this clash.

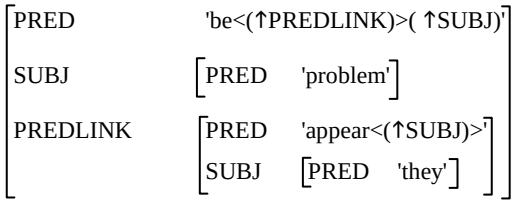

Figure 10. F-structure with a no conflict (Dalrymple et al. 2004)

7 The double-tier closed function as the chosen analysis

The double-tier closed function approach is a third possibility for analyzing the copula constructions in LFG. In our opinion this is the best possible representation as no serious challenges have been given against the general applicability of this analysis. We maintain that the closed complement analysis is the default syntactic representation for all languages. The presence vs. absence of a copula, presence vs. absence of agreement features on the predicate are all paradigmatic alternations that do not affect the syntactic function. The closed function analysis is also the only account which succeeds in providing a valid representation for all constituent types which take various semantic roles, as shown in Table 2.

Example	Constituent Type	Semantic Role
He is a doctor.	NP	Predicative
He is good.	Adjective	Predicative
He is here.	Adverb	Locational
He is in the garden.	PP	Locational
The meeting is tomorrow.	Adverb	Temporal
He is my father.	NP	Equative
The idea is that we need some time.	CP	Proposition

Table 2. Constituent types and semantic roles of copula complements

Only the closed function analysis allows for a unified account of the predicational phenomenon. Other accounts which assume that the predicative adjective is a head subcategorizing for the subject definitely find it harder to do so with other constituents such as NP and PP. Bresnan (2001) (cited by Lødrup 2006) proposes for sentences like (52) to manipulate lexical rules as in (53) to make nouns and prepositions subcategorize for subjects.

(52) a. The pills made him a monster.
b. She seems in a bad mood.
(53) a. 'monster' => 'be-a-monster<(↑ SUBJ)>'
b. 'in<(↑ OBJ)>' => 'be-in-state-of<(↑ SUBJ) (↑ OBJ)>'

This analysis, however, looks, in our opinion, too artificial and unnecessarily complex. Both Dalrymple et al. (2004) and Rosén (1996) agree on the fact that common nouns should not be considered as taking a subject in their argument structures.

> This [requiring a subject argument] does not seem implausible for adjectives, especially in languages such as French with adjectival agreement, but is less so for PPs and particularly for NPs. That is, it seems unlikely that every NP in a given language, regardless of the syntactic construction in which it appears, requires a subject. (Dalrymple et al. 2004, pp. 197-198)

> And in any case, this analysis [having the PRED of the NCOMP subcategorize for a SUBJ] would mean that all nouns would have to be subcategorized for subjects, which is certainly not desirable. (Rosén 1996)

It is noteworthy that in the Penn English Treebank (PTB) (Marcus, et al. 1994), small clauses are considered as sentences which are composed of a subject and a predicate, with no traces for an omitted verb or any sort of control relationship, as shown in the example in (54).

(54) (S (NP-SBJ I)
(VP consider
(S (NP-SBJ Kris)
(NP-PRD a fool))))

The team working on the Penn Arabic Treebank found this approach very convenient and satisfactorily representative of the copula constructions in Arabic, which is mainly verbless (Maamouri and Bies 2004). Therefore they used a similar analysis with no assumption of a deleted copula verb or control relationship, as shown in the example in (55).

(55) (S (NP-SBJ Al-mas>alatu المسألة)
(ADJ-PRD basiyTatuN بسيطة))

المسألة بسيطة
al-masʾalatu basīṭatun
The question is simple.

The closed complement analysis is also the most intuitive representation for verbless constructions. A large number of languages do not use a copula verb to express the predicational relationship.

> The class of languages which contain be-less sentences is widespread; it includes languages from practically every language family and from every continent. (Carnie 1995, p. 251)

In the analysis of copula-less languages we do not assume that a copula verb is elided, we consider that the relationship is intrinsically expressed merely by juxtaposing the constituents. In Maori a copula verb is never used, but the relationship is expressed by the grammatical construction as a whole (Rosén 1996). Therefore constituents are not related through a verb, either overt or non-overt, but through the structure of the clause, as further emphasized by Butts (2006) for Aramaic.

> Nexus can be expressed, however, by means other than a finite verb. In Aramaic, the verbless clause, that is, a clause lacking a finite verb as core constituent, is defined as a clause in which nexus is expressed not by a finite verb, but by the syntactical juxtaposition of subject and predicate. (Butts 2006, p. 56)

In our analysis, we do not make any functional distinction between copula and copula-less constructions, as they are semantically and functionally equivalent.

> … verbless constructions … are generally functionally equivalent (or at least, in functional overlap with) with copula constructions in other languages (or even within the same language). (Nordlinger and Sadler 2006)

The presence or absence of a copula is a parameter of variation. The copula itself is considered semantically redundant. In the typological and syntactic literature the copula verb has been described as “light”, “bleached” and “semantically void”.

We adopt Nordlinger and Sadler’s (2006) account of the copula-less construction as involving a higher structure. They argue that the main predicator is not an elided copula but a more hierarchical structure that governs the whole sentence:

> … these verbless clauses have a more hierarchical f-structure in which the f-structure of the non-verbal predicate functions as an argument within a higher f-structure which itself has a PRED, but where there is no overt syntactic element corresponding to this predicate in the c-structure. (Nordlinger and Sadler 2006)

So we consider that the main predicator is “null-be” without the assumption that there is an elided *be*-like verb. In many languages the mere juxtaposition of subjects and predicates is enough to express the predicational relationship. Further, it might be asked why a predicator is needed after all. The answer is that we need a predicator not only to satisfy the coherence condition in LFG, but also to state the fact that a grammatical sentence is composed of a subject and a predicate, nothing more, nothing less. A predicator is also needed to convey sentential information such as tense and negation. So for the Arabic example in (56) we have the phrase structure rules in (57) and the f-structure in Figure 11.

(56) هو طالب
hwa ṭālibun
he student
‘He is a student.’

(57) $S \rightarrow$ NP (↑ SUBJ)=↓ ε (↑ PRED)='null-be<SUBJ,PREDLINK>' (↑ TENSE)=pres NP ∨ AP (↑ PREDLINK)=↓ (↓ GEND)=(↑ SUBJ GEND) (↓ NUM)=(↑ SUBJ NUM)

PRED	'null-be<(↑SUBJ) (↑PREDLINK)> '
SUBJ	[PRED 'he']
PREDLINK	[PRED 'student']
TENSE	present

Figure 11. F-structure of an Arabic copula sentence

We also consider that PREDLINK should be included in the inventory of grammatical functions that denote the subject and predicate in the universally acknowledged predicational construction.

We must emphasize that our argument is that the closed function analysis can be considered as the default analysis as it accounts for a large range of the spectrum of copula complements. This, however, does not mean that it is the only possible analysis. There are special cases where the single-tier is perfectly motivated, as in Nordlinger and Sadler's (2006) account of the single-tier analysis for languages where the NP/AP carries verbal morphology.

8 Conclusion

We conclude that a unified analysis of copula constructions is motivated. The different strategies employed in the predicational structures are language-specific variations that basically express the same grammatical function. We assume that the copula complement is a closed function, i.e. PREDLINK. This analysis can serve as a “boilerplate” strategy that can account for all the different constituents that can occupy the predicate position and express cross-linguistic generalizations pertinent to the functional use of copula constructions. We

have discussed the other two analyses (single tier and open function) and showed their inadequacies in handling the different types of copula constructions.

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NOUN-ADJECTIVE COMPOUNDS IN GUNWINYGUAN LANGUAGES

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Abstract: In Gunwinyguan languages (Northern Australia), nouns may incorporate not only into verbs, but also adjectives. These N-Adj compound structures have interpretations identical to those of noun phrases modified by an adjective in English. A consideration of the evidence nevertheless argues that the morphological head of the N-Adj construction is the adjective. We show that this paradox can be resolved using inside-out function application to allow the compound to be headed by the adjective at c-structure, but by the noun at f-structure. We show further that the same analysis extends to cases of nominal 'classification' where the incorporated nominal is construed as a generic classifier together with an independent specific noun in apposition.

1. Introduction

In this paper we examine the incorporation of nominals into adjectives in Gunwinyguan languages (from Arnhem Land, northern Australia), including Ngalakgan (Merlan 1983, Baker 2008), Nunggubuyu/Wubuy (Heath 1984), Ngandi (Heath 1978), and Bininj Gun-wok (Evans 2003), as in (1).[†1]

(1) Ngalakgan

a.	ceɲ-ŋolkko fish-big	'big fish'
b.	kuɳʈu-joccoŋ country-clear	'clear (not sacred) country'
c.	ɭaŋka-kaɲaʔ billabong-small	'small waterhole'

These N-Adj compounds involve a subset of nominals with 'generic' or classifying functions and exist alongside phrasal N + Adj combinations of the more familiar type, as in (2):[2,3]

[†] For comments, suggestions and discussion, we are grateful to Aaron Broadwell, Miriam Butt, Mary Dalrymple, Cliff Goddard, Mark Harvey, Tracy Holloway King, Ron Kaplan, Ingo Plag, Louisa Sadler, and Jane Simpson. We uphold our right to take full blame for any infelicities which remain, despite the efforts of the afore-mentioned scholars.

[1] Examples, except where noted, are drawn from Baker's fieldnotes and Baker (2008). We have represented language examples throughout with standard IPA, rather than the orthography of each language. Abbreviations are listed at the end of the paper. Loanwords in examples are represented in italics.

[2] The standard reference work for this language (usually, though incorrectly, referred to as 'Nunggubuyu') is Heath (1984).

[3] Note that we use the term 'compound' throughout the paper in a neutral sense, interchangeably with 'incorporation', as a combination of two lexical roots or stems. However, as discussed briefly below, compounds in GN languages have different

(2) Wubuy

ana-ciici	macii,
NEUT.TOP-sore	COND

pa-warna + kana	**ana-ciici**	**ana-ɻuŋkal**
2sg-hold+TAKE.PR	NEUT.TOP-sore	NEUT.TOP-big

if yu abum so, bigwan[4]

'If you have a sore, a big one that is...' [31/5/04]

The class of nouns which may be compounded with Adjs is restricted to the same class that may be incorporated into verbs. In Wubuy, Heath (1984:471) notes that

> 'Only certain nouns can occur as [N in both N-Adj or N-Verb compounds], either unchanged, with phonological changes, or with a suppletive replacement. In general, specific flora-fauna terms, specific implement terms, and NAdj ['adjectival nouns'] (including most human nouns) are not permitted as cpd. initial.'

In all three languages, the nominals that occur in N-Adj compounds include the special suppletive forms otherwise found only in verb incorporations. In (3), the Ngalakgan special suppletive compounding form /piɲi/ 'water' is used, rather than the regular form /weʔ/.

(3) Ngalakgan

ku-ku-po-wan	jeʔ-jereʔ
3NP-NEUT-river-follow.NP	INTENS-downstream

piɲi-ŋolkko-kaʔ	kuɳmaɳʔ	ceɲ	ku-joŋon	
water-big-LOC	maybe	fish	3NP-lie.NP	[Ngkn; 2/9/97:1B]

'they (fish) follow the river downstream, maybe the fish are in the big water'

Suppletive stems such as /piɲi/ cannot be used as independent nouns (see Baker 2008:88 for discussion).

The interpretations of most N-Adj compounds and many N-V compounds are 'phrasal', rather than lexical. In contrast to English and many

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semantics to compounds in English, German and other languages (and see Baker 2008 for more discussion).

[4] Translations offered by speakers in Kriol are occasionally used in examples, where relevant. Kriol is an English-lexifier creole, and is the vernacular language of many Indigenous people of northern Australia (Harris 1986; Munro 2004).

other languages, for instance, N-Adj compounds in GN languages do not have interpretations as types or kinds (like 'blackbird', 'brown bear', etc). Rather, compounds such as 'big fish' only have strictly compositional interpretations, identical to the phrasal combination of the same adjective and noun (or their equivalents in English). We therefore do not find Bloomfield's (1949:197) famous contrast between 'blackbird' and 'black bird' in GN languages. Most of the time, only the 'black bird' interpretation is possible.[5]

Most of the essential properties of this type of incorporation are thus similar to what we find in nominal incorporation into verbs (as discussed in Nordlinger & Sadler, this volume), and demand a similar analytical approach. Different issues also arise however, since in this case, the morphologically incorporated element (i.e. the nominal), is functionally equivalent to the head in the phrasal counterpart. In this paper we provide an LFG account of these N-Adj compounds which exploits the flexibility of the LFG architecture to provide an explanatory account in which the compound is headed by the adjective at c-structure level, but by the noun in the f-structure.[6]

In §2 and §3 we present the core data that we will be concerned with and argue that these N-Adj combinations are (i) compounds rather than phrases (§2); and (ii) morphosyntactically headed by the adjective (§3). Despite being headed by the adjective, these N-Adj compounds have the same interpretations as Adj + N phrasal combinations (in both these languages, and in English), which are headed by the noun. In §4 we provide our analysis which captures both the morphosyntactic facts discussed in §2 and §3 as well as the functional equivalence with Adj + N phrases. In §5 we extend our analysis to constructions in which the incorporated nominal is in a generic-specific relationship with an external nominal, building on the analysis presented by Nordlinger & Sadler (this volume). Finally in §6 we show how our analysis interacts with the analysis of nominal incorporation into verbs presented in Nordlinger & Sadler (this volume).

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[5] Many GN languages have a small class of terms for biological taxa which are formally compounds. For instance, Wubuy has names such as /ŋuta-l̪ar̪tark/ (lit. 'midriff-rough') 'king brown snake (*Pseudichis australis*)'. However, such terms always involve a body part and an adjective, and are semantically exocentric. Crucially, they never involve a biological hypernym on the model of 'blackbird'.

[6] Our analysis is therefore different to that of Broadwell (2007), who provides an account of similar data from Zapotec which makes use of lexical-sharing. We prefer our analysis for the Gunwinyguan data since it allows for integration with Nordlinger and Sadler's analysis (this volume) of nominal incorporation into verbs in these languages, thereby providing a unified account for both types of incorporation. It is also not clear how Broadwell's approach would extend to the co-occurrence of N-Adj compounds with external nominals, as discussed in §5. However a detailed comparison of the merits of the two different approaches is yet to be undertaken.

2. Compounds, not phrases

Here we'll concentrate on the morphological criteria distinguishing compounds from phrases in this group of languages.[7] In GN languages, compounds take affixation only at the word edges, and not internally. In example (4), the Ngalakgan compound takes an initial noun class prefix, and a final case suffix.

(4) Ngalakgan

jini-munku-ɻa,	ku-colkko-maʔ-kaʔ
2sg/1pl-follow-FUT	NEUT-ground-good-LOC

'You follow us, to the good [i.e. soft, sandy] ground.' [5/9/97:1A]

Compounds of this form can therefore be distinguished from phrases, which would never take a single set of affixes on each edge, since Ngalakgan does not, in general, allow case-marking on a single constituent of a (notional) phrase. So examples such as (5), where the noun is prefixed for noun class but the coreferential adjective is suffixed for case, are not accepted by speakers.[8]

(5) Ngalakgan

*ku-colkko	maʔ-kaʔ	jini-munku-ɻa
NEUT-ground	good-LOC	2sg/1pl-follow-FUT

Secondly, there is morpho-phonological evidence from Wubuy for a compound analysis. In Wubuy, there is a phonological rule which inserts a meaningless epenthetic string /-ŋu-/ before stop-initial stems, following another stem or a consonant-final prefix.[9] N-Adj compounds are subject to the rule, just like verbs. The rule only applies within words, hence the forms in (6) are ungrammatical.

(6) Wubuy (Heath 1982:277)

a. ana-jir-ŋu-ʈiku	'green leaves, foliage'
NEUT.TOP-leaves-EPENTH-raw	
b. ana-jir-ŋu-ʈaʈark	'dried-up leaves'
NEUT.TOP-leaves-EPENTH-dry	

[7] There are also prosodic criteria distinguishing compounds in GN languages from phrases; see Baker (2008); Baker & Harvey (2003); Evans (2004).

[8] Merlan (1983:81) makes the contrary claim, that only the head of NP need take overt case marking. In fact, this is only true with respect to demonstratives, which may omit a case suffix if the case-marked noun immediately follows. It is not true of sequences of noun and adjective, in Baker's data.

[9] See Heath (1984:35-7) for discussion of this rule.

c. * ŋu-ʈiku, * ŋu-ʈaʈark

In short, the phonological evidence suggests that we are dealing with domains of phonology that are typically regarded as 'words' of some kind.

3. Compounds as adjectives

In this section, we show that in GN languages, N-Adj compounds are morphologically headed by the adjective and thereby take the full range of inflectional possibilities open to other (non-compounded) adjectives. We propose here that N-Adj compounds are always headed by the adjective, even where they function as arguments, as in (4).[10] If we regard them as words of adjective category, then their other properties follow, as we now show.

The arguments that N-Adj are of the Adj class morphologically, rather than the N class, come principally from two sources: noun class assignment, and potential for TAM inflection. On these criteria, we can distinguish two classes of 'nominals' in the lexicon of GN languages:

	Class 1	Class 2
Noun class	Variable/contingent	Fixed/inherent
Inflection for TAM	Possible	Impossible

Fig 1. Classes of Nominals in the GN lexicon

Class 1 consists of nouns referring to 'human status' (the equivalents of 'person', 'child', 'old person', 'initiated man', 'young girl', 'thief', 'good hunter', etc) and kinship on the one hand, and adjectives on the other. Adjectives realise properties and attributes of size, colour, quality, age, and so on as in English. Class 2 consists of, on the one hand, names (personal and placenames, and names for species and particular kinds of implements), and on the other 'generic terms', such as the equivalent of 'billabong', 'fire', 'water', '(any kind of) spear', '(any kind of) kangaroo', 'camp', 'rock', '(any kind of) tree' and so on. N-Adj compounds always consist of a class 2 nominal followed by a class 1 nominal, in that order. Moreover, they must consist of a 'generic' nominal compounded with an 'adjectival' nominal.

Inflection for Tense-Aspect-Mood

Nominals in class 1 can be inflected for TAM when functioning as clausal predicates. Normally, inflection for TAM is made possible by the addition of a finite auxiliary root (/me-/ in Ngalakgan, /ma-/ in Wubuy):

[10] Here we differ from Evans (2003), who takes the nominal element to be the head, when the compound is functioning referentially. As we show below, this category indeterminacy arises from the fact that these compounds exhibit a mismatch between the c-structure head and the f-structure head—a mismatch that is straightforwardly accounted for on our analysis.

(7) Ngalakgan (Merlan 1983:58)

ŋajkkaʔ	koʔje	ŋu-**miɻppara-meniɲ**
I	here	1sg-child-STAT.PC

'I was a child'

N-Adj compounds functioning as clausal predicates can also be inflected for TAM, in the same way as other class 1 nominals. Here, the N-Adj compound takes a tense-specific negative suffix, which can only be used on verbs, and class 1 nominals functioning as clausal predicates.

(8) Ngalakgan

ku-kuŋɻu-**cappuru-ʔmolk**	kuŋmaŋʔ
NEUT-country-sacred-PRNEG	maybe

'it might not be sacred country' (Ngalakgan)

In contrast, nominals from class 2 (species terms, 'generic' terms, specific implement terms) cannot be inflected for TAM, even when they function as clausal predicates. Existence or identity can be predicated of (apparently) any noun, as in the following Wubuy example:

(9) Wubuy

matamu	**mana-jirpaɻa**,	a-ciici-jiɲuŋ
VEG-PROX	VEG.TOP-ironwood,	NEUT-sore-REL

dijan iya ayinwud tri, im blanga so 'ironwood here, it's [used] for sores.'

Thus, the fact that these N-Adj compounds can be inflected for TAM shows them to be class 1 nominals, morphologically.

Another piece of evidence that N-Adj compounds are adjectives comes from verb agreement morphology. As well as TAM marking, adjectives (and other class 1 nominals) can take verb agreement morphology when functioning as clausal predicates, as shown in (10). Class 2 nominals, on the other hand, can never take this type of agreement morphology, as shown in (10). N-Adj compounds pattern as class 1 nominals in this respect, as shown by the example in (10). (10) is a compound of a generic noun /jaŋ/ 'voice' and an adjective /waɻawaɻaɻ/ 'strong, firm' (which is reduplicated in this case). Since it was used as a predicate in this example it takes a verbal argument prefix /ni-/ '3 masculine singular' agreeing with the referent, a man. This prefix cannot occur on common (non-adjectival) nouns, and hence (10) is ungrammatical.

(10) Wubuy

a. /ni-waɽawaɽaɽ/
3M-strong
'he is strong'

b. */ni-jaŋ/

c. [nijambaɖawaɖawaɖaɖ]
/ni-jaŋ-waɽa-waɽawaɽaɽ/
3M-voice-INTENS-strong
'his voice is strong, he is strong voice-wise' [9/4/07: tk1]

What this demonstrates, as with the other examples, is that (10) cannot be considered to be a phrase consisting of two morphological words, because the putative first word is ungrammatical. Rather, it is a morphological word (in some sense), which takes prefixation appropriate to its head, the adjective.

Agreement for Noun Class

Nominals in class 1 can take variable noun class prefixation, consonant with the idea that the noun class 'agrees' with a referent. In BGW, where 'noun class' on heads and 'agreement' on modifiers can be distinguished (Evans 1997, Evans et al. 2002), compounds take agreement, rather than noun class, where these differ (Evans 2003:177). They therefore take the same inflectional morphology as adjectives, agreeing with the incorporated noun, rather than taking the gender prefix that noun takes when it is an independent word. In example (11), from the Gundjeihmi dialect of BGW, the compound /an-tulk-ɻajek/ 'hard wood' takes VEG agreement with prefix /an-/, because the noun /tulk/ governs VEG agreement on cooccurring modifiers (adjectives, demonstratives). However, the noun /tulk/ itself, when independent, takes the NEUT noun class prefix /kun-/. Similarly with the (b) example (from the Kunwinjku dialect; both examples from Evans 2003:177):

(11) Bininj Gun-wok

a. /an-tulk-ɻajek/ VEG-tree-hard 'hard wood'

c.f. /kun-tulk/ NEUT-tree (Dj)

b. /man-piḷi-kimuk/ VEG-flame-big 'big flame'

c.f. /kun-piḷi/ NEUT-flame (W)

This appears to be solid evidence against the proposal that the noun is the morphosyntactic head of the compound, even where the compound is used referentially. If it were, there would be no reason for the compound to take gender agreement, rather than noun class prefixation.[11] On the other

[11] See Evans (2004) for an alternative view.

hand, it is also solid evidence that the incorporated noun is the controller for the purposes of gender agreement, a property that is usually associated with an f-structure head.

If we allow that compounds are adjectives, then their other properties follow, since adjectives can be referential in GN languages (as in Australian languages generally, cf. Hale 1983 on Warlpiri):[12]

(12) Ngalakgan

ŋolkko	ŋu-pawunʔ-miɲ
big	1sg-leave-AUX.PP

bigmob ai bin libim
'I left a lot.'

(13) Ngalakgan

a. jekke ŋu-ku-ceɲ mokkol ku-ɻapon?
INTERR MA-TOP-fish father 3NP-go.PR
'Dad, any fish [here]?'

b. **ŋolkko** cecepaɻŋʔ ŋu-ɳaniɲ, **ŋolkko** ku-ɻapon
big yesterday 1sg-see.PC, big 3NP-go.PR
O bigmob fish im wokabaut
'I saw a lot yesterday, a big mob moving around' [2/9/97:1B]

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[12] These examples are not ideal unfortunately, because the interpretation is quantificational rather than attributive. We find the same shift in BGW examples presented in Evans (2003:178):

na-peʔɳe	cappilaɳa	ka-po-karme	an-po-kimuk
MA-that	billycan	3-liquid-have.NP	VEG-liquid-big

'That billycan has lots of water.'

Ngandi too appears to share the same ambiguity, where the Adj /kaɭi/ is translated as 'big, many' by Heath (1982). It could be that (some) adjectives allow quantificational readings as well as attributive ones, and that the reading depends on the kind of noun involved. There has not been enough research on these languages to determine this question. What is also unclear, is under what circumstances adjectives can be referential without some cooccurring nominal. The examples we have so far been able to find in Ngalakgan suggest that there is always an inferred referent supplied by discourse. Thanks to Cliff Goddard for alerting us to this important question.

In sum, N-Adj compounds in Gunwinyguan languages are functionally equivalent to Adj + N phrasal combinations, but exhibit the following distinctive morphosyntactic properties:

(i) they are compounds rather than phrases, as shown by the morphophonological and prosodic evidence;
(ii) they belong to the morphological category of class 1 nominals, as shown by the fact that they take TAM inflection and verbal agreement morphology when functioning as clausal predicates, and gender agreement morphology, rather than noun class marking;
(iii) although the adjective is the morphosyntactic head, the incorporated nominal shows some head properties, such as controlling gender agreement.

Thus in these N-Adj compounds we find a mismatch between the morphosyntactic properties (which show the adjective to be the head), and the semantic/functional properties (which suggest that the incorporated nominal is the head, on analogy with equivalent Adj + N phrasal combinations). This mismatch of properties explains why there is some debate in the literature as to whether these compounds are indeed adjectives or nouns (cf. Baker 2008 and Evans 2003; 2004). In the next section we show how the flexibility of the LFG architecture can be exploited to provide a straightforward account of these compounds and their properties.

4. Analysis of N-Adj compounds

Using inside-out function application in LFG, these complex empirical facts can be given a straightforward and explanatory account, as follows. As noted above, these N-Adj combinations share many functional similarities with N-V incorporations (as discussed by Nordlinger and Sadler (this volume)), and in fact the same N may be incorporated into both a verb and an adjective in a single construction, as shown in the Bininj Gun-wok example in footnote 12. Our formal analysis, then, aims to capture this relationship by generating the incorporated nouns in the same part of the f-structure irrespective of whether or not they are incorporated into an adjective or into a verb. Thus, the analysis presented here interacts seamlessly with the analysis of N-V incorporations provided by Nordlinger and Sadler (this volume), as we exemplify in §6.

Firstly, we assume the basic c-structure rules provided in (14):[13]

[13] Heath (1986) argues that sequences of nominals and adjectives do not form phrases in Wubuy, and his arguments could be extended to Ngalakgan and BGW also. However, for expository purposes we are assuming a phrasal level for each constituent type here since it enables us to simplify the f-descriptions in the lexical

(14) NP→…A , … N …
↓ ∈ (↑ ADJ) ↓ ∈ ↑
↓ IND = ↑ IND

We assume that a regular adjective with attributive function carries the information provided in (15) (from Wubuy). When combined with an ↓ ∈ (↑ ADJ) annotation from the c-structure, this projects the f-structure in (16):

(15) /ɻuŋkal/: A
(↑ PRED) = 'big'

(16) $\left[\text{ADJ}\left\{\left[\text{PRED 'big'}\right]\right\}\right]$

When there is no incorporated nominal, the PRED of the outer f-structure will be provided by an external nominal (as in (2)), or by the pronominal agreement marking on the verb (as in (13)).

When the adjective is compounded with an incorporated nominal, the nominal itself constructs the PRED for the superordinate f-structure, using inside-out function application. The lexical entry for the incorporated nominal /ŋucica/ 'fish (generic)' is given in (17) (this will be revised slightly in §5).[14] This lexical entry is transparently related to the lexical entry of the unincorporated nominal via a lexical redundancy rule which adds the (ADJ ∈ ↑) = ↓ specification and associates all other f-descriptions with ↓.

(17) /ŋucica-/:
(ADJ ∈ ↑) = ↓
(↓ PRED) = 'fish (generic)'
(↓ INDEX PERS) = 3
(↓ INDEX NUM) = SG
(↓ INDEX GEND) = RESID

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entries. This analysis could be converted into a completely flat structure, however, if required.

[14] We have not addressed the semantics of the incorporated noun here. One approach is that of Wilkins (2000), who argues that the semantics of generic nouns used in classifier constructions in Arrernte is the same as their semantics in independent use, what is different is the semantics carried by the classifier construction itself and the particular intersection of the generic meaning and the specific meaning. We believe this is a fruitful line of enquiry for GN languages also, but lack the space to fully develop it here.

The N-Adj compound /ŋucica-ɻuŋkal/ ‘big fish’ then has the lexical entry provided in (18), which projects the f-structure in (19).

(18) /ŋucica-ɻuŋkal/: A
(↑ PRED) = ‘big’
(ADJ ∈ ↑) = ↓
(↓ PRED) = ‘fish (generic)’
(↓ INDEX PERS) = 3
(↓ INDEX NUM) = SG
(↓ INDEX GEND) = RESID

(19)
$$\begin{bmatrix} \text{INDEX} \begin{bmatrix} \text{PERS } 3 \\ \text{NUM SG} \\ \text{GEND RESID} \end{bmatrix} \\ \text{PRED 'fish (generic)'} \\ \text{ADJ } \{[\text{PRED 'big'}]\} \end{bmatrix}$$

In this f-structure, the information associated with the incorporated nominal has been projected into the outer f-structure which the adjective ‘big’ modifies. Thus, despite being a different category at c-structure (i.e. adjective), this N-Adj compound projects an f-structure analogous to that of Adj + N phrasal combinations, such as ‘big fish’ in English. Since the INDEX information associated with the incorporated nominal is also projected into the outer f-structure we capture the fact that it is the incorporated nominal that controls verbal agreement and adjectival gender agreement, despite the fact that it is not the morphological head of the N-Adj compound.[15]

[15] There are alternative ways to achieve this f-structure formally. For example, one option would be to use a local name for the f-structure associated with the incorporated nominal, and therefore avoid the use of the ↓ in the lexical entry in (17) and (18). Another option would be to use a sub-lexical rule to combine the N and Adj as follows: (Ron Kaplan, p.c.):

NP → A …
↑ = ↓
A → N A
↑ = ↓ ↓ ∈ (↑ ADJ) (cont. below)

5. Generic-specific constructions with an external nominal

N-Adj compounds exhibit a type of classifier noun incorporation (Rosen 1989), except that in this case the incorporation is into an adjective (which may be in an argument position) rather than into a verb. Like other types of classifier noun incorporation discussed in the literature (and in Nordlinger & Sadler, this volume), N-Adj compounds can occur in a 'generic-specific' construction with an external nominal, as in the following:

(20) Bininj Gun-wok (Manyallaluk Mayali dialect; Evans 2003:17)
an-**carman** ko-no **ko**-ŋermej
VEG-kurrajong flower-PRT flower-red
'Kurrajong (*Brachychiton sp*.) trees have red flowers.' (An alternative translation is: 'Brachychiton flowers are red ones [flowers].')

(21) Ngalakgan
paliɲʔ mu-**maj**-pinti ***plawa***
like VEG-veg.food-real flour
'like real flour' ['flour' < Kriol] [DD]

(22) Wubuy (Heath 1980:435)
nirima-l̪alwul̪ii **aɻ**-ma-mawuɻaatuc anaa-**kuku**
1pl/VEG-soak.PR water-RED-cold NEUT.TOP-freshwater
'we soak it [gum of wattle sp.] in cold water'

(23) Wubuy
ŋucica-ɻuŋkal **jiŋkul̪panti** ŋiini-maŋi
fish[RESID]-big barramundi[NA] 1in.pl/NA-get.PC
'we got a big barramundi [NA gender]'

We follow Nordlinger & Sadler's (this volume) analysis of these constructions, in which both the incorporated and external nominals contribute to an f-structure set, on a par with their treatment of phrasal generic-specific counterparts (Sadler & Nordlinger 2006).

To illustrate, consider the following example in which the Wubuy N-Adj compound /ŋucica-ɻuŋkal/ 'big fish' is combined with the specific external noun /jiŋkul̪panti/ 'barramundi'.[16]

(24) Wubuy
ŋucica-ɻuŋkal **jiŋkul̪panti**
fish-big barramundi 'big barramundi'

However, this approach does not allow the adjective to have scope over the entire generic-specific combination when this N-Adj combination co-occurs with an external nominal (see §5), and thus we prefer the analysis presented here.

[16] This constructed example has been tested with Baker's primary Wubuy consultant. However, it is consistent with similar, naturally-occurring examples such as (20).

Recall the NP c-structure rule, repeated below. We assume (following standard LFG assumptions) that all nodes are optional (which allows for the two elements to constitute two separate discontiguous phrases).

(25) NP→…A , … N …
↓ ∈ (↑ ADJ) ↓ ∈ ↑
↓ IND = ↑ IND

The lexical entry for /jiŋkuɭpanti/ 'barramundi' is that given in (26). When combined with the c-structure rule in (25) (in the N position), this projects the partial c-structure and f-structure in (27):

(26) /jiŋkuɭpanti/: N
(↑ PRED) = 'barramundi'
(↑ INDEX PERS) = 3
(↑ INDEX NUM) = SG
(↑ INDEX GEND) = NA

(27)
$$\begin{bmatrix} \text{INDEX} \begin{bmatrix} \text{PERS } 3 \\ \text{NUM SG} \\ \text{GEND NA} \end{bmatrix} \\ \left\{ \begin{bmatrix} \text{PRED 'barramundi'} \\ \text{INDEX} \begin{bmatrix} \text{PERS } 3 \\ \text{NUM SG} \\ \text{GEND NA} \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix}$$

Turning now to /ŋucica-ɻuŋkal/ 'big fish', the lexical entry for the incorporated nominal provided in (18) needs to be modified to allow for the fact that the incorporated nominal may contribute information to a set at f-structure. The modified lexical entry is provided below, where we have added the information that the f-structure to which the nominal contributes may *optionally* belong to a set in the outer f-structure to which the ADJ belongs (((ADJ ∈ ↑) (∈)) = ↓.

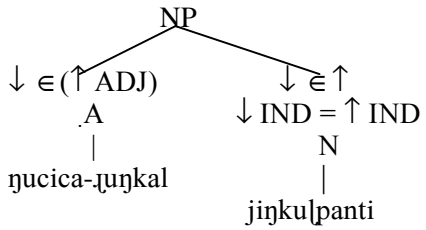
(28) /ŋucica-/:
((ADJ ∈ ↑) (∈)) = ↓
(↓ PRED) = 'fish (generic)'
(↓ INDEX PERS) = 3
(↓ INDEX NUM) = SG
(↓ INDEX GEND) = RESID

The c-structure rule ensures that the INDEX of the external nominal will always be projected to the f-structure of the set. Where there is a mismatch between the INDEX values of the external nominal and the incorporated noun (i.e. mismatches in number or gender), it is the values of the external nominal which are always identified with those of the set (as in (23)[17]). We capture this by not projecting the INDEX features of the incorporated nominal to the outer f-structure so that, when an external nominal is present, the INDEX of the set will always be that of the external nominal.

When combined with the adjective /ɻuŋkal/ 'big' this results in the following f-structure for the N-Adj compound:

(29)
$$\begin{bmatrix} \left\{ \begin{bmatrix} \text{PRED 'fish (generic)'} \\ \text{INDEX} \begin{bmatrix} \text{PERS 3} \\ \text{NUM SG} \\ \text{GEND RESID} \end{bmatrix} \end{bmatrix} \right\} \\ \text{ADJ} \left\{ [\text{PRED 'big'}] \right\} \end{bmatrix}$$

Finally, when combined with the f-structure associated with the external nominal, we generate the following c- and f-structure for the whole generic-specific construction.



[17] Wubuy is a good language to test this implication with, since (unlike most GN languages) it religiously distinguishes among 7 genders of objects. In example (23), we find an argument prefix /ŋiini-/ which agrees with the gender of the external noun /jiŋkuɭpanti/ (NA gender), rather than the incorporated generic /ŋucica/ (RESID gender). The corresponding argument prefix for a RESID gender object would be /ŋuru-/.

(30)
$$\left[\begin{array}{l} \text{INDEX}\left[\begin{array}{l}\text{PERS 3}\\ \text{NUM SG}\\ \text{GEND NA}\end{array}\right] \\ \left\{\left[\begin{array}{l}\text{PRED 'fish (generic)'}\\ \text{INDEX}\left[\begin{array}{l}\text{PERS 3}\\ \text{NUM SG}\\ \text{GEND RESID}\end{array}\right]\end{array}\right]\right. \\ \left.\left[\begin{array}{l}\text{PRED 'barramundi'}\\ \text{INDEX}\left[\begin{array}{l}\text{PERS 3}\\ \text{NUM SG}\\ \text{GEND NA}\end{array}\right]\end{array}\right]\right\} \\ \text{ADJ}\left\{\left[\text{PRED 'big'}\right]\right\} \end{array}\right]$$

This f-structure is exactly analogous to those provided by Nordlinger & Sadler (this volume) to account for incorporated generics in verbal incorporations, thereby capturing the similarities between the two types of incorporation structures. The only difference here is that the nominal set is modified by an adjective.[18]

6. Putting it all together

Now, consider an example in which there is both types of generic-specific incorporation—into a verb and into an adjective—as in the following (constructed) example:

(31) Wubuy
ŋucica-ɻuŋkal **jiŋkuɭpanti** ŋiini-**ŋucica**-maŋi
fish[RESID]-big barramundi[NA] 1in.pl/NA-fish-get.PC
'we got a big barramundi [NA gender]'

[18] Note that we are assuming that the ADJ function is non-distributive. Here we deviate from Dalrymple (2001:366) in which grammatical functions (GFs) are assumed to be distributive features. However, there appear to be independent reasons for treating GFs as non-distributive, as in the example *She ate her breakfast and put her plate in the dishwasher* where we would not want to distribute the PP across each coordinated VP. We are also assuming that PRED is distributive (as discussed in Nordlinger & Sadler, this volume) to rule out the possibility that ↓ in (30) is identified with the f-structure of the set when there is an external nominal. If PRED is distributive then this identification would result in a PRED clash, rendering the f-structure invalid.

Following Nordlinger and Sadler (this volume), the verb+incorporated nominal project the f-structure in (32), and, on our analysis, the N-Adj + external nominal projects the f-structure in (33):

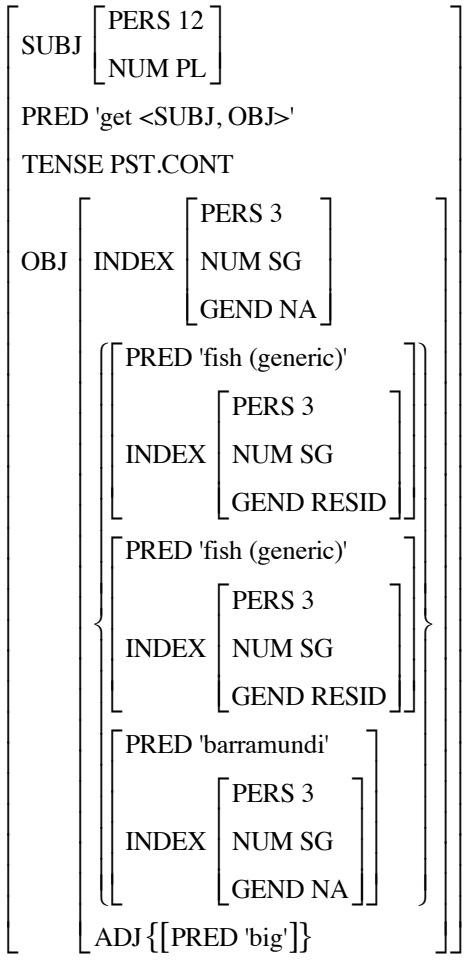
(32)
$$\begin{bmatrix} \text{SUBJ} \begin{bmatrix} \text{PERS } 12 \\ \text{NUM PL} \end{bmatrix} \\ \text{PRED 'get <SUBJ, OBJ>'} \\ \text{TENSE PST.CONT} \\ \text{OBJ} \left\{ \begin{bmatrix} \text{PRED 'fish (generic)'} \\ \text{INDEX} \begin{bmatrix} \text{PERS } 3 \\ \text{NUM SG} \\ \text{GEND RESID} \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix}$$

(33)
$$\begin{bmatrix} \text{INDEX} \begin{bmatrix} \text{PERS } 3 \\ \text{NUM SG} \\ \text{GEND NA} \end{bmatrix} \\ \left\{ \begin{bmatrix} \text{PRED 'fish (generic)'} \\ \text{INDEX} \begin{bmatrix} \text{PERS } 3 \\ \text{NUM SG} \\ \text{GEND RESID} \end{bmatrix} \end{bmatrix}, \begin{bmatrix} \text{PRED 'barramundi'} \\ \text{INDEX} \begin{bmatrix} \text{PERS } 3 \\ \text{NUM SG} \\ \text{GEND NA} \end{bmatrix} \end{bmatrix} \right\} \\ \text{ADJ} \left\{ \begin{bmatrix} \text{PRED 'big'} \end{bmatrix} \right\} \end{bmatrix}$$

When these two f-structures are combined (assuming the c-structure provides ($\uparrow$ GF) = $\downarrow$ annotations for the NPs containing both the N-Adj compound and the external nominal), we end up with the f-structure for the whole clause shown in (33) (next page).[19]

[19] We assume that the generic/classifying nature of the incorporated nominals is accounted for in the semantics, and that it is this semantic property which allows for there to be repeated members in the set.

(35)



7. Conclusions and further implications

In this paper we have shown how the mixed categoriality of these N-Adj compounds can be accounted for by providing an analysis in which the compound is an adjective at morphological structure, and at c-structure, but headed by the incorporated nominal at f-structure. This allows us to account for the morphosyntactic facts, while capturing the functional similarities with Adj + N phrasal combinations in languages like English. Furthermore, we have shown how our approach can be extended to account for the combination of these compounds with external nominals in generic-specific constructions. In doing so we capture similarities between these constructions and other types of generic-specific constructions including those involving juxtaposed external nominals (Sadler & Nordlinger 2006) and those involving incorporation into verbs (Nordlinger & Sadler, this volume).

Abbreviations

1, 12, 2, 3: 1st, 1st incl., 2nd, 3rd person; F feminine noun class; M masculine noun class; NC noun class; NA non-human masculine noun class; NEUT neuter noun class; O object; RESID residual noun class (Ngandi and Wubuy); S subject (that is, Agent of a transitive or Subject of an intransitive verb); VEG vegetable noun class; DAT dative; DIST distributive; EPENTH meaningless epenthetic element (Wubuy); ERG ergative; F/FUT future; GEN genitive; IMMED immediate; IN incorporated noun; INST instrumental; INT interrogative clitic; INTENS intensive; INTERR interrogative particle; IRR irrealis; ITER iterative; LAT lative; LOC locative; NP nonpast; PC past continuous; PNEG/PRNEG/FNEG past/present/future negative suffixes; POSS possessive; POT potential; PROX proximal; PP past punctual; PR present; RED (semantically-empty) reduplication; REL relative/subordinator; RR reflexive/reciprocal; SAP speech act participant (1st and 2nd person referents); sp species; STAT stative; TOP topic.

Language groups

BGW Bininj Gun-wok; Dj Gundjeihmi (dialect of BGW); GN Gunwinyguan (language family); MM Manyallaluk Mayali (dialect of BGW); Ngkn Ngalakgan; Ngdi Ngandi; Wby Wubuy ~ Nunggubuyu; W Kunwinjku dialect of BGW.

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URDU EZAFE AND THE MORPHOLOGY-SYNTAX INTERFACE

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Abstract

This paper introduces data from Urdu into the discussion surrounding the well-known Persian *ezafe*-construction (Samvelian 2007, Gomeshi 1997, Samiian 1994) in order to further explore the interplay of phonology, morphology and syntax. In contrast to earlier studies of Samvelian (2007) for HPSG and Luís and Otoguro (2005) for LFG, who each introduce new formal mechanisms that map between the morphology and the syntax in order to resolve the tension between lexical/affixal properties of clitics (phrasal affixes) and their ability to take wide phrasal scope, our approach demonstrates that the classic LFG projection architecture already allows for a straightforward account of the properties of Urdu *ezafe* and postlexical clitics in general. In particular, we invoke postlexical prosodic phonology in order to ensure the correct placement of clitics, while accounting for their phrasal scope and lexical selectional properties in terms of c-structure representations and f-structure constraints, respectively.

1 Introduction

The aim of this paper is to introduce the hitherto undiscussed phenomenon of Urdu *ezafe* and to illustrate issues of the morphology-syntax-prosody interface with respect to clitics and phrasal affixes in general.[1] The *ezafe*-construction describes a dependency between a head noun and its modifiers in that it connects these modifiers to the head noun via the insertion of the *ezafe -e*. Samvelian (2007), who we take as a point of departure, follows Zwicky and Pullum (1983), Zwicky (1987) and Miller (1992) and analyzes the Persian *ezafe* as a phrasal affix that is part of the nominal morphology, which is introduced at the morphological level, but not postlexically as clitics are. We, on the other hand, propose that there is no real distinction between phrasal affixes and clitics. Phrasal affixes are those clitics which are on their way towards reanalysis as pieces of inflectional and derivational morphology. Within our understanding of grammar, clitics are not introduced postlexically but are independent lexical items, occupying their own leaf in the syntactic tree. The *prosodic* treatment of the clitics, however, occurs postlexically. Acknowledging the role of postlexical prosody in our view is imperative with respect to the *ezafe*-construction (and other clitics), because the proper integration of prosodic phonology into the architecture of grammar is what allows for a complete and straightforward analysis of the complex accumulation of behavioral properties of *ezafe* (and other clitics).

In section 2, we provide a brief overview on the Persian *ezafe* data in order to bring the reader up to date on the current discussion with respect to *ezafe*. An introduction to the Urdu data is given in section 3, followed by a Lexical-Functional Grammar (LFG) analysis in section 4. Although the Urdu *ezafe*-construction is not as complex as its Persian counterpart, our analysis allows us to revisit Samvelian's

[1]We would like to thank Tafseer Ahmed for help with and discussions of the relevant Urdu data.

analysis of *ezafe* as a phrasal affix in section 5, where we suggest that Persian *ezafe* could also be analyzed as a postlexial clitic. We conclude in section 6.

2 Persian *Ezafe*

Persian *ezafe* (from Arabic *iḍāfa* 'adjunction/addition') has been discussed extensively (Samiian 1983, 1994, Gomeshi 1997, Kahnemuyipour 2000, Holmberg and Odden 2005, Larson and Yamakido 2005, Samvelian 2007). An example is provided in (1), which illustrates that Persian *ezafe*, in contrast to the generally head-final nature of the language and NPs in particular, allows the head noun to be initial, with modifiers licensed to its right. The Urdu construction (section 3) functions similarly, however, the Persian *ezafe*-construction is much more complex in that modifiers can include adjectives, nouns and some PPs and that each of these in turn can function as the host for a further *ezafe*-construction. This stacking of *ezafe* is also illustrated by (1).

(1) [in ketâb]-e [kohne]-ye [bi arzeš]-e maryam
this book-Ez ancient-Ez without value-Ez Maryam
'this ancient worthless book of Maryam's' Persian
Samvelian (2007:606)

The *ezafe* originates from an Old Iranian relative pronoun *-hya*. In Middle Iranian, the pronoun evolved into *y/i* and became specialized as a device for nominal attribution. Samvelian (2007) argues that the *ezafe* was reanalysed further and has now become part of the nominal inflection. In order to provide the reader with the necessary overview, the following sections briefly summarize two major analyses of *ezafe* (Gomeshi 1997, Samvelian 2007).

2.1 Gomeshi's Analysis of the Persian *Ezafe*

The standard existing analysis for Persian *ezafe* is that of Gomeshi (1997), who builds on Samiian (1983). Gomeshi provides an X-bar account which involves non-projecting heads that may adjoin to each other. The *ezafe* never attaches to phrases, but selects as its domain the domains of X^0s or bare (lexical) heads. Gomeshi analyzes the *ezafe* as having no morphological status, but as being a sort of phonological linker inserted into the Phonological Form via an ***ezafe* Insertion Rule**. This rule attaches the *ezafe -e* to a lexical X^0 head bearing [+N].

2.2 Samvelian's HPSG-analysis of the Persian *Ezafe*

Samvelian (2007) reexamines the standard analysis of Gomeshi by providing new empirical facts and proposes an alternative analysis couched within Head-Driven Phrase Structure Grammar (HPSG). For the purpose of our analysis, we take Samvelian (2007) as a point of departure.

Samvelian demonstrates convincingly that the *ezafe* is not restricted to X^0s, but can attach to phrases as well. This is illustrated by (2), where the *ezafe*-licensed modifier of the head noun *Maryam* is phrasal.

(2) mojgân-e [az rimel sangin]-e maryam
eyelid.Pl-Ez of mascara heavy-Ez Maryam
'Maryam's mascara-laden eyelids' Samvelian (2007:635) Persian

Samvelian proposes that the *ezafe* is a *phrasal affix*, attaching to nominal heads or projections and marking them morphologically as expecting a modifier. In contrast to word-level inflectional affixes, which attach directly to their host and cannot be separated from them, *phrasal* affixes appear on the right edge of nominal constituents (usually non-maximal projections) and do not bear lexical stress. They are attached after the word-level affixes and cannot separate these from their hosts, as shown in (3).

(3) in pesar-hâ-ye/*pesar-ye-hâ ahmaq
this boy-Pl-Ez/boy-Ez-Pl silly
'these silly boys' Samvelian (2007:619) Persian

Samvelian also shows that phrasal affixes have wide scope over coordination. Miller (1992) establishes the coordination criterion in order to separate clitics from affixes: an element, which is unable to show wide scope over coordination and has to be repeated on each conjunct must have affixal status. However, Samvelian does not take this as a definitive argument in favor of a clitic status for *ezafe* since the argument works only towards ruling in affixes, but not necessarily ruling in clitics.

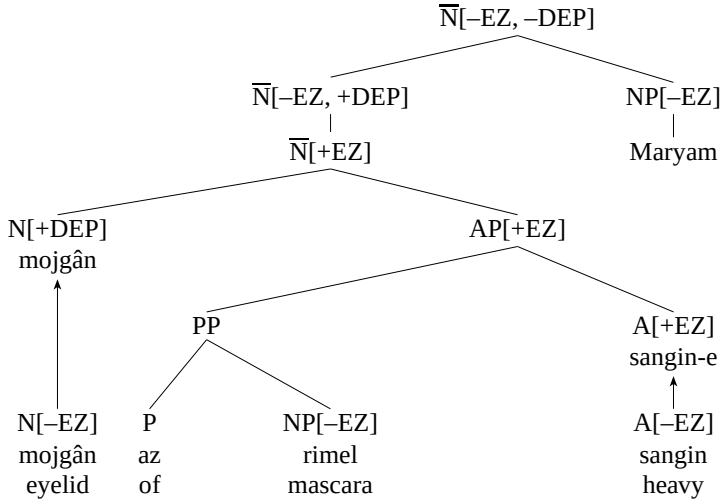
Samvelian's main argument why the *ezafe* does not have (postlexical) clitical status is because it is in complementary distribution with other phrasal affixes like the personal clitics and the determiner *-i* and can therefore be argued to involve haplology. The haplology criterion is a non-last-level phonological rule which also applies to *ezafe* and for that reason, Samvelian argues that *ezafe* cannot be a clitic (and have postlexical status), but must be a phrasal affix and as such part of word-level morphology, indicating grammatical (in this case dependency) relations.

We do not agree with Samvelian's analysis of *ezafe* as a phrasal affix and would like to suggest that she is forced into this analysis given the architectural assumptions of HPSG (we revisit the haplology criterion/argument in some detail in section 5). For example, Samvelian's analysis of (2) is illustrated in (4). The *ezafe* itself is introduced via two different lexical rules: 1) a word-to-word type; 2) a plain-word to phrasal-affix word. The word-to-word lexical rule allows the addition of *ezafe* to a word and produces a simple word (see *mojgân* in (4)). The second lexical rule allows *ezafe* to attach to a word that heads a phrase, as for *sangin* in (4). The consistent placement of *ezafe* at the right edge of a constituent is handled via an EDGE constraint first formulated by Miller (1992).

Once the *ezafe* has been added on to a word via one of the lexical rules, it then has the effect of introducing/licensing a dependent (DEP) to the right of the

head/phrase via a [+DEP] feature. When a dependent is not found in the immediate vicinity, the feature [+DEP] is carried along until a dependent is found to satisfy the [+DEP] requirement, at which point this feature is also reset to a negative value. The [+Ez] feature is set for *ezafe* on phrases and interacts with the EDGE constraint. The combined effect is to allow the *ezafe* to appear at the right edge of a phrase, while licensing the dependent via the head that may (as in (4)) or may not be embedded in a phrase.

(4) ↑= Lexical Rule Application



As already stated above, while we greatly appreciate Samvelian's insightful discussion and clarification of the facts, we would like to propose that constructions like the Persian *ezafe* do not necessarily need to be classified as a phrasal affix, but could be treated as a clitic. This can be done in an architecture which recognizes different levels of representations, or *projections*, as in LFG. We thus see the key to *ezafe* in recognizing a prosodic phonological component that interacts with syntactic structure at a level that goes beyond the definition and application of edge constraints. We would therefore not treat *ezafe* as part of the morphological component and indeed see no reason to do so. We present a concrete example of an analysis with respect to Urdu, for which we have an implemented grammar (Butt and King 2007) and for which we present the relevant facts in the next section.

3 Urdu *Ezafe* — A Brief Overview

This section provides a brief overview of the *ezafe*-construction in Urdu, which borrowed the construction from Persian (Platts 1909). Persian was the language of the Mughal court for several centuries and heavily influenced the language of the courtiers and poets at the court. Hence, the *ezafe* construction is still mainly part of the high/literary language. It remains productive today, but a tendency for modern speakers to leave it out can be observed (Schmidt 1999:247).

3.1 Headedness

As illustrated in (5) and as in Persian, the *ezafe -e* expresses a dependency between the head noun and a modifier to the right within the NP. This modifier can either be a noun as in (5a) or an adjective as in (5b); in the script, the expression can be either spelled out as one word or two words, where the *ezafe* is always attached to its host on the left.

(5) a. aarbaab=e k^{h}irad
owner=Ez wisdom
'wise person' Platts (1909:99) Urdu

b. sadaa=e buland
voice=Ez high
'a high voice' Delacy (2003:100) Urdu

As in Persian, the word order within the *ezafe*-construction is unusual for Urdu since its NP syntax otherwise conforms to the head-final pattern that is (almost) pervasive in this SOV language. For comparison, (6) illustrates a run-of-the-mill NP in Urdu.

(6) eek laal gaarii
one red car.F.Sg
'one/a red car' Urdu

The head-final pattern is also found in genitives, which are functionally/semantically related to the *ezafe*-construction. Example (7) demonstrates the common use of the genitive clitic *kii/kaa/kee*. As is usual for Urdu NPs, the head noun is in the final position of the NP while the modifier precedes the head. The genitive clitic inflects for gender and number and agrees with the head noun, see Butt and King (2005) and Payne (1995).

(7) paakistaan=kii hukuumat
Pakistan=Gen.F.Sg government.F.Sg
'Pakistan's government Schmidt (1999:246) Urdu

Compare the genitive in (7) with the functionally and semantically identical construction in (8), but which uses an *ezafe*. While the semantics are identical, the syntax clearly differs: as already established, the *ezafe* construction does not follow the head-final pattern observed in (7), but a head-initial pattern, the syntactic head being on the very left.

(8) huukumat=e paakistaan
government=Ez Pakistan
'the government of Pakistan' Schmidt (1999:246) Urdu

That the *ezafe* construction is indeed head-initial can be demonstrated via agreement facts. As shown in (9a) with respect to adjective agreement, the predicative adjective *baṛii* 'big' agrees with the feminine *vaadii* 'valley', just as it does in the simple predication in (9b).

(9) a. [**vaadii**=e sind^{h}] bahut **baṛ-ii** hai
valley.F.Sg=Ez Indus.M.Sg very big-F.Sg be.Pres.3.Sg
'The Indus valley is very big.' Urdu

b. **vaadii** bahut **baṛ-ii** hai
valley.F.Sg very big-F.Sg be.Pres.3.Sg
'The valley is very big.' Urdu

In a genitive NP, on the other hand, agreement clearly identifies the final noun as the head. This is illustrated in (10a) and (10b), the latter of which can be compared directly with (9a).

(10) a. naadyaa=kaa **kuttaa** bahut **baṛ-aa** hai
Nadya.F.Sg=Gen.M.Sg dog.M.Sg very big-Perf.M.Sg be.Pres.3.Sg
'Nadya's dog is very big.' Urdu

b. [sind^{h}=kii **vaadii**] bahut **baṛ-ii** hai
Indus.M.Sg=Gen.F.Sg valley.F.Sg very big-F.Sg be.Pres.3.Sg
'The valley of the Indus/Sindh is very big.' Urdu

Like Persian, the Urdu *ezafe* construction is thus head-initial, rather than following the usual head-final pattern. And like Persian, it licenses a modifier/dependent to the right of the head. Unlike Persian, however, Urdu does not allow stacking of *ezafe* and only licenses either an adjective or noun as a modifier. The Persian construction is thus more complex, but as we are focusing on the question of affix vs. phrasal affix vs. clitic, the additional complexities of Persian are not relevant for the purposes of this paper.

3.2 Clitic vs. Affix

As already discussed, the morphological status of the *ezafe* itself is of particular interest in the context of this paper. At first glance, it might be a simple affix. However, unlike affixes and very much like clitics, the *ezafe* shows wide scope ((13)) and the head noun to which *ezafe* attaches can head a phrase ((11)) as well as be embedded within a phrase ((12)).

(11) [ye baṛ-aa diivaan]=e aam
this big-M.Sg hall of audience=Ez public
'this big public hall of audience' Urdu

(12) [[har baṛ-e diivaan]=e aam]=mẽ
every big-Obl hall of audience=Ez public=in
'in every big public hall of audience' Urdu

In (11) and (12), the *ezafe*-NP contains a determiner/quantifier and an adjective and is therefore clearly able to form a phrase over which the *ezafe* takes scope. The ability of *ezafe* to take wide scope is further supported by data from coordination, as shown in (13). Compare this to the example with a case clitic in (14), which has been established to have wide scope (Butt and King 2005, Mohanan 1994).

(13) [ye maal o daulat]=e dunyaa
this material and wealth=Ez world.Nom
'this material and wealth of the world' Urdu
(from *zarb-e-kaleem* by Muhammad Iqbal)

(14) [maal or daulat]=ko kumaa-o
material and wealth=Acc earn-Imp.Rude
'Earn/gather material and wealth!' Urdu

Morphological inflections, that is, common affixes like gender and number in Urdu, are not able to do this. The discrepancy between common inflections and *ezafe* and the resemblance of the *ezafe*-construction to the behavior of the well-known Urdu case clitics (Butt and King 2005, cf. Miller 1992) supports the analysis that the *ezafe* is also a clitic. In the next section, we present an analysis of Urdu *ezafe* as a clitic within LFG's standard projection architecture.

4 LFG Analysis of Urdu *Ezafe*

LFG is an inherently modular theory of grammar. The principle of *Lexical Integrity* defines word formation as being solely the domain of morphology, which interacts with *Lexical Phonology* (Kiparsky 1982). Anything that goes beyond the word level is the provenance of syntax, which builds phrases out of words and interacts with *Prosodic* and *Postlexical Phonology*. *Prosodic Phrasing* is part of *Prosodic Phonology* (Selkirk 1984, 1986, Nespor and Vogel 1986, Selkirk 1995), which we view as an additional module of the grammar. In our implementation we model this (as best as we can) via a *prosodic projection p* (Butt and King 1998).

Prosody is of great interest in the analysis of *ezafe*, because although clitics are considered to be "little words", they depend on a host. This is because clitics do not form a *prosodic* word of their own; they are prosodically deficient. Instead, they are phrased together with another prosodic word as part of the prosodic phrasing (prosodic phonology). Attaching them to their hosts is therefore not the business of morphology. The handling of so-called "special clitics" (Zwicky 1977) like the *ezafe*, which have a given, specialized syntactic distribution, in our opinion is the business of syntax. Since architectural questions appear to be of prime

importance in an analysis of clitics, we not only present a theoretical proposal for the treatment of *ezafe*, but model the phenomenon very concretely via a computational implementation, so that each module of the grammar and the interactions across modules are described concretely and precisely. The following subsections describe the modules involved, beginning with the morphological module.

4.1 Morphological Analyzer

For the morphological module of the current Urdu grammar, we use an autonomous finite-state analyzer (Beesley and Karttunen 2003), which is currently under development at Konstanz (Bögel et al. 2007). This analyzer takes a surface form and provides a morphological analysis in terms of abstract tags in combination with the word stem. A simple example with the word for *boy* is shown in (15), where the surface form is to the left and the morphological analysis is to the right.[2]

(15) `laRkA` 'boy' `laRk +Noun +Masc +Sg +Nom`

This abstract morphological analysis of a surface word is fed into the LFG grammar and is associated with appropriate f-structural information within the morphology-syntax interface (Kaplan et al. 2004). Essentially, each tag functions as a sublexical item with which f-structural information is associated. For example, the abstract morphological tag `+Sg` is "translated" for the purposes of the LFG grammar as the f-structural information (↑NUM) = sg.

In an *ezafe*-construction like *sher=e panjaab* 'lion of Punjab', *sher* and *panjaab* are nouns that are analyzed via the morphological analyzer, as shown in (16), which represents the actual (but for purposes of presentation somewhat simplified) output of our current morphological analyzer.

(16) `sher e panjAb` 'lion of Punjab'
```
sher +Noun +Masc +Sg +Nom
e +Token
panjaab +Noun +Masc +Sg +Nom
```

Note that the *ezafe -e* is not dealt with by the morphological analyzer — it simply returns the information that this is a token, which simply means that the analyzer recognizes the *ezafe -e* as an independent element, not as a morphological affix. This is because we do not analyze the *ezafe* as an affixal morpheme and as such it is not dealt with within the morphological component. Rather, we treat it as an independent lexical element which we encode in the hand-written lexicon, along with other elements with special lexical and syntactic properties such as case clitics and auxiliaries (see (20)).

[2]Here we ignore the process of transliteration from the Urdu Arabic-based script to Roman characters, but see Bögel et al. (2007) for some discussion and references.

4.2 C- and F-structure Analyses

With respect to the phrase structure, we assume that the *ezafe* forms a constituent with the complement it introduces, motivated by its historical source as a relative clause (cf. section 2). This leads us to the phrase-structure analysis in (17), in which we posit an Ezafe Phrase (EzP), which is embedded in an NP and which functions as introducing an ezafe-licensed modifier to the head noun, which in turn is contained within an NP.[3]

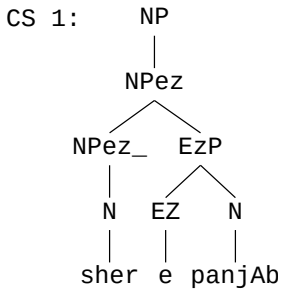
(17) a. NPez $\longrightarrow$ NPez′ EzP

b. EzP $\longrightarrow$ Ez $\{N \mid A\}$

Our c-structural analysis for the sample *ezafe* construction *sher e panjaab* 'lion of Punjab' in (18a) is the c-structure tree in (18b).

(18) a. sher=e panjaab
lion=Ez Punjab
'a/the lion of Punjab' Urdu

b. C-structure Analysis



The EzP (*ezafe* Phrase) is headed by the *ezafe*, which takes the modifying noun as a complement and thereby licenses it. If there is no *ezafe*, there can be no modifier of the head noun.

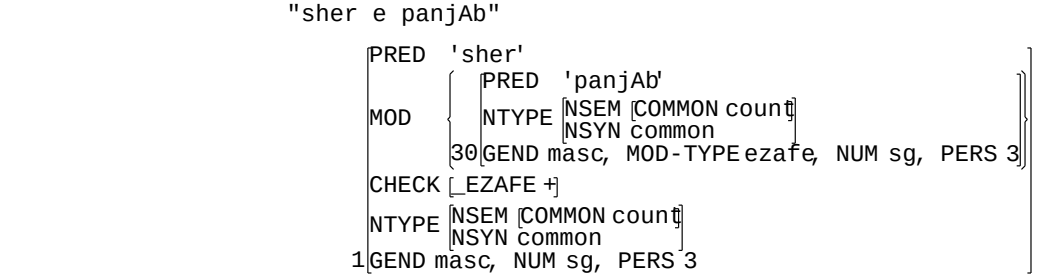
This functional modification relation is represented at f-structure, as illustrated in (19). The head noun is *sher* 'lion' and therefore *sher* is encoded as the main predicate (PRED) of the construction. This main PRED is shown to be modified by the noun *panjaab*, which at c-structure is introcuded as the complement of *ezafe*. The presence of the *ezafe* is registered at the f-structure by means of a CHECK feature, which is generally used within the ParGram (Parallel Grammar) project (Butt et al. 2002) as a means for wellformedness, but has no further functional or semantic significance.

[3]Note that we could also simply assume a ternary-branching tree as in (i).

(i) NPez $\longrightarrow$ NP Ez $\{N \mid A\}$

However, we have chosen the binary branching tree since it demonstrates the mismatch across levels of representation much more clearly.

(19) F-Structure analysis of *sher e panjaab*



The lexical entry for *ezafe* in the hand-coded lexicon is provided in (20). All it says is that there is a modification and that its type is of the *ezafe* type.

(20) e EZ * (↑MOD MOD-TYPE) = ezafe.

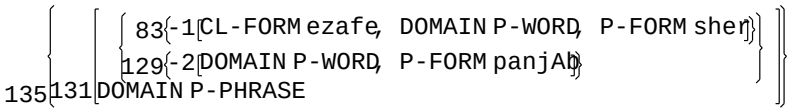
Note that we have intentionally chosen an f-structural analysis that bears similarities to the standard ParGram treatment of compounding. This is because the Urdu *ezafe* does seem to be functionally similar to compounding in the sense that a modifier is placed in a range of semantic relations, possessive among them, to a head. However, since *ezafe* is not equivalent to compounding, we have registered the type of modification at hand via the MOD-TYPE feature.

4.3 P-structure Analysis

We now turn to the prosodic analysis of *ezafe*. That is, we need to be able to model the fact that the *e* is prosodically attached to the word on its left; in a phrase like *sher e panjaab* the intonational break is after the *ezafe* and not before it. This grouping with the word on its left is not accounted for by our c- and f-structural analysis since the *ezafe* forms a constituent with the modifier at c-structure and is barely represented at f-structure.

We propose to model the prosodic grouping of *ezafe* with the word on its left via the *prosodic projection* proposed by Butt and King (1998). As shown in (21), it is at this level of representation that the *ezafe* is grouped together with the word on its left (the head noun). That is, it is prosodically incorporated into the prosodic word on its left.

(21) Prosodic Structure



As can be seen, the construction is analyzed as a prosodic phrase which consists of two prosodic words: *panjAb* 'Punjab' and *sher* 'lion'. The *ezafe* is not an independent prosodic word (p-word) since as a clitic it is prosodically deficient. At p-structure, it is registered as [CL-FORM ezafe], where CL stands for "clitic" and is encoded having been incorporated into the domain of the p-word *sher*. The basic prosodic bracketing is also illustrated in (22).

(22) [[sher e] panjAb]

We have now accounted for all the properties of the *ezafe* construction. At c-structure, the *ezafe* functions as a head and licenses a complement to its right, thus introducing the modifier adjective or noun. The modification relation between this noun or adjective and the head noun is modeled at f-structure. To complete the picture, the prosodic relationship of the *ezafe* clitic with the head noun is expressed in (21) by combining them within one p-word at p-structure.

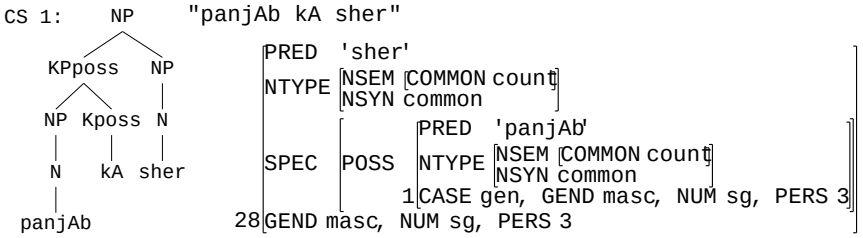
We therefore conclude that the analysis in terms of the independent modules of morphology (this includes lexical phonological processes), syntax and postlexical prosody provide exactly the right results for Urdu *ezafe*. Given our analysis, we can now revisit Persian *ezafe* to see if our basic approach can also apply to the more complex Persian case. But before turning to that in section 5, for the sake of completeness, we provide a comparison with the Urdu genitive construction, which bears a functional and semantic similarity to a subset of the *ezafe* constructions.

4.4 Comparing the Representation of the Genitive with *Ezafe*

Consider the genitive equivalent of *sher=e panjaab*, shown in (23). Here the head noun *sher* 'lion' is phrase final and the possessor (POSS) is licensed by the genitive case clitic *kaa*. Exactly this is modeled in (22).

(23) panjaab=kaa sher
Punjab=Gen.M.Sg lion.M.Sg
'Punjab's lion' Urdu

(24) C- and F-structure analysis of the genitive construction *panjaab kaa sher*



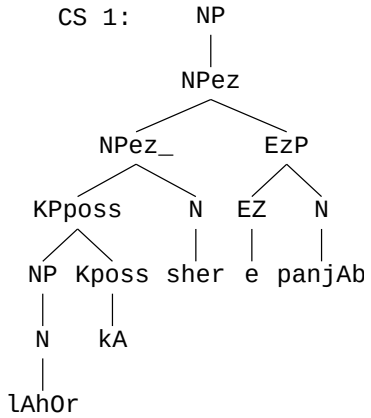
At c-structure ‘lion’ is the head of an NP, which includes an overtly case-marked possessive phrase called KPposs (for the use and justification of KP, see Butt and King 2005). The KPposs is headed by the genitive clitic, which introduces the possessor to its left. Unlike with the *ezafe*, there is no mismatch between syntactic and prosodic structure with respect to case clitics in general: they appear phrase finally in the syntax and are phrased together with the prosodic word on their left.

The f-structure analysis follows the standard ParGram LFG analysis of genitive possessors: the possessor is encoded under SPEC POSS, i.e., a specifier which provides further information about the head noun (*sher* ‘lion’ in (24)). Thus, while the c-structures of the genitive and the *ezafe* differ quite significantly, at f-structure both encode a modification relation — the genitive denotes a possessor relation, while we have analyzed *ezafe* as a semantically wider modification, resembling that found in compounding in other languages.

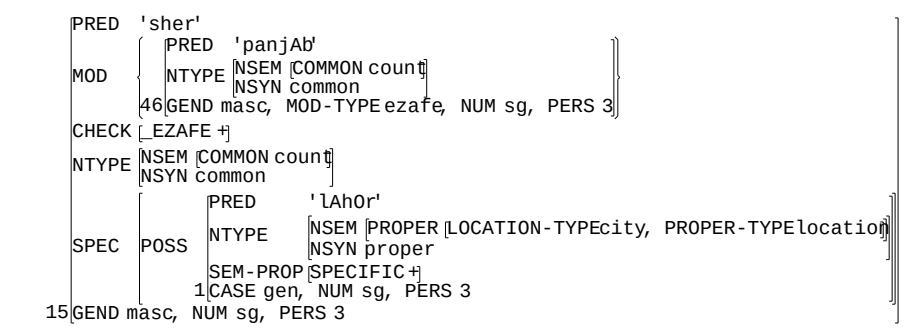
The example in (25) illustrates a combination of these two distinct syntactic constructions. As can be seen in (26), the head noun is again *sher* ‘lion’. It is modified by a possessor phrase (‘Lahore’) as well as by a noun (‘Punjab’) introduced through the *ezafe*. The *ezafe* itself functions as the head of its own syntactic projection, however, at p-structure it will be incorporated into the prosodic word to its left, namely *sher* ‘lion’.

(25) laahor=kaa sher=e panjaab
Lahore=Gen.M.Sg lion.M.Sg=Ez Punjab
‘Lahore’s lion of Punjab’ Urdu

(26) a. C-structure Analysis



b. F-structure Analysis



Again, our analysis models exactly the right relationships at the right levels of analysis. We now examine Samvelian's analysis of Persian *ezafe* as a phrasal affix in some detail and suggest that given LFG's projection architecture, Persian *ezafe* could also be analyzed as a clitic along the lines of Urdu *ezafe*.

5 Revisiting Samvelian's Analysis

Samvelian (2007) analyzes the Persian *ezafe* construction as a *phrasal affix*. According to Anderson (2005), who assumes a Lexicalist Hypothesis (Anderson 1992), phrasal affixes (or Zwicky's 1977 *special clitics*) are a type of clitic which have restrictions as to which hosts they can appear with. Anderson calls these phrasal affixes the "morphology of phrases", because both derivational[4] and inflectional[5] phrasal affixes can be identified. Contra Samvelian, Anderson explicitly assumes prosodic phonology (Selkirk 1984, 1986, Nespor and Vogel 1986, Selkirk 1995) and sees phrasal affixes as being introduced postlexically. As modeled in our analysis above, clitics cannot be prosodic words on their own: they are analyzed as prosodically deficient and hence, have to be incorporated into the prosodic word or phrase of a host. We basically agree with Anderson's approach, except that we see the expression "morphology of phrases" as being about the *shape* of phrases and thus as falling squarely within the domain of syntax.

Anderson argues strongly against a syntactic approach to clitics. However, our approach does not presuppose movement for the positioning of clitics, which is what he objects to most (he proposes an Optimality Theoretic analysis in terms of alignment instead). Our analysis of Urdu *ezafe* would therefore seem to be in line with Anderson (2005), except that we see phrasal affixes as picking out those clitics

[4]Derivational clitics involve a modification of the meaning and/or discourse function, i.e. distinct interpretation of the form containing the clitic (="particles"); this could possibly include our *ezafe*.

[5]Inflectional clitics realize the phrasal properties of their domain, e.g., determiners/possessors within the NP.

which are in the process of being reanalyzed as derivational and inflectional morphology — a historical process which cannot be reflected directly in a synchronic model of grammar.

Returning to Samvelian (2007), her definition of phrasal affixes is quite different from Anderson's. She views phrasal affixes as occuring generally on the edge of a constituent, attaching to whatever word appears in this position. The phrasal affixes therefore exhibit a low degree of selection with respect to their host and resemble postlexically introduced clitics in many ways. However, she rejects Anderson's view that phrasal affixes come into play postlexically and analyzes Persian *ezafe* as part of word level morphology (following proposals by Zwicky 1987, Miller 1992) and distinguishes phrasal affixes from (postlexically introduced) clitics on this basis. As a proof for her theory she adduces three arguments:

1. Clitics do not have access to word-level properties.
2. The *haplology* criterion (Miller 1992, building on Zwicky 1987).
3. Anderson assumes a clear cut distinction between *word-level affixes* and *phrasal affixes*, but Persian *ezafe* would seem to be both at once.

The following sections take a closer look at each of these arguments.

5.1 Access to Word-Level Properties

We maintain that Samvelian's first argument is the product of fallacious reasoning about the architecture of grammars, namely that access to word-level properties of an entity can only happen within the morphological module. A quick comparison with other syntactic elements not involving clitics demonstrates this.

The word-level properties of *ezafe* need to access the class of part-of-speech that is involved, since it does not appear with just any kind of word, but is confined to adjectives, nouns and prepositions. However, exactly this kind of information is generally needed to ensure syntactic wellformedness. Consider non-clitic determiners, for example. These can never appear before verbs, but generally need to "look for" adjectives or nouns. Or consider the phenomenon of auxiliary stacking (cf. Chomsky's auxiliary hopping) in English: here each auxiliary in a chain like *John has been being seen* demands a certain morphological form on the verb or auxiliary it selects, otherwise the sentence is ill-formed. These are clearly both instances where syntactic processes must have access to word-level properties, but where one would not necessarily conclude that determiners or English auxiliaries should therefore be dealt with only within the prelexical morphological module.

5.2 The Haplology Criterion

Samvelian's use of the Haplology Criterion is taken from Miller (1992), who builds on Zwicky (1987). Haplology, as originally formulated in (27), has been used to

explain the fact that in the case of English nouns, multiple *'s* (plural/possessor) at the end of a word are supressed and only one *'s* remains, representing all others (Zwicky 1987, but also see Halpern 1995). Miller (1992) uses this as a proof of the treatment of phrasal affixes in the lexicon, because the applicability of Haplology would be hard to explain if the multiple *'s* were not added at the same (lexicon) level.

(27) **Haplology**
One syllable is deleted in the case of two identical syllables

However, as phonological processes can also apply as part of postlexical phonology, it is not clear to us why processes similar to Haplology, such as the fusion of multiple *'s* into one, should be taken as an indication of a process taking place in the prelexical morphological module (cf. Anderson 2005 for similar argumentation).

In any case, Samvelian (2007:627) builds on Miller's work and takes the Haplology Criterion to mean that one has to establish the following:

> (a) Elements are in complementary distribution (i.e., in competition) when adjoined to the right edge of the same constituent;
>
> (b) any sequence containing two or more of the same element is excluded, even when their scope is in the same constituent.

In particular, after taking some time to establish that the definite *=i* and the personal pronoun clitics are enclitics and are phrasal affixes under her definition, she compares their distribution with respect to *ezafe*. She finds that the definite *=i* and the personal pronouns are in complementary distribution/competition with *ezafe* and that there cannot be more than one of them attached to a phrase (or word). In (28a), for example, the *ezafe* is applied to the head noun, and the indefinite article is applied to the modifier. Surprisingly, in (28b), the position of the *ezafe* is taken over by the indefinite determiner, which appears on the head noun instead of the modifier. (28c) further shows that the indefinite determiner **has** to appear on the head noun instead of the modifier in order to take over the function of the *ezafe*. Otherwise, the sentence is ungrammatical.

(28) a. xâne-ye digar-i
house-Ez another-Indef
'another house' Samvelian (2007:627) Persian

b. xâne-i digar
house-Indef another
'another house' Samvelian (2007:627) Persian

c. *xâne digar-i
house another-Indef
(putatively) 'another house' Samvelian (2007:628) Persian

d. *xâne-i-e/e-i digar
house-Indef-Ez/Ez-Indef another
(putatively) ‘another house’ Samvelian (2007:627) Persian

Finally, in (28d), Samvelian demonstrates that the *ezafe* and the indefinite determiner cannot cooccur on the same word. Samvelian interprets these facts as due to a version of the Haplology Criterion, where the indefinite determiner is dominant over the *ezafe* and inherits its functions whenever it “suppresses” the *ezafe*. Since Samvelian has established that the indefinite *=i* is a phrasal affix, she concludes that the *ezafe* must also be a phrasal affix that cannot be introduced postlexically, but must be part of the prelexical morphological module, where it competes with the indefinite *=i*.

However, the question of dominance between the *ezafe* and the two other enclitics is not as clear anymore if we look at another of Samvelian’s examples, shown in (29).

(29) lebâs-e sefid-e bi âstin-am/-i
dress-Ez white-Ez without sleeve-Pers.I.Sg/-Indef
‘my/a white dress without sleeves’ Samvelian(2007:621–622) Persian

Both the determiner *-i* and the personal pronoun *-am* are normally attached directly to the head noun they modify. However, in (29), the head noun *lebâs* is part of an *ezafe* construction and is marked with an *ezafe*. Instead of appearing in the normal position on the head noun and simply “suppressing” the *ezafe* as should be possible according to Samvelian’s analysis, the enclitics select the only non-*ezafe*-marked modifier (*âstin*) as their new host. In this case, the *ezafe* seems to display some dominance, because the others will attach to the last (not *ezafe*-marked) modifier in case of an *ezafe*-construction.[6]

One could also argue that the *ezafe* and the indefinite determiner *-i* have overlapping functions and are therefore in complementary distribution on functional grounds. (Complementary distribution also seems to rule out a coocurrence of personal pronouns and clitics; see Samvelian (2007) for a detailed description.)

If we nevertheless consider complementary distribution (for whatever reason) as a criterion to establish prelexical morphological affixation, it is still not clear what speaks against the postlexical clitic analysis, because there are other well-known syntactic elements like indefinite vs. definite determiners or past vs. present tense auxiliaries that tend to be in complementary distribution. Furthermore, if there are clitics which fulfill a certain function or license modifiers (like the *ezafe* does), then it is not clear that they should be stackable with other clitics — this would depend on the syntactic construction and what the syntax of the language is

[6]In (29), the *ezafe* seems to banish the indefinite *-i* and the personal affixes to other positions. As Samvelian remarks in her section about these affixes, they are much more promiscuous with respect to their host than the *ezafe*. It is therefore logical that these two are more mobile and able to attach themselves to a new host while the *ezafe* stays in the position where it naturally licenses a following modifier.

able to license. Therefore we conclude that the haplology criterion is not a strong argument in favor of the lexical treatment of the *ezafe*.

5.3 Word-Level Affixes vs. Phrasal Affixes

Anderson (2005) assumes a clear cut distinction between *word-level affixes* and *phrasal affixes*, but according to Samvelian's analysis, which involves two types of lexical rules for *ezafe* (one word-to-word, the other word-to-phrase, cf. section 2), Persian *ezafe* is both at once. *Ezafe* also attaches to intermediate projections, but not maximal ones. She thus sees Persian *ezafe* as having mixed properties that cannot be accomodated within Anderson's system, in which phrasal affixes are always introduced postlexically.

However, this reasoning is not very strong, if one simply assumes that *ezafe* is syntactically placed in a certain syntactic position in order to license a modifier, as per our analysis in section 4, and then is prosodically incorporated into the prosodic word on its left in prosodic phonology. Using this solution, no special rules need to be formulated and *ezafe* is not any different from any other clitic with special syntactic distribution (Anderson's *phrasal affix*).

In addition, a very strong argument for the interpretation of the *ezafe* as a clitic is the coordination test. This is so even if one focuses exclusively on the Criteria formulated by Zwicky and Pullum (1983), which Samvelian relies on heavily. Their *Criterion E* states that no syntactic operation treats a word and a clitic as a unit, which would have to be the case with coordinated structures like the one in (30), where a coordination rule would have to treat *zard-e* 'yellow-Ez' as a unit.

(30) [[kolâh-e sefid](*-e) va [lebâs-e zard]]-e maryam
hat-Ez white(-Ez) and dress-Ez yellow-Ez Maryam
'Maryam's white hat and yellow dress' Samvelian(2007:630) Persian

Under our view, the inability of the adjective *sefid* to take an *ezafe* is because the *ezafe* is an independent syntactic element heading a constituent and introducing a complement (the *ezafe* modifier), but in terms of prosody is prosodically deficient and therefore must incorporate prosodically to the prosodic word on its left. Since clitics on the one hand are not repeated on each conjunct, and affixes on the other hand are supposed to be able to do so,[7] the analysis of the *ezafe* as a phrasal affix which is introduced prelexically in the morphological module is on shaky ground and an analysis as a clitic would seem to fit the facts better.

6 Conclusion

If one assumes a modular architecture of grammar in which phonology, morphology, syntax and prosodic phonology are all able to interact, a clean and straightforward analysis of both the Urdu and Persian *ezafe* constructions is possible. In

[7] Note the fact that personal pronouns and the determiner *-i* can attach to every conjunct.

particular one needs to acknowledge the role of prosodic phonology, formalized by us as a *prosodic projection*. With this solution one does not have to overload the morphology in order to deal with syntactic and postlexical prosodic phenomena (and thereby give up on the modularity of grammar.)

Under our analysis, the *ezafe* is treated as a lexical item in that it has its own lexical entry and is realized as a leaf in the c-structure tree. Its idiosyncratic distributional properties follow directly from the syntactic constraints as to where it can be placed and after what kinds of constituents (only nominal projections in Urdu). The ability of *ezafe* to take phrasal scope is also represented in the syntax, but the phonological/prosodic attachment to just one member of the constituent is realized postlexically in terms of the p(rosodic)-projection. That is, the *ezafe* is analyzed as being part of the same prosodic word as the preceding noun.

Based on our analysis and implementation of Urdu *ezafe*, we thus argue that there is no need to augment the existing architecture of LFG. Rather, if one analyzes/situates the right aspects of phenomena involving phrasal affixes/clitics at the right levels of representations, the existing architecture proves more than adequate.

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OBJECTS AND OBJ

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Abstract

The notion of object plays an important role in both descriptive and theoretical work, especially so in a theory such as Lexical-Functional Grammar, where a separate functional structure is assumed in which grammatical relations are captured. In spite of the importance attached to the notion, the object is a relatively understudied phenomenon. In this paper, we consider how the function object links to semantic content, in particular to thematic roles. We conclude that unlike subject, object is not associated with any easily definable semantic content, it is a semantically inert grammatical function. To the extent that it is associated with any one thematic role, this is the Theme, the vaguest of thematic roles. We show how languages exploit this semantic vagueness, for instance through the use of cognate object and pseudo-objects and we consider the impact of this for the association between thematic roles and grammatical relations.

1. Introduction

In both typological and theoretical work, the characterization of the core relation object has taken second place to that of subject, with very few studies being devoted exclusively to the properties of objects (Plank (1984b) is an honourable but by now inevitably slightly dated exception).[1] Yet, the term 'object' has been used in talk about language for many centuries (for a summary see Lepschy 1992). It belongs to a longstanding descriptive and language-teaching tradition which derives its core concepts from the grammar of the classical languages, and especially of Latin. As long as this, or indeed any other term, is confined to the classroom and to pre-theoretical discussions and classifications of linguistic data, the principal criteria by which to judge it are practical ones. For those approaches which go further and incorporate the notion of object into their theoretical metalanguage, however, such practical justifications do not suffice. We require instead that the concept be well defined, simple, economical, consistent with other parts of the theory and able to support significant generalizations.

In the present paper we address a number of issues that arise first in relation to delimiting and defining the pre-theoretical notion object and second to the relation between this concept and theoretical construct OBJ in Lexical-Functional Grammar (LFG).[2] We argue in particular for the view that object is the semantically inert

[1] We are grateful to Miriam Butt, Joan Maling and Grev Corbett for their comments after the presentation of the paper at the International Lexical-Functional Grammar Annual Conference at the University of Sydney on 4th July 2008. We also benefited from comments made at the LAGB meeting at the University of Essex in September 2008, where we presented ideas similar to those contained in this paper. We also thank Miriam Butt and Tracy Holloway King for their comments and suggestions on the first submitted draft of the paper.

[2] The only other modern theory that we are aware of which incorporates 'object' directly as a theoretical primitive is Relational Grammar (RG), whose '2' relation is equivalent to a traditional object in all but name. Some of what we have to say applies within RG, although the fact that the model has never been worked out in full detail and that there are few if any

grammatical relation par excellence and for a revised understanding of the way such a relation links to the thematic roles Patient and Theme. We do not, however, develop a revised formal analysis of the mapping between grammatical relations and thematic roles; this would go well beyond the aim of this paper. We discuss evidence from a range of construction types in a variety of languages though on neither count will, or indeed given the size of the relevant literature could, our discussion be exhaustive.[3]

The structure of the paper is as follows. Section 2 chronicles the role of the OBJ function within LFG, first as a primitive grammatical relation (GR) and second as part of a set of featurally defined GRs within Lexical Mapping Theory (LMT, Bresnan & Kanerva 1989; Bresnan 2001a:Ch 14; Dalrymple 2001:Ch 8). Much of the support for the latter position comes from the cross-linguistic treatment of passives and double-object constructions, and this body of data and arguments is reviewed in section 3. Section 4 moves on to consider a broader range of syntactic phenomena involving objects. Our overall conclusion and the consequences of it for the link between OBJ and semantic roles are discussed in section 5.

2. OBJ in LFG

In early LFG, OBJ was a primitive, one of a set of grammatical relations which also included SUBJ(ect), OBJ2 (second object) and OBL(ique). These relations were used in constructing the f-structure representations of sentences, which lie at the core of LFG analysis of natural language syntax. In this sense its status was very similar to that of the term 2 in Relational Grammar alluded to in footnote 1, although with the difference that LFG does not allow relation-changing or revaluation operations. Work in the late 1980s led to the replacement of these undecomposed relations by a pair of features [± semantically restricted] and [± objective] (abbreviated as [± r] and [± o] respectively) within Lexical Mapping Theory. This permitted the featural decomposition of GRs in (1) and hence the use of syntactic natural classes as in (2):

(1)

	[–o]	[+o]
[–r]	SUBJ	OBJ
[+r]	OBL_{Θ}	OBJ_{Θ}

(2)

	[–r]	=	SUBJ, OBJ
	[+r]	=	OBL_{Θ}, OBJ_{Θ}
	[–o]	=	SUBJ,, OBL_{Θ}
	[+o]	=	OBJ,, OBJ_{Θ}

Lexical entries for predicates are then set up in terms of thematic roles rather than GRs and the mapping from the lexical argument structure to f-structure is achieved by a mixture of intrinsic linking statements (e.g. Agents are inherently [–o]) and general

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current practitioners means that our arguments are of less immediate relevance within that framework.

[3] In particular we will not address here the general problem that the existence of ergative languages — or of ergative constructions within split-ergative systems — poses for theories like LFG which assume a universally applicable set of grammatical relations such as subject and object. For some discussion see Butt (2006:Ch 6) and Farrell (2005:Ch 2.1).

conditions (e.g. that a sentence must contain a SUBJ). Thematic roles are conceived of as forming a hierarchy in terms of which default linkings are stated, such as that the highest ranking theta role in a lexical array is assigned [–r]. Function-Argument Biuniqueness further ensures that every thematic role is linked to exactly one GR and *vice versa*. Grammatical operations such as passive manipulate the theta roles, and thus affect the default assignments. The example in (3a) illustrates these mechanisms and shows the a-structure to f-structure mapping for a sentence such as *The mouse stole the cheese*. In the passive *The cheese was stolen*, on the other hand, the theta-role Agent is suppressed and the mapping therefore proceeds as in (3b).

(3) a) lexical *steal* < AGENT , PATIENT >
Intrinsic [–o] [–r]
Subject Condition [–r]

SUBJ

b) lexical *steal* < AGENT, PATIENT >
Passive Ø
Intrinsic [–r]
Subject Condition [–o]

SUBJ

This approach has led to interesting work on the active-passive and the transitive-unaccusative relations as well as on causative constructions. However, since the feature [+objective] is no better defined than was the relation itself, it cannot be said to enhance our understanding of the relation of object or the theoretical construct OBJ. For instance Bresnan & Kanerva (1989:25) describe the feature as follows: 'The intuition behind the feature [+o] is that there are several objectlike functions that appear as arguments of transitive categories of predicators (Verb and Preposition) but not of the intransitive categories Noun and Adjective.'[4] In other words, an object is something that behaves like an object; hence Butt's (2006:127) terse observation that the feature [± objective] is 'more difficult to justify'. An alternative proposal, which has largely been ignored in the subsequent literature, is that of Alsina (1996:19 ff). This avoids the circularity problem by setting up an alternative feature set which has the effect of reducing objecthood to two other properties: [– subject, – oblique]. We will return to this definition of OBJ in section 5.

Returning then to the classical LMT features, the only independently verifiable property of OBJ is that it is [–semantically restricted], a property which it shares with SUBJ. We suggest, however, that even this feature is more problematic than is commonly recognised. Although SUBJ shows a considerable range of semantic freedom, this freedom is restricted to different degrees in different languages (Hawkins 1986:Ch 4). At the same time, there is a strong cross-linguistic preference for subjects to be Agents and to a lesser extent Experiencers. Put another way the

[4] It can be argued that adjectives can also take objects, as in the Swedish example in (i) (see also Mittendorf & Sadler (this volume) and footnote 9):

(i) Han var helt överlägsen de nyanställda.
he was completely superior the newly.appointed
'He was completely superior to the newly appointed staff.'

unmarked SUBJ is restricted to certain roles, but in marked circumstances (passive, sentential arguments, etc) may be associated with other arguments or with expletives. The unmarked OBJ on the other hand is, we argue, inherently unrestricted, and thus is capable cross-linguistically of assuming a wide range of functions. Thus, while it is true that both subjects and objects have a degree of semantic freedom that is not shared by oblique arguments, they achieve this state of affairs from opposite ends of the semantic spectrum. Labelling both as [–r] hides more than it reveals about the behaviour of the two relations. We return to this issue in section 5.

3. OBJ and passive

Passivisability is possibly the most commonly used defining criterion for object status and it is indeed used within LFG to identify the OBJ function. Still, it is generally recognised that there are a number of problems associated with the passive, problems which make it both too narrow and too broad as a criterion. There are for instance passive sentences where the corresponding active sentence would generally be assumed not to have an object, as in (4). There are passive sentences with no corresponding active sentence, as in (5) (for description and analysis, see Payne (1985; 1999)). Even though clausal complements — COMPs — are assumed to be distinct from OBJ (but see Alsina, Mohanan & Mohanan (2005) and discussion in Section 4.5), there are clauses containing a COMP which appear to have undergone passivisation, as in (6).

(4) a. Someone has walked on this road. — This road has been walked on.
b. Someone has slept in this bed. — This bed has been slept in.

(5) a. He is rumoured to be doing a gig in London tomorrow.
b. *They/People rumour him to be doing a gig in London tomorrow.

(6) a. People often say that power lies with those who count the votes.
b. It is often said that power lies with those who count the votes.

When applied to ditransitive clauses, passivisability selects the first noun phrase as the "real" object, in the sense that it behaves in the same way as the object of a monotransitive verb. This is illustrated in (7). In this discussion, we will follow Hudson (1992) and refer to the object of a monotransitive verb as OO, and the two objects of a ditransitive clause as O1 and O2.[5]

(7) a. Oscar gave [the cat]$_{O1}$ [some food]$_{O2}$.
b. The cat was given some food by Oscar.
c. *Some food was given the cat by Oscar.

Hudson (1992) argues that passivisation is actually the only criterion for object status which selects O1 as the object in a double object construction; other criteria point to O2 as the grammatical relation most similar to OO. Furthermore, the outcome of the

[5] OO and O2 are those traditionally referred to as Direct Object and O1 as Indirect Object. Dryer (1986) shows that there are some languages in which OO and O1 behave in similar ways and he uses the terms Primary Object (OO and O1) and Secondary Object (O2). Siewierska (2004:57ff) discusses similar issues as alignment of P (OO) with T (O2) or R (O1).

passive criterion is not entirely consistent; not all O1s can undergo passivisation as in (7b) and some O2s can, unlike (7c) (see Hudson (1992:257) for examples and further references).[6]

Still, it is the behaviour with respect to passive illustrated in (7) which is the reason why *the cat* in (7a) would have the status of OBJ in LFG, whereas *some food* would be an OBJ_θ. This distinction is then argued to be justified by the fact that the O2 is restricted as to its thematic role; Falk (2001:106) describes it as 'non-Patient Theme in English' and states that this may differ slightly between languages, but will always be restricted to a small set. Dalrymple (2001:21) describes OBJ as 'thematically unrestricted' and OBJ_θ as 'thematically restricted'. However, in ditransitive sentences such as (7a), O1 is generally also restricted with respect to its thematic role, a Recipient/Beneficiary role. This is not captured by the use of OBJ and OBJ_θ for English ditransitive sentences in LFG.[7] We would argue that there is evidence that the passive is conditioned not just by grammatical relations, but also by a complex interaction between structural position and semantics and hence is not a reliable test for a grammatical relation.

Indeed, Hudson provides a number of ways in which it is actually O2 which shares most properties with OO. Some of the criteria he uses refer directly or indirectly to similarity of thematic roles, for instance the fact that it is O2, not O1, which typically has the same thematic role as the OO when these verbs are used monotransitively, as illustrated in (8).

(8) a. We gave the children (Recipient) sweets (Theme).
b. We gave the children sweets (Theme).
c. *We gave the children (Recipient).

Maling (2001:420–4) argues that alleged similarities between OO and O2 can, in fact, generally be reduced to similarities in thematic role and hence the generalisations are over semantic roles rather than grammatical relations. Indeed, the data she presents to argue against Baker's conclusions on the basis of synthetic compounding show that OOs also behave differently depending on their thematic roles. This might lead one to conclude that the most appropriate LFG representation of the data would be to make all objects, including OOs, OBJ_θ, as suggested by Butt (1998), an issue to which we will return in section 5 (see also Cetinoglu & Butt, this vol).[8] Maling's criticism is more directly of Baker (1997) than of Hudson. Since Baker sets out to argue for an analysis in which O1 underlyingly consists of a preposition phrase, he is interested in highlighting similarities between O1 and prepositional objects. Hudson's arguments are aimed at showing the similarities between OO and O2 and therefore only partly overlap with those put forward by Baker.

Hudson does refer to some arguments which are more syntactic in nature. Verbs taking two objects (almost) always select for the second object, often they do not for

[6] Strictly speaking, it is of course the clause as a whole and not a noun phrase that undergoes passivisation, but we will sometimes use this terminological shortcut to mean 'can become the subject of a corresponding passive clause'.

[7] For a discussion of the role of 'restricted' and 'unrestricted' in relation to multiple objects in Bantu languages, see also Bresnan & Moshi (1990).

[8] It should be pointed out that Maling's article is not written within a formal LFG framework and does not draw this conclusion.

the first object, an example was (8).[9] In fact, as Jackendoff (1990a:447) points out, almost any apparently monotransitive verb which involves affecting the object in such a way that another entity can benefit from or receive it can be made transitive in this way. A common example is found in (9a-c) and a less obvious one in (9d).

(9) a. Oscar peeled me an orange.
b. Oscar peeled an orange.
c. #Oscar peeled me.
d. Oscar kicked Sarah the cat.

A further syntactic argument with respect to which O2 behaves in the same way as OO relates to the ability to be displaced within the sentence. Data used by both Hudson and Baker relate to extraction, but with respect to for instance *wh*-displacement there is substantial variation in acceptability judgements between speakers. The behaviour with respect to Heavy NP shift is less ambiguous: O2, but not O1, can shift in the same way that an OO does; (10) and (11) from Hudson (1992:259) illustrate.

(10) a. Fred met [Ann]$_{OO}$ on Sunday.
b. Fred met on Sunday [someone he hadn't seen since he was in college]$_{OO}$.

(11) a. Fred gave [Ann]$_{O1}$ [some flowers]$_{O2}$ on Sunday.
b. Fred gave Ann on Sunday [some flowers that he'd bought in the market the day before]$_{O2}$.
c. *Fred gave some flowers on Sunday [the girl he had met at the party the night before]$_{O1}$.

In (10), we see how a heavy OO can shift to the right, past an adverbial. An O2 in a double object construction can be shifted in the same way, as (11b) shows, whereas an O1 cannot, as illustrated by (11c). See Hudson (1992) for further arguments relating to for instance idioms, extractability and potential for controlling an adjectival secondary predicate, though Maling (2001) argues against Hudson's (1992) and Baker's (1997) interpretation of the facts relating to secondary predicates.

At the very least, Hudson has shown that there is no clear argument for assigning the same grammatical relation to OO and O1 and a different one to O2. This is true even if we accept Maling's conclusion that 'The picture is obviously far more complex than one would assume from reading Baker or Hudson.' (2001:424) Depending on the extent to which one is convinced that some of Hudson's arguments truly generalise over grammatical relations, rather than semantic relations, he may have shown that OO and O2 should be considered instances of the same grammatical relation, distinct from that exemplified by O1, at least for the English.

4. Aspects of object syntax

It is relatively common in the literature to associate the grammatical function object quite directly to the semantic role Theme, which is the broadest and least well-defined of semantic roles, to the point of being devoid of semantic content. Indeed Levin's

[9] As Joan Maling pointed out to us, *feed* would appear to form an exception.

(1988) proposal that Theme is unrestricted in the way it maps to GRs is commonly cited as the inspiration for the lexical mapping idea (Dalrymple 2001:203). And in analyses which assume the Uniformity of Theta Assignment Hypothesis, an object with any other thematic role would have to be underlyingly the object of some preposition (see Baker 1988; 1997 and discussion by Maling 2001:424–6). We will return to the connection between the grammatical relation object and particular thematic roles in section 5. In this section, we will show that regardless of the exact link between object and thematic roles, the object function is associated with a very general semantics and furthermore that this fact is exploited in many languages.[10]

4.1. Non-canonical objects and case marking

In languages which have case marking, there is usually an object case and the objects identified by that case are associated with a very general semantic role, as expected. Farrell (2005:14) for example states: 'the prototypical direct object is a patient (or the primary target of an agent's action) and the patient is a direct object in a basic active-voice clause.' The exact semantics of the role is derived from the meaning of the verb. There is also a cross-linguistic tendency to mark objects which have a more specific semantic content with a non-canonical case (Aikhenvald, Dixon & Onishi 2001). Thus in the German and Latin examples in (12) the internal argument of a verb of helping is animate, and it is marked with the dative case, which is typically used elsewhere for animate or human beneficiaries.

(12) a. Er diente dem Köning. German
he served the.DAT king

b. Regi serviebat. Latin
king.DAT serve.3SG
'He served the king.'

Another example of marking for object which are in some sense unexpected or non-canonical involves so-called Differential Object Marking (see Bossong 1985; 1991; Aissen 2003), where objects which are "higher in prominence" (Aissen 2003:436) have marking that differentiates them from other objects. The notion higher in prominence refers particularly to animate and to specific or definite objects, implying that canonical objects are inanimate and indefinite. The latter links in with information-structural properties associated with objects, in particular the fact that objects are often non-topical, they generally represent new information. This may in turn be why in so-called presentational focus constructions, the focused constituent carrying the new information appears in an immediately post-verbal position. The positional properties of such focus constituents has led to them being analysed as objects (for a debate on this issue around Scandinavian presentational sentences, see Lødrup (1999) and Börjars & Vincent (2005)). However, the information structural properties associated with objects have not been well-studied. As Plank (1984a:5) puts it: 'In particular — and this is perhaps surprising in view of the widely regognized pragmatic ingredients of subjecthood — some seem, often tacitly, to dismiss discourse-pragmatic structuring as one potential *raison d'être* for the emergence of direct objects from purely semantic relations.'

[10] A further example where the use of the OBJ function depends on an assumption of its syntactic presence more than its intrinsic semantic content is to be found in the treatment of objects of adjectives in Welsh by Mittendorf & Sadler (this volume).

4.2. Cognate objects

In the next three sections we consider different types of construction in which the semantic neutrality of the object is exploited in different ways. The first of these concerns the use of cognate objects, that is to say the circumstance in which a normally intransitive verb occurs with what appears to be an object and where that object has to be a cognate noun phrase (cf Horrocks & Stavrou To appear: 'core Cognate Object Construction'). Examples are found in (13).

(13) a. He laughed a cruel laugh.

b. De flesta katterna dog trafikdöden. Swedish
the most cat.PL.DEF died traffic.death.DEF
'Most of the cats died in traffic accidents.'

The cognate object essentially fulfils an adverbial function semantically; (13a) is interpreted roughly as *He laughed cruelly*. Indeed, Maling (1993: 51) includes 'cognate objects' in a list of types of adverbials which get syntactic case and Melis (2002) argues that similar examples from French should be classed as 'adjuncts'. We would argue that from a syntactic point of view such items conform to the normal behavioural patterns of objects, for instance in their position, case marking (if relevant) and even in extreme instances availability for passive (e.g. *Disturbed dreams were dreamt by everyone who ate the mushrooms*). It is however precisely the semantic neutrality of the object function which permits this use (for recent literature on cognate objects in a range of languages see also Simpson 1991:343–9, Pereltsvaig 1999, Lazard 2003 and Horrocks & Stavrou, to appear).

Simpson, citing Austin (1982), defines cognate objects as ones which 'extend, make explicit or quantify the activity denoted by the verb' (1991:343). A similar link between the cognate object and the aspectual meaning of the verb in English is made by Horrocks & Stavrou (to appear:35), who state that cognate objects in English 'denote only terminative events in their default function, which is to provide terminative "periphrastic" equivalents to non-terminative unergatives'. This can be illustrated by sentences such as those in (14). An intransitive verb like *laugh* is not normally delimited and hence compatible with an adverbial like *for hours*, but as (14c) shows, the introduction of a cognate object changes this.

(14) a. She laughed for hours.

b. She laughed cruelly for hours.

c. #She laughed a cruel laugh for hours.

The connection between different object cases and aspect is well-known in the literature, with accusative often associated with boundedness and partitive with unboundedness (other terms used are 'measurer' (Arad 1998) or 'delimiters' (Tenny 1994)). This is the case in Finnish, where the object case marking distinction indicating changes in aspect can also be made on adverbials, with the same aspectual consequences (see Maling (1993) and Kiparsky (1998) and also Nelson (2007) for similar phenomena in Inari Saami). The fact that cognate objects may have the same effect as the core object case in some languages, namely of limiting the activity described by the verb is then not surprising. However, we would argue that it is the general lack of semantic content associated with the object relation that permits this association with aspect.

Simpson (1991) suggests that cross-linguistically cognate objects typically co-occur with verbs of performance (*sing, dance,* etc).[11] In her discussion of their occurrence in Warlpiri she notes that the subject of the construction containing a cognate object is typically ergative (though she also cites one instance of an Abs-Dat verb with a cognate object), that the presence of the cognate object is not registered on the auxiliary unlike with normal objects and that the cognate object is in the absolutive case not in the Dative, which Simpson takes to be the case of the direct object.[12] Furthermore, a cognate object can co-occur with a Dative, all pointing to the cognate object not being the OBJ. Hence she proposes that cognate objects are to be treated as OBJ_{Θ}. Note however that this is a rather unusual use of the theta restriction, which is normally deployed in circumstances in which a function is associated with a very limited range of theta-roles. Here instead the only restriction imposed is that of the semantic content of the governing predicate.

4.3. Pseudo-objects

So-called pseudo-objects are similar to cognate objects in that they exploit the semantic vagueness associated with the object function. Examples of the use of pseudo-objects in English resultative constructions are provided in (15).

(15) a. Bill shaved his razor dull. (Jackendoff 1990b:227)
b. Oscar laughed himself silly.
c. Oscar laughed his head off.
d. She worked her fingers to the bone

In (15a), *his razor* appears to be the object of *shave*, though its presence in the sentence is dependent on the presence of the predicate *dull*. *His razor* in (15a) does not have the role normally associated with the object, as in *The barber shaved the first customer*. (15b) contains what has been referred to as a 'fake reflexive' in object position. In (15c) and (15d) we have idiomatic examples of the same type of construction. The interdependence of the presence of a non-canonical object and a resultative secondary predicate has led to these examples being analysed as 'constructions' in the formal sense (see Simpson 1983; Jackendoff 1990b:225–41; Carrier & Randall 1992).

A similar construction is the Swedish directed motion construction, where a reflexive is used to support a directional secondary predicate. The examples in (16) come from Toivonen (2002), who also discusses the difference between this construction type and resultatives. For a construction-based LFG analysis of these sentences, see Asudeh, Dalrymple & Toivonen (this volume).

(16) a. Flickan armbågade sig in i folksamlingen.
girl.DEF elbowed REFL in in crowd
'The girl elbowed her way into the crowd.'

[11] In other words, with unergative verbs. It is worth noting in passing that a common analysis of such items in derivational frameworks is to associate them with a null pro object, that is to say a place-holding argument devoid of either phonological or semantic content.

[12] Simpson also notes (p.349, note 22) that cognate objects are possible in Icelandic impersonal passives where normal objects are not (see Maling 1988).

b. Han ljög sig ut ur armén.
he lied REFL out out of army.DEF
'He lied his way out of the army.'

Once again we would suggest that these constructions provide evidence for our argument that the object function has so little semantic content associated with it that the function can be exploited to encompass semantically unorthodox objects, as in (15a), or semantically contentless ones as is the case with the reflexive in all these examples.

4.4 Object expletives

Pseudo-objects involve constructions where an object is required for syntactic purposes — for example to act as the pivot for a secondary predicate — but where it is essential that the apparent semantic content of the object should not be subsumed into the overall interpretation of the sentence. In this respect, pseudo-objects behave in a manner similar to expletives such as the dummy subject in *it seems Bill is ill*, which also are items whose *raison d'être* is syntactic not semantic, and which are excluded from the clause's semantic computation. Subject expletives of course are well attested, as in (17), and have been widely discussed:

(17) a. **It** is raining.
b. **Der** tales om valg. Danish
there talk.PASS about election
'There is talk of an election'

Object expletives by contrast are unusual. It may not be surprising that an intransitive verb does not require an object expletive, as in (18a). However, an expletive might be expected in (18b), where a transitive verb is used without an object in the syntax, but with a specific interpretation of the role associated with the object; *too much alcohol*. Similarly, why should an expletive not be able to serve as the pivot for a secondary predicate as in (18c)? The element over which *hoarse* predicates is, after all, present in the sentence.

(18) a. *Oscar smiles it_{EXPL} / $there_{EEXPL}$.
b. *Oscar drinks it_{EXPL} / $there_{EEXPL}$.
c. *Oscar sang it_{EXPL} / $there_{EEXPL}$ hoarse.

As Postal & Pullum (1988) show, object expletives do occur. Typical environments in which they are common is coindexed with a clause, as in (19), and in certain idiomatic expressions, as in (20).

(19) a. I hate it when you do that.
b. I take it (that) Bill has failed the exam.

(20) a. He has got it made.

b. She is living it up in London.
c. They kept/stopped/prevented it from becoming widely known.
d. I put the misses on one side and perhaps come back to them weeks, or a year later, and battle it out.

Postal and Pullum (1988) show that 'idiomatic' is not quite the right term, since there is a reasonably productive pattern involving for instance 'V *it up*' and there are certain classes of verbs which allow an expletive object, such as 'prevention complements with *from*+gerund', as in (20b). The degree of productivity is not directly relevant to our point here, however. The example in (20) shows that *it* here is not the referential pronoun, since if it was referring to *the misses*, it would be expected to appear in its plural form, as in *come back to them*.

Expletives in object position are not unique to English, as the examples in (21) show ((29c) from Caluianu 2008).

(21) a. Me la vedo brutta. Italian
me it.FEM see.1SG ugly.FEM
'Things look bad to me.'

b. Hon har det jobbigt just nu. Swedish
she has EXPL tiresome right now
'She is going through a tough time at the moment.'

c. Am luat-o devale. Romanian
aux take-3S-F-ACC downhill
'We started moving downhill.'

The main point to notice with respect to these examples is that where there is an expletive in object position it appears to be selected by the verb, thereby illustrating the dependency of the object function on the individual verb. The difference between the two examples in (22) illustrate this (used by Postal & Pullum 1988:658 to make a different point)

(22) a. I resented it that he was not promoted.
b. I believed (*it) that he was not promoted.

Indeed it is the fact that these expletive elements occur in a subcategorised position and that this is predicted to be impossible in some theoretical approaches which has made them the subject of theoretical discussion (see for instance for English *it* Postal & Pullum 1988; Stroik 1990; Stroik 1996; Alba-Salas 2004 and for German *es* Rostila 2002).[13]

4.5. OBJ and COMP

The view that OBJ brings no semantic contribution of its own fits neatly with Alsina, Mohanan & Mohanan's (2005) argument for the abandonment of the GR COMP. They conclude that there is unnecessary redundancy in specifying that the clause *that Bill speaks Amharic* in *Sue believes that Bill speaks Amharic* is a CP in categorial terms,

[13] Similar in a number of respects to pseudo-objects and expletives are subject-to-object raising constructions such as *The police believe John to be a liar*, where once again an object function is syntactically required but then must be excluded from the semantics (Zaenen & Engdahl 1994; Asudeh 2005).

that its grammatical function is COMP, and that semantically it is a proposition. All that needs to be said is that it is an argument of the predicate *believe*. Its propositonal value follows from the fact that it is a CP, and does not need to be respecified further at f-structure through the use of the COMP relation. In other words, the difference between COMP and OBJ follows from the semantics of the predicates they are associated with and the categorial status of the items that realise them. All that is required is one semantically neutral GR to encode the internal argument in f-structure, which is precisely what we have been arguing that OBJ is. In this sense, our proposal reconstructs the traditional designation for *that Bill speaks Amharic* in the above example, namely that is a 'noun clause object'.

5. Linguistic theory and the understanding of OBJ

The idea that there is a single argument in the sentence which is semantically inert and depends for its interpretation on the main predicate goes back at least as far as Fillmore (1968: 25), where the case Objective is defined as 'the semantically most neutral case, the case of anything representable by a noun whose role in the action or state identified by the verb is identified by the semantic interpretation of the verb itself'. There is a telling conflict here between intention and terminology. The aim of Case Grammar in the Fillmorean sense is to provide 'a set of universal, presumably innate, concepts which identify certain types of judgements human beings are capable of making about the events that are going on around them' (Fillmore 1968:24). In other words, cases in this sense purport to provide a universal semantic classificatory framework for natural languages, and yet the label Fillmore chooses for this case is clearly redolent of the traditional terminology of morphosyntactic as opposed to semantic relations. It is partly in order to avoid this confusion between the semantic and the morphosyntactic that in later work Fillmore opted for a different designation for this case, calling it Neutral rather than Objective. Of course, case in Fillmore's sense is a semantic relation akin to what would nowadays be called a thematic role, and indeed from Gruber (1976) onwards a very similar definition has been given for the role Theme as the entity which moves with a verb of motion, the entity which is located by a verb of location and so on. In short the participant in the clause with no role or properties which can be defined independently of the verb.

The arguments in section 4 suggest similar conclusions about semantic neutrality and dependence on the verb hold for the OBJ function as well as for the semantic role Theme. The question therefore arises as to how that parallellism between the OBJ and Theme can be expressed within the theory. Various possibilities present themselves. One would be to retain the existing LMT with its reliance on the feature [± r] and to follow the lead of Levin (1988) in stating that Theme is intrinsically [– r]. This captures the ability of Themes to occur as objects or subjects but at a price since the unrestrictedness of OBJ is intrinsic in a way that it is not for SUBJ. Consider, for example, Hawkins' (1986:53) generalization that 'the class of subjects and direct objects … is larger in English than it is in German'. This holds good but in complementary ways: German subjects are semantically restricted while German objects are less open to additional semantic content. Subjects become non-canonical the more they depart from their core semantic content; conversely, objects become non-canonical the more they add to their intrinsic lack of content. SUBJ has strong cross-linguistic preference for Agents but may show a considerable range of semantic freedom. This freedom is restricted to different degrees in different

languages (see for example the discussions in Hawkins (1986:Ch 4) for German; Müller-Gotama (1994) for Korean; Comrie (cited in Müller-Gotama) for Russian; Svenonius (2002:200) for Icelandic). Thus the contrasting pairs of German and English sentences in (23) to (25) demonstrate a tolerance for non-human, non-agentive subjects in English which German does not share:

(23) a. This hotel forbids dogs.
b. *Dieses Hotel verbietet Hunde.
this hotel forbids dogs

(24) a. The trial cannot proceed.
b. *Der Prozeß kann nicht fortfahren.
the process can not proceed

(25) a. This tent sleeps four.
b. *Dieses Zelt schläft vier.
this tent sleeps four

Conversely, as we have already noted in section 4.1, when an object has special semantic properties such as animacy, a different case marking may be required. Hence, Hawkins' generalization holds true because:

(i) English allows non-canonical theta-roles (Experiencer, Locative, Instrument, etc) as subjects and thus expands the class of possible subjects;

(ii) German bars certain non-canonical theta-roles (Experiencer, etc) as objects and thus reduces the class of possible objects.

The inability to express this asymmetry is a serious weakness of LMT in its canonical version.

An alternative therefore would be to devise a new version of LMT which retains the notion of featural decomposition of GRs but offers a different set of features. This is the proposal of Alsina (1996), where the features [± subject] and [± oblique] generate the following classes:

(26) [+ subj] = subjects
[+ obl] = obliques
[–subj] = obliques and objects
[– obl] = subjects and objects

As we have already noted, this shares with the present paper the idea that the characterization of OBJ is in terms of an absence of intrinsic properties, but does not get us any nearer to achieving a natural statement of the connection between Theme and OBJ. Nor does it obviously allow for the kind of differential behaviour of subjects and objects observed by Hawkins. Thirdly, it represents an undesirable mix of genuine binarity or privativity (a subject is [+ subj] and an object is [-subj]) and monovalence or equipollence (a subject is the only GR which is [+subj] and an oblique is the only GR which is [+obl]). Failing a genuinely viable proposal involving different features, for the present we conclude that the way forward is not to be found by devising new binary feature sets.

A third option is to treat the relation between the semantic emptiness of both Theme and OBJ as a due to the principle of iconicity which privileges parallel content at the levels of a-structure and f-structure. The inspiration for this line of thinking is Bresnan's (2001b) account of the relations between overt and reduced pronouns. The

difference is that in Bresnan's account the link is between discourse function and form, so that a pronoun with reduced discourse prominence is realised by reduced, ultimately even zero, phonetic content. However, if we think of Bresnan's proposal not as being about links between form and content in a pre-theoretical sense, but rather as expressing the relation between two representations — f-structure (or d-structure, cf O'Connor 2006) and p-structure — within LFG's parallel architecture, then the proposal that there could also be similar types of link between a-structure and f-structure carries more force. In those instances in which additional properties intervene, as with the dative marking of animate objects with some German or Latin verbs exemplified in (12), it would then be a relatively straightforward matter to establish a language-particular preference for a higher ranked faithfulness constraint (Aissen 2003; de Hoop & Malchukov 2008). A further step in this direction would be to link the unmarked status of the OBJ-Theme connection to the fact that in many languages these relations are in turn realised by the least marked case, namely accusative. A fuller exploration of these ideas will however have to wait for another occasion.

Perhaps the most radical way to model the parallelism would be to say that OBJ and Theme are the same, that a theta-role without intrinsic content is nothing other than a (minimal) GR. In other words, a-structure and f-structure are not parallel domains, as is standardly assumed, but rather axes that converge at the point of null content. However, Maling (2001:435) refers to, and deplores, 'a widespread tendency to treat Theme as the default theta-role on direct objects', and deploys a range of data from English, German and Icelandic in favour of the view that we need to keep the two notions apart.

That said, an approach which comes close to achieving the same effect is that found within Role and Reference Grammar (RRG) (van Valin & Lapolla (1997) and much subsequent literature, see Farrell (2005:Ch 4) for a convenient summary). RRG does not recognise a designated set of GRs either as primitives or through any form of feature decomposition and it does not have a fixed set of theta roles. Rather it allows for an in principle open set of roles such as Patient, Entity, Stimulus, Content, etc linked to the semantics of particular predicates, and supplemented by two macroroles Actor and Undergoer. Although, as Farrell (2005:139) notes, the macroroles serve to reconstruct much of the content of the traditional notions of subject and object, they do so from an explicitly semantic starting point. Finally, there is a grammatical function Pivot or PSA (privileged syntactic argument), which can vary not only from language to language but also from construction to construction within a language. The system thus accords priority to semantic roles and discards any claim to a universal set of GRs when they do not conform to those roles.

An alternative way to achieve the same end, and one more consistent with the rest of the structure of LFG, would be to maintain the notion of OBJ as a universal grammatical function but to discard Theme as a distinct theta-role. What is standardly called Theme is simply a projection into an internal argument slot of some or all of the lexical semantic content of the predicate. There are thus as many types of Theme as there are (classes of) predicates: *read* requires an object which is in some sense readable, *drink* an object which is drinkable, and so on. Beyond that, the only property such items have in common is that they are OBJs. In this respect they differ from subjects, which are characterised, in the unmarked case at least, by independently verifiable properties such as animacy and volition. Given this approach, the standard distinction between OBJ and OBJ_Θ disappears, in some sense all objects are OBJ_Θ. This in turn removes the uncertainties noted in section 3 over

whether the direct or the indirect object is the one to be characterised as being semantically restricted.

There is obviously much more to be said about the complex tangle of relations between GRs and theta-roles, and indeed much more that has been said in the literature and which we have not been able to take into account in one short conference presentation. Two conclusions, however, suggest themselves at this stage. First, Lexical Mapping Theory as standardly conceived in terms of a binary featural decomposition of grammatical relations is not fit for purpose as far as the GR OBJ is concerned. The reason for this is that OBJ as a general notion is best seen as a GR with no content, the content always being derived from the particular verb of which it is an OBJ. It is from this observation that we derive our second conclusion, namely the need for a reassessment of the connection between OBJ and Theme, since it is at this point of least content that the two notions seem to converge.

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PARALLEL LFG GRAMMARS ON PARALLEL CORPORA: A BASE FOR PRACTICAL TRIANGULATION

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Abstract

This paper presents an approach to annotation projection in a multi-parallel corpus, that is, a collection of translated texts in more than two languages. Existing analysis tools, like the LFG grammars from the ParGram project, are applied to two of the languages in the corpus and the resulting annotation is projected to a third language, taking advantage of the largely parallel character of f-structure. The third language can be a low-resource language. The technique can thus be particularly beneficial for corpus-based (cross-) linguistic research.

We discuss a number of ways to realize automatic corpus annotation based on multi-source projection, including direct projection and approaches with an additional generalization step that employs machine learning techniques. We present a series of detailed experiments for a sample annotation task, verb argument identification, using the German and English ParGram grammars for projection to Dutch and maximum entropy models for learning generalizations.

1 Introduction

With the rising prominence of corpus-based linguistics and linguistically grounded language technology, the demand for annotated corpora or wide-coverage tools that will add annotation automatically is increasing. However, the development of the necessary resources (through direct engineering, or indirectly through manual annotation of training data for machine learning techniques) is complicated and time-consuming, and, especially for low-density languages, the associated costs may be prohibitive. As a possible means of getting around this problem, researchers have investigated techniques of *annotation projection* (Yarowsky and Ngai, 2001; Yarowsky et al., 2001): annotation in a text in one language is transferred to a parallel text in a second language. This way, the development of resources in a language can benefit from existing resources in another language.

The research presented in this paper is situated in SFB 632, a large collaborative research programme that investigates the linguistic realization of information structure across languages. Corpus-supported research plays an important role in this cross-linguistically oriented programme and thus there is a need for medium-sized to large annotated corpora for many languages. Moreover, specialized linguistic research into information structure will often require annotations not included in standard treebanks: ways of providing additional annotations for more than one language would facilitate cross-linguistic research significantly. In this paper, we will therefore further investigate the method of automatically projecting

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annotation from better-studied to less-studied languages to create the required resources. Collections of translated text, parallel corpora, can be obtained relatively easily, even for low-resource languages. In particular, we investigate an extension of the annotation projection idea: Instead of projecting from a single source language, we can combine information from parallel texts in several languages (so called *multi-parallel* texts) to induce an annotation for the target text.

It is obvious that the quality of the projected annotation depends crucially on that of the source-side annotation; so annotation projection presupposes the availability of reliable wide-coverage tools for source language annotation. Multi-parallel annotation projection even requires that annotation (tools) exist for *several* languages and that the parallel annotations be comparable. In the form of the LFG grammars from the Parallel Grammar (ParGram) project (Butt et al., 2002), high-quality broad-coverage analysis tools are available for a number of languages, providing an excellent starting point. LFG's f-structure offers a level of analysis that exhibits great parallelism between languages and is thus suitable for projection, be it directly or in the form of more theory-neutral dependency structures derived from them. Moreover, the cross-linguistic stability of the analyses produced by different ParGram grammars is increased by the use of a carefully controlled common framework for grammar development.[1] The multi-source annotation projection approach is thus also an interesting new context of application for the ParGram grammars.

The rest of this paper is structured as follows. Section 2 describes multi-parallel annotation projection and its background. Then, to make the proposal more concrete and to be able to empirically study various aspects of multi-source annotation projection, Sections 3–5 describe our investigations of an example task that we approach by means of annotation projection. Section 3 introduces this task – *argument identification* – and discusses different ways in which multi-parallel corpora may be used in this task. After that, technical details of our implementation are given in Section 4. Finally, Section 5 gives experimental results of using consensus projection in various ways in the argument identification task. We offer a short conclusion and outlook in Section 6.

2 Multi-parallel annotation projection

The idea of exploiting parallel texts and cross-lingual parallelism to transfer existing annotations in one language to a new language first was brought forward by Yarowsky and Ngai (2001) and Yarowsky et al. (2001), who applied it to part-of-speech tagging, morphological analysis and NP bracketing. Their method of

[1] In contrast, when using standard treebank-trained parsers for source-side annotation (each based on the major available treebank for a language), one has to deal with considerably more, purely technical mismatches. For instance, the standard dependency treebank resources for German and English differ with respect to whether the highest verb or the complementizer is the head of a subordinate clause.

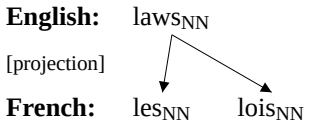


Figure 1: Incorrect POS-tag projection on the basis of 1–n alignment

annotation projection has been applied to a wide range of annotations, including dependency parsing (Hwa et al., 2005) and role semantic analysis (Padó and Lapata, 2005).

In these studies, annotation is projected from one language (the source language) to another (the target language). There are several circumstances in which annotation projection may be problematic. First, it may be that the source language does not make distinctions that the target language does make. In the context of projecting POS-tags, there may for instance be an important target-language distinction between prepositions and subordinating conjunctions, which the source language tag set may not make (as is the case for the Penn Treebank tag set (Marcus et al., 1993)). Similar situations may arise with regard to the adverb/adjective distinction, etc. This can to a certain extent be avoided by projecting a sufficiently general annotation. Post-processing the target annotation may also improve this situation somewhat. Secondly, the word alignment can be problematic if several words in one language are allowed to align to one in the other. Consider the alignment and projection in Figure 1, taken from Yarowsky et al. (2001). Since the English bare plural *laws*, with POS-tag NN (noun) is aligned with the French two word definite NP *les lois* 'the laws', naive annotation projection will assign the NN tag to both words. However, this is clearly only correct for *lois*. Yarowsky et al. (2001) solve this problem, too, by post-processing the target annotation.

A third source of problems for annotation projection may be the quality of the alignment itself. Given sentence level alignment, word level alignment for large corpora can be induced automatically (Brown et al., 1993). The quality of the resulting alignment is good enough to be used in a wide range of applications – most prominently in statistical machine translation. Nevertheless the alignment will contain many errors.

Each of the three problems can be looked upon as an instance of having too little information to correctly project annotation. In the case of a target annotation that is richer than the source, this is clear. Secondly, incorrect projection of annotation to a word that is part of a 1–*n* alignment (like assigning NN to *les* in Figure 1) could be avoided if we had some information about which alignments in a one-to-many configuration we should use and which not. Finally, the impact of noisy word alignment would be reduced if we had some information that would help us to recognize and filter out the noise from the true alignments.

The post-processing common in annotation projection work can be seen as an attempt to add this extra information. As an example of how effective this can be, we can take the work of Hwa et al. (2002) who project dependency structure

from English to Chinese. They report poor performance when simply projecting dependency structure (f-score 38.1; see footnote 5 for an explanation of f-score), but dramatically improve annotation quality (f-score 67.3) by applying transformations to the projected annotation based on independent knowledge of Chinese syntax.

Instead of manually inputting the extra information needed to improve the quality of the projected annotation, we propose to rely on a third (or fourth, etc.) parallel text as a source of information. For instance, target language details that are lacking in the annotation of one source language could well be present in the annotation of a second source language or they could be derivable from the combination of two projected annotations. Comparing multiple single source annotations may also tell us when we should be confident about an annotation (for instance, when the projected annotations agree) or when we are better off ignoring it. This offers possible solutions to the problem of not knowing which path in a 1–*n* alignment to use and the problem of not being able to tell noise from signal. Of course, using extra languages is not a watertight solution to the problems sketched above. It is in principle possible that all of the source languages project exactly the same wrong annotation, so that combining annotations does not help us at all. Still, we expect that by using an extra language this scenario becomes less likely, thereby increasing the overall quality of the projected annotation.

The (possibly redundant) use of two or more sources has been discussed in various guises in quite different contexts. In Machine Translation, the old idea of *triangulation* (originally due to Martin Kay) is considered a helpful tool for disambiguating translational choices (Och and Ney, 2001; Cohn and Lapata, 2007). In the same paper that introduces annotation projection, Yarowsky et al. (2001) demonstrate that using multiple aligned corpora improves automatic induction of morphological analyzers in a target language. Finally, it has been pointed out that multi-parallel data can be naturally interpreted as different views on the same data (Callison-Burch and Osborne, 2003). It can thus be exploited in machine learning methods that rely on having different views of the same data, such as co-training (Blum and Mitchell, 1998) and weakly supervised versions thereof (Hwa et al., 2003).

3 Annotation projection applied: Argument identification

To give a more concrete picture of the various aspects of multi-parallel annotation projection, the rest of the paper will lay out a projection approach to the *argument identification* task. This task consists of finding, for a given verb, the head words of its arguments. An example annotation is given in in (1), where each word is classified as an argument or non-argument of the given head verb *stellen* ('compose').[2,3]

[2] A given word can be a non-argument in several ways: It may be a modifier of the head word under consideration (like *morgen*, 'tomorrow'), further embedded inside an argument (*nieuwe*, 'new'), higher up than the head word in the embedding hierarchy (*als*, 'if'), or only indirectly related.

[3] Were needed, we abbreviate languages as follows: Dutch *dut*, English *eng*, German *ger*.

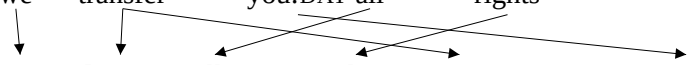
(1) Als$_{\text{non-arg}}$ wij$_{\text{arg}}$ morgen$_{\text{non-arg}}$ nieuwe$_{\text{non-arg}}$ regels$_{\text{arg}}$ **stellen**$_{\text{hd}}$ **...** (dut)
if we tomorrow new rules compose
'If we make new rules tomorrow...'

Annotation like this is useful in corpus investigations of argument frames or, especially when enriched with grammatical function labels, principles of argument ordering – an area that is directly relevant to the study of information structure, the topic of our larger research programme. At the same time, the task is conceptually simple enough to serve as a demonstration and to allow us to concentrate on the methodology. Since LFG's PRED values point to the lexical heads of f-structures and there is a list of argument functions, the relevant information is also directly available from an LFG parse.

3.1 Single source projection

In the most direct realization of an annotation projection approach to argument identification, we simply transfer for each word in the source language its argument status to aligned words in the target language. For instance, in (2), the German annotation and the word alignment are given and used to create the annotation of the Dutch sentence for the verb *over|dragen* (the verb particle is treated as a non-argument).

(2) Wir$_{\text{arg}}$ **übertragen**$_{\text{hd}}$ Ihnen$_{\text{arg}}$ alle$_{\text{non-arg}}$ Rechte$_{\text{arg}}$ (ger)
we transfer you.DAT all rights



Wij$_{\text{arg}}$ **dragen**$_{\text{hd}}$ alle$_{\text{non-arg}}$ rechten$_{\text{arg}}$ over$_{\text{non-arg}}$ aan$_{\text{non-arg}}$ u$_{\text{arg}}$ (dut)
we transfer all rights VPART to you

Argument status annotation of the source language can be created by parsing the source corpus and then labelling each word in a sentence whether it is the head of an argument of a selected verb in the sentence. Word alignment can also be induced automatically, given that we have a sufficiently large, sentence aligned corpus.

If we automatically word align the Europarl corpus, use the German and English LFG grammars to parse part of it in the respective languages, and then extract argument status from the LFG analyses, we can project this information from German to Dutch or from English to Dutch. We can compare this projected annotation to a manual annotation of the same corpus (Section 4 for details), which gives us the quality results of Table 1. Projecting from German or English to Dutch, we find about half of all arguments that are in the corpus (*recall*), and about half of the words that we project to be arguments are indeed arguments (*precision*). According to the manually annotated gold standard, about every tenth word is an argument. This means that projecting argument status from, say, German offers an improvement in precision over just picking random words from 10.1% to 52.2%.

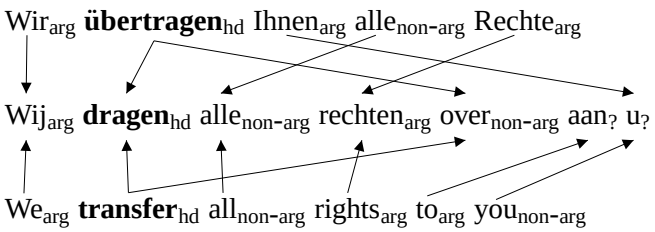
	Precision	Recall	F-score
German → Dutch	52.2	52.9	52.6
English → Dutch	54.3	48.8	51.4
consensus	74.6	34.1	46.8

Table 1: Single source raw projection (top) and German/English consensus projection (bottom) for the argument identification task.[5]

3.2 Multi-source projection

As mentioned in the previous section, projection based on a single source language is likely to suffer quite immediately from problems like annotation mismatch, multi-word alignment, or alignment errors. By moving to multi-source projection, we hope to systematically increase the precision of the projection without using any language- and task-specific rules and heuristics. We combine projections in the following way: Only labels that would be assigned consistently by single source projection from two (or more) languages are actually assigned to the target language words. We shall refer to the result as a *consensus projection*. The German/English-consensus annotation for (2) is in (3):

(3)



Note that we have a third category now, indicated with '?'. This label is assigned when the two sources disagree. In (3), English projects argument status to the preposition *aan*, as English uses an oblique complement for the verb *transfer* just like Dutch does for *over*|*dragen*. The German counterpart, however, uses the dative and thus German projects argument status to the pronoun *u*. The result is that both words in the PP are labelled '?'.

Going back to our system that involves Europarl and LFG parses for the source languages, Table 1 shows that consensus projection indeed results in a comparatively high precision annotation. Recall and precision refer to those words labelled as arguments, which means that in these statistics the difference between

[5]Precision is a measure of correctness, in our case it is the number of words pairs that the system correctly classifies as argument-head pairs divided by the number of all word pairs that the system proposes. Recall is a measure of coverage, in our case the number of word pairs that the system correctly proposes divided by the number of actual head-argument pairs in the text. There is typically a trade off between precision and recall. F-score summarizes the overall system performance by taking the harmonic mean of the two measures: $f = 2 \times (\text{precision} \times \text{recall}) / (\text{precision} + \text{recall})$.

non-arguments and '?'s is ignored.[6] Of course, there is a precision/recall trade-off, but high precision can be very useful in a certain type of explorative linguistic corpus research, where the goal is to find some typical examples of a rare phenomenon in a large corpus, without requiring exhaustivity or representative samples. Furthermore, the high-precision results may be a good basis for machine learning of generalizations, which we will come to next.

3.3 Beyond raw projection

So far, annotation projection has been a completely deterministic process, which has not gone beyond the simple mechanism of projecting information over word alignments. Let us refer to this as raw projection, a term which is agnostic about the number of sources for the projection. We will try to improve the usefulness and/or quality of projection by using raw projection data in two ways.

Target language classifiers Attractive an idea as it may be, raw projection – by design – has a great disadvantage: In the end, we are tied to the parallel corpus. Hwa et al. (2005) use projection annotation to create training data for a statistical parser that itself does not rely on the parallel corpus. To explore this option, we have used machine learning techniques to construct an argument status classifier on the basis of data that we get from raw projection. An important empirical question is whether using consensus data has any advantages over the alternatives: training on single source projected data, or training on a small set of manually annotated data. Furthermore, since the motivation for annotation projection is to avoid time-intensive and costly manual labour, we shall compare the effectiveness of projected annotation (i.e., using high-quantity/medium-quality data) with manual annotation that takes about a day to create (low-quantity/high-quality data). Sections 5.1 and 5.2 discuss the results of these studies.

Using more information in the parallel data As it stands, we use only a fraction of the information that is available about the source languages in our raw projection method. The LFG parses give us much more information about the source than just argument-head relations. For instance, we also have information such as part-of-speech, case, finiteness, and agreement features for the words in the parsed source language sentences. We could exploit this information in a machine learning step that follows the raw projection step, by projecting the relevant features to the target language words. Although this move does not free us from the parallel corpus, one might hope that the quality of annotation improves compared to raw consensus projection, for instance by improving recall without sacrificing too much precision. An additional interesting question is how the resulting models compare to target language classifiers that use richer information about the target language, that is: can we replace target language information with source language

[6]The '?'-words would form an obvious starting point for adding some heuristics to further improve the projected annotation. However, in the present paper we focus on fully general, non-heuristic techniques.

information without losing annotation quality? Section 5.3 gives experimental results that answer these questions.

4 Details of the implementation

Having given a high level overview of the projection of argument status and the effects of moving from single source projection to multi-source consensus projection, we now describe in detail how we obtain projected annotations and stand-alone target language classifiers from the plain parallel corpus.

For the results reported in the previous section, and in the experiments of the next section, we use the Dutch, English, and German parts of the Europarl corpus (Koehn, 2005). Europarl consists of translations of the proceedings of the European Parliament in 11 languages ($\sim$30 million words in $\sim$1 million sentences per language). Dutch will serve as the target language in the experiments presented here. The use of Dutch as the target language instead of an actual low-density language is motivated in these exploratory stages: We are free to play around with the amount of resources we assume to be available in the target language (for instance, we can choose to POS-tag the target corpus or not), we have easy access to linguistic expertise in the target language that will help us evaluate the results of the projection, and, finally, we can use existing tools (like parsers) to simulate a target-language expert in the experiments that rely on input from such an expert.

To get from the plain parallel corpus of source and target language texts to annotated target language texts, one takes the following steps:[7] (1) The parallel target and source texts are tokenized, split into sentences, a sentence alignment is computed, which is then used as the basis for bootstrapping a statistical word alignment between the target and source language words in the sentences. (2) The source language corpora are parsed and the relevant information (most prominently head-argument relations) is extracted from the analyses. (3) The word alignments are used to project the head-argument relations from the source sentence(s) to the target sentence. The exact nature of the projected annotations depends on whether we choose to do single source or multi-source projection. For the experiments that involve machine learning, another step is added: (4) Using the projected data as training data, we train a binary argument status classifier. In one of the configurations, the classifier can refer to additional information from the source languages

[7] Various of the steps described go along with a potential loss of data. For instance, if the sentence alignment skips a sentence for one of the language pairs, the sentence cannot be used, even if it is included in the other language pair; parse failures for either of the source languages render the complete sentence triple unusable; free translations or errors in the automatic word alignment may make it impossible to identify candidate head words in the target language. For our experimental work, we did not attempt to minimize loss of data (which in some cases may not be too hard to do), since we had a sufficient amount of raw data to start with. From a potential set of 300k German-English-Dutch sentence triples submitted to the pipeline, we ended up with 52k usable triples. Note that processing is completely automatic, so no human resources are wasted. When working with a smaller corpus, the process may have to be optimized however.

that has not been used in raw projection. The details of these steps and our evaluation scheme in the following subsections.

4.1 Preprocessing

We used the sentence-aligned form of the Europarl corpus (Koehn, 2005). German–Dutch and English–Dutch word alignments were obtained with the GIZA++ tool (Och and Ney, 2003). The IMS TreeTagger (Schmid, 1994) was used for POS-tagging of the three languages. The POS-tags for Dutch are only used by some of the target language classifiers in the machine learning step (details in Section 4.4).

We parsed the German and English portions of the corpus with the ParGram LFG grammars running in the XLE environment (Crouch et al., 2007). Figure 2 shows how the information from the parses (LFG f-structures) flows from the German and English side to form a consensus annotation of a Dutch clause. As can be seen there, the German and English f-structures in this example are largely parallel. The only structural difference lies in the complexity of the direct object. This is in spite of the fact that the phrase structures are not very alike at all.

4.2 Feature extraction

Since our projection task is defined at the level of words and word alignments, we need to transfer the grammatical information encoded in the f-structure to the tokens of the parsed string. This information of course includes grammatical dependencies, but also a host of other information that the ParGram grammars use in parsing. This step of flattening down the nested f-structures to properties of words in the string (that is, c-structure terminals) is labelled '[feature extraction]' in Figure 2. The extraction of all relevant features is implemented as a set of rewrite rules which are executed by XLE's transfer system (using the `extract` command; see Section 'Transfer' in Crouch et al. (2007)). Note that the information extracted from f-structure is always relative to a particular head word in the sentence. Hence, for all other words in the sentence, the f-structure path under which they are embedded with respect to the head word (if there is such a path) can be uniquely specified. Henceforth, we call this specification the *path* feature of the word. Figure 2 shows for each token the extracted path features with respect to the head verbs *erlassen* and *make* in German and English, respectively.

The rich information encoded in the deep LFG grammars enables the XLE parser to augment the preliminary tokenization provided in the input. These modifications chiefly concern compound words and multi-word expressions. However, since the word alignment is defined on the Europarl tokenization, we need an additional mapping step after the mapping of information from f-structures to c-structure terminals. For instance, in the German '[retokenization]'-step in Figure 2, we can see that the compound *Rechts|vorschriften* 'regulations' has been deconstructed by the parser. The compound in the Europarl tokenization will receive the features extracted for the head according to XLE.

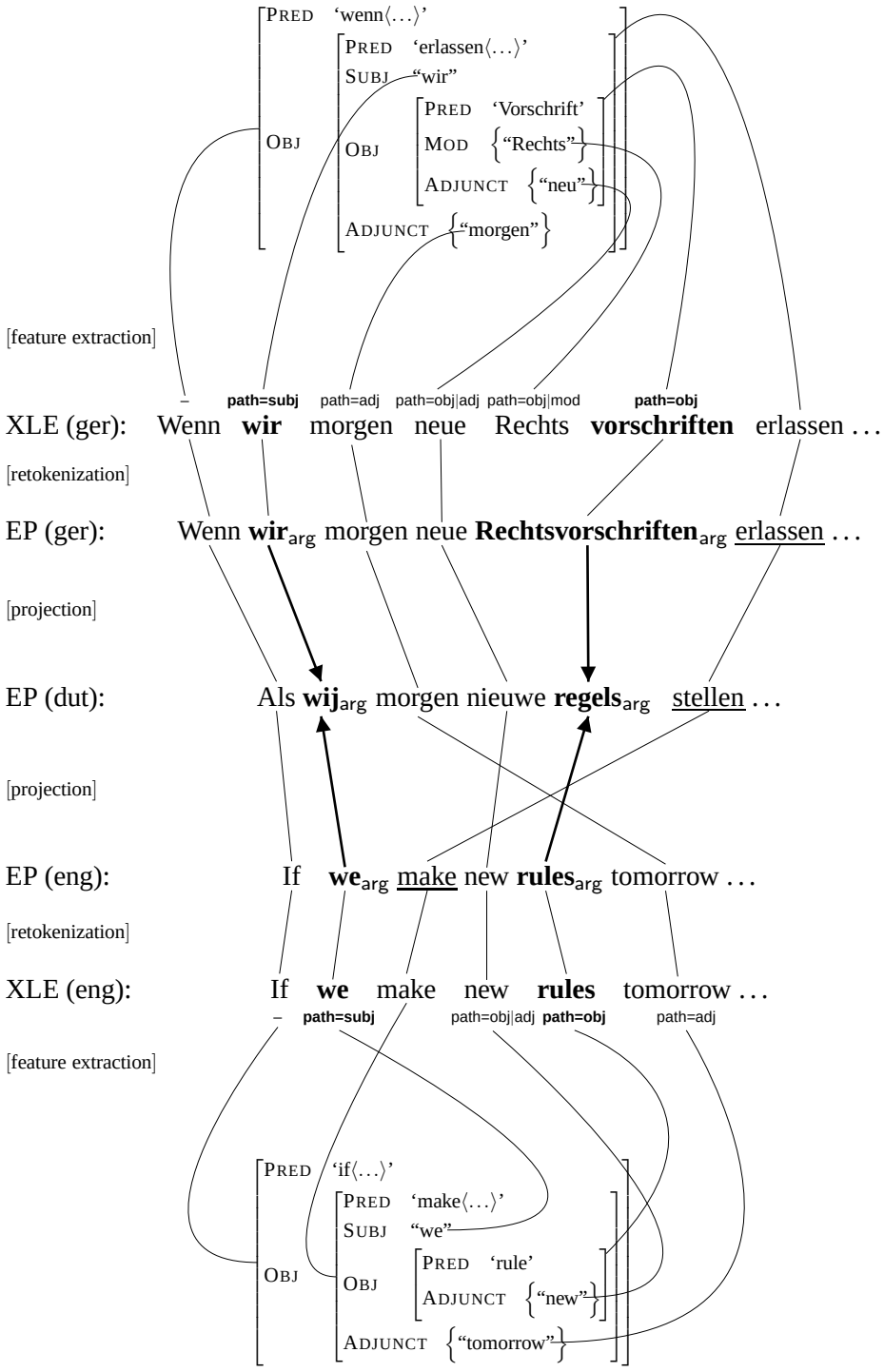


Figure 2: Multi-source consensus projection of head-argument relations from German and English f-structures to Dutch. Dutch *wij* and *regels* align with arguments of *erlassen* in German and *make* in English, fulfilling the consensus criterion.

4.3 Annotation projection

The extracted path features can be directly used to generate the source language annotation (i.e., assigning the label *arg* or *non-arg* to each word, relative to a particular target verb): A word d is an argument of the given verb h when there is an extracted feature $path(h, d, gf)$, and gf is one of SUBJ, OBJ, OBJ-TH, XCOMP, XCOMP-PRED, VCOMP, COMP, or any of the variants of OBL.

Having established the relevant information on the source language tokens in the word-aligned parallel corpus, we can determine whether a target language word w is an argument of a given target language verb h under *single source projection*: A target language word w is an argument of h iff there are aligned source language words w' and h' such that w' is an argument of h'.

The *consensus projection* on the basis of two languages is defined in terms of two single source projections. Target word w is an argument of h when the two single source projections agree it is and w is not an argument of h when the two single source projections agree it is not. Otherwise, w,h is annotated with a '?'.

4.4 Machine Learning

We used the MegaM software package[8] to train maximum entropy (maxent) binary classifiers for the argument identification task. The classifiers make use of features relating to the head word and the candidate argument, and features relating to the context. However, the classifiers do not take into account any information about the argument status of other words than the candidate. We used the default settings of MegaM and did not try to optimize parameter settings such as those concerning penalization.

The features used by the maxent classifiers fall into four categories: lexical, contextual, alignment geometry, and projected features. *Lexical features* include the surface form, as well as the lemma and POS-tag of the candidate argument (if available). *Contextual features* are sentence length, position and distance between the head and the candidate, POS-tags of adjacent words, and intervening complementizers, verbs, and punctuation. *Alignment geometry features* encode information about the word alignment, such as the number of words the candidate is aligned to (as an indication of uncertainty in the word alignment). *Projected features* are used in Section 5.3, where we explore the use of source language information in the post-raw-projection stage. Instead of providing the classifiers with Dutch POS-tag and lemma information (as in the feature set described as 'dut features'), the Dutch words are here marked with feature information projected from the aligned German and English tokens, including NP form, person, number, tense, voice, aspect, verb type and clause type (this feature set is referred to as 'ger+eng+surface dut features'). Finally, the feature space also includes selected conjunctions of atomic features.

[8] See `http://www.cs.utah.edu/~hal/megam/`

	Precision	Recall	F-score
3 nearest nominals	37.0	50.6	42.7
Alpino	87.1	92.5	89.7
	Averaged performance		
Random baseline (hypothesized)	10.1	-	-
Classifier trained on 100k data points with expert annotation, dut features (50 runs)	73.4	53.9	62.4

Table 2: Upper and lower comparison points for the argument identification task.

Some of the machine learning experiments do not use raw projection data to train the classifiers, but rather expert annotated data. For these experiments, we make use of the Alpino parser for Dutch (Malouf and van Noord, 2004) to simulate human input. We use simulated expert input rather than actual human input to be able to repeatedly train the same models on randomly selected training sets. The amount of expert annotated training data is kept around 200 verbal heads (or 4k data points), an amount we estimate can be manually annotated in a matter of hours.

4.5 Evaluation

We evaluate the annotation produced by raw projection or by one of the machine learned classifiers by comparing it to a small gold standard annotated by a linguistically trained native speaker of Dutch. The annotation largely follows the guidelines of the spoken Dutch corpus CGN (Hoekstra et al., 2003), with the important difference that not whole phrases, but only the head words of phrases are annotated as arguments. The gold standard consists of 240 verbal heads in 222 sentences, giving a total of 4756 data points.[9]

Table 2 describes the gold standard in terms of the performance of several reference approaches to the argument identification task. For instance, a simple heuristic that assigns argument status to the three nominals that are closest to the selected head achieves precision of 37.0% and recall almost as high as the single source projections of Section 3. The Alpino parser can be used for argument identification by simply extracting the relevant verb/argument pairs from the full parsing output. It performs very well when tested against the gold standard annotation. This justifies its use in the simulation of expert annotation. A non-deterministic baseline that would randomly assign argument status to words, would average a precision that is equal to the proportion of argument-head pairs in the gold standard. In our case, this is 10.1%.

In the evaluation of machine learned classifiers, it is important to try to rule out the possibility that the observed results are simply due to the fact that the training

[9] We count a data point for each candidate pair w, h. This number is typically greater than the total number of words in the selected subcorpus, since the same word w may be paired with different hs in the sentence.

data is very much like or unlike the evaluation data. We therefore report average results over 50 runs of machine learning on randomly selected sets of training data. About these averages it is important to realize that they need not correspond to an actual run, nor is it guaranteed that one can train a model that performs exactly like that. Apart from the averages, it is also instructive to inspect the variation of performance between runs: of two equally performing systems, one should prefer one that shows little variation between test runs, as this system is more likely to perform similarly on unseen data in the future.

As an upper limit for the machine learned classifiers based on our representations and our set of learning features, Table 2 reports a classifier that has access to all and only Dutch features, which was trained on 100k data points that were annotated by our simulated expert. The annotation quality on the evaluation data is considerably lower than that of a carefully designed full parser like Alpino. This comparison shows that despite the conceptual simplicity of the argument identification task, it is a very hard classification task to acquire in isolation, using machine learning techniques. Some of the difficulties are intuitively clear, as argument identification is cast as an extremely local decision. Knowing whether or not *cheese* in *I don't like cheese crackers* has been classified as an argument of *like* should influence the argument identification decision for *crackers*, but the classifier is ignorant of this.[10] Contrary to the purely local application of our sample classifier, any full parser will build smaller units (phrasal constituents or dependency subgraphs), e.g., [*cheese crackers*] and incorporate valency knowledge. As our goal is to investigate what relative improvements can be obtained with various annotation projection techniques, the hardness of the sample task is not problematic in itself – to the contrary, it is interesting to study the techniques specifically for a hard task.[11] At the same time, one has to be aware that the results we obtain are likely to depend on the choice of the sample task.

5 Experimental results

We will now turn to the experimental investigation of the three questions that were raised in Section 3.3. To start, we investigate whether the high-precision annotation that is the result of consensus projection is of use in training a target language classifier for the argument identification task (Section 5.1). We then compare the utility of high-quantity/medium-quality projection data to low-quantity/high-quality data (Section 5.2). Finally, we look into the question of whether we can replace some target language information in the classifiers with parallel source language information (Section 5.3).

[10] With contextual POS tag features, which are only included in the richest feature set 'dut features', it may be possible to learn typical noun-noun compound contexts, so the resulting classifier may have a preference for the correct reading of the *cheese crackers* example.

[11] Practical uses of the projection technique in the context of linguistic research on information structure can be expected to involve similarly hard classification tasks; so, a realistic application has to employ some interactive, semi-automatic regime.

5.1 Target language classifiers trained on consensus projection

We have seen in Section 3.2 that, compared to single-source projection, consensus projection leads to high-precision annotation. However, since consensus projection is the intersection of two single-source projections, the increase in precision comes with a considerable loss of recall. The first question we look at is whether the resulting high precision annotation can be used as training data for a generalizing target language classifier, that is, a classifier that is independent of information from the parallel corpus. To this end, we compare average performance of three systems. In each system, the classifier uses Dutch lemma and POS-tag information to make predictions. The systems differ in whether they are trained on 100k data points with labels projected from German, from English, or from both languages.

The results of these experiments are shown in Table 3,[12] together with the repeated results of the various raw projection methods. The results show that the generalization step on average ameliorates the recall problem observed for raw consensus projection (from 34.1 to 39.9). The improved f-score (from 46.8 to 49.5) shows that the resulting classifier strikes a better balance between precision and recall than raw consensus projection does.

If we compare the different classifiers, we can see that the consensus data trained classifiers (f-score 49.5) offer overall improvement over the single source data trained classifiers (f-scores 45.6 and 44.6 respectively).[13] We draw the conclusion that by using consensus data we are able to induce higher quality target-language classifiers compared to single-source projection.

In addition to the increase in average performance, the boxplots clearly indicate that the variation in recall and precision of the classifiers is less for the consensus data trained classifiers. We interpret the increased stability of the classifiers based on consensus data as symptomatic for the noise filtering function of the consensus projection, speculated upon in Section 2.

In all, these first series of experiments provide evidence that for tasks like our example task, consensus projection offers an advantage over single source annotation projection for the induction of target language classifiers.

[12] Each projection+generalization method was run 50 times using randomly selected Europarl sentences and tested each time on the held-out gold standard. For instance, there are 50 precision measurements for 'consensus, dut features': $58.2, 59.1, \ldots, 64.2, 64.3, 64.4, 64.4, \ldots, 70.4, 70.7$ (sorted). These outcomes are summarized by the average (median) and boxplots. All boxplots are on a scale 0–100 points. The boxplot whiskers indicate the 1.5×inter-quartile-range area around the central 50 percent of the data. Outliers are plotted as dots. The systems without a generalization step are deterministic, so the reported performance measures are not averages as such. For ease of comparison, the corresponding 'boxplots' are drawn as medians only.

[13] The consensus data trained classifiers offer statistically significant improvement over the ones trained on data projected from German in terms of average precision (median +5.1, $p < .001$), average recall (+1.6, $p = .023$) and average f-score (+3.9, $p < .001$), and over those trained on data projected from English in terms of average recall (+4.4,$p < .001$) and average f-score (+4.9, $p < .001$) although not in terms of average precision (+0.8, $p = .169$).

Significance testing is done with approximate randomization testing of the median. The p-values are based on 50k random resamplings of the pooled evaluation data of two systems. See Yeh (2000) for references and recommendations.

Projection	Generalization	Precision Average	Precision Distribution
ger→dut	(none)	52.2	
	dut features	59.3	
eng→dut	(none)	54.3	
	dut features	63.6	
consensus	(none)	74.6	
	dut features	64.4	
		Recall	
ger→dut	(none)	52.9	
	dut features	38.3	
eng→dut	(none)	48.8	
	dut features	35.6	
consensus	(none)	34.1	
	dut features	39.9	
		F-score	
ger→dut	(none)	52.6	
	dut features	45.6	
eng→dut	(none)	51.4	
	dut features	44.6	
consensus	(none)	46.8	
	dut features	49.5	

Note: Raw projection, labelled '(none)', is tied to parallel corpus data, whereas the generalized 'dut features' classifiers can be applied to arbitrary text.

Table 3: Performance of raw projection and target-language internal classifiers. Also see footnote 12 for explanation.

5.2 Consensus projection instead of low-quantity/high-quality data

Since the purpose of annotation projection is to avoid time- and cost-intensive manual efforts, a relevant question to ask is how a consensus projection based system fares against a system that relies on a modest amount of manually annotated data, as such a system would be a practical alternative. Table 4 compares the results of training a classifier on 100k data points of consensus data and training it on 4k expert annotated data points. The table shows that using expert data results in considerably higher average precision, but that it makes no difference in average recall. In terms of f-score, there is a small overall advantage in using expert annotated data.[14]

Two things need to be pointed out about this comparison. First, the picture in

[14] 100k consensus vs 4k expert: average precision $+7.3$, $p < .001$, average recall -0.9, $p = .107$, and average f-score $+1.5$, $p = .002$.

Projection	Generalization	Average	Distribution
		Precision	
consensus	dut features	64.4	
(expert)	dut features	71.7	
		Recall	
consensus	dut features	39.9	
(expert)	dut features	39.0	
		F-score	
consensus	dut features	49.5	
(expert)	dut features	50.8	

Table 4: Training on 100k consensus data vs. 4k expert data.

Table 4 shows smaller variation for the consensus trained models on all fronts. This is likely to be an effect of using much more data and using data that is systematically filtered because of the consensus requirement. In a recall-oriented approach, it is thus preferential to use a lot of consensus data over a modest amount of expert data: The reduced stability of the latter means that a particular instance may in fact perform much worse than average. Recall-oriented approaches are, for instance, useful for linguistic research in the semi-automatic set-up common in lexicography, which involves generating a candidate list of items that is then checked by a linguistic expert.

Secondly, the consensus approach has the advantage that, depending on the specific classification task, it may be possible to improve upon performance by simply adding more data, at merely the cost of more computation time.

5.3 Trading target language for source language information

The classifiers we examined in the previous section relied on the availability of some (admittedly fairly low level) analysis of the target level language, that is, lemma and POS-tag information. For a low-density language it may be the case that this level of analysis is not available. To compensate, one may look at information that comes from the parallel corpus to replace the target language information. The price one pays for this move is that the final classifier remains dependent on being applied in the context of a multi-parallel corpus.[15]

Table 5 gives an overview of the performance of systems that incorporate multi-parallel information in the generalization step: Recall that the 'dut features' classifier has access to lemma and POS-tag information, which is missing from 'surface dut features'. The classifier 'ger+eng+surface dut features' can draw on projected

[15]The technique may of course still be of interest as a stepping stone in some bootstrapping cycle that reaches independence from the parallel corpus at a later stage.

Projection	Generalization	Precision Average	Precision Distribution
consensus	dut features	64.4	
	surface dut features	77.6	
	ger+eng+surface dut features	62.3	
		Recall	
consensus	dut features	39.9	
	surface dut features	20.6	
	ger+eng+surface dut features	38.3	
		F-score	
consensus	dut features	49.5	
	surface dut features	32.2	
	ger+eng+surface dut features	47.3	

Table 5: Impact of reduced target language information on performance.

morphosyntactic features from German and English, which may thus in part stand in for the lacking information. Only information about the verb and argument candidate itself is projected, so there is no stand-in for the contextual information included in 'dut features'.

We begin by noting that there is a considerable penalty in terms of recall and f-score if we withhold POS-tag and lemma information from the target-language internal classifier. Unexpectedly, however, precision increases to levels that on average lie even above consensus projection precision. The explanation for this is that the classifier that only relies on Dutch surface forms is very conservative. It learns for a limited number of surface forms that they are arguments. For instance, one will see that these classifiers always predict that *wij* 'we' and *ik* 'I' are arguments. This is correct: Dutch nominative pronouns are almost exclusively found in subject position. Under this strategy, high precision goes hand in hand with low recall. The fact that these models basically list specific cases also explains why there is such enormous variation in the precision of these models and relatively large variation in recall and f-score: The effectiveness of the listing approach relies directly on how well the training data resembles the testing data.

The use of morpho-syntactic features from German and English in addition to the Dutch surface features makes up for the loss in recall and f-score to a great extent. The resulting system still performs worse than a system with access to Dutch POS-tags and lemmata,[16] but the differences are modest. Whether the remaining differences are due to the lack of contextual features in 'ger+eng+surface dut features' needs to be investigated in future research.

[16] 'ger+eng+surface dut features' vs. 'dut features': average precision -2.1, $p < .001$, average recall -1.6, $p < .001$, average f-score -2.2, $p < .001$.

One may argue that if one has access to a parallel corpus anyway, one might as well use a raw projection method. Some of these even perform better than 'ger+eng+surface dut features': Table 1 shows that raw projection from German achieves f-score 52.6. However, classifiers do have the advantage that they can assign a confidence level to a classification. The results in Table 5 suggest that, if one needs classification confidence in a parallel corpus, one could replace target language information with source language information without sustaining too much of a hit in performance. One scenario we intend to explore in which this ability is relevant is so-called *active learning*. This involves iteratively improving a classifier by letting the machine learner select small amounts of training data to be annotated by an expert, on the basis of its own classification confidence. Nevertheless, we are aware that, as it is, projected feature information as a stand-in for target language POS-tags and lemmata is of a limited use.

6 Conclusion

We have presented an extension of annotation projection, in which we exploit multi-parallel corpora and use two (or more) languages as the source of projection. The source language annotation is automatic and based on the ParGram LFG grammars. These grammars are a very good basis for this technique, as they are designed to assign syntactic analyses to the two source language strings that are as parallel as is linguistically justified.

We illustrated and tested the technique for a sample task (verb argument identification), in which one has to decide whether a word is the head of an argument of a given verb. We have compared various ways of automatically annotating the target language in experiments with English and German as source languages and Dutch the target language, using Europarl data with standard statistical word alignments. The simplest automatic annotation method is direct, 'raw' projection of annotation from a single source, which yields f-scores of 52.6 (German to Dutch) and 51.4 (English to Dutch; see Table 1). Precision and recall are very balanced for single-source projection. The idea of multi-source projection can be implemented by relying only on the consensus of the two simpler projections. As expected, raw consensus projection reduces recall but results in high precision (74.6).

The argument identification task, which we chose for its conceptual simplicity, turned out to be a hard task to train an automatic classifier for. This is shown by the fact that even when a relatively large amount of expert-annotated training data is provided and a rich, reliable set of learning features is used, the classification quality is nowhere near the quality that can be reached by reading the argument identification decision off the output of a carefully designed full parser like the Alpino parser (Table 2). Since we were interested in ways of obtaining relative improvements by projection-informed techniques, a hard sample task is actually a good starting point. One should be aware, however, that details in the results may depend on our sample task.

Because the sample task is so hard, it is not trivial to train a stand-alone classifier for the target language without providing any expert information on the target language classification. However, the experiments reported in Section 5.1 show that with training data obtained from consensus projection, a significant improvement over training on single source projected data can be achieved (Table 3). The recall problem of raw consensus projection can be alleviated by generalizing over the projected data. Moreover, the resulting stand-alone classifier (average f-score of 49.5) is applicable outside the context of a parallel corpus too.

We further compared automatic classifiers based on consensus projected training data vs. small amounts of manually labelled training data (Section 5.2) and we tested to what degree source language information may replace target language POS-tag information – which may not be available for a low-resource language (Section 5.3). In both cases, the use of automatically obtained, multi-parallel projection information yielded performance only slightly inferior to the more resource intensive alternatives. A consistent pattern was that multi-parallel projection information helped to achieve high stability in classifier performance over training trials. This shows that the projection technique is less dependent on the contingent similarity between training and application data.

In future work, we plan to investigate projection of different types of annotation and to do an application test of semi-automatic versions of the technique in corpus-supported linguistic research and especially in an active learning setting. We are also planning to explore the use of more noise robust learning techniques. The local character of the argument identification decision, discussed briefly at the end of Section 4.5, may be typical for some annotation projection tasks. However in general, multi-parallel projection should be combined with more globally informed models. This is one of the most prominent goals of our ongoing work. For instance, we are now exploring full dependency parsing of the target language. This poses some interesting research questions, like what should be counted as consensus when the structural homomorphism across languages does not exhaust the entire candidate sentence.

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Bardi complex predicates as a challenge to monotonicity

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Abstract

Bardi (Nyulnyulan, Australian) has both simple and complex predicates and extensive morphological marking on the inflecting verb for agreement and valency. While in simple predicates valency marking is straightforward, in complex predicates there is a mismatch, a 'missing' argument which is marked in the verb but is not subcategorised for in the argument structure. It appears that the coverb modifies the f-structure introduced by the light verb – if so, this is a clear violation of monotonicity.

1 Introduction

Bardi is a Nyulnyulan language, a member of one of the Non-Pama-Nyungan Indigenous Australian language families spoken in Australia's North. It is morphologically complex, and displays multiple agreement, not only for subject and direct object, but also for adjuncts in various semantic roles. The language has both simple and complex predication (Bowern 2004a) and overt marking in the verb of tense, aspect, and valency in addition to agreement properties. For more information on these topics, see Bowern (2004a, 2006b) for Bardi, and Bowern (2006a), McGregor (2002), Schultze-Berndt (2000), Wilson (1999) for more information on Northern Australian complex predicates more generally.

This paper concerns an interesting feature of the interaction between complex predication and transitivity/valency marking. Here I describe a mismatch between morphological marking and syntax and the problems it causes for analysis.

2 Valency marking in the Bardi simple predicates

In simple predicates, there is a prefix of the form *n-* ∼ *a-*, which is used with simple predicates which introduce a direct object.[1] The prefix is *n-* when the subject of the verb is singular, and *a-* when it is plural. Verbs which do not subcategorise for a direct object have no such prefix. Some examples of verbs which alternate in transitivity and can appear with or without this prefix are given in (1). (In Bowern (2004a) this marker is glossed as TR and this practice is followed here.)

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[1]Several people have suggested to me in conversation that this marker could be a vestige of Nyulnyulan third person object prefixal marking, and therefore cognate with other *n-* object prefix markers in other Northern Australian languages. This is possible, but there is no evidence within Nyulnyulan to suggest it (object marking in all Nyulnyulan languages is enclitic or suffixal to the verb) and given the very small number of cognates between Nyulnyulan and surrounding languages (Bowern 2004b), there is no direct evidence for it and it does not add to the argument to claim it. After all, Bardi has many morphemes of the form *-n(V)*, and the form of the valency marker is only *n-* when the subject is singular.

(1)	*imarran*	it's cooking	*i**n**marran*	(s)he's cooking it
	imbarndigal	it got covered	*i**n**ambarndigal*	(s)he covered it
			*i**n**argal*	(s)he spears it (lice)
			*i**n**kajan*	(s)he brings it

Approximately thirty verbs may appear with or without the prefix, and in that case they exhibit variable argument structure configurations (the forms with *n-* ∼ *a-* being transitive, and those without intransitive). The majority of the 250 simple verb roots in Bardi do not alternate, and the morpheme is either consistently present or consistently absent.

There is good evidence in Bardi for saying that *n-* is associated with verbs which take two arguments, and that the absence of this marker is found with one-argument verbs. Specifically (and more correctly), the prefix is associated with verbs which subscategorise for a direct object.[2] Therefore, the lexical entry for the morpheme would look something like this:

(2) a. /n-/ : (↑ GF) = OBJ
(↑ SUBJ NUM) = SG

b. /a-/ : (↑ GF) = OBJ
(↑ SUBJ NUM) = PL

I assume that a verb like *inamarragalirr* 'she/he is cooking them' would have the following partial f-structure:[3]

[2]There are three apparent exceptions. One is lateral-initial roots, such as *-laba-* 'hold' and *-(a)rli-* 'eat', where the *n-* of the transitive prefix is deleted. This is a regular morphophonemic rule and such verbs are otherwise regular. There are some semi-transitive verbs, which have ergative subjects and oblique objects, but they do not take transitivity markers. If we specify that the prefix occurs only with verbs with direct objects (and not those sub-categorised for oblique arguments), such verbs are not an exception at all. The second is the verb *-kal-* 'visit, travel, wander', which is ambitransitive but appears to always appear with the transitivity marker. Finally, I should also note that according to Bill McGregor (pc), this analysis would not apply to Bardi's closest neighbour, Nyulnyul, where no function can be attributed to the cognate morpheme *n-* and there is considerable irregularity in which verbs appear with the prefix. McGregor (1996) glosses it as an epenthetic nasal without function. The same problems in interpretation appear to hold (to greater or lesser degrees) for a number of other Nyulnyulan languages; in Nyikina (Stokes 1982), for example, the prefixal material is cognate but functionally rather different, as a result of extensive internal paradigm reorganisation. See Bowern (2007) for more information. In Yawuru Hosokawa (1991) describes conjugation classes for which the morpheme is present, absent or optional.

[3]Bardi agreement markers introduce a PRED feature. Bardi is non-configurational; for the moment, I treat all agreement between verbal person/number affixes and free noun phrases as anaphoric, although that is clearly an oversimplification. It is not relevant for this problem, however.

(3)
$$\begin{bmatrix} \text{PRED} & \text{cook} < \text{SUBJ, OBJ} > \\ \text{SUBJ} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \\ \text{PRED} & \text{PRO} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{PL} \\ \text{PRED} & \text{PRO} \end{bmatrix} \\ \text{TENSE} & \text{RECENT PAST} \end{bmatrix}$$

3 Complex predicates

The analysis in (2) above applies only to simple predicates. Bardi also has an extensive array of complex predicate structures (Bowern 2004a). Complex predicates in this language comprise an uninflecting preverb[4] and an inflecting light verb (which inflects for the same categories as verbs in simple predicates, with one difference to be discussed below). (4) below gives some examples. Tests for complex predication (including the tests used by Butt (1995) for Urdu) are given in Bowern (2004a:Ch.9). For some comparative discussion with other Australian languages, see Bowern (2006a).

(4) a. *Iila* ***daag i-n-da-n***.
dog sleep 3-TR-do-CONT
'The dog is sleeping.'

b. *Baawa-nim moodiga* ***wajim i-ng-arr-a-ma-gal***.
child-ERG car wash 3-PST-PL-TR-put-REC.PST
'The kids were washing the car.'

There are approximately ten common light verbs, and another twelve which appear sporadically in complex predicate constructions (including *-jarrmi-* 'rise', as in (5a) below). Both monovalent and bivalent simple verbs are represented in complex predicates. There are some patterns of preverb/light verb use. All stative complex predicates, for example, use the light verb *-ni-* 'sit, be in a place' (as in (5b) below), and many resultatives (anti-causatives) use *-jiidi-* 'go', as illustrated in (5c).

(5) a. *wirr i- ny- jarrmi -n*
get.up 3- PAST rise CONT
'She got up.'

b. *garnka i- ni -n*
raw 3- sit -CONT
'It's raw.'

[4]In the literature on complex predicates, preverbs are also known as coverbs.

c. *lambard i- ny- jiid -ij*
open 3- PAST- go -MID.PERF
'It opened.'

All the monovalent light verbs form intransitive (that is, single argument) complex predicates. This includes not only the non-compositional complex predicates such as *birrbad -ganyi-* 'ricochet' (involving an unidentifiable initial element and the light verb meaning 'climb') but also those productively formed from adjectives (such as the stative predicates illustrated in (5b) above). This is expected.

However, light verbs with the marker *n-* ∼ *a-* have a rather different pattern. There is no transitivity restriction on complex predicates formed with formally transitive light verbs. While a verb such as *-ar-* 'spear (lice), pierce' is always transitive when occurring as a simple predicate, there is no such restriction on the complex predicates which may be formed with *-ar-*. (6a) shows an impersonal predicate, (6b) an intransitive one, and (6c) a transitive one. In all these examples, the light verbs are marked with the valency marker *n-* ∼ *a-* irrespective of whether a direct object is present in the predicate.

(6) a. *Ool i- n- ar -n*
water 3- **tr** pierce -CONT
'It's raining.'

b. *Jool i- n- ar -n*
kneel 3- **tr** pierce -CONT
'She/he is kneeling.'

c. *jiin i- n- ar -n*
point 3- **tr** pierce -CONT
'she/he is pointing at something.'

All the common light verbs which can take the valency marker form both transitive and intransitive complex predicates.[5] Some further examples are given in (7) below:

(7) a. roowil i**n**nyagal '(s)he walked' (-nya- = 'catch')
b. jirrjirr i**n**nnyagal '(s)he was standing'
c. ngalar i**n**nyagal '(s)he's glowing'
d. daag i**n**joon '(s)he's sleeping' (-joo- = 'do/say')
e. joodoog i**n**agal '(s)he stumbled' (-ø- = 'give')
f. darr i**n**argal '(s)he came' (-ar- = 'spear (lice)')
g. maarr i**n**amboogal 'it bloomed' (-boo- = 'hit, poke')

[5] I have no evidence for positing a class of ditransitive verbs in Bardi. All the possible candidates have the syntax of simple transitive verbs.

The behaviour of these light verbs is a problem for our analysis of the morpheme *n-* ∼ *a-* above. If the morpheme's lexical entry includes a specification for a direct object, none of these items should be well-formed, for no object appears in the phrase. The light verb's f-structure would be introducing an OBJECT function which never receives a PRED feature. Thus either the preverb is deleting f-structure introduced by the light verb (in violation of monotonicity), or the transparent analysis advanced above is not correct.

4 Discussion

Transitivity mismatches in complex predication are not particularly unusual; however, those reported in the literature so far all appear to be cases where there is an 'extra' argument not licensed by the agreement in the light verb. That is, there are formally monovalent light verbs which nonetheless receive two arguments. Samek-Lodovici (2003) provides an analysis of restructuring predicates in Italian where the light verb appears to subcategorise for one fewer argument than appears in the predicate. In Wagiman (Wilson 1999), complex predicates with the verb 'go' are transitive with certain preverbs. The same is found in Worrorra (Clendon 1999).

In other cases, there is either strict agreement in valency with the light verb, or the light verbs appear to have an empty argument structure array which is filled by the preverb. An example of the former case is Warlpiri (Nash 1982, Simpson 1991), where monovalent light verbs form intransitive complex predicates, and bivalent light verbs form transitive ones. An example of the latter is Japanese, where the complex predicate can have one, two or three arguments (Grimshaw and Mester 1988) depending on the light verb.

The only other example to my knowledge of a case similar to Bardi is in the Australian language Jaminjung (Schultze-Berndt 2000), where some transitive verb roots appear without a direct object, despite taking transitive prefixes. (8) provides an example with the verb *-ma* 'hit', which takes transitive prefixes even when there is no direct object.

(8) *Ngayin=malang bul* ***gani****-ma bunyag.*
meat.animal=GIVEN emerge **3sg:3sg**-HIT.PST 3dl.OBL
'The animal came out to/for the two.' (Schultze-Berndt 2000:181)

Schultze-Berndt (2000) analyses such verbs as introducing a dummy argument and provides an account in construction grammar. Her solution works for the verbs with dummy object agreement, however it is too general, in that is cannot rule out verbs which should be ungrammatical with dummy arguments (i.e. regular intransitive verbs).

5 Conclusions

In summary, the Bardi data presented here are an interesting morphology-syntax mismatch. The facts from simple predicates and intransitive complex predicates lead us to a particular systematic interpretation of the prefix *n-* $\sim$ *a-*; however the complex predicates formed with bivalent light verbs challenge that interpretation.

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TURKISH SUSPENDED AFFIXATION IS LEXICAL SHARING

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Abstract

Turkish displays a phenomenon known as *suspended affixation*, in which an affix takes scope over two or more preceding words. This phenomenon raises problems for lexical integrity, as it is usually understood. However, the lexical sharing approach of Wescoat (2002) allows us to give a satisfying account of suspended affixation within LFG.

1 What is suspended affixation?

Suspended affixation is the term used Lewis (1967) to describe instances in Turkish morphology where an affix takes scope over two more preceding words:

(1) a. [Zengin ve ünlü]-y-dü-m.
rich and famous-cop-past-1sg
'I was rich and famous.'

b. [Zengin ve mesut]-tu-m.
rich and happy-past-1sg
'I was rich and happy.'

Examples like this raise problems for lexical integrity, as it is usually understood (Bresnan and Mchombo 1995, Bresnan 2001).

The problem is that some affixes seem to take scope over phrases and not simply over words. This paper addresses the issue of how such issues are best addressed within LFG.

2 Lexical sharing

Wescoat (2002), uses a slightly relaxed version of lexical integrity which allows a single word to *coinstantiate* more than one adjacent c-structure node. This lexical sharing model can provide a natural LFG account of the Turkish facts. I will argue that the best representation of (1a) is the tree shown in Figure 1:

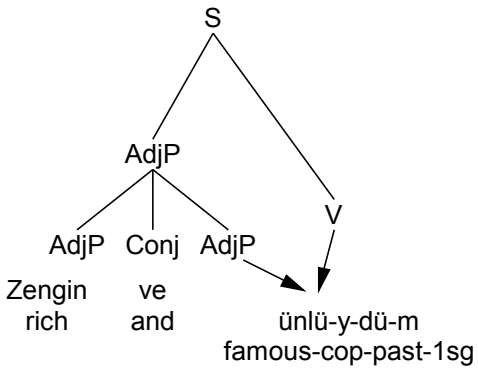

Figure 1 Lexical sharing

In a diagram like this, the arrow represents the relationship *instantiate,* which is the relationship between terminal nodes in a tree and the lexical items that they correspond to. While a syntactic node must be dominated by only one other node, this restriction does not apply to the relationship between terminal nodes and lexical items. A lexical item may instantiate more than one terminal node, subject to a number of restrictions.[1]

In Wescoat's (2002, 2007) approach, words can only co-instantiate multiple c-structure nodes under a few special conditions:

a.) Special lexical items (such as Prep+Det contractions) are listed in the lexicon as co-instantiators (Wescoat 2007).
b.) Lexical rules may create co-instantiating lexical items
c.) Co-instantiated nodes must be adjacent in the tree

3 Copulas in Turkish

3.1 The contracted copula

With this framework in mind, let us try to formulate the lexical rule that creates copular contraction in Turkish. The Turkish copula is *–y* after a vowel; Ø after a consonant, and the copula plus any suffixes of the copula are affixed to the end of the preceding phrase.

We thus need a rule like the following:

[1] Bresnan and Mugane (2006)'s approach to mixed categories shares a number of similarities to the lexical sharing approach of Wescoat (2002, 2007), since their approach also allows a single word to instantiate more than one c-structure node. However, Bresnan and Mugane (2006) posit such a solution only in the case of agentive nominalizations where the derivational morphology creates a word that simultaneously belongs to two categories. It is possible that such a solution could be extendeded to generalize to the cases of inflectional morphology and contraction discussed here.

(2) Φ← [POS X], Ψ ← [POS V]
[Cop +]

→ Φ - Ψ ← [POS X + V]

The backward arrow shows the 'instantiate' relationship. Thus this rule is to be read as follows: 'If /Φ/ instantiates a word with X as its part of speech and / Ψ/ instantiates a V which is [Cop +], then there is another word /Φ - Ψ/ which (co-)instantiates X + V.'

3.2 Uncontracted copulas in Turkish

The forms given in (1) above are the normal ways of expressing the copula in Turkish; in these examples the copula is contracted and affixed to the end of the end of its complement.

However, it is also possible to have an uncontracted copula, *i*, which forms a separate word and is the host of the verbal suffixes:

(3) [Zengin ve ünlü] i-di-m.
rich and famous cop-past-1sg
'I was rich and famous.'

Turkish speakers tell me that the uncontracted form in (3) sounds either regional or old-fashioned, but it is possible. If we consider the c-structure for (3), then we can see that it is essentially the same as that seen for (1), but here the copula is a separate word, rather than coinstantiated with its complement:

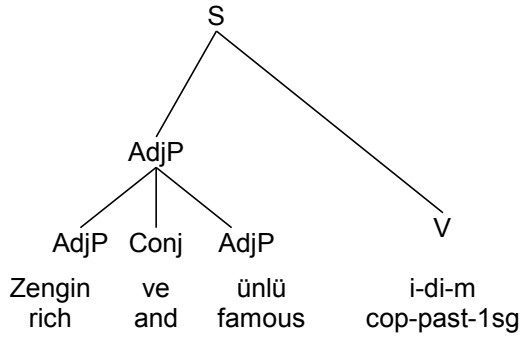

Figure 2 The uncontracted copula

An advantage of the lexical sharing approach is that it can posit identical c-structures for the contracted and uncontracted copulas; the two differ only in whether a single word coinstantiates the Adj and V positions, or whether they are separately instantiated. A very similar argument for a lexical sharing approach to the Korean copula is found in Kim, Sells, and Wescoat (to appear).

4 Suspended affixation and noun phrases

4.1 Case endings

Suspended affixation is also found with the case endings, as in the following example:

(4) [Can'-ın divan-ı ve
John-gen couch-3sg and

Orhan'-ın yatağ-ın]-da uyu-du-m.
Orhan-gen bed-3sg-loc sleep-past-1sg

'I slept on John's couch and Orhan's bed.'

Note here that the locative case takes scope over both preceding NPs. The lexical sharing approach yields a natural analysis of such examples:

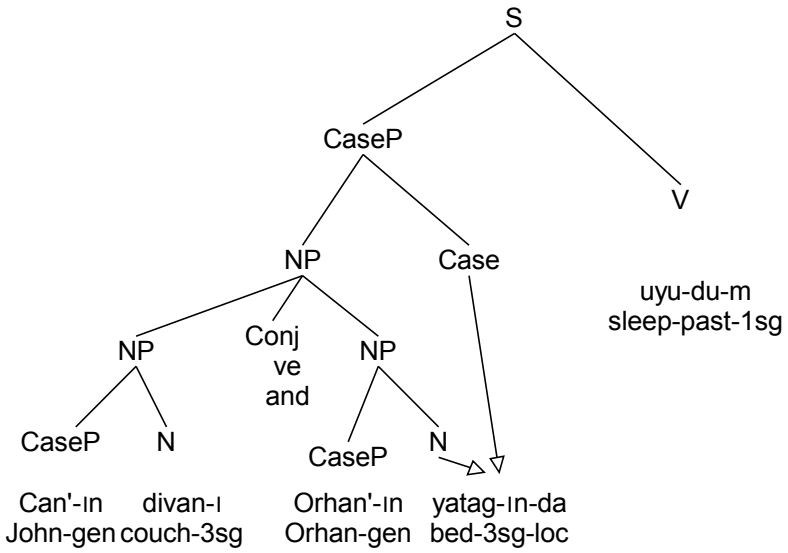

Figure 3 Lexical sharing analysis of case

4.2 The plural

Suspended affixation is also found with the plural (Kabak 2007:335):

(5) [ev ve dükkan]-lar
house and shop-plur
'houses and shops'

This implies that Turkish also has PluralP, as shown in Figure 4.

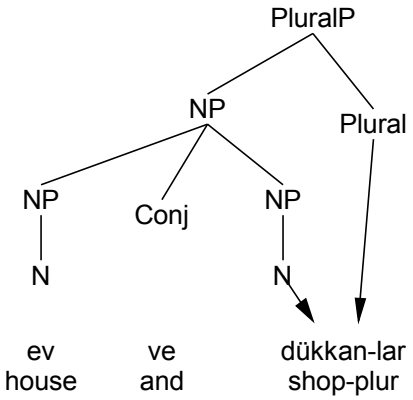

Figure 4 Lexical sharing analysis of plural

4.3 Rules for lexical sharing of case and number

The rules that inflect a Turkish noun for case can be written in the following way:

(6) /Φ /← [POS N] → /Φ-dE/ ← [POS N + Case]
[CASE LOC]

Note that the output of the lexical rule changes the POS value of the word so that it now co-instantiates N and Case. A similar rule inflects a noun for plurality:

(7) /Φ /← [POSN] → /Φ-lEr/ ← [POS N + Plur]
[NUM PL]

5 Some alternatives to lexical sharing

Though the treatment of lexical sharing that I have proposed is not yet the standard account within LFG, I argue that it is the least problematic approach. In particular, it has distinct advantages over three possible alternatives:

a.) Treating the morphemes which participate in suspended affixation as clitics
b.) Allowing conjunction in the lexicon
c.) Adding a special annotation to the final conjunct

5.1 Alternative 1: Cliticization

Turkish phonology gives us good argument against any account that treats suspended affixation as a form of cliticization.

The rules of vowel harmony and voicing assimilation are only found within the word in Turkish. Note that in the following examples of copula contraction, the

vowel of the past tense suffix /-dI/ shows vowel harmony with the last vowel of the adjective that precedes it.

(8) a. [Zengin ve ünlü]-y-dü-m.
rich and famous-cop-past-1sg
'I was rich and famous.'

b. [Zengin ve mesut]-tu-m.
rich and happy-past-1sg
'I was rich and happy.'

Another phonological rule which is restricted to words changes the initial /d/ of many suffixes to /t/ when the preceding sound is voiceless. Thus in (8b), the allomorph of the past tense is /-tu/ because of the preceding /t/.

The phonological properties of the past tense morpheme /–dI/ are the same when it is uncontroversially an affix on a verb:

(9) Git-ti-m 'I went'
Oku-du-m 'I read'

However, the past tense does not license suspended affixation when it attaches to a verb:

(10) *Git ve oku-du-m.
go and read-past-1sg

(I went and read.)

This difference can be captured naturally in the lexical sharing account by saying that the rule which adds a past tense ending to a verb does not involve coinstantiation:

(11) /Φ /← [POSV] → /Φ-dI/ ← [POS V]
[TENSE PAST]

If we try to treat suspended affixation as a type of cliticization, then we encounter the difficulty that /-dI/ 'past' must be treated as an affix when attached to verbs, but as a clitic when attached to other parts of speech. Nevertheless, the phonology is identical in the two cases.

Another difficulty for accounts that involve cliticization comes from the very different behavior of true clitics in Turkish. The true clitics like 'relative' *ki* do not show vowel harmony:

(12) Ankara-da=ki yeni bina-lar
Ankara-loc=rel new building-pl
'the new buildings in Ankara'

Bilecik-te=ki yeni bina-lar
Bilecik-loc-rel new building-pl
'the new buildings in Bilecik'

Note that here the locative case ending shows vowel harmony and voicing assimilation; while the clitic does not. Thus case endings like /–da~-de~-te~-ta/ 'locative' are affixes and not clitics.

Finally, let me argue that a clitic analysis is to some degree a mere label for the phenomenon, since there is no uniform LFG treatment for the various items called clitics. To the extent that any such analysis posits separate syntactic nodes for number, case, and the copula, it is similar to the lexical sharing approach. The virtue of the lexical sharing approach is that it presents an explicit account of how multiple syntactic nodes may correspond to a single phonological word.

5.2 Alternative 2: Coordination in the lexicon

Could we instead allow coordination in the lexicon, and attach the affix to the coordinate? There are two problems with this approach. The first is that most affixes cannot take scope over coordination. The second problem is that the material in the conjuncts may be phrasal.

5.2.1 **Affixes which do not allow suspended affixation**

Suspended affixation is impossible with any of the derivational morphemes of the language.[2] For example, there is a suffix /-cI/ which attaches to a noun N and gives the meaning 'one who sells/makes N'

(13)	halı	'carpet'	halı-cı	'carpet salesman'
	havlu	'towel'	havlu-cu	'towel salesman'

It is impossible, however, to suspend this affix:

(14) halı-cı ve havlu-cu
'carpet salesman and towel salesman'

*[halı ve havlu]-cu

We also find that none of the verbal derivational morphemes (e.g. passive, causative) license suspended affixation:

[2] However Kabak (2007:336) notes that there are a small number of lexicalized examples of a derivational morpheme with scope over a conjunct:

badana	ve	boya-cı
whitewash	and	paint-der
'painter'		

These cases are unproductive and don't generalize to the lexicon as a whole, so they must be listed. In contrast, regular suspension of case, number, and copular morphology is completely productive.

(15) a. Can küçük düş-ür-ül-dü ve
John small fall-cause-pass-past and

aşağıla-n-dı.
insult-pass-past

'John was humiliated and insulted.'

b. * Can [küçük düş-ür ve aşağıla]-n-dı.
John small fall-cause and insult-pass-past

Many verbal inflectional morphemes also fail to license suspended affixation. The affix -meli 'necessitative', for example, cannot scope over coordination:

(16) Can ye-meli ve iç-meli.
John eat-necess and drink-necess

'John must eat and drink'

*Can [ye ve iç]-meli.
John eat and drink-must

These problems seem to make coordination as an input to lexical morphology problematic, since it is difficult to see how one could account for difference between morphemes. Some morphemes may be attached to coordinates, but others may not, and there is no apparent motivation for this difference in an entirely lexical approach.

5.2.2 The potentially phrasal nature of the conjuncts

Another problem for an entirely lexicalist approach to suspended affixation is that each of the conjuncts in suspended affixation is potentially complex and phrasal:

(17) [[Can'-ın divan-ı] ve [Orhan'-ın
John-gen couch-3sg and Orhan-gen

yatağ-ın]]-da uyu-du-m.
bed-3sg-loc sleep-past-1sg

'I slept on John's couch and Orhan's bed.'

(18) Meyva-lar [[Can'-ın uzun ağac-ı] ve
fruit-pl John-gen tall tree-3sg and

[Orhan'-ın kısa bağ-ın]]-dan gel-ir.
Orhan-gen short vine-3sg-abl come-aor

'The fruits come from John's tall tree and Orhan's short vine.'

Thus if we try to allow coordination before attachment of the case affix, we have to

incorporate all the rules for constructing a NP in the lexicon. That is an obviously unattractive duplication of PS-rules in the syntax

5.3 Special annotation for the final conjunct

A third possibility is that the final conjunct has some annotation that specifies that its value for tense, mood, number, case, etc. is shared with the preceding conjuncts. Thus we might add an annotation like (↑CASE) = (↓CASE) and (↑NUM) = (↓NUM) to the following tree:

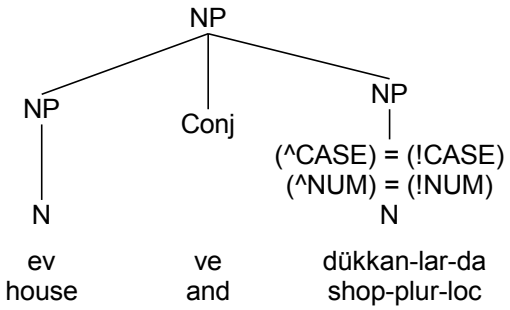

Figure 5 Special annotation alternative analysis

This will correctly insure that the case and number features of the second conjunct are shared with all the members of the coordination.

However, this analysis fails to capture an essential fact about suspended affixation, which is that the affixes with scope over the coordination are always peripheral to the coordination. In an approach with special annotation, nothing in principal prevents adding this annotation to the initial conjunct instead of the final conjunct.

In contrast, the lexical sharing account of suspended affixation does not have this flaw. Case and Plural are separate functional heads that follow NP. The principles of lexical sharing only allow coinstantiation of adjacent terminal nodes, and the Case and Plural nodes can only be adjacent to the final member of the coordinate structure.

6 Objections to functional categories

LFG avoids the use of empty categories, thus LFG analyses of English do not posit categories like PluralP or CaseP, since there are no words that head such phrases. On the other hand, there are languages for which such analyses are clearly appropriate.

6.1 Case Phrases

A number of languages have case markers which are independent words or clitics, as in Modern Hebrew and Copala Triqui (Oto-Manguean, Mexico):

(19) Ra'iti et Moshe v-Shimon. (Hebrew)
I:saw acc Moshe and-Shimon

'I saw Moshe and Shimon.'

(20) Que-ne'e^3 Juan^4 mãã^3 xnii^3 xco^4 ve'^{3}. (Triqui)
com-see Juan acc boy behind house

'Juan sees the boy behind the house.'

The Triqui example is a particularly clear case of an independent word which is a case marker. Triqui words may only have nasal vowels in a final syllable (Hollenbach 1984). So *mãã^3 xnii^3* 'boy (acc)' cannot be a single word.

Mãã^3 cannot be some other part of speech like preposition because it fails to undergo pied-piping, which is otherwise found with all prepositions

(21) [$_{PP}$ Xco^4 ve'^{3}] que-ne'e^3 Juan^4 mãã^3 xnii^3.
behind house com-see Juan acc boy

'Juan saw the boy *behind the house*.'

*? [$_{CaseP}$ Mãã^3 xnii^3] que-ne'e^3 Juan^4 xco^4 ve'^{3}.
acc boy com-see Juan behind house

(Juan saw *the boy* behind the house.)

6.2 Plural Phrases

Copala Triqui also shows clear examples of dual and plural markers as separate words:

(22) roj^1 xnii^3 'boys (dual)'
dual boy

nij^3 xnii^3 'boys (three or more)'
plur boy

The phonology again shows us that these are separate words, since /h/ (<j>) may only occur as a coda consonant in word-final position (Hollenbach 1984). More generally, Dryer (1989, 1992) has shown that plural words constitute a small separate part of speech category in a number of languages.

6.3 Variation in existence of functional categories

The architecture of LFG is flexible enough to allow separate functional projections in c-structure for some languages but not others. Variation in the syntactic status of Infl and Det is well-known crosslinguistically, since some language realize categories like Tense, Mood, and Definite analytically --- through separate words ---

and other realize these categories synthetically -- through affixation.

In LFG with lexical sharing, we may posit a syntactic status for a functional morpheme when some syntactic phenomenon (like coordination) makes that status clear. The co-instantiation cases show us, however, that phonological status as an affix does not preclude a separate syntactic node. The realization possibilities for Case can be schematized as in the following chart:

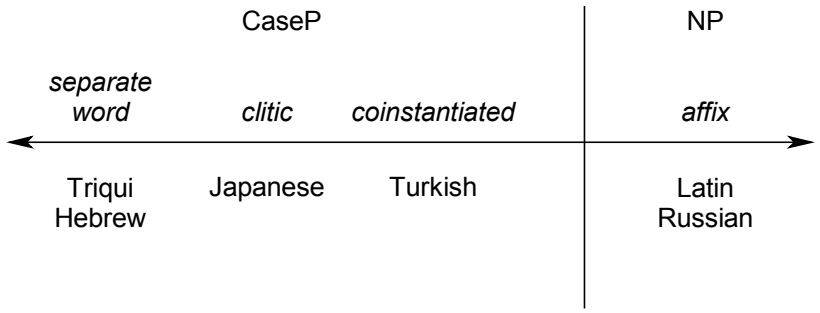

Figure 6 Possible realizations of case

7 Verb-internal suspended affixation

Turkish also has more complex cases where the non-final conjunct has some suffixes:

(23) [Çalış-acak ve başar-acak]-tı-k
work-fut and succeed-fut-past-1pl

'We were going to work and succeed.'

My analysis follows the insight of Kornfilt (1996), which claims that such structures involve a null copula internal to the verb suffixes.

Kornfilt argues that the correct analysis of such examples is as follows:

(24) Çalış-acak ve başar-acak-Ø-tı-k
work-fut and succeed-fut-COP-past-1pl

'We were going to work and succeed.'

The copular analysis is well-motivated in Turkish morphology. Note the multiple appearance of tense markers in the verbal suffix string and an overt /y/ in some environments:

(25) Gör-dü-y-dü-m
see-past-cop-past-1sg

'I had seen'

Adopting such a copular analysis of verb-internal suspended affixation allows us to extend our lexical sharing account to these forms as well, and they will have a treatment like that of the other copular contraction examples.

8 Morphological restrictions on suspended affixation

Kabak (2007) demonstrates the importance of the notion *morphological word.* An important constraint is that any non-final conjunct must be a legitimate morphological word. Legitimate morphological words need to end in an agreement marker or one of a small number of aspect/modality markers.

Thus there are some cases where the null copula might be expected to license suspended affixation, but the result is not good:

(26) *[Avşa-ya git-ti ve deniz-e gir-di]-y-dik
Avsha-dat go-past and sea-dat enter-past-cop-past-1pl

'We went to Avsha and swam in the sea.' (Kabak 2007:318)

The problem with this example is that *gitti* is not a valid morphological verb in Turkish since it lacks (appropriate) agreement.[3]

While Kabak (2007) is a thorough account of how morphology limits suspended affixation, his approach says nothing about the syntactic status of suspended affixation. The potentially phrasal nature of the conjuncts renders any account to deal with suspended affixation exclusively in the morphology problematic.

I believe that the most likely way to make Kabak's (2007) results compatible with a syntactic representation is to specify that syntax creates suspended affixation structures, but the structures must also satisfy a morphological filter.

9 Choices in syntactic representation

9.1 Minimalist approaches

If we accept the idea that morphology acts as a filter on suspended affixation, we are still left with the question of the most appropriate syntactic representation. In a Minimalist approach to Turkish, nearly every morpheme will head a separate XP – including inflectional morphemes like the passive and necessitative. Consider a sentence like

(27) Araba yıka-n-malı-dır
car wash-pass-necess-emph
'The car needs to be washed.'

[3] According to Kabak (2007), a finite verb needs to contain an agreement marker. *Gitti* is a possible word, but can only be interpreted as containing a 3rd singular agreement marker -Ø. In the context of this example, however the 3rd singular clashes with the features of the following verb in the coordination.

This will yield a tree like the following:

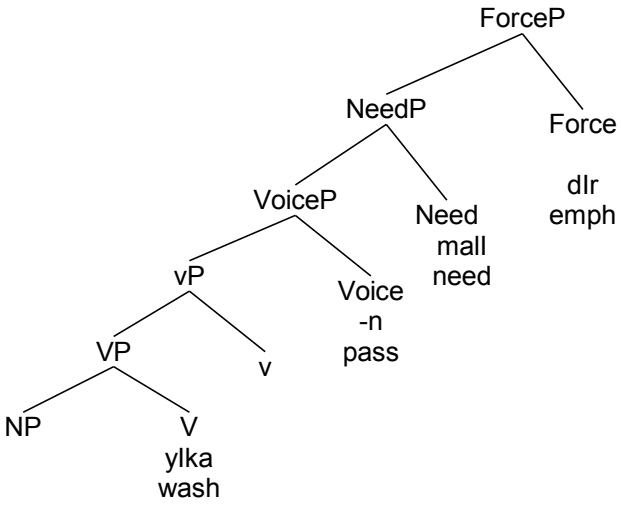

Figure 7 Possible minimalist analysis

However, if the rule of coordination allows all phrases and heads to coordinate, then the problem is that a tree of this sort predicts that all morphemes should license suspended affixation. In fact, only a few morphemes have this special property, so the Minimalist tree massively overgenerates. Though it is possible to allow the syntax to generate suspended affixation structures for every morpheme, this result essentially eliminates a syntactic explanation in favor of some morphological stipulation about possible words.

The utility of a morphological filter for languages other than Turkish also seems questionable. If we consider an English example like the following, it is not clear what principle rules this out.

(28) *John was [insult & humiliat]-ed

Insult is certainly a possible morphological word of English, so the ungrammaticality does not seem be the result of a morphological filter like the one that Kabak (2007) proposes. Instead, a lexical sharing approach can explain this simply by saying that there is no separate Tense head in English with is coinstantiated with the verb. Instead tense is simply an affix on the verb with no syntactic realization.

9.2 Problems for a standard LFG approach

While the Minimalist representation makes the incorrect prediction that all affixes should occur with suspended affixation, the classical LFG approach, which doesn't allow any morphology to be represented in the tree, also makes incorrect predictions. The ordinary LFG approach, if not supplemented by special annotation or lexical sharing, does not predict wide scope for the final affixes in an example like the following:

(29) [ev ve dükkan]-lar-da
house and shop-plur-loc
'in houses and shops'

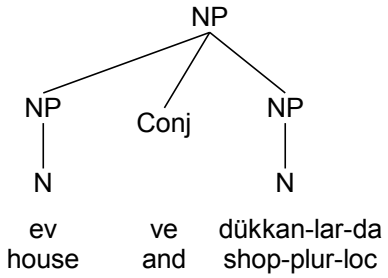

Figure 8 Classical LFG analysis

LFG + lexical sharing can give syntactic representation to some morphology when the facts motivate this treatment. Thus it is able to provide a simple account of suspended affixation. In contrast, the Minimalist approach provides too much syntactic representation to morphology and predicts many cases of suspended affixation that do not occur. Classical LFG does not provide enough syntactic structure to account for the Turkish facts. The addition of lexical sharing to the LFG toolbox provides us with a natural account of these otherwise problematic facts.

Acknowledgments and Bibliography

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TURKISH NON-CANONICAL OBJECTS

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Abstract

In this work we analyze objects with non-canonical case markers in Turkish. We show that semantic factors give rise to non-canonical case marking and try to determine criteria to decide on the grammatical function status of non-canonical objects. We conclude that ablative partitives and dative objects participating in an affectedness alternation should be analyzed as straightforward objects (OBJ), but that lexically specified non-canonically case marked objects should be treated as OBJ_θ. Based on our analysis, we provide an LFG implementation as part of the Turkish ParGram grammar and show how this analysis provides just the right results for the data observed with respect to causativization, passivization and raising.

1 Introduction

Turkish is a free word order language in which case plays a large part in identifying participants of a clause. Subjects are generally nominative and agreement is with the subject. Turkish also has a well-known case alternation on objects that correlates with the semantics of specificity (Enç 1991). A nonspecific direct object generally bears nominative case and a specific direct object is marked with the accusative. (1) and (2) exemplify this well-known contrast.[1]

(1) a. Ali bir **piyano** kiralamak istiyor
Ali one piano.Nom to.rent want.Prog.3sg
'Ali wants to rent one (some) piano.' (Enç 1991)

b. Ali bir **piyano-yu** kiralamak istiyor
Ali one piano-Acc to.rent want.Prog.3sg
'Ali wants to rent a certain piano.' (Enç 1991)

(2) a. **su** içtim
water.Nom drink.Past.1sg
'I drank water.'

b. **su-yu** içtim
water-Acc drink.Past.1sg
'I drank the water.'

A less well-known fact is that Turkish contains further semantically conditioned case markings as well. In this paper, we survey the range of non-canonical case marking on objects in Turkish and show that there are at least two identifiable groups (section 2): one which involves Differential-Object Marking (Aissen 2003)

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[1]Note that Turkish is a pro-drop language and that it is natural to drop the subject, as in (2).

encoding semantic differences at a clausal level, and one where the non-canonical object marking seems to be conditioned exclusively by the lexical semantics of the verb. Since both are semantically conditioned in some way, we would expect that both types should be analyzed as semantically restricted ([+r]) and be realized as OBJ_θ with respect to LFG's standard linking theory (Bresnan and Zaenen 1990). In section 3, we run through a number of tests involving passivization, causativization and raising in order to get a handle on the distribution and behavior of the non-canonical objects. We conclude that ablative partitives and dative objects participating in a case alternation should be analyzed as straightforward objects (OBJ), but that lexically specified non-canonically case marked objects should be treated as OBJ_θ. We provide a detailed analysis in section 4 in form of a concrete implementation as part of the Turkish ParGram grammar (Çetinoğlu and Oflazer 2006).

2 Non-Canonical Object Marking in Turkish

In addition to the well-known specificity alternation in (1) and (2), an ablative object indicates partitivity as in (3) with verbs of consumption (Dede 1981, Kornfilt 1990). As illustrated by (4), the relation only holds when the object is consumable.[2]

(3) su-dan içtim
water-Abl drink.Past.1sg
'I drank some of the water.'

(4) şişe-den içtim
bottle-Abl drink.Past.1sg
'I drank (something) from the bottle.'

In addition to signaling partitivity, case in Turkish also appears to make distinctions between the degree of *affectedness* of an object. The examples in (5) and (6) illustrate this type of case alternation, which occurs with a group of verbs that also includes 'look' and 'blow on'. Here the dative encodes less affected objects and alternates with the accusative. For example, in (5) the action and, indeed, the verb is the same. However, if an accusative is used, the interpretation is that the child was shot; when a dative is used, the object 'child' is less affected and the interpretation is that the child was merely hit.

(5) a. Ali **çocuğ-u** vur-du
Ali.Nom child-Acc hit-Past.3sg
'Ali shot the child.' (Dede 1981:41)

b. Ali **çocuğ-a** vur-du
Ali.Nom child-Dat hit-Past.3sg
'Ali hit the child.' (Dede 1981:41)

[2]Note that the surface form of the case markers differs from example to example. This is due to the well-known effects of vowel harmony in Turkish.

(6) a. fare **peynir-i** ye-di
mouse.Nom cheese-Acc eat-Past.3sg
'The mouse ate the cheese.' (Dede 1981:41)

b. fare **peynir-e** dokun-du
mouse.Nom cheese-Dat touch-Past.3sg
'The mouse touched the cheese.' (Dede 1981:41)

In (6) the verbs differ, but the effect of the case alternation is the same: actions affecting an object to differing degrees are encoded via differential case marking.

Alternating case markers due to the affectedness of the object are also found in many other languages (e.g., Scottish Gaelic, Finnish, South Asian languages in general, cf. Butt 2006). For example, Kiparsky (1998) analyzes a Finnish alternation that is very similar to the one in (5) as involving boundedness.

(7) a. Ammu-i-n **karhu-n**
shoot-Past-1sg bear-Acc
'I shot the/a bear.' (Kiparsky 1998:267)

b. Ammu-i-n **karhu-a**
shoot-Past-1sg bear-Part
'I shot at the/a bear (bear is not dead).' (Kiparsky 1998:267)

We leave aside the question of the exact semantics underlying the observed alternations in (5) and (6) and move on to another type of non-canonical case marking on objects found with a large subset of pysch verbs. Although all the verbs given in (8) are similar in meaning, only (8a) bears the canonical accusative case. (8b) and a group of verbs such as *hate, fear, suspect, be disgusted, get fed up* have ablative objects and (8c), and another subset of pysch verbs such as *beg, be crazy about, be angry, believe* have dative objects.

(8) a. Ali **Ayşe'-yi** seviyor
Ali.Nom Ayşe-Acc love.Prog.3sg
'Ali loves Ayşe.'

b. Ali **Ayşe'-den** hoşlanıyor
Ali.Nom Ayşe-Abl like.Prog.3sg
'Ali likes Ayşe.'

c. Ali **Ayşe'-ye** tapıyor
Ali.Nom Ayşe-Dat adore.Prog.3sg
'Ali adores Ayşe.'

There is also another set of verbs which simply take non-canonical objects. These verbs do not have a common semantic property and can have either ablative or dative objects. *ride* in (9) and *help* are from this class.

(9) Hasan at-a bindi
Hasan horse-Dat ride.Past.3sg
'Hasan rode the horse.'

It would be interesting to conduct an in-depth study of the use of semantic case alternations in Turkish. However, from our initial investigations it seems that the Turkish case alternations are not quite as productive as, for example, those found in South Asian languages (cf. Butt and King 2005, Butt et al. 2004) and rather seem to encode the vestiges of a productive system. Similarly, the non-canonical case marking found with psych verbs and verbs like *ride* and *help* seem to be lexically-conditioned vestiges of a more systematic lexical semantic classification.[3]

In this paper, we focus on how these non-canonical objects should be analyzed. Given that they are clearly semantically restricted ([+r]), we would expect them to function as OBJ_θ or even OBL in terms of LFG's linking theory (Bresnan and Zaenen 1990). A related question is whether these non-canonical objects, when passivized, should be analyzed as subjects. In the next section, we therefore examine data with respect to passivization, causativization and raising.

3 Object Tests

As to be expected in Turkish, both causativization and passivization are morphological. Both affect argument structure and thus are potentially good tests to distinguish between types of objects. Indeed, as the next four sections show, these tests as well as data from raising show that there are two classes of objects.

3.1 Passivization

The standard analysis of passives across theoretical frameworks is that the direct object of an active clause is realized as a subject in the passive. In standard LFG analyses (e.g., Bresnan 1982, Sells 1985, Butt et al. 1999), the assumption is that the OBJ, but not OBJ_θ, is realized as the SUBJ of the passive clause (also see the discussion of the status of OBJ in Börjars and Vincent 2008). This section thus investigates the behavior of the non-canonical objects with respect to passivization.

In canonically marked clauses, the nominative/accusative object is realized as a standard nominative subject which agrees with the verb under passivization.

(10) a. ben-i kovaladı
I-Acc chase.Past.3sg
'S/he chased me.'
b. ben kovalandım
I.Nom chase.Pass.Past.1sg
'I was chased.'

[3]For example, Joan Maling (p.c.) pointed out that Slavic languages use a special case for verbs of transport, such as *ride*.

In contrast, the ablative partitive object preserves its case under passivization. As Dede (1981) points out, if the ablative were absorbed under passivization with ablative partitives, then the partitive reading would be lost. There is thus a *clausal semantic* reason for the ablative to be preserved.

(11) a. **su** içildi
water.Nom drink.Pass.Past.3sg
'Water was drunk.'

b. **su-dan** içildi
water-Abl drink.Pass.Past.3sg
'Some of the water was drunk.'

Given that observation, the next question is the function of the ablative partitives in the passivized sentence. Subjecthood rules given in Kornfilt (1997) are the nominative case and the agreement with the verb in person and number (cf. also Göksel and Kerslake 2005), and (11b) fails with respect to both of them. This is more clearly illustrated by the (semantically somewhat strange) examples in (12) where the verb agreement is 3sg in (12.b).

(12) a. **ben** iç-il-di-m
I.Nom drink.Pass-Past.1sg
'I was drunk.'

b. **ben-den** iç-il-di
I-Abl drink.Pass-Past.3sg
'Some of me was drunk.'

However, there are indications, as in (13), that these ablative partitives function as subjects. Kornfilt (1990) points out that these examples involve unaccusative verbs where the ablative is the sole core argument and is naturally analyzed as a subject (despite the absence of verb agreement). Kornfilt (1990) argues that the ablative objects have the same distribution as canonical objects and proposes a *pro* which receives a phonologically unrealized Structural Case, thus bringing ablatives in line with canonical nominative/accusative objects (Kornfilt abandons the subjecthood criterion of verb agreement with respect to these examples).

(13) a. biz-de bu kitap-tan kal-ma-dı
we-Loc this book-Abl remain-Neg-Past
'We don't have any (copies) of this book left.' (Kornfilt 1990:287)

b. dolap-ta bu sucuk-lar-dan var/yok
cupboard-Loc this sausage-Pl-Abl exist/Neg.exist
'There are/aren't (some/any) of these sausages in the cupboard.'
(Kornfilt 1990:287)

Non-canonical case encoding degree of affectedness/boundedness is also preserved under passivization. When (14a) is passivised the dative object is still dative

in (14b) instead of nominative. Again, case absorption would erase the semantic contrast; the sentence would mean ‘shot the child’ rather than ‘hit the child’.

(14) a. Ali çocuğ-a vur-du
Ali.Nom child-Dat hit-Past
‘Ali hit the child.’

b. çocuğ-a vur-ul-du
child-Dat hit-Pass-Past
‘The child was hit.’ (Dede 1981:45)

If we apply a test on both alternatives of *vur*, we can observe that the passivized accusative and dative behave exactly alike with respect to anaphora resolution. This indicates that the passivized dative argument may be functioning as a subject.

(15) a. **çocuk** kendisi tarafından vuruldu
child.Nom self.P3sg by shoot.Pass.Past.3sg
‘The child was shot by itself.’

b. **çocuğ-a** kendisi tarafından vuruldu
child-Dat self.P3sg by shoot.Pass.Past.3sg
‘The child was hit by itself.’

In psych verbs, the object also preserves its case under passivization as exemplified in (16b). A small group of native speakers also accept the passivization as grammatical when the object becomes nominative as in (16c).

(16) a. san-a tap-tı
you-Dat worship.Past.3sg
‘S/he worshipped you.’

b. san-a tapıldı
you-Dat worship.Pass.Past.3sg
‘You were worshipped.’

c. %sen tapıldın
you.Nom worship.Pass.Past.2sg
‘You were worshipped.’

Although (16c) is ungrammatical for some speakers, the same data providers find (17) grammatical. In this example, *tapılarak* ((while) being worshipped) is the sentential complement which behaves as an adverb and is constructed by appending an *-arak* suffix to the verb. The subject of the *while*-clause always matches the subject of the main sentence (presumably via obligatory anaphoric control, cf. Dalrymple 2001). So, it seems that, to be able to construct the matrix sentence, the inner sentence should have a subject, and the verb *tap-* (worship) is forced to be passivized and have a nominative case marker, rather than a dative one.

(17) **öküz** tap-ıl-arak kilise-ye getir-il-di
ox.Nom worship-Pass-ByDoingSo church-Dat bring-Pass-Past.3sg
'The ox, while being worshipped, was brought to the church.'
(Knecht (1986) taken from Özkaragöz (1979))

When the matrix verb is impersonally passivized, *ox* can keep its dative case marker in the embedded clause. On the whole, the evidence from passivization with respect to the psych verbs again seems to indicate that the non-canonical object is indeed functioning as a direct object that is realized as a subject under passivization.

(18) **öküz-e** tap-ıl-arak dans ed-il-di
ox-Dat worship-Pass-ByDoingSo dance make-Pass-Past.3sg
'It was danced while the ox was worshipped.'

Lastly, we turn to the class of verbs like *ride*, which have dative objects. As shown in (19), case is again preserved under passivization.

(19) a. Hasan at-a bindi
Hasan.Nom horse-Dat ride.Past.3sg
'Hasan rode the horse.'

b. at-a bin-il-di
horse-Dat ride-Pass-Past.3sg
'The horse was ridden.'

However, this data by itself again is not sufficient to establish the potential subjecthood (and hence the precise object status of the non-canonical object) as it is also possible to passivize clauses with an intransitive verb and constituents other than the direct object, as in (20). In these cases passivization is impersonal, that is, the constituent preserves its function (and also its case marking) and there is no subject in the passivized sentence ((20a) and (20b)).

(20) a. Ali okul-a git-ti
Ali.Nom school-Dat go-Past.3sg
'Ali went to the school.'

b. okul-a gid-il-di
school-Dat go-Pass-Past.3sg
'The school was gone to. (Somebody went to the school)'

But all is not lost as Turkish distinguishes between subject and non-subject gaps in the participles by marking them with the derivational suffixes *-en* and *-diği*, respectively. Thus, if we convert the passivized sentence into a participle and extract the constituent we are interested in, we can determine whether or not it is functioning as a subject. Consider the data in (21). (21a) represents the base predication. In (21b) and (21c) participles corresponding to the base predication have

been formed. In (21b) the suffix *-en* indicates that there is a subject gap, i.e., *dog* is the missing subject of the participle. In (21c), on the other hand, the object *cat* has been extracted and the non-subject suffix *-diği* marks this.

(21) a. köpek kedi-yi kovaladı
dog.Nom cat-Acc chase.Past.3sg
'The dog chased the cat.'

b. [ ]$_i$ kedi-yi kovala-**yan** köpek$_i$
cat-Acc chase.PresPart dog.Nom
'The dog that chased the cat.'

c. köpeğ-in [ ]$_i$ kovala-**dığı** kedi$_i$
dog-Gen chase-PastPart.3sg cat.Nom
'The cat that the dog chased.'[4]

So now let us try the participle extraction test with the *ride* class. When we make a participle out of the passive version in (19) and extract the constituent *horse*, the morphological marking on the participle indicates that the former non-canonical object is now patterning with subjects. We take this as an indication that these non-canonical objects behave like subjects when they are passivized.

(22) a. bin-il-en/*diği at
ride-Pass-PresPart/PastPart.3sg horse.Nom
'The horse that was ridden.'

The data in this section has demonstrated that in all instances of non-canonical object marking the case was preserved under passivization. Despite this case preservation and the lack of agreement with the verb, a range of tests indicate that these non-canonical objects function as subjects when passivized. Thus, the passivization data so far also suggest that all of the objects could be analyzed as OBJ. In the next section we turn to data from causativization to see whether this analysis can be confirmed or whether our analysis needs to be more differentiated.

3.2 Causativization

Turkish exhibits quite complex patterns with respect to causativization, including double causatives. Here we focus only on single causativization. As shown in (23b), if the verb is intransitive, the subject becomes an accusative object.

(23) a. kedi uyu-du
cat.Nom sleep-Past.3sg
'The cat slept.'

[4]Literally, since these are participles: 'The cat is one chased by a dog.' The genitive case on *dog* is because it is functioning as the agent/Spec of the participle.

b. çocuk kedi-yi uyu-t-tu
child.Nom cat-Acc sleep-Caus-Past.3sg
'The child made the cat sleep.'

In transitive clauses, the canonical nominative/accusative object preserves its case and function when the verb is causativized. The causee (former nominative subject) is marked with the dative.

(24) a. köpek kedi-yi kovala-dı
dog.Nom cat-Acc chase-Past.3sg
'The dog chased the cat.'

b. çocuk köpeğ-e kedi-yi kovala-t-tı
child.Nom dog-Dat cat-Acc chase-Caus-Past.3sg
'The child made the dog chase the cat'

The ablative on partitive objects is similarly preserved under causativization. The causee is again dative. This is in parallel to the canonical causative in (24), indicating that the ablative object patterns with canonical objects.

(25) a. su-dan içtim
water-Abl drink.Past.1sg
'I drank some of the water.'

b. annem ban-a su-dan içirdi
mother.P1sg I-Dat water-Abl drink.Caus.Past.3sg
'My mother made me drink some of the water.'

Where a dative object signals low affectedness, we encounter a difficulty because Turkish has a general constraint which disprefers two dative-marked objects in a clause. However, if one of the datives is an indirect object, then two datives in a clause are allowed, as in (26).

(26) Babam-a çocuklar-a masal anlat-tır-dı-m
father.P1sg-Dat child.Pl-Dat story.Nom tell-Caus-Past-1sg
'I had my father tell stories to the children.' (Göksel 1993:216)

The pattern with causatives of dative less affected objects is complex in that it allows for an alternative realization of both the causee and the object. Each can be realized with a dative or an accusative, depending on whichever is compatible with an affectedness/boundedness reading. Consider *look* in (27), which takes a dative object in the base predication. In (27a), the causee is in the dative, but in (27b), the causee is accusative and the door (which is not affected) is dative.

(27) a. **hizmetçi-ye** çocuğ-u bak-tır-dı-k
maid-Dat child-Acc look-Caus-Past-1pl
'We made the maid look after the child.' (Dede 1981:43)

b. **herkes-i** kapı-ya bak-tır-dı-m
everybody-Acc door-Dat look-Caus-Past-1sg
'I made everybody look at the door.' (Dede 1981:43)

A similar pattern can be observed in (28) with the shoot/hit alternation.[5] When the child is less affected (hit rather than shot), it appears in the dative.

(28) a. Ahmet Ali'**ye** çocuğ-**u** vur-dur-du
Ahmet.Nom Ali-Dat child-Acc shoot-Caus-Past.3sg
'Ahmet made Ali shoot the child.'

b. Ahmet Ali'**yi** çocuğ-**a** vur-dur-du
Ahmet.Nom Ali-Acc child-Dat hit-Caus-Past.3sg
'Ahmet made Ali hit the child.'

Knecht (1986) gives another interesting example which allows two causativization patterns for a verb with a non-canonical object. The verb *hohla* 'blow on' subcategorizes for a dative object. Most of the native speakers prefer to keep *ayna* 'mirror' in the dative case, and convert *Ufuk* into accusative when causativized (29c). But it is also acceptable to transform the non-canonical object of the main verb into the accusative object of the causative verb, demonstrating the alternative possibilities in verbs with no clearly affected object (29b).

(29) a. Ufuk ayna-**ya** hohladı
Ufuk.Nom mirror-Dat blow.on.Past.3sg
'Ufuk blew on the mirror.'

b. Ufuk'**a** ayna-**yı** hohlattım
Ufuk-Dat mirror-Acc blow.on.Caus.Past.1sg
'I made Ufuk blow on the mirror.'

c. Ufuk'**u** ayna-**ya** hohlattım
Ufuk-Acc mirror-Dat blow.on.Caus.Past.1sg
'I made Ufuk blow on the mirror.'

The fact that causatives of non-canonical dative objects do not allow two datives in the clause indicates that both the causee and the non-canonical object should be analyzed as objects — the causee cannot be analyzed as an indirect object, otherwise two datives in a clause should be licit, as in (26). Furthermore, modulo the double-dative constraint, the non-canonical objects pattern like canonical transitives in terms of causativization.

We now turn to the pattern with psych verbs and verbs of the *ride* type. Both with ablative and dative objects of psych verbs, the case is preserved under causativization. However, the causee (former nominative subject) is accusative rather than dative, as shown in (30) and (31).

[5]Note that an "affectedness" alternation in causatives has also been documented in Romance, Bantu and South Asian languages (Alsina and Joshi 1991, Alsina 1997, Butt 1998).

(30) a. kedi köpek-ten korktu
cat.Nom dog-Abl fear.Past.3sg
'The cat feared the dog.'

b. çocuk **kedi-yi** köpek-ten korkuttu
child.Nom cat-Acc dog-Abl fear.Caus.Past.3sg
'The child made the cat fear the dog.'

(31) a. Ali ateş-e taptı
Ali.Nom fire-Dat worship.Past.3sg
'Ali worshipped the fire.'

b. babası **Ali'-yi** ateş-e taptırdı
father.P3sg Ali-Acc fire-Dat worship.Caus.Past.3sg
'His father made Ali worship the fire.'

The same pattern holds for the *ride* type. As shown in (32), the case of the object is preserved under causativization, and again, the causee must be accusative.

(32) a. Hasan at-a bindi
Hasan.Nom horse-Dat ride.Past.3sg
'Hasan rode the horse.'

b. babası **Hasan'-ı** at-a bindirdi
father.P3sg Hasan-Acc horse-Dat ride.Caus.Past.3sg
'His father made Hasan ride the horse.'

The evidence from causativization thus partitions the data into two sets: those which allow for a dative causee in parallel to canonical transitive clauses and those which require an accusative causee, deviating from the canonical pattern. Under the assumption that causatives always need to include an OBJ in the subcategorization frame, we suggest that the data from causativization can be understood as follows: ablative partitives and affectedness alternation involve "real" objects, i.e., OBJ. However, the psych verbs and the other non-canonical case marking verbs subcategorize for OBJ_θ. That is, when a clause with a partitive or less affected object is causativized, then the causee is realized as a dative OBJ_θ (or the causee as an OBJ and the affected object as an OBJ_θ in the case of the alternative possibilities in examples as in (27) or (29)) because there is already an OBJ in the clause. On the other hand, when a psych verb or *ride* type verb is causativized, there is only a lexically determined OBJ_θ in the clause and so the causee is linked to an OBJ.

3.3 Passives of Causatives

In order to test this hypothesis, we can examine the behavior of the causativized clauses with non-canonical objects when these in turn are passivized. As a bench mark, the passivization of a causativized canonical verb is given in (33). Note that the translation in (33b) might be misleading. In the Turkish sentence, *kedi* 'cat' is the subject whereas in the English sentence *dog* is the subject.

(33) a. çocuk köpeğ-e kedi-yi kovala-t-tı
child.Nom dog-Dat cat-Acc chase-Caus-Past.3sg
'The child made the dog chase the cat.'

b. kedi (çocuk tarafından) köpeğ-e kovala-t-ıl-dı
cat.Nom child.Nom by dog-Dat chase-Caus-Pass-Past.3sg
'The dog was made to chase the cat (by the child).'

The ablative partitives again pattern canonically in that the causee remains in the dative. However, the ablative case is preserved and the subject is non-nominative. That is, the ablative object of the main verb seems to be the one linked to the OBJ in the causative version and it is this argument which is subject to passivization in (34b). That is, the ablative object preserves its case as well as its function as OBJ in the causative construction and then becomes an ablative subject under passivization in (34b). Again, the English translation might be misleading.

(34) a. annem ban-a su-dan içirdi
mother.P1sg I-Dat water-Abl drink.Caus.Past.3sg
'My mother made me drink some of the water.'

b. ban-a su-dan içirildi
I-Dat water-Abl drink.Caus.Pass.Past.3sg
'I was made to drink some of the water.'

The dative less affected objects (not shown here for lack of space) pattern like the ablatives; however, the psych verbs and *ride* type verbs again exhibit a different pattern. Examples of a psych verb with an ablative object (35), a psych verb with a dative object (36), and *ride* with the dative object (37) are provided below. In all the examples the accusative causee in the causativized sentences becomes nominative under passivization. This is consistent with our analysis of the accusative causee having been linked to OBJ in the causative and then being available for standard passivization whereby a canonical OBJ is realized as a nominative SUBJ.

(35) a. çocuk kedi-yi köpek-ten kork-ut-tu
child.Nom cat-Acc dog-Abl fear-Caus-Past.3sg
'The child made the cat fear the dog.'

b. kedi köpek-ten kork-ut-ul-du
cat.Nom dog-Abl fear-Caus-Pass-Past.3sg
'The cat was made to fear the dog.'

(36) a. babası Ali'yi ateş-e taptırdı
father.P3sg Ali-Acc fire-Dat worship.Caus.Past.3sg
'His father made Ali worship the fire.'

b. Ali ateş-e taptırıldı
Ali.Nom fire-Dat worship.Caus.Pass.Past.3sg
'Ali was made to worship the fire.'

(37) a. babası Hasan'-ı at-a bindirdi
father.P3sg Hasan-Acc horse-Dat ride.Caus.Past.3sg
'His father made Hasan ride the horse.'

b. Hasan at-a bindirildi
Hasan.Nom horse-Dat ride.Caus.Pass.Past.3sg
'Hasan was made to ride the horse.'

In sum, the data from passivized causatives are consistent with our analysis made on the basis of the data with respect to simple causatives and passives. Ablative partitive and dative less affected objects behave in parallel to canonical objects, strengthening our claim that they are OBJ. For the sentences in (35)–(37), the result of the passivization is as expected: causativization introduces OBJs with an accusative case to these sentences, and passivization makes these OBJs nominative SUBJs. Hence the psych verbs and the other subset of verbs with non-canonical objects can be analyzed as subcategorizing for OBJ_θs in their basic form.

3.4 Raising

Raising is another possible test for subject status. That is, one could take a passivized version of the clauses with non-canonical objects and see if the passivized object is able to raise out of the clause, as a normal subject would. However, it turns out that verbs like *seem* and *believe*, which are equivalent to raising verbs in other languages, display quite a complex set of syntactic properties (a.o., Mulder 1976, Kornfilt 1977, Moore 1998) in Turkish.

When the lexical item *gibi* 'like' is used, agreement markers can appear on both the matrix and the embedded verb. Since this provides information about subject status and is thus potentially interesting for our investigation, we here only provide examples with *gibi*, as in (38).

(38) biz san-a süt iç-ti-k gibi görün-dü-k
we.Nom you-Dat milk drink-Past.1pl like seem-Past-1pl
'We seemed to you to have drunk milk.' (Mulder 1976:(26b))

The *we* here is nominative and is clearly the subject of the matrix verb *seem*; as evidenced by verb agreement, it is also the subject of the embedded verb.

In (39), we have taken our bench mark transitive clause, passivized it and then embedded it in a raising construction. As can be seen, the embedded subject is raised to be the matrix nominative subject, which agrees with the raising verb. Interestingly, this subject (*we*) may or may not agree with the embedded verb.

(39) a. biz sana kovala-n-dı-k gibi görün-dü-k
we.Nom you.Dat chase-Pass-Past-1pl like seem-Past-1pl
'We seemed to you to have been chased.'

b. biz sana kovala-n-dı gibi görün-dü-k
we.Nom you.Dat chase-Pass-Past.3sg like seem-Past-1pl
'We seemed to you to have been chased.'

Now let us examine what happens with respect to clauses with non-canonical objects. First, we take the examples of semantic case alternation. As can be seen from the alternation in (40), the case is again preserved in order to be able to preserve the semantic distinction of partitivity.

(40) a. su iç-il-di gibi görün-dü
water.Nom drink-Pass-Past.3sg like seem-Past.3sg
'It seemed that water was drunk.'

b. su-dan iç-il-di gibi görün-dü
water-Abl drink-Pass-Past.3sg like seem-Past.3sg
'It seemed that some of the water was drunk.'

The same is true for the affectedness alternation, where a nominative on *child* in (41a) would result in the reading that the child was shot, rather than hit (cf. Kornfilt 1977). This can be seen in (41b), which is ambiguous. In the second reading, the subject has been pro-dropped and is interpreted as a third person pronoun.

(41) a. çocuğ-a vur-ul-du gibi görün-dü
child-Dat hit-Pass-Past.3sg like seem-Past.3sg
'It seemed that the child was hit.'

b. ban-a vur-ul-du gibi görün-dü
I-Dat hit-Pass-Past.3sg like seem-Past.3sg
'It seemed that I was hit.'
'It seemed to me that s/he was shot.'

So, again it seems that in these cases the non-canonical object is acting as a direct object which can be raised out of a clause after passivization, though preserving its case marking for reasons of semantic contrast.

The pattern with respect to the psych verbs and the *ride* type again differs. We illustrate this here only with respect to the verb *fear* (all the other verbs behave the same way as this one). As can be seen from (42a) vs. (42b), the *we* can marginally be raised; however it is not the subject of the embedded verb, as it cannot agree with that. Furthermore, as illustrated by (42c), one cannot raise the *we* while preserving its non-canonical case marking. The *we* can appear with the non-canonical case marking, but then only as part of the embedded clause (cf. Kornfilt 1977) on a discussion of the significance of word order in such examples) and the verb *seem* must be interpreted as having an impersonal subject.

(42) a. *biz sana kork-ul-duk gibi görün-dük
we.Nom you.Dat fear-Pass-Past.1pl like seem-Past.1pl
'We seemed to you to have been feared.'

b. ?biz sana kork-ul-du gibi görün-dük
we.Nom you.Dat fear-Pass-Past.3sg like seem-Past.1pl
'We seemed to you to have been feared.'

c. *biz-den sana kork-ul-du gibi görün-dü
we-Abl you.Dat fear-Pass-Past.3sg like seem-Past.3sg
'It seemed to you that we were feared.'

d. sana [biz-den kork-ul-du] gibi görün-dü
you.Dat we-Abl fear-Pass-Past.3sg like seem-Past.3sg
'It seemed to you that we were feared.'

To summarize, the raising data confirms the patterns observed with respect to causativization and passivization: the non-canonical objects in Turkish can be grouped into two types. In one, the non-canonical marking is used to express a semantic case alternation at a clausal level and here the object can be analyzed as an OBJ. In the other, the non-canonical case marking is tied to the inherent lexical semantics of particular verbs, such as psych verbs and verbs such as *ride*, and in this case, the object can be analyzed as an OBJ_θ. In the next section, we present our analysis as we have implemented it within the Turkish ParGram grammar.

4 Analysis and Implementation

Given these empirical considerations, we conclude that the instances of Differential Object Marking (DOM), namely the ablative partitives and the affectedness alternation should be analyzed as involving OBJ. On the other hand, the cases of lexically specified non-canonical case marking involving dative and ablative arguments should be analyzed as inherently semantically-restricted objects, i.e., as OBJ_θ. We show how this analysis plays out in the actual implementation with respect to passivization and causation thereby further confirming the formal validity of our analysis.

4.1 Passivization

The passivization rule for Turkish has two parts. One part is the standard lexical rule that takes an OBJ and makes it a SUBJ under passivization. In its canonical form, a transitive verb has the subcategorization frame `verb<SUBJ, OBJ>`. When passivized, SUBJ becomes NULL unless an oblique agent is introduced in the passive sentence. This is illustrated in (43) and (44), which provide simplified f-structures of the sentences in (10a) and (10b) respectively.

(43) F-structure for *köpek beni kovaladı*

$$\begin{bmatrix} \text{PRED} & \text{`kovala}\langle\text{köpek, ben}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`köpek'} \\ \text{CASE} & \text{nom} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{`ben'} \\ \text{CASE} & \text{acc} \end{bmatrix} \\ \text{TENSE} & \text{PAST} \end{bmatrix}$$

(44) F-structure for *ben kovalandım*

$$\begin{bmatrix} \text{PRED} & \text{`kovala}\langle\text{NULL, ben}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`ben'} \\ \text{CASE} & \text{nom} \end{bmatrix} \\ \text{TENSE} & \text{PAST, PASSIVE +} \end{bmatrix}$$

Another subpart of the passive lexical rule deals with the psych verbs and *ride* type verbs. For these, we posit the subcategorization frame `verb<SUBJ, OBJ-TH>` and we add a disjunction to the standard passive lexical rule[6] to encode that an OBJ-TH (OBJ_θ) becomes SUBJ ((↑ OBJ-TH) → (↑ SUBJ)) when there is no OBJ available in the clause. The result is illustrated in (45) and (46), which give the simplified f-structures of the sentences in (19a) and (19b), respectively.

(45) F-structure for *Hasan ata bindi*

$$\begin{bmatrix} \text{PRED} & \text{`bin}\langle\text{Hasan, at}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`Hasan'} \\ \text{CASE} & \text{nom} \end{bmatrix} \\ \text{OBJ-TH} & \begin{bmatrix} \text{PRED} & \text{`at'} \\ \text{CASE} & \text{dat} \end{bmatrix} \\ \text{TENSE} & \text{PAST} \end{bmatrix}$$

(46) F-structure for *ata binildi*

$$\begin{bmatrix} \text{PRED} & \text{`bin}\langle\text{NULL, at}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`at'} \\ \text{CASE} & \text{dat} \end{bmatrix} \\ \text{TENSE} & \text{PAST, PASSIVE +} \end{bmatrix}$$

Finally, the partitivity and affectedness relations are controlled via CHECK features, which are used generally within ParGram to enforce well-formedness constraints. Thus, for example, if a verb of consumption has a consumable object, it is allowed to have an ablative object in the basic sentence and an ablative subject in its passive form.[7] (47) shows the f-structure analysis of (3). The passivized sentence (11b) has the f-structure in (48).

(47) F-structure for *ben sudan içtim*

$$\begin{bmatrix} \text{PRED} & \text{`iç}\langle\text{ben, su}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`ben'} \\ \text{CASE} & \text{nom} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{`su'} \\ \text{CASE} & \text{abl} \\ \text{CHECK} & \text{consumable} \end{bmatrix} \\ \text{TENSE} & \text{PAST} \end{bmatrix}$$

(48) F-structure for *sudan içildi*

$$\begin{bmatrix} \text{PRED} & \text{`iç}\langle\text{NULL, su}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`su'} \\ \text{CASE} & \text{abl} \\ \text{CHECK} & \text{consumable} \end{bmatrix} \\ \text{TENSE} & \text{PAST, PASSIVE +} \end{bmatrix}$$

4.2 Causativization

For the implementation of causatives, we follow the approach used for Urdu complex predicates (Butt and King 2006), which allows the merger of two separate

[6] Available at http://www2.parc.com/isl/groups/nltt/xle/doc/notations.html

[7] Ideally, this kind of information should be encoded and checked at the level of representation of world knowledge.

argument structures to form a new complex predicate via the Restriction Operator (Kaplan and Wedekind 1993). The causative itself is analyzed as a two place predicate where the first argument is the causer and the second argument is the event that is caused. The base verb preserves the number of arguments it has although the arguments themselves are altered (see also Butt et al. 2008 for some discussion).

There are two types of behavior for the causativization of transitives. If the core predication already contains an OBJ, then the causee (former SUBJ) is realized as a dative OBJ_θ. This rule applies to canonical transitives, ablative partitives and the affectedness alternation. A canonical transitive verb and its causative form as exemplified in (24) have the f-structures (49) and (50), respectively.

(49) F-structure for *köpek kediyi kovaladı*

$$\begin{bmatrix} \text{PRED} & \text{`kovala}\langle\text{köpek,kedi}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`köpek'} \\ \text{CASE} & \text{nom} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{`kedi'} \\ \text{CASE} & \text{acc} \end{bmatrix} \\ \text{TENSE} & \text{PAST} \end{bmatrix}$$

(50) F-structure for *çocuk köpeğe kediyi kovalattı*

$$\begin{bmatrix} \text{PRED} & \text{`caus}\langle\text{çocuk, kovala}\langle\text{köpek,kedi}\rangle\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`çocuk'} \\ \text{CASE} & \text{nom} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{`kedi'} \\ \text{CASE} & \text{acc} \end{bmatrix} \\ \text{OBJ-TH} & \begin{bmatrix} \text{PRED} & \text{`köpek'} \\ \text{CASE} & \text{dat} \end{bmatrix} \\ \text{TENSE} & \text{PAST} \end{bmatrix}$$

Both the base and causativized versions of the partitive example in (25) are represented by the f-structures (51) and (52), respectively.

(51) F-structure for *ben sudan içtim*

$$\begin{bmatrix} \text{PRED} & \text{`iç}\langle\text{ben, su}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`ben'} \\ \text{CASE} & \text{nom} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{`su'} \\ \text{CASE} & \text{abl} \\ \text{CHECK} & \text{consumable} \end{bmatrix} \\ \text{TENSE} & \text{PAST} \end{bmatrix}$$

(52) F-structure for *annem bana sudan içirdi*

$$\begin{bmatrix} \text{PRED} & \text{`caus}\langle\text{anne, iç}\langle\text{ben,su}\rangle\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`anne'} \\ \text{CASE} & \text{nom} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{`su'} \\ \text{CASE} & \text{abl} \\ \text{CHECK} & \text{consumable} \end{bmatrix} \\ \text{OBJ-TH} & \begin{bmatrix} \text{PRED} & \text{`ben'} \\ \text{CASE} & \text{dat} \end{bmatrix} \\ \text{TENSE} & \text{PAST} \end{bmatrix}$$

If the core predication does not contain an OBJ, then the causee has to be realized as an accusative OBJ. Psych verbs and *ride* type verbs subcategorize for an OBJ-TH instead of an OBJ, therefore the SUBJ of the base verb becomes the OBJ after causativization. (53) and (54) depict f-structures of (30). (55) and (56) are the implementation for (32).

Our partitioning of non-canonical objects in Turkish into two distinct sets, one which subcategorize for OBJ but with special case marking that is motivated by clausal semantic factors, and one which subcategorize for an OBJ_θ due to inherent lexical semantic factors, thus allows for a straightforward implementation.

(53) F-structure for *kedi köpekten korktu*

$$\begin{bmatrix} \text{PRED} & \text{`kork}\langle\text{kedi, köpek}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`kedi'} \\ \text{CASE} & \text{nom} \end{bmatrix} \\ \text{OBJ-TH} & \begin{bmatrix} \text{PRED} & \text{`köpek'} \\ \text{CASE} & \text{abl} \end{bmatrix} \\ \text{TENSE} & \text{PAST} \end{bmatrix}$$

(54) F-structure for *çocuk kediyi köpekten korkuttu*

$$\begin{bmatrix} \text{PRED} & \text{`caus}\langle\text{çocuk, kork}\langle\text{kedi, köpek}\rangle\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`çocuk'} \\ \text{CASE} & \text{nom} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{`kedi'} \\ \text{CASE} & \text{acc} \end{bmatrix} \\ \text{OBJ-TH} & \begin{bmatrix} \text{PRED} & \text{`köpek'} \\ \text{CASE} & \text{abl} \end{bmatrix} \\ \text{TENSE} & \text{PAST} \end{bmatrix}$$

(55) F-structure for *Hasan ata bindi*

$$\begin{bmatrix} \text{PRED} & \text{`bin}\langle\text{Hasan, at}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`Hasan'} \\ \text{CASE} & \text{nom} \end{bmatrix} \\ \text{OBJ-TH} & \begin{bmatrix} \text{PRED} & \text{`at'} \\ \text{CASE} & \text{dat} \end{bmatrix} \\ \text{TENSE} & \text{PAST} \end{bmatrix}$$

(56) F-structure for *babası Hasan'ı ata bindirdi*

$$\begin{bmatrix} \text{PRED} & \text{`caus}\langle\text{baba, bin}\langle\text{Hasan, at}\rangle\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`baba'} \\ \text{CASE} & \text{nom} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{`Hasan'} \\ \text{CASE} & \text{acc} \end{bmatrix} \\ \text{OBJ-TH} & \begin{bmatrix} \text{PRED} & \text{`at'} \\ \text{CASE} & \text{dat} \end{bmatrix} \\ \text{TENSE} & \text{PAST} \end{bmatrix}$$

5 Conclusion

In this paper we analyzed objects that bear cases other than the canonical nominative/accusative case in Turkish. With a set of examples, we observed the possible alternation scenarios and divided the non-canonical objects into subsets. Verbs of consumption have ablative objects when only part of the object is affected from the action. Degree of affectedness or boundedness causes alternation in object cases for another set of verbs as well. Most of the psych verbs subcategorize for either dative or ablative objects, as do a small subset of verbs with no common semantics.

When the sentences including non-canonical objects are passivized, all of the objects preserve their case. Although Turkish has nominative subjects in general, there are indications that non-canonical objects might turn into subjects. On the other hand, data from causativization points to two distinct groups. Objects with partitivity or affectedness/boundedness alternations behave the same as canonical objects, with the difference that they preserve their non-canonical case so as not to erase the semantic information coded by them. Objects of psych verbs and the *ride* type behave as if they do not already contain an OBJ, as the accusative causee fills that role. We thus analyze these non-canonical objects as OBJ_θ.

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INCORPORATED ADJUNCT CLASSIFIERS IN ANINDILYAKWA: AN EMPIRICAL CHALLENGE TO LFG

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Abstract

Verbal classifiers, or incorporation into the verb of a generic nominal that is in apposition with an external specific nominal, is a common feature in northern Australian languages. The incorporated generic is typically in S or O function. Nordlinger and Sadler (this volume) analyze the classifier as a member of a SUBJ or OBJ set, the other member being the co-referential external specific nominal. In Anindilyakwa incorporated apposition is also very common. However, classifiers in this language are not always in S or O function, but they can be associated with an adjunct too. These adjunct classifiers not only defy the typological generalization of the grammatical function of verbal classifiers, but they also pose a challenge to LFG. This is because the incorporated generic can be ambiguous in its grammatical function, so it is unclear what the lexical entry of a verb with an incorporated classifier, should look like.[1]

1 Introduction

Anindilyakwa is a Non-Pama-Nyungan language spoken by about 1500 people living on Groote Eylandt in the Gulf of Carpentaria, Northern Territory, Australia. It is a highly agglutinative polysynthetic head-marking language (Nichols 1986): subject and object are identified by pronominal prefixes on the verb, and free subject and object nominals are caseless. Anindilyakwa freely allows the incorporation of body part noun roots into verbs, adjectives, numerals and postpositions. These body part noun roots can have two functions: they can either denote a real body part that belongs to the subject or the object, in which case they instantiate noun incorporation (NI), or they can be used as a generic that categorizes an external noun. This is exemplified in (1a) and (1b), respectively.[2]

(1) a. *ningi-**lakbak**-arrkwuj-ey-ina* (Julie Waddy unpublished material)
1Sg-**leg**-hurt-Pl-Npast
'my legs are aching'

[1] This paper was presented at the 'Empirical Challenges to LFG' speed talk session. It is part of my PhD project, and is still work in progress.

[2] Glosses used in this paper: 1: first person; 2: second person; 3: third person; Sg: singular; Pl: plural; Tri: trial; m: masculine; f: feminine; Excl: exclusive; Npast: non-past; REFL: reflexive; ERG: ergative; ABS: absolutive; REDUP: reduplication; CL: classifier; SUBJ: subject; OBJ: object; PURP: purposive; ALL: allative; CAUS: causative; EMPH: emphatic; PRO: pronoun; A, D, M, Y, WURR: noun classes; *x*>*y*: portmanteau form of subject *x* and object *y*.

b. *ni-**lakbak**-arjiyaj-uwa-ma* *yiraka*
3mSg>Y-**CL:SHORT.UPRIGHT.OBJECT**-put.up-past-? Y.didjeridu
'he stood up the didjeridu'
(Julie Waddy unpublished material, Ansec1; gloss mine)

Incorporated generic nominal roots as in (1b) describe an external noun or NP in terms of shape, consistency, animacy and so on. I will refer to incorporated generics as classifiers, following Allan (1977) and Aikhenvald (2000, 2006), among others. Classifiers are typically optional (their presence depends on discourse factors), they are very productive and the meaning of the incorporation complex is semantically transparent, as can be seen in (1).[3] Interestingly, in the literature, classifiers incorporated into verbs are claimed to characterize a noun that is typically in S (intransitive subject) or O (direct object) function – not in A (transitive subject) function (Aikhenvald 2000, 2006; Evans 2003, among others). In Anindilyakwa too, classifiers are never associated with a transitive subject.[4] However, in this language classifiers are not only associated with core grammatical functions, because they can refer to adjuncts as well.

This paper is organized as follows. Section 2 provides a brief sketch of the structure of Anindilyakwa. Section 3 describes the different types of classifiers observed in Anindilyakwa, as well as NI and lexical compounds. All of these incorporation processes involve the same morphemes. The differences between the various types of incorporation are discussed as well. Section 4 introduces incorporated adjunct classifiers, which are not associated with a core grammatical function. Section 5 discusses Nordlinger and Sadler's LFG analysis of classifiers and shows why adjunct classifiers are problematic. Section 6 concludes that this type of classifier presents an empirical challenge to LFG.

2 Anindilyakwa[5]

Like most Non-Pama-Nyungan languages, Anindilyakwa is a prefixing head-marking language, and, like most Australian Aboriginal languages, it has free word order and allows null anaphora and discontinuous NPs (cf. Hale 1983 and many others that followed). The pronominal prefixes on the verb are

[3] Assuming that the Anindilyakwa speakers have both meanings of *-lakbak-*, 'leg' and 'short upright object', listed.

[4] I think an interesting question is *why* verbal classifiers in the world's languages display this ergative pattern of being associated with S and O, but not A (see also Baker (1988), who notes the same pattern for NI). However, I will not attempt to answer this question here.

[5] The section is based on Stokes (1982), Waddy (1988), Leeding (1989, 1996), and unpublished material from Velma Leeding and Julie Waddy.

obligatory and index person, number and gender for humans, and one of five noun classes (NCs) for non-humans. These NCs are WURR, Y, D, M, A, named after the first letter(s) of the noun they categorize.[6] All adjectives and numerals agree with the noun they modify. An example sentence is given in (2). [7]

(2) *Ku-mungku-mungkad-ina y-akina yaraja biya*
2Sg-REDUP-dig-Npast Y-that Y.goanna then
ki-n-akburrang-a.
2Sg.SUBJ-Y.OBJ-find-Npast
'You keep on digging and then you find the goanna.'
(Velma Leeding unpublished story)

Since subject and object are identified by prefixes on the verb, the corresponding free nominals are optional and a sentence can consist of a verb only:

(3) *karru-buku-ma-wurraki-rringk-a-ma*
3Pl.SUBJ-Tri-M.OBJ-Pl-see-Npast-?
'the three of them might be seeing many [canoes, NC M]'
(Leeding 1989:426, orthography and gloss mine)

Incorporation of one or two nominal roots into verbs and adjectives is very common in Anindilyakwa. This will be discussed in more detail in the next section.

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[6] WURR is the plural noun class for humans. For example, the plural of *didarringka* 'woman' (NC D) is *wurridarringka* 'women' (NC WURR). However, this noun class also contains some singular items, such as *wurrajija* 'bird' and *wurruwarda* 'dog', which is why this is considered to be a distinct noun class, rather than merely the plural for humans. Non-human items cannot be pluralized by a change of noun class, so for instance *akwalya* 'fish' (NC A), *makarda* 'sea' (NC M) and *yingarna* 'snake' (NC Y) are ambiguous between a singular and a plural reading.

[7] One as yet unresolved issue in Anindilyakwa is the orthography. There exist two different orthographies, based on different analyses of the vowels: one by Leeding (1989), and one by Julie Waddy and Judith Stokes. Without going into detail, vowels in Anindilyakwa are conditioned by the surrounding consonants (somewhat like in the Arandic languages (e.g. Breen 2001)) and as a result they are not stable but fluctuate. Leeding (1989) proposes an orthography with two vowels, /a/ and /i/, together with numerous phonological rules that generate the range of observed allophones. The Waddy-Stokes system sticks closer to the surface and assumes four vowels: /a/, /i/, /e/ and /u/. The latter two are taken to be epenthetic vowels, the distribution of which can be predicted (see also Heath 1977). I have chosen to adopt the Waddy-Stokes system here, because I think it is more practical and user-friendly than the more abstract Leeding orthography.

3 Classifiers

Allan (1977:285), the pioneering linguist on the semantics of classifiers, defines classifiers as morphemes that occur under specifiable conditions and that denote "some salient, perceived or imputed characteristic of the entity to which an associated noun refers". In other words, classifiers characterize a noun with which they co-occur in terms of its shape, size, animacy or other inherent properties.

There are various types of classifiers, differing in the morpho-syntactic environment in which they occur. Aikhenvald (2000, 2006) distinguishes the following:

- noun classifiers: characterize the noun with which they co-occur, as in the following example from Yidiny (Pama-Nyungan).

(4) *mayi* *jimirr* *bama-al* *yaburu-ŋgu julaal*
vegetable.ABS yam.ABS CL:PERSON-ERG girl-ERG dig.past
'The person girl dug up the vegetable yam' (Literally)
(Aikhenvald 2006:465, ex. 3; from Dixon 1982:185)

- numeral classifiers: occur next to a numeral or quantifier, as in the following examples from Thai.

(5) a. *khru.* *lâj* *khon* (Allan 1977:286, ex. 1; from Haas 1942)
teacher three CL:PERSON
'three teachers'
b. *mă* *sì* *tu* (Allan 1977:286, ex. 2; from Haas 1942)
dog four CL:BODY
'four dogs'

- verbal (or verb-incorporated) classifiers: appear on the verb, categorizing a noun typically in S or O, but not A, function.[8] These are called predicate classifiers by Allan (1977), classificatory noun incorporation by Mithun (1984) and generic noun incorporation by Evans (2003). An example from Bininj Gun Wok (Non-Pama-Nyungan) is given in (6).

(6) *ba-bo-yakm-inj* *gukku / gun-gih / an-bang* (Evans 2003:334)
3-CL:LIQUID-disappear-PP water IV-mud III-grog
'The water/mud/grog disappeared.'

[8] The use of the term *verbal classifier* here, referring to a nominal being classified by 'verbal means', should not be confused with the term *verb classifier* or *verb classification* as referring to the closed class of generic verbs that categorize events in many Northern Australian languages (cf. e.g. Schultze-Berndt 2000, McGregor 2002).

- locative classifiers: occur with locative prepositions and postpositions, as in (7) from Palikur (Arawak language, Brazil).

(7) *pi-wan min* (Aikhenvald 2006:468)
2Sg-arm CL.LOC.vertical
'on your (vertical) arm'

- classifiers in possessive constructions
- deictic classifiers

The last two types will not be discussed here because they are not relevant to this paper, as they do not occur in Anindilyakwa. Allan (1977) assumes an additional classifier type that he labels 'concordial classifiers'. These are morphemes that are "affixed (usually prefixed) to nouns, plus their modifiers, predicates, and proforms […] Many African (Bantu and Semi-Bantu) and Australian languages are of this type" (p.286). However, Aikhenvald (2000, 2006) argues that these are not classifiers but noun class (NC) markers. NC markers differ from classifiers in that each noun in a given language belongs to only one (though occasionally more than one) NC, whereas a noun can be typically characterized by several different classifiers, focusing on different characteristics of the same object. Furthermore, some constituent outside the noun itself must agree in NC with the noun, but this is not the case for classifiers. Finally, there is always a limited, countable number of NCs in a given language, whereas the number of classifiers is usually fairly large. I will follow Aikhenvald for the purpose of this paper.

3.1 Classifiers in Anindilyakwa

Anindilyakwa has both NC markers and a number of different types of incorporated classifiers. The incorporation of nominal roots into various morpho-syntactic categories is very common in Anindilyakwa. These nominal roots are either body part noun roots or adjective roots. In a classifier construction they are used as generics that describe a more specific external nominal with which they are in apposition (e.g. 'long and flexible, snake' in (8a) below). An incorporated body part noun root can also occur in NI constructions and in lexical compounds, which will be discussed in sections 3.2 and 3.3, respectively.
I propose that Anindilyakwa has four different types of classifier: verbal classifiers[9], noun classifiers, numeral classifiers[10] and locative classifiers. Each of these is exemplified in (8)-(11), respectively.

[9] Worsley (1954:281-3) already noted the existence of verbal classifiers in Anindilyakwa, which he described as a "cross-cutting system of noun-classification

(8) verbal classifiers:

a. *ni-**rreku**-ward-anga* *yingarna*
3mSg>Y-**CL:LONG+FLEXIBLE**-kill-past Y.snake
'he killed the snake'
(Waddy 1988:169, gloss mine)

b. *nga-**rukwu**-dak-ina* *darruwurukukwa*
2Sg>D-**CL:ANIMALS.WITH.LEGS**-cook-Npast D.dove
'cook the doves!'
(Waddy 1988:169, gloss mine)

c. *na-**lingku**-bija-jungw-una* (Leeding 1989:375; orthography mine)
A-**CL:GRASS/LEAVES**-jump-REFL-past
'the grass grew'

In (8a) and (8b), the portmanteau prefixes *ni-* and *nga-* include a NC marker that represents the object and that agrees with the external noun. Both examples also involve a verbal classifier, which agrees with the external noun as well. In (8c) there is no external noun, but the NC marker *na-* tells us the subject is of NC A, and the verbal classifier tells us that it is something classified as grass or leaves.

(9) noun classifiers:[11]

a. *ma-**mungk**-ababurna* *mininga* (Waddy unpublished material)
M-**CL:SOFT+ROUND**-many M.burrawang
'heaps of burrawang'

b. ***embirrk**-aruma* *amaduwaya*[12] (Waddy 1988:169, gloss mine)
A.**CL:ROUND**-big A.stingray
'a large stingray'

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by means of prefixes […] entirely unconnected with the known noun-classes". Since they follow the usual noun class prefixes, he termed them 'secondary prefixes' (see also Waddy 1988:168-71). He observed that the older men knew more about the correct secondary prefixes than the younger men, and he concluded that the secondary prefixes may be dying out (p.284). However, the use of verbal classifiers is very common in my data (texts collected in the 1970s and 80s), suggesting that they were still prolific at least 30 years ago.

[10] In her (2000) Classifiers book, Aikhenvald notes that "Numeral classifiers are […] absent from Australia." (p.124). The examples in (10), however, provide counterevidence to this claim.

[11] This name is potentially confusing, because all classifiers of course relate to nouns denoting entities. Following Aikhenvald (2000), what is meant here is that this type of classifier occurs in a noun phrase, as opposed to e.g. verbal classifiers which occur in a verb phrase (abstracting away from whether Anindilyakwa has NPs and VPs).

[12] The absence of a NC marker is interpreted as NC A, because there is a morpho-phonological in Anindilyakwa that deletes a morpheme-final vowel if the following morpheme starts with a vowel.

(10) numeral classifiers:

a. *mu-**lukw**-abiyakarbiya mamurukwa* (Stokes 1982:149)
M-**CL:ROAD**-three M.road
'three roads'

b. *yi-**lakbak**-ambilyuma yikarba*
Y-**CL:SHORT.UPRIGHT.OBJECT**-two Y.woomera
'two woomeras (standing up)'
(Julie Waddy unpublished material, gloss mine)

(11) locative classifiers:

*nuw-akum-arna adalyuma-manja a-**kwi**-yak-bidjina*
A>A-put-past A.river-LOC A-**CL:WATER**-river-beside
' … it [cat] put it [kitten] down beside the river'
(Julie Waddy unpublished story, ref y45; gloss mine)

The same morphemes can be used in all the different classifier constructions. The meaning of a classifier construction is semantically transparent, assuming that the Anindilyakwa speakers have the two different meanings of the same morpheme listed. For instance *-mungk-* in (9a) can also be used as a body part denoting 'cheek', and *-lakbak-* in (10b) can also mean 'leg' (as in (1a) above). Importantly, the classifiers in the above examples are optional, as their presence depends on discourse factors.[13] For instance, when a noun in mentioned for the first time it may occur without a classifier, but with further mentioning it may be represented by a classifier alone.

3.2 Noun incorporation

I assume NI to be a noun combining with a verb to form a single morphological unit, while retaining its syntactic status (e.g. Mithun 1984; Hopper and Thompson 1984; Baker 1988; Mohanan 1995; among many others). The verb can also occur with the same meaning without the incorporated nominal. NI is much rarer in Anindilyakwa than classifier constructions. It almost exclusively involves body parts (the same morphemes as those used in classifiers constructions), plus a few non-body part nominals (e.g. *-mak-* 'camp' and *-yak-* 'river', as in (18) below). An example of NI with an intransitive verb is given in (12a), and with a transitive verb in (12b).

(12) a. *ningi-**lakbak**-arrkwuj-ey-ina* (= (1a) above)
1Sg-**leg**-hurt-Pl-Npast
'my legs are aching'

[13] This is not shown here because I lack the relevant data. However, the verbs in these examples can also occur without a classifier, or with a different classifier.

b. *ningeni-**lyang**-baj-anga* (Leeding 1989:430, orthography mine)
1Sg>3mSg-**head**-hit-past
'I hit him on the head.'

These examples are analyzed as NI rather than classifiers, because the incorporated nominal roots do not describe inherent properties of the subject or object, but they are body parts that *belong* to the subject or object. Moreover, I have not found any examples in my data of a NI construction with an external noun that denotes the possessor of the incorporated body part (e.g. *I hit the man on the head*), whereas classifiers frequently occur with an external (specific) noun. This could be because NI is rare in Anindilyakwa, so the chance of finding such examples is relatively small. An alternative explanation could be that this is a difference between NI and verbal classifiers: the latter can occur with a co-referential external noun, whereas the former cannot.[14]

As can be seen in (12), the pronominal prefix on the verb represents the possessor of the body part, not the body part itself.[15] As for the classifiers, the meaning of a NI construction is semantically transparent.

3.3 Lexical compounds

There is yet another construction with a body part noun root incorporated into a verb, which are lexical compounds. The incorporated nominal cannot be omitted in this construction, and the meaning of the N+V complex is not semantically decomposable (cf. e.g. Leeding 1996; Evans 2003).

(13) a. *n-**aburr**-bij-anga* (Leeding 1989:366, orthography mine)
3mSg-**buttocks**-jump-past
'he was startled'
b. *nginu-**werriki**-jir-anga ningeniki-liki-yada Darwin-uwa*
3mSg>1Sg-**chest**-push-past 1Sg-go-PURP D.-ALL
'he persuaded me to go to Darwin'
(Julie Waddy unpublished material)

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[14] This would make Anindilyakwa typologically different from language like Mohawk (Baker 1988) or BGW (Evans 2003), where the incorporate in a NI construction can be externally modified.

[15] The prefixing of the possessor rather than the possessed body part is sometimes referred to as 'possessor raising' or 'possessor ascension', which is related to inalienable possession (e.g. Blake 1984, Chapell and McGregor 1996). By promoting the possessor to argument status, the possessor is interpreted as intimately affected by the action of the verb, rather than the possessed BP. This construction thus represents inalienability, which may be why it only involves body parts and not other possessed items.

Omission of the incorporated nominal root in these examples will result in a change of meaning. Lexical compounds are unproductive and lexicalized.

3.4 Differences between various constructions with incorporated body parts

Aikhenvald (2000), in discussing ways to differentiate between the different kinds of incorporation in the world's languages, notes that "[i]n other cases, it may be more difficult to distinguish incorporated verbal classifiers from other cases of incorporation and compounding. In Anindilyakwa […], about 100 'bound roots' are used as verbal classifiers and as numeral classifiers. The same morphemes are used to form compounds. There are semantic and syntactic differences which allow one to distinguish the two processes - see Leeding (1996) for details" (p.151, fn2).

Leeding (1996) only distinguishes between lexical compounding and what she terms 'syntactic incorporation' (which includes my verbal classifiers and NI). The differences are that the former is unproductive, it has a metaphorical meaning, and the incorporated nominal is obligatory. Leeding claims that lexical compounds are intransitive only. Syntactic incorporation, on the other hand, is productive, has a literal meaning and the incorporated nominal is optional. She claims that these are only transitive and REFL.

I propose that the difference between lexical compounding on the one hand and verbal classifiers and NI on the other, lies *not* in that the former is intransitive and the latter transitive or reflexive. This is because transitive and intransitive examples of both types of constructions have been found: for example, (8c) and (12a) above are instances of intransitive 'syntactic incorporation' (i.e., a verbal classifier and NI, respectively), and (13b) is an example of a transitive lexical compound. Rather, the differences involve Leeding's other observations: lexical compounds are unproductive, lexicalized and the incorporated nominal root cannot be omitted. 'Syntactic incorporation' is very productive - that is, verbal classifiers and NI can be freely created - the incorporated nominal root is optional and they are semantically decomposable.

Leeding (1996) does not distinguish between verbal classifiers and NI in Anindilyakwa. I propose that, even though the same morphemes are used in both constructions, there are differences, which are mainly semantic: a verbal classifier is a generic nominal root that categorizes an external, more specific and co-referential noun. By contrast, the incorporated morpheme in NI denotes a real body part. As discussed above, it is unclear whether an external co-referential noun can be present (but if it can, it is expected to denote the possessor of the body part). In both constructions, it is not the incorporated nominal that is prefixed to the verb. For verbal classifiers, it is the external specific noun that is prefixed to the verb, and for NI it is the possessor of the

body part. The difference may become more clear in the following two examples with the same incorporated body part noun root, where (a) is analyzed as NI and (b) as a classifier.

(14) a. *ningeni-**lyang**-barr-a* (Stokes 1982:149)
1ExclSg>3mSg-**head**-hit-Npast
'I hit him on the head'
b. *na-**lyangk**-arrng-a awarnda*
A-**CL:HARD+ROUND**-break-past A.rock
'the rock broke'
(Julie Waddy unpublished material, Ansec1)

In (14a), the incorporate *-lyang-* 'head' is used as a possessed body part, and the possessor is prefixed to the verb. In (14b) the same morpheme is used as a classifier with a meaning related to 'head', and categorises the subject argument, the external noun *awarnda*, as 'hard and round'.

Another difference between NI and verbal classifiers that is evident in (14) is that classifiers never seem to be associated with humans. That is, they only describe things and animals. NI, on the other hand, almost exclusively involves body parts of humans in my data (plus a few others, such as *-mak-* 'camp' and *-yak-* 'river' mentioned above).

4 Adjunct Classifiers

As discussed above, verbal classifiers in the world's languages typically categorize a noun that is in S or O function. However, in Anindilyakwa it also seems possible for a verbal classifier to be associated with an adjunct. Consider the following example.

(15) *y-akina […] n-**al**-dirruw-ajungw-una-ma minimbaji-manja*
Y-that Y-**CL:LONG+THIN**-bury-REFL-Npast-? M.-LOC
'they [goannas, NC Y] hide themselves in the Minimbaja grass'
(Velma Leeding unpublished story, gloss and orthography mine)

The verb in this example is reflexive, and reflexive verbs are always intransitive in Anindilyakwa. This means that the classifier *-al-* could potentially categorize the subject goannas as being long and thin. However, the generic *-al-* is always associated with inanimate things like grass or strips of bark in my data, as exemplified in (16).[16]

[16] One could object that the incorporate in (15), *-al-*, and the one in (16), *-alku-*, are different morphemes. However, I want to argue that they are the same morpheme, because Anindilyakwa has many complex morpho-phonological rules, which often

(16) *arrirra nuw-**alku**-warri-j-ina-ma amarda*
A.wind A>A-**CL:LONG.AND.THIN**-move-CAUS-Npast-? A.grass
'the wind is moving the grass'
(Julie Waddy unpublished dictionary, gloss mine)

Since *-al-* normally only refers to inanimate things, it seems to be associated with the adjunct *minimbaji-manja* 'in the Minimbaji grass' in (15). One could argue that this example is an unproductive, listed lexical compound, as these more often involve unpredictable grammatical relations between the verb and the incorporate. However, the verb *dirruwajungwuna* in (15) occurs with other classifiers as well, making a lexical compound analysis less plausible:

(17) … *biya numi-**yin**-dirruw-ajungw-una-ma ngal-abakiya-ba*
and M-**back**-bury-REFL-Npast-? M-by.itself-EMPH
'…and they [crabs, NC M] always bury themselves'
(Julie Waddy unpublished story, ref d21)

In (17), the verb occurs with the incorporated body part *-yin-* instead of *-al-* in (15). The classifier example in (15) is also not an exception, because I found several instances of what seems to be an incorporated adjunct classifier, such as the following.

(18) *ngayuwa ningi-**kuw**-arjey-a a-**kwi**-yak-bidjina…* [17]
1Sg.PRO 1Sg-**CL:FLUID**-stand-past1 A-**CL:FLUID**-river-beside
'I was standing beside the river.'
(Julie Waddy unpublished story, ref y15; gloss mine)

The verb *arjeya* in this example is intransitive but the classifier *-kuw-* cannot refer to the subject, because the subject is 1Sg. Instead, it seems to be associated with the locative adjunct *akwiyakbidjina* 'beside the river'. (Note that the postposition *-bidjina* occurs with both an incorporated classifier *-kwi-* and an incorporated noun root *-yak-*.) This example cannot be a lexicalized compound, because the classifier is optional, as shown in (19) from the same text:[18]

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result in deletion of morpheme-final consonants. In my data, the two morphemes are used in different phonological environments (details are beyond the scope of this paper).

[17] Again, *-kuw-* and *-kwi-* represent the same morpheme, which is subject to morpho-phonological rules.

[18] I analyze the past1 and past2 suffixes on the verbs in (18) and (19) as involving punctual and continuous aspect, respectively. Punctual aspect can also be used to denote the beginning of an action or event. (18) should thus be more accurately translated as something like 'I began to stand beside the river'.

(19) … *akwa ning-arjiy-inga adalyuma-manja a-**kwi**-yak-bidjina*.
and 1Sg-stand-past2 A.river-LOC A-**CL:FLUID**-river-beside
'and I was standing beside the river.'
(Julie Waddy unpublished story, ref y7; gloss is mine)

The fact that *-kuw-* is optional confirms that it is a classifier, as classifiers are optional by definition. Moreover, the fact that *adalyuma* 'river' has LOC case in (19) is evidence that it is indeed an adjunct, as core arguments of the verb are never case-marked in Anindilyakwa.

5 Analysis of classifiers

Incorporated generic classifiers are generally considered to be in apposition with the external specific noun they classify (Evans 1996; Nordlinger and Sadler, this volume; implicit in Leeding 1996). Nordlinger and Sadler analyze incorporated apposition as involving two members of a set: both the incorporate and the external noun contribute elements to a hybrid f-structure. In their analysis, the f-description associated with the incorporated form of (8a) above, repeated in (20), will be as in (21).

(20) *ni-**rreku**-ward-anga yingarna*
3mSg>Y-**CL:LONG+FLEXIBLE**-kill-past Y.snake
'he killed the snake'

(21) *rreku-ward* (↑ PRED) = 'kill<(SUBJ)(OBJ)>'
(↑ OBJ (∈)) = ↓
(↓ PRED) = 'long and flexible'

In (21), the incorporate is allowed to be either the OBJ or a member of an OBJ set. Nordlinger and Sadler argue that, given PRED uniqueness, when an external NP is present (such as *yingarna* 'snake' in (20)), then the incorporate must be a member of set (↑ OBJ ∈). When the external NP is absent, the minimal solution will choose (↑ OBJ). They propose an additional semantic constraint to ensure that the nominal PREDs are compatible with appositional (in this case, generic-specific) semantics.[19]

It is also possible for the incorporate to be in SUBJ function in Anindilyakwa, as in (8c) above, repeated here as (22). The lexical entry of the incorporated form is given in (23).

[19] Nordlinger and Sadler's analysis also accounts for the semantics of other types of incorporated apposition that occur in Australian languages, such as the part-whole construction.

(22) *na-**lingku**-bija-jingw-una*
A-**CL:GRASS/LEAVES**-jump-REFL-past
'the grass grew'

(23) *lingku-bija* (↑ PRED) = 'jump<(SUBJ)>'
(↑ SUBJ (∈)) = ↓
(↓ PRED) = 'grass or leaves'

Again, when an external specific NP is present, the incorporate is a member of a set; when no external NP is present the minimal solution will choose (↑SUBJ).

Nordlinger and Sadler base their account of incorporated apposition on their analysis of juxtaposed nominal appositional structures in Australian languages, which are treated as syntactic coordinations (Sadler and Nordlinger 2006). The standard treatment of coordination in LFG involves a hybrid f-structure that includes the f-structures of both conjuncts as well as their resolved agreement features. For instance, the resolved agreement feature of the two (singular) conjuncts of the Spanish sentence *Jose y yo hablamos* 'Jose and I are speaking' is 1Pl, as indicated on the verb. Sadler and Nordlinger argue that the difference between the f-structures of coordination and of apposition is that the latter does not involve resolution of agreement features, because the members of the set are co-referential.[20] Thus the agreement features on the verb of the following two nominals in apposition will be singular, not plural.

(24) *kawuka jardiyali* (Kayardild, Evans (1995: 249))
bundle fighting.stick
'a bundle of fighting sticks'

Nordlinger and Sadler argue that the f-structures of incorporated apposition are identical to those of juxtaposed apposition.

[20] In fact, in some Australian languages the string of juxtaposed nominals itself can be ambiguous between nominal coordination and nominal apposition, which is disambiguated by the verbal morphology only (Sadler and Nordlinger 2006). For example, the Wambaya string *garidi-ni bungmanyi-ni* 'husband-ERG old.man-ERG' (Sadler and Nordlinger 2006, ex. 14) is an instance of apposition if the prefix on the auxiliary is 3Sg (i.e. the old man husband), and an instance of coordination if the prefix is 3Du (i.e. the old man and the husband).

5.1 Adjunct classifiers

Nordlinger and Sadler's analysis seems to be able to account neatly for most verbal classifiers in Anindilyakwa. However, when the classifier is not a core argument of the verb, their analysis runs into problems. Consider the adjunct classifier example in (18) above, repeated here as (25).

(25) *ngayuwa ningi-**kuw**-arjey-a a-**kwi**-yak-bidjina…*
1Sg.PRO 1Sg-**CL:FLUID**-stand-past1 A-**CL:FLUID**-river-beside
'I was standing beside the river.'

The problem is what does the f-description associated with the incorporated form looks like. One possibility is that it is analogous to (21) and (23) above, with the only difference that the incorporate does not have a SUBJ or OBJ function but is an adjunct instead:

(26) *kuw-arjey* (↑ PRED) = 'stand<(SUBJ)>'
(↑ ADJ (∈)) = ↓
(↓ PRED) = 'fluid'

However, this analysis runs into several problems. First of all, the head of ADJ is the postposition *-bidjina* 'besides', but what the incorporated generic is referring to is the *object* of the adjunct. In other words, what is incorporated into the verb is in fact not the adjunct, but an argument of the adjunct. Therefore, the incorporate cannot be a member of an ADJ set. Secondly, the incorporated classifier could be associated with the intransitive subject as well, if allowed by the NC prefix on the verb. Thus when there is no overt nominal present, then there are two readings allowed by the f-structure: 1) *something fluid is standing*, and 2) *something is standing by the fluid*. And finally, there could be several adjuncts in a sentence referring to a fluid, so it will be unclear which adjunct the classifier is associated with. I think the existence of incorporated adjunct classifiers constitutes an interesting empirical challenge for LFG.

6 Conclusion

Verbal classifiers occur in a variety of Australian languages, as well as in other polysynthetic languages in the world. They are interesting because they cannot be accounted for by the standard treatment of NI in LFG, as this assumes that the incorporated nominal contributes the PRED feature to the relevant argument at f-structure (cf. Nordlinger and Sadler, this volume). Given PRED uniqueness, two PRED values of the same argument cannot unify. Nordlinger and Sadler resolve this problem by assuming that the

incorporated generic classifier and the external specific noun are members of a set, so both contribute elements to a hybrid f-structure.

Besides verbal classifiers that are in S or O function, Anindilyakwa also seems to have incorporated generics that are adjuncts – or more specifically, objects of adjuncts. Incorporation of adjuncts does occur in some other languages too (e.g. Chukchi (Spencer 1995)), but there they are instances of NI, and not of a classifier construction. This is because the incorporate cannot co-occur with a co-referential external noun. The problem with the adjunct classifiers described in this paper is that they are not associated with a grammatical function. Whereas in other languages the lexical entry of a verb with an incorporated classifier includes the grammatical function that the classifier is associated with (S or O), this is not possible in Anindilyakwa, because the classifier can refer to an adjunct as well. I conclude that incorporation of adjunct classifiers presents a challenge to non-transformational frameworks like LFG, because the grammatical function of the incorporated generic nominal is ambiguous.

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LFG ARCHITECTURE, SEMANTIC DEFINITENESS STRUCTURES AND NONVERBAL SYNTACTIC CONSTRUCTIONS

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Abstract[*]**

Nonverbal sentences have posed a challenge for modern linguistic theories. The proper analysis of definiteness/specificity helps account for certain nonverbal sentences. This paper is a preliminary study of a semantic definiteness structure in LFG theory which expresses three semantic definiteness relations found in natural language: Existential, Identity, and Characterizational. The three relations derive their features for definiteness/specificity from the discourse, similar to the feature systems of Heim (1982, 1983) and Enç (1991).

1 Introduction

Nonverbal sentences have posed a challenge to the theory of LFG. The proper analysis of definiteness/specificity helps account for certain nonverbal sentences. This paper is a preliminary study of a semantic definiteness structure in LFG theory which expresses three semantic definiteness relations found in natural language: Existential, Identity, and Characterizational. The three relations derive their features for definiteness/specificity from the discourse, similar to the feature systems of Heim (1982, 1983) and Enç (1991).

Addressing the problem of verbless sentences, Rosén initially examines alternative analyses of predicative complements proposed by Grimshaw (1982) and Andrews (1982), and then argues for a modification to F-structures using situation semantics (Fenstad et al, 1987) for structures which have no copula verb, such as topic-comment constructions (Vietnamese) and nominal sentences (Maori). Her main argument and proposal focuses on the latter construction from Maori shown in Example (1):

(1) Nominal sentences (Maori)

He taariana, te hoiho
INDEF stallion DEF-SG horse
'The horse is a stallion.' (Biggs 1969, p. 24).

According to Rosén's analysis, the first NP in this sentence is predicative and the second NP is the 'subject'. Semantically, the first NP predicates a property of the second NP, the property of being a stallion. Pointing out that the existing LFG F-structure analysis is incoherent, she analyses the relation of the two arguments SUBJ and OBJ through indexing without introducing a PRED by following the path between the F-structure

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and the two arguments in the 'situation semantics schema'. As it stands, Rosén's analysis provides a workable solution.

However, further study of nonverbal sentences shows relations within these languages which play a significant role in the syntax of the language. This paper extends Rosén's analysis proposing that nonverbal predicates can be more adequately and completely explained if they are analyzed according to the relation between the semantic definiteness/specificity features of the sentence, the semantic meaning of the relation between these, and the function of the semantic definiteness/specificity structures of elements in the sentence with respect to the discourse.

I first briefly review elements of Heimian semantics and present data from one language, Sinhala, coded with features which show a system in one language with grammatical constraints based on relations of definiteness/specificity marking, followed by a preliminary formulation of the three semantic/definiteness structures resulting from the proposed relations. Section 3 formulates the structures of the three relations, borrowing heavily from Jackendoff's approach for describing functional a(rgument)-structures of Conceptual Semantics (1983, 1990). Section 4 presents a formal representation of a level of definiteness/specificity structures, contrasting the a-structure with the proposed definiteness structures and their connection to a simplified phrase structure. The paper concludes with discussion of future research.

2 Semantic Definiteness Relations in Verbless Syntactic Constructions

This section gives a brief outline of key features of File Change Semantics and Enç's (1991) further developments for specificity. I then give examples of nonverbal sentences from Sinhala which have definiteness constraints. Thirdly, I formulate the three proposed semantic definiteness/specificity relations.

2.1 Semantic Definiteness/Specificity Relations

Building on Kartunnen's argument (1976) that not all sentences are referring expressions, Heim (1982, 1983) reformulated "the familiarity theory of definiteness", in her theory File Change Semantics (FCS) so that links to the discourse were neutral to referents. FCS characterizes definiteness and indefiniteness using the metaphor of file cards, which contain the information presented by an utterance, constantly changing and being updated as new information is added to definites and new cards are being started for indefinites (Heim 1983, pp. 167-169), similar to Kamp's (1981, 1993) "discourse representation structures". In terms of indexing in Heim's system, NPs are *variables*, where definite NPs have an index that refers to a previously introduced, or *familiar* NP, while the index for an indefinite NP presents a newly introduced, or *novel* NP into the discourse. Once an NP is entered into a discourse, it can become an antecedent for a referring expression (e.g. pronoun).

Enç (1991) develops Heim's notion of definiteness to accommodate specificity. Definiteness involves a strong link, that of identity of reference to an already established discourse referent. Enç calls the antecedents of a definite NP a "strong antecedent" (cf. Milsark 1977). Certain nominals are

inherently definite: "names, definite descriptions, and pronouns are definite NPs" (Enç 1991, p. 9). In addition to the original definite reference index, there is a second specificity index, representing the variable that the discourse referent is to be chosen from. This means that "all NPs carry a pair of indices, the first of which represents the referent of the NP" (Enç 1991, p.7), while the second index represents the specificity relation. The specificity relation of the NP is constrained by its linkage indicated by the second index. If both indices are indefinite and not discourse-linked, the NP is indefinite and non-specific. But if the first index is indefinite while the second is linked to a definite NP, the NP is specific. If an NP is indefinite but nonetheless includes a discourse referent which is linked to a strong antecedent, it is specific. The antecedents of specific NPs are called "weak antecedents", a modification of Milsark's insight into the behavior of "weak determiners".

The approach to coding definiteness and specificity in this paper adheres to File Change Semantics concepts of definiteness and specificity with minor modifications. I also code the definiteness/specificity *relation* obtaining *between NPs within* a sentence. The following examples from Sinhala demonstrate.

2.2.1 Existential Relation

The first is the Existential relation, coded lexically in Sinhala with a special verb to distinguish animate and inanimate Existence, as shown in Example (2).

(2 a) [–def/–spec]
lɑmxyek *inxwɑ*
child-IND be.AN.PRE[1]
'There is a child.'

(2b) [–def/–spec]
unx *tiyenəwɑ*
fever be.INAN.PRE
'Fever exists.' (Henadeerage 2002, p. 170).

Examples (2a) and (2b) each introduce an element into the discourse, so each respective NP is not discourse-linked and therefore the NP is indefinite and nonspecific, coded [–def/–spec]. If the only function of a sentence is to introduce an indefinite and nonspecific element into a discourse, then this can be said to have an Existential Semantic Definiteness Relation.

2.2.2 Characterizational Relation

The second Semantic Definiteness Relation is the Characterizational Relation, a label used by Kuno and Wongkhomthong (1981) to describe one

[1] Henadeerage interlinear gloss codes present tense as 'PRE'.

type of copula in Thai. This relation also introduces an indefinite and nonspecific element into the discourse; however, unlike the Existential Semantic Definiteness Relation, in this relation the indefinite and nonspecific element assigns a property or characteristic to another NP in the sentence.

Example (3a), a verbless sentence (NVS), adds the characteristic of being a teacher to the first NP, Mr. Gunasiri, who has already been mentioned in the discourse, is coded NOM and is definite and specific [+def/+spec]. The second NP is morphologically coded indefinite, and not having been previously mentioned in the discourse, is indefinite and nonspecific [–def/–spec].

(3a) [+def/+spec] [–def/–spec]
Gunasiri mahattəya ape iskoole guruwərek
Gunasiri gentleman.NOM 1PL.GEN school.LOC teacher.IND
'Mr. Gunasiri is a teacher of our school.'(Henadeerage 2002, pp. 160-161).

The Characterizational Definiteness/Specificity Relation reflects an important constraint in the grammar of Sinhala. In this sentence type, the indefinite NP is always the predicator and must always follow its argument: the word order is fixed and is constrained by the indefinite predicator.

(3b) [–def/–spec] [+def/+spec]
**ape iskoole guruw ərek Gunasiri mahattəya*
1PL.GEN school.LOC teacher.IND Gunasiri gentleman.NOM

In Example (3c) the child has the property of having a fever, a newly introduced NP, which is not discourse linked, and so is [–def/–spec].

(3c) [+def/+spec] [–def/–spec]
lɑməyɑ-ṯə unə tiyenəwɑ
child-DAT fever be.INAN.PRE
'The child has a fever.' (Henadeerage 2002, p. 170)

Henadeerage offers this sentence as an example of an existential verb. He is very clear that the copula goes with 'fever', an inanimate object, not with the animate NP 'child' in (3c) (p.c.). This sentence is not an Existential in our sense of the Existential Relation of Example (2b). Instead, it has a Characterizational Relation between the two NPs, with the first NP having the property of the second NP. Note that it follows the constraint of the predicator following the argument, 'child'.

2.2.3 Identity Relation

The last Semantic Definiteness Relation proposed is the Identity Relation. In this sentence type in Sinhala, the two arguments are not morphologically coded for definiteness, rather each nominal is marked with NOM. In this relation, both NPs in the sentence are definite and specific. Note that in this sentence, both are discourse-linked to the same third definite specific NP,

following the definitions of Heim and Enç for a strong antecedent. Example (4a) illustrates this relation.

(4a) [+def/+spec] [+def/+spec]
Gunasiri mahattəyɑ ɑpe iskoole mul guruwərəya
Gunasiri gentleman.NOM 1PL.GEN school.LOC head teacher.NOM
'Mr. Gunasiri is the head teacher of our school.' (Gair & Paollilo 1988, p. 40)

As shown in (4b), the word order is not fixed: the word order of the two NPs can be inverted; therefore, either can be the predicator.

(4b) [+def/+spec] [+def/+spec]
ɑpe iskoole mul guruwərəya Gunasiri mahattəyɑ
1PL.GEN school.LOC head teacher.NOM Gunasiri gentleman. NOM

2.2.4 Action Nominals

Sinhala also has verbless 'action nominals' (AN) which are "not a nominalised form of a verb", nor are they "derived from a verbal predicate in any way", but they "describe activities, not states", as was the case for the other nominal predicates shown above (Henadeerage 2002, p. 163). We might ask if these three types of Semantic Definiteness relations hold for these. Example (5) illustrates the use of definiteness in the progressive aspect.

(5) a. *laməya paadəmə/waedə /hinaawə.*
child.NOM lesson.DEF/work.DEF/smile.DEF
'The child (is) studying.'
'The child (is) working.'
'The child (is) laughing/smiling.'

b. *Andare enə kotə gowiyo kataawə.*
Andare.NOM come.PRE.VADJ PTK farmer.PL.NOM talk.DEF
'When Andare came the farmers (were) (really) talking.' (Gair & Paolillo 1988, p. 62).

c. *ayya-y taatta-yi barə kataawak.*
elder.brother.NOM-CONJ father.NOM-CONJ serious talk.IND
'Elder brother and father (are engaged in) a serious talk / (are seriously) talking.'

ANs have the meaning of continuous action, denoting repetition of the act, unlike other NVSs. Although they usually occur as definite nouns, sometimes indefinite ANs are possible, as in (5c). They may also be modified by an adjective, as with any other noun. In addition, as with other NVSs, time reference needs to be indicated by time adverbs in the context, or as in the adverbial clause starting with "when' in (5b) (Gair & Paolillo 1988, cited in Henadeerage). In fact, some ANs "only become acceptable with the context specified by means of adverbs" (Henadeerage 2002, pp. 163-164).

According to Gair and Paolillo, (cited in Henadeerage 2002, p. 163),

they differ from equational clauses syntactically in at least two ways:

(1) There is no co-reference, identity or class inclusion relation between subject and predicate. Put simply, there is no 'is' relation.
(2) The interpretation is 'do' rather than 'is', i.e., 'NP do the action of N'(Gair & Paolillo 1988, p. 63).

Thus, ANs can never have a Semantic Definiteness Relation of Identity, and since they refer to an existing element in the discourse, can never have an Existential Semantic Definiteness Relation either. As far as their definiteness/specificity relation in the Characterizational Relation, the predicate describes an activity being performed by the predicated element. However, although the activity is coded with a DEF marker, it does not refer, i.e., the action can be interpreted as continuous, short actions which flow together to give the meaning of the progressive aspect which is newly introduced, or [–def/–spec]: the predicator in these sentences is [–def/–spec], the same as the other Characterizational sentences above.

To summarise, Examples 2-5 contain two classificatory elements. The first classification uses the traditional categories of NP, [+/–Def], NOM, DAT, GEN, LOC, Adj, and one verb which is an existential copula coded for animacy [+/–ANIMATE BE]. The sentences in (2) have been termed Existential based on the verb; simple declaratives with one argument predicating a second argument in the sentence are found in the examples in (3); an equational construction based on the two "equal" nominals on each side of the copula are shown in the examples in (4); finally, (5) shows action nominals with key properties of nouns, adverbs, and adjectives.

The second classification has three distinct types of sentences whose features consist solely of [+/–Def] and [+/–Spec] and whose meanings can be divided semantically into three propositions formed by the relations between elements in the sentence and elements in the discourse: 1) Existential Relation, with one indefinite nonspecific argument; 2) Characterizational Relation, a verbless sentence, with two elements, one predicating an element which is definite and specific and the other whose element is assigning an indefinite nonspecific property to the first definite specific element; 3) Identity Semantic Definiteness/Specificity Relation in which both elements are definite and specific, referring to a third definite specific element in the Discourse.

Thus, we see that in Sinhala, verbless, as well as certain verbal sentences, can be grouped into three categories of meaning at the level of the sentence, according to their definiteness/specificity Relations to the discourse. The set of elements with properties of definiteness and specificity have three distinct relations, forming three distinguishable structures. These Semantic Definiteness/Specificity Relations and their Structures are summarized in Table 1.

Table 1. Semantic Definiteness/Specificity Structures[2]

Existential Structure – a structure which expresses a relation which is not linked to an existing element or discourse referent; therefore, it introduces at least one indefinite and non-specific element.

Characterizational Structure – a structure which expresses a relation which further describes or denotes a property or characteristic of an element or discourse referent; therefore, it characterizes a relation between one element and another indefinite and nonspecific element in the sentence.

Identity Structure – a structure which expresses a relation between two elements with an already existing element; therefore, it expresses a relation between a definite and specific element and another definite specific element to the same third definite specific element in the discourse.

As shown in the examples above, these relations can be used to describe the constraints on word order in the grammar of Sinhala at c-structure.

3 Semantic Definiteness/Specificity Functions and Structures

This section first gives a brief overview of Jackendoff's theory of Lexical Conceptual Structures (LCS), organized according to the three proposed semantic definiteness/specificity structures. As we review these structures, differences to the LCS will be proposed according to the semantic definiteness relations in the data from Sinhala in Section 2. A proposed classification for [THING] which is designed specifically for the def/spec of individuals is given, followed by a sketch of the three semantic definiteness/specificity relations and their functional structure.

In 1983 Jackendoff first sketched what he called lexical conceptual constituents, through the lexical decomposition of verbs and semantic meaning of prepositions subcategorized for verbs. This sketch was a combination of grammatical and conceptual structures, incorporating semantic roles and the conceptual "parts of speech", or [THINGS], later "conceptual constituents" (Jackendoff 1991, pp. 22-25). In order to capture the cognitive connection with grammar, he formulated lexical conceptual structures (LCS). These LCSs encode a verb's meaning through predicate 'decomposition'. These have been incorporated into LFG as a level of predicate argument structure, a-structure. For example, Butt (1996) incorporated LCS for an elaborated argument structure of light verbs and aspect in Urdu.

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[2] I am using the term 'element' according to current usage in LFG syntactic analyses of discourse ('null elements')(Butt & King (2000).

However, predicate argument structure requires a verb to interpret the thematic roles of the argument and their function in a sentence. Simply revising LCSs by expanding their interaction with conceptual constituents to include the three semantic definiteness/specificity structures potentially confuses the semantic interpretation of the meaning of the definiteness/ specificity relations. Instead of using [THING] as representations of the conceptual counterpart of "parts of speech", each linguistic [THING] must be coded not only for definiteness or specificity, but also must maintain the meaning of the overall semantic definiteness/specificity relation of the respective sentence.

Moreover, when we sort elements and their characteristics at a semantic definiteness level, the characteristics of objects in a situation are closely intertwined with the context of the discourse situation. How do we sort objects, elements and properties according to definiteness and specificity? Fellbaum (2001) compared Aristotle's notion of the classification of predicates (κατηγορίαι) (Aristotle 'The Categories' translated and analyzed in Kneale and Kneale 1962, p. 23) to modern day notions of predicates. Although it is not entirely clear what Aristotle means in a technical sense with this list of categories, Kneale argues that we can assume that this is the classification of 'things', "whether these terms occupy subject or predicate positions in sentences" (p. 29). My interest here is not with the specific details and controversies surrounding categorical usage, but rather with using Aristotle's classification to exemplify one set of properties which can be used at a semantic definiteness level to distinguish different types of 'THINGS' coded for definiteness and specificity.

Aristotle's list can be divided into the following ten classes of properties at a semantic definiteness level shown in Table 2. Aristotle's list[3] is on the left with Greek equivalents for the class provided by Kneale (1962). In the right column, I have provided additional information regarding the interpretation of the Greek meanings of the classes provided on the right[4].

In the semantics of Existential Relations, an element may be human as in (2a) above, or properties may be associated with an element at the time they are first introduced into a discourse, as in Example (5b) above, for example. The general semantic meaning of the Existential proposition is a 'state' or stative, the eighth class. The Characterizational Relation in (3b) assigns the property of being a teacher, the first class on the list. All of the items on this list may be instantiated with the features of definiteness and specificity, independently of their categorical status of constituent at the level of argument structure.

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[3] I thank Steve Lack for assistance with creating the Greek diacritics in this list.

[4] I wish to thank Robert Barnes discussion of this list and its meaning for Aristotle and the ancient Greek philosophers and Rex Mickan for providing the additional semantic information on the right, as well (p.c.).

1.	Substance (*οὐσία*)	'a man', 'property', 'wealth'
2.	Quantity (*ποσόν*)	'how much', 'how many'
3.	Quality (*ποιόν*)	'what', 'which', 'what kind of'
4.	Relation (*πρός τi*)	'to what'
5.	Place (*ποῦ*)	'where'
6.	Time (*ποτέ*)	'when'
7.	Situation (*κεῖσθαι*)	'event'
8.	State (*ἔχειν*)	'being'
9.	Action (*ποιεῖν*)	'doing'
10.	Passion (*πάσχειν*)	'undergoing', 'experiencing'

Table 2. Semantic Definiteness Classification of 'THINGS'

3.1 Existential Semantic Definiteness Functional Structure

In the Existential Relation, as shown in Example (2), the argument is indefinite and nonspecific, acquiring its features [–def/–spec] from its relation to other elements in the discourse. Jackendoff's decomposition of the copula BE in the sentence 'A child exists' proceeds as follows.

$$\text{State} \quad [\,_{\text{THING}}\, X_i] \;,\; [\,_{\text{State}}\, F\, [(\, X_i)]]$$

This 'well-formedness rule' says that in the State function F, with one argument, X_i, the Thing, X_i is a variable bound to the function F. This binding relationship prohibits an 'action' and any semantic relation other than 'theme'. In this proposal, a theme can be defined as the semantic relation of a "participant…, being in a state or position" provided by Andrews (2007, p. 8).

Jackendoff's functional (lexical) decomposition for this proposition is:

$$[\text{STATE}] \;\rightarrow\; [\,_{\text{State}}\, \text{BE}\, ([\,_{\text{THING}}\, X_i])]$$

The function is STATE with the verb BE. The [THING] is the argument and is bound to the verb BE. This transliterates from Jackendoff's LCS to the data in Example (2a) as:

$$[\text{STATE}] \;\rightarrow\; [\,_{\text{State}}\, \text{BE}\, ([\text{child}])]$$

where the Function is Stative BE and THING X_i = child. We know from the definition of 'state' and the semantic role of 'theme', that child (THING Xi) must be a 'theme', since 'state' can not have an agent or actor.

In order to add the semantic definiteness/specificity relation of Existence, we can specify directly what kind of feature of specificity is

mediated by the Existential State BE, by adding these features to the semantic description of the Existential function and its state relation of the [THING]=child. Three different meanings of a stative relation were given in Examples 2 - 5, and the Existential copula specifies the relation of existence meaning from the other two Semantic Definiteness relations in Sinhala.

$$[\text{ State } BE_E (\begin{bmatrix} -\text{spec} \\ \text{child} \end{bmatrix})$$

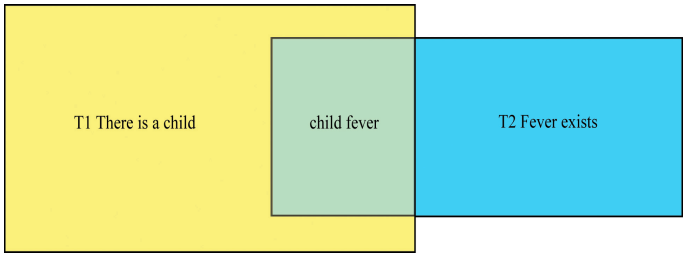
This equation tells us that the [THING] in the Existential BE function is nonspecific and combined with facts about definiteness and specificity as provided in the definitions of Semantic Definite Structures shown in Table 1, this represents the Existential Semantic definiteness/specificity Relation. Jackendoff proposes the Existential BE and the existence of the existential BE lexeme in language. However, his theory does not directly incorporate the means for identifying the Existential Relation in Conceptual Semantics. Moreover, the incorporation of specificity and/or definiteness is not a necessary (obligatory) feature of Jackendoff's LCS for Existential BE, i.e., BE_E.

Finally, this semantic definiteness equation is a function of Time, necessary for the conceptual relation of definiteness and specificity, but not for the lexical compositional structure of verbs without specificity marking. Returning to Examples (2a) and (2b), I introduce these as a sequence of sentences represented at (T1) and (T2), (T=Time).

There is a child.	T1
Fever exists.	T2

'The child has a fever.'

Alternatively, these sentences can be represented as Venn Diagrams represented as sets, rather than the sequential listing, with the intersection of sets and accumulation of sets as the PowerSet = Discourse (Korpi 2004)[5].



A set which includes a 'child' at T1, and a second set which includes the property, 'fever' intersects at T2 with 'child fever'; the ordering in the discourse creates the meaning. In order to capture the information of not

[5] I thank Andrew Yip for creating this Venn Diagram.

being previously mentioned which gives rise to the Existential Relation, 'Time' must be included as a variable in the function representing the specificity features [–spec] of the individuals in both sentences.

$$_{T0}[\text{ State } BE_E(\begin{bmatrix}-\text{spec}\\ \text{child}\end{bmatrix})]_{,T>0}[\text{ State } BE_E(\begin{bmatrix}-\text{spec}\\ \text{fever}\end{bmatrix})].$$

To summarize, in Sinhala the Existential Semantic Definiteness Relation has the 'Existential BE' copula, is stative, has a semantic role of theme = BE_E, has an argument which is [–spec], and is a function of the time of utterance.

3.2 Characterizational Semantic Definiteness Functional Structure

The Characterizational Semantic Definiteness Relation characterizes an individual. Thus, it differs from the Existential Relation whose sole function is to introduce an individual. We have seen three types of Characterizational Semantic Structures. The first is a straightforward function with one [+spec] individual being predicated by another [–spec] individual. The Semantic Definiteness/Specificity structure for Example (3a), 'Mr. Gunasiri is a teacher', is shown below.

Semantic Definiteness/Specificity Characterizational Function

$$_{T>0}[(BE_C)(\begin{bmatrix}+\text{spec}\\ \text{Mr.Gunasiri}\end{bmatrix}\ \begin{bmatrix}-\text{spec}\\ \text{teacher}\end{bmatrix})].$$

This equation says that this Characterizational Semantic Definiteness/Specificity function has two individuals, one [+spec] and one [–spec], which are arguments with the second predicating the first in the Characterizational relation. In addition the function includes the variable of time which must be greater than 0 when the first argument is [+spec]. Note that if this were the first sentence of a discourse, even though it is a proper noun, it would not be coded as [+spec] since the individual has not been previously mentioned. This accounts for certain "nominals" which "are inherently definite: 'names, definite descriptions, and pronouns are definite NPs' (Enç 1991, p. 9) nonetheless being coded [+def/–spec], if they have not been previously mentioned; the variable of T>0 in this function tells us that this inherently nominal definite is [+spec] because of its position in the discourse.

Action nominals are a second type of Characterizational semantic definiteness structure. This function has [+def] nominals predicating an individual. These nominals create an aspectual meaning for the predicating nominal, such as 'lesson+DEF' creating the progressive aspect, repetition of action meaning of studying (Example 5). Because these nominals are actually progressive aspectual structures, and not strictly nominals. I will not analyze them further here. However, it is worth noting that these nominal functions require a time reference or some other time adverb in the context, in addition to the 'time' variable of the function. The [+def/–spec] features

of the predicating nominal in this function are independent of the contextual requirements for meaning in the grammar.

A third type of Characterizational Semantic Definiteness/Specificity function is shown below. The function below gives the a-structure for Example (3c), 'The child has a fever'.

A-structure

$$[(BE_C)(\begin{bmatrix}+\text{spec}\\ \text{child}\end{bmatrix}(BE_E\ \begin{bmatrix}-\text{spec}\\ \text{fever}\end{bmatrix}))].$$

This equation tells us that the [THING] in the Existential BE function is nonspecific, although it is predicating 'child'. Henadeerage describes the sentence "The child has a fever" as an Existential, non-animate copula of existence, with existential argument structure. This produces an inconsistency at the level of predicate argument structure if we call this anything but an existential verb. Lexically it must be an Existential verb. Below we test for its linking to the syntax, where it will be shown that this maps correctly to the syntax as an indefinite structure which must have the object postverbally with fixed word order.

3.3 Identity Semantic Definiteness Functional Structure

The third Semantic Definiteness/Specificity relation is the Identity Relation. As described earlier, the presence of two [+def/+spec] elements referring to a third, unique element, creates the semantic meaning of the Identity Relation. Example (4a) is the Identity Specificity Relation, with the two +def/+spec individuals identical to each other and to a third individual already in the discourse, a symmetric, reflexive relation. This can be written as:

$$\underset{}{[\lambda(BE)_I\text{gentleman}]} \leftrightarrow \underset{[+\text{def/+spec}]}{[\lambda(BE)_I\text{Gunasiri}]} \leftrightarrow \underset{[+\text{def/+spec}]}{[\lambda(BE)_I\text{head teacher of our school}]}$$

The Specificity Identity Functional Structure for the sentence in Example (4a) is shown below:

$$_{T0}\,[\text{gentleman}] \leftrightarrow {}_{T>0}[(BE_I)(\begin{bmatrix}+\text{spec}\\ \text{Mr.Gunasiri}\end{bmatrix}\begin{bmatrix}+\text{spec}\\ \text{head teacher}\\ \text{of our school}\end{bmatrix})].$$

This semantic definiteness structure follows a preceding mention of either the gentleman, the head teacher, or Mr. Gunasiri. Hence, it has a three way correlation and must appear at Time 2, after an earlier utterance in the discourse.

To summarize, three core Semantic Definiteness Relations create an interface between the [THINGS] of the semantic definiteness/specificity structure and the discourse in Sinhala. Three forms of function-definiteness structure are postulated which have different meanings at the level of Conceptual Structure: Existence, Characterization, and Identity. These meanings are created through the relation created between individuals within

the sentence and between other individuals in the discourse. The individuals are represented as definiteness and specificity features and may be in a subset, set, proportional relation, or other modificational relation.

Although these relations are represented with three stative meanings, the relational form of the copula is similar to the verb BE, yet is independent of Lexical BE found in natural languages. Henadeerage argues very convincingly that these verbless sentences do not have a hidden copula; I have only included them in these sketches to cover their occurrence in those sentences in Sinhala where they are manifested. Semantic Definiteness/ Specificity Existential Be is not the same as Lexical Be, as in the verbless sentences. Another point to notice is that the three structures have a semantic role which is most similar to 'theme' with three distinct manifestations. Those Characterizational sentences with action nominals can be characterized as predicating properties which are nonspecific within the relation, 'changing its state or position' (Andrews, p. 8) as the properties of the respective individual.

4 Structural Correspondences of the Semantic Definiteness Structures and C-structure

The preceding sections have formulated a set of relations composed of features derived from their position in the discourse and then organized in a set of relations at the level of the sentence. This is still insufficient to justify a level of semantic definiteness/specificity functions. An architectural assumption of the approach to the theory of LFG is of " …correspondence functions that map between the elements of one (usually more concrete) structure and those of another"(Kaplan, 1995, p. 15). Therefore, we need to establish an "element-wise correspondence" to further establish "a description of these formal properties".

In order to establish this correspondence, I use the Characterizational Example (3c) with a dative subject and existential verb.

(3c) [+def/+spec][–def/–spec]
lɑməyɑ-t̲ə unə tiyenəwɑ
child-DAT fever be.INAN.PRE
'The child has fever.' (Henadeerage 2004, p. 170).

At the level of a-structure this sentence uses the existential verb to say that a 'fever is at the child'. The problem then arises that we have an existential relation associated with the meaning of the verb and an indefinite nonspecific individual assigned to that verb. This is the description of a Semantic Existential Definiteness Relation. The semantic definiteness meaning of the sentence as a whole introduces a characteristic to an existing, i.e. definite specific element. Thus, the Existential Relation is embedded in the main structure, the *Characterizational* Semantic Definiteness Structure.

Figure 1 shows the mapping between the phrase structure and an argument functional structure with the Existential BE, and Figure 2 shows the mapping between the phrase structure and a Characterizational Semantic Definiteness Structure.

Figure 1. Phrase structure and functional Existential a-structure[6]

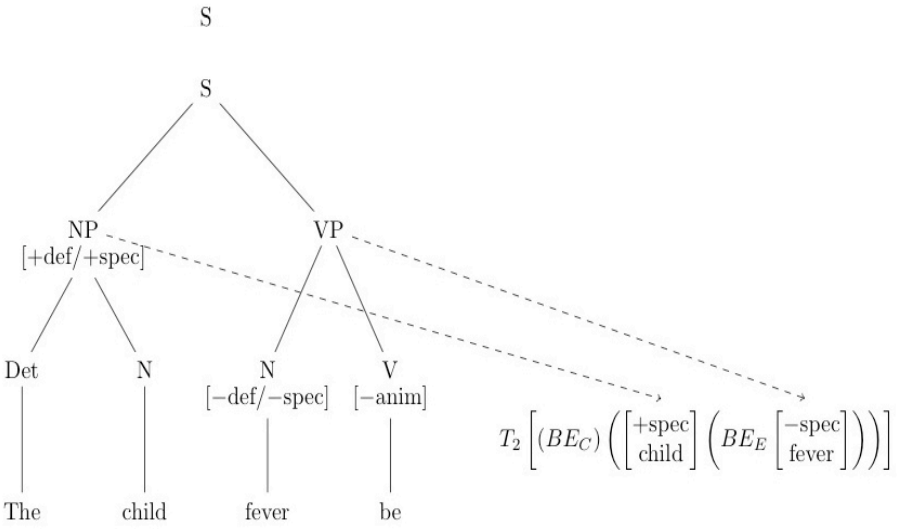
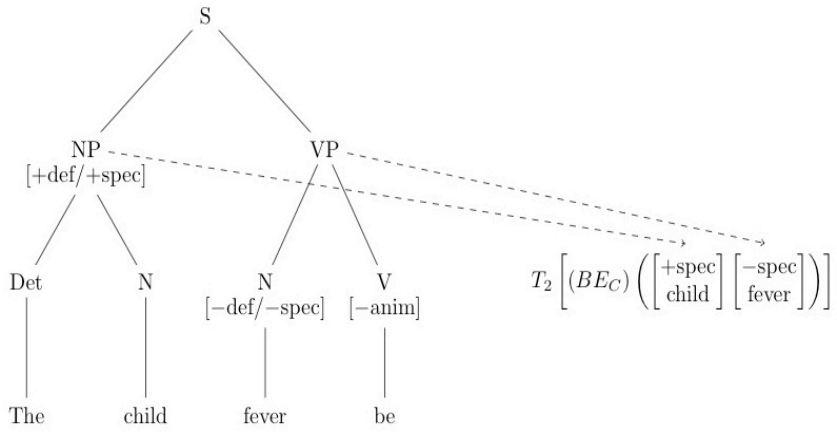


Figure 1 demonstrates that the Characterizational Semantic Definiteness has an embedded Existential relation at the level of a-structure in Sentence (3c). It is composed of two semantic definiteness structures, the Existential Semantic Definiteness/specificity relation and the Characterizational Semantic Definiteness/Specificity relation.

Figure 2 below shows that the Characterizational Semantic Definiteness structure projects the meaning of the sentence assigning a property to the first NP. This satisfies the syntactic constraints of word order in Sinhala with an indefinite and nonspecific element following the first argument which is definite and specific.

[6] I thank Steve Lack for assistance with these two tree diagrams.

Figure 2. Phrase Structure and Characterizational Semantic Definiteness Structure



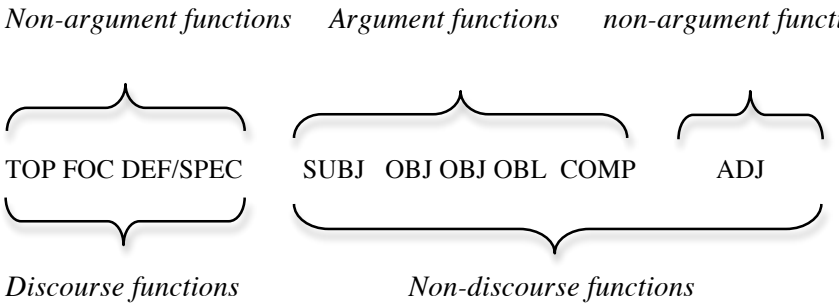
Thus, we have a mismatch in form and meaning between the arguments of the a-structure, with a verb which is exclusively existential in meaning with a nonspecific argument, and the Semantic Definiteness Structure which assigns the nonspecific property to one argument and definiteness/specificity to the other argument of the Characterizational Semantic Definiteness Structure.

We could simply instantiate the [THING] in the a-structure with the relevant specificity marking, i.e. [+spec] for 'child' and [–spec] for 'fever'. However, this requires a redefinition of the relation of the Semantic Definiteness Characterizational Relation. We can also argue that the word order in this sentence is fixed to match the constraint on word order in Sinhala of the Characterizational: the indefinite and nonspecific element must follow the definite and specific one. This meets the demands of Kaplan for an extension to the organization of linguistic information in LFG.

Moreover, these semantic definite relations are coded independently of topic as part of Information structure as shown in (6) below.

(6) *Topic Interpretation*
Gunapalɑ nɑŋ guruwərəyek
Gunapala.NOM TOP teacher.IND
'As for Gunapala, he is a teacher.' or
'Gunapala is a teacher' (but Siri is not).' (Kariyakarawana1998, p. 63)

How exactly does the topic of i-structure fit with these semantic definiteness relations and especially the element in these relations which is being predicated, e.g., the [+def/+spec] of the Characterizational Relation/Structure? Is this a 'discourse subject' or is it actually a topic as in (6), or both, or something else? The revised scheme is summarized in the diagram below (cf. Bresnan 2000, pp. 96-98; Henadeerage 2002, pp. 21-22).



It is beyond the scope of this paper to work through the details of integrating a semantic definiteness/specificity structure with i-structure (Butt and King, 1996) and ellipsis of +Spec objects, as Butt and King (2000) did for Hindi and Urdu objects. Are they part of one main discourse function (D-function) which links to c-structure through f-structure and a-structure independently of semantic definiteness and specificity? Or, are the [+spec] objects of Turkish, Hindi and Urdu part of the proposed sentence level definiteness/ specificity structure? How do topic and focus work in a system which integrates definiteness/specificity as a structure in its own right?

Related to the questions of the behavior of D-function structures are issues such as discourse subject, discourse topic and the processes of gr-subject (Manning 1994). I have not given a label to the [def/spec] in the above diagram pending further studies of some of these interactions.

5 Conclusion

Additional evidence for the usefulness of the three structures for tracking the development of a definiteness/specificity and referential system was shown in a study of second language acquisition, in a corpus of Japanese to English interlanguage. A clear pattern of development of definiteness/specificity structures, independent of morphological definiteness coding, was found. This study also found evidence suggesting that the Identity Structure, which requires a direct link to the discourse may be more difficult to acquire, and also, that the specific communicative task may constrain the occurrence of the three Semantic Definiteness structures in language. Moreover, this study incorporated definiteness/specificity structures directly into Jackendoff's LCS, as they were isomorphic to predicate argument structure (Fellbaum Korpi 2004). Further studies of the structures are needed in both first and second language acquisition, for their usefulness for a developing system of predicate argument structure and referentiality.

In conclusion, I have proposed that the LFG architecture be extended to

include a function composed of semantic definiteness/specificity structures which derive their features from the discourse. This structure can represent the verbless sentences of Sinhala in their entirety. Given this structure, verbless sentences can be coherently, completely, and consistently represented with respect to their features and relations. Thus, these verbless sentences pose no problem for the theory.

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FRENCH INTERROGATIVES IN AN OT-LFG ANALYSIS

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Abstract

The present paper approaches the French interrogative system from a non-derivational perspective, aiming to provide an analysis that accounts not only for its own complexity (optional simplex and complex variants of the same question in formal French and in situ questions in informal French), but for its differences with other languages (English) as well. As will be shown, the choice of the theoretical framework (OT-LFG) is motivated by important lexical differences between the two languages, which cannot be captured solely by OT-type constraints.

1 Introduction

The syntax of interrogatives (be it constituent or polarity, single or multiple) has vast literature in transformational grammar, dealing mainly with English, and is considered as an important field of analysis in non-derivational frameworks as well (Grimshaw 1995, Ackema & Neeleman 1998, Ginzburg & Sag 2000).[1] The present analysis focuses on French main clause interrogatives and shows how the non-derivational framework of OT-LFG (Optimality Theory and Lexical Functional Grammar) (Kuhn 2001, Sells 2001, Abeillé 2007) can account for this system in its whole complexity. As some significant lexical differences between languages (in this case, English and French) show, the OT-type constraint ranking needs to be completed by a lexicalist theory encoding these lexical differences.

In Optimality Theory (Prince & Smolensky 1993, Grimshaw 1995, Kager 1999) Universal Grammar consists of a set of soft (violable) constraints on well-formedness and individual grammars are constructed by the reranking of these constraints. The expression that satisfies the higher ranked constraints is the optimal, thus, the grammatical one; the others are then considered ungrammatical.

The OT architecture contains an Input that consists of elements from the lexicon. A general structure generator (Gen) constructs candidate expressions from the Input that constitute the candidate set. In the evaluation part, the optimal candidate is selected, based on the language-specific constraint-hierarchy.

The paper is structured as follows. After a short overview of previous OT analyses, the system of French interrogatives will be presented with examples, followed by some important conclusions that have to be taken into account by the analysis. Then comes the analysis itself, starting with the presentation of the framework and concluding with its major claims and their realizations within this architecture. Finally, some examples illustrate the proposed analysis.

[1]I would like to thank Anne Abeillé and Mark Newson for their useful comments about earlier versions of this paper, as well as the anonymous reviewer for the equally important remarks.

2 Previous analyses

Let us first consider analyses in the framework of Optimality Theory treating interrogatives and French phenomena. For this, a short introduction of OT is offered. In Optimality Theory (Prince & Smolensky 1993, Grimshaw 1995, Kager 1999) Universal Grammar consists of a set of soft (violable) constraints on well-formedness and individual grammars are constructed by the reranking of these constraints. The expression that satisfies the higher ranked constraints is the optimal, thus, the grammatical one; the others are then considered ungrammatical.

The OT architecture contains an Input that consists of elements from the lexicon. A general structure generator (Gen) constructs candidate expressions from the Input that constitute the candidate set. In the evaluation part, the optimal candidate is selected, based on the language-specific constraint-hierarchy. In Pesetsky's account (1997) there is a preference in French for the complementizer to be pronounced instead of the adjacent relative pronoun, if this latter is not modified (2–5):[2]

In non-subject relatives the complementizer *que* is pronounced instead of the relative pronoun (*qui*) preceding it:

(1) *la fille que j'ai vue*
the girl that I have seen

Pronouncing the relative pronoun only would lead to ungrammaticality:

(2) **la fille qui j'ai vue*
the girl who I have seen

Pronouncing both is ungrammatical, but is possible in some dialects:

(3) **la fille qui que j'ai vue*
the girl who that I have seen

The relative pronoun must be pronounced when modified:

(4) *la fille avec qui il est parti*
the girl with whom he has left

In the OT framework, analyses of interrogatives have been proposed, concentrating on English. According to Grimshaw (1995, 1996), subject-auxiliary inversion and do-insertion

[2]In subject relatives the complementizer appears in another form: *qui*

(i) *la fille qui est partie*
the girl that has left

in English interrogatives can be accounted for by the following constraints: interrogative operators must appear in specifier positions (CP), no headless projections (auxiliary movement and do-insertion), Stay (economy constraint: no movement, lexical verbs cannot move to C). Ackema & Neeleman (1998) give an OT analysis of multiple questions in English, Bulgarian, Czech and Chinese/Japanese, with different constraint-rankings: QMark (a question must be overtly question-marked), QScope (Q+ elements must c-command the VP at surface structure), Stay. However, neither of these analyses can be applied to French without some necessary adaptations. The present analysis is based on the constraints defined by Ackema & Neeleman (1998), with some modifications, elaborated later on. In what follows the French main clause interrogative system will be presented, to point out some crucial differences with English, and problems the analysis can encounter.

3 The French main clause interrogative system

In French main clause interrogatives, depending partly on the register, there are three ways of asking the same question. The first type, at first sight, contains subject-auxiliary inversion. In the second, the question is biclausal, the main clause containing inversion of a dummy verb and a pronoun, whereas the content question follows it with indicative word order in the embedded clause. The third version is present in colloquial French, which is considered as a different grammar. In this latter case, the monoclausal question is used without inversion and interrogativity is indicated only by rising intonation at the end of the sentence. Consider the following examples:

3.1 Polar Interrogatives

All 3 types are present.

(5) *Parlez-vous* *français* *?*
speak$_{pl2pres}$ you French
Do you speak French?

(6) *Est-ce* *que* *vous* *parlez* *français* *?*
is it which/that you speak$_{pl2pres}$ French
Do you speak French?

(7) *Vous* *parlez* *français* *?* *(informal)*
you speak$_{pl2pres}$ French
Do you speak French?

3.2 *Wh*-Interrogatives

In *Wh* subject interrogatives, on the other hand, this is not always the case. In animate questions there are only two possibilities, since the colloquial question falls together with the monoclausal formal one. However, in inanimate subject interrogatives, the would-be monoclausal question is not grammatical. In object interrogatives the tripartite difference as described above is again present.

- Subject:
  - Inanimate:
    (8) **Que vous dérange ?*
    what cl_{pl2acc} $\text{disturb}_{sg3pres}$
    What disturbs you?
    (9) *Qu'est-ce qui vous dérange ?*
    what is it that cl_{pl2acc} $\text{disturb}_{sg3pres}$
    What is it that disturbs you?
    (10) **Quoi vous dérange ?*
  - Animate
    (11) *Qui va à Paris ?*
    who $\text{go}_{sg3pres}$ to Paris
    Who is going to Paris?
    (12) *Qui est-ce qui va à Paris ?*
    who is it who $\text{go}_{sg3pres}$ to Paris
    Who is going to Paris?
- Object
  - Inanimate
    (13) *Que faites-vous ?*
    what $\text{do}_{pl2pres}$ you
    What are you doing?
    (14) *Qu'est-ce que vous faites ?*
    what is it that you $\text{do}_{pl2pres}$
    What are you doing?
    (15) *Vous faites quoi ? (informal)*
    you $\text{do}_{pl2pres}$ what
    what are you doing?
    (16) *Quoi faites-vous ? (inversion)

(17) *Vous faites que ? (informal)

– Animate:

(18) *Qui cherchez-vous ?*
who look for$_{pl2pres}$ you
Who are you looking for?

(19) *Qui est-ce que vous cherchez ?*
who is it that you look for$_{pl2pres}$
Who are you looking for?

(20) *Vous cherchez qui ? (informal)*
you look for$_{pl2pres}$ who
Who are you looking for?

(21) *Cherchez-vous qui ?

(22) *Est-ce que vous cherchez qui ?

It has to be pointed out that unlike English, French interrogatives do not contain subject-auxiliary inversion at all. [3] Instead, French contains interrogative verb forms in its lexicon. According to Huot (1987) and Miller & Sag (1997) French bound pronominal-clitics (complement or enclitic) are best analyzed as lexical pronominal affixes forming one single lexical unit (word) with the verb [4] (Huot (1987), Miller and Sag (1997)). Similarly, a class of suffixes qualify verbs as interrogative in French, incorporating the subject as well (the hyphenated verb forms in the examples (9-23) all illustrate this phenomenon). The clitic status of these elements can be justified by the fact that since they cannot appear as subjects, the subject has to be present in the clause as well:

(23) *Paul part-il ? (clitic doubling)*
Paul leave$_{pl2pres}$ he
Paul, is he leaving?

In addition, they cannot take scope over coordinated verbs, unlike ordinary pronouns:

(24) *Il vient et repart aussitôt.*
He come$_{sg3pres}$ and leave$_{sg3pres}$ soon.
He comes and leaves soon.

Il as a personal pronoun can take scope over coordinated verbs, unlike the homonymous lexical affix, which must be present on each verb:

[3] I thank Anne Abeillé for pointing this out to me.

[4] This is a basic lexical difference between English and French, which shows that the different ranking of the same constraints is not enough when determining differences between particular langugaes.

(25) **Vient et repart-il ?*
come$_{sg3pres}$ and leave$_{sg3pres}$ he?

(26) *Vient-il et repart-il ?*
come$_{sg3pres}$ he and leave$_{sg3pres}$ he?
Does he come and leave?

From the above data we can draw the following conclusions. French simple questions contain interrogative verbs with enclitics, the bi-clausal complex alternative is constructed with clitic-inversion in the matrix clause (and indicative word order in the embedded clause), and both the *wh*-word and the verb are *in situ* in colloquial French. The presence of interrogative verb forms with enclitics is, therefore, a lexical difference to be taken into consideration by any analysis.

As shown by example (23), the *wh*-word must precede *est-ce que*, and cannot be *in situ* in the case of interrogative verb forms; see (22).[5] On the whole, a conflict between two tendencies can be observed: question-marking with interrogative verb forms (simple questions), or the avoidance of these (indicative word order) in the matrix clause (colloquial French), and the biclausal alternative, which is the combination of the two, satisfying one in the matrix and the other in the embedded clause.

There are three main problems to be solved by the analysis. First of all, in inanimate subject interrogatives only the complex, bi-clausal alternative is possible, neither the simplex one with the interrogative verb form nor the in situ question is allowed. Secondly, in the other cases, however, optionality can be observed between the simplex and complex versions that cannot be accounted for by a register difference. Thirdly, the role of *qui/que* in the *qu'est-ce qui/qu'est-ce que* constructions has to be made clear.

Let us deal with the third problem first and compare the French and English systems of *wh*-words and complementizers:

WH operator	**Complementizer**
qui$_{(anim)}$ que$_{(inanim)}$	que, qui
who, what, etc.	that what (non-standard)[6]

As seen in the tableau, both *qui* and *que* can function as a *wh*-operator or as a complementizer. In the present analysis, they both appear in the *que/qui est-ce qui/que* constructions, as wh operators in initial positions and as complementizers in the other (both *qu'est-ce qui* and *qui est-ce qui* refer to subjects; in all other cases, however, these constructions end in

[5]Adjunct interrogatives follow the pattern of examples (14-23), and the analysis works identically in their case as well.

[6]I thank Mark Newson for pointing out the non-standard use of *what* to me.

que, the non-subject complementizer). From this it follows that there are two lexical entries belonging to *qui* and *que*. This is a second issue in which LFG, a lexicalist theory, facilitates the representation.

As for the second problem, optionality, we can anticipate that with the help of the OT-LFG architecture, the analysis can capture the free choice between the simplex and complex alternatives, as shown below.

Concerning the first issue, it is important to emphasize that this can also be stated in lexicalist terms. More precisely, it is a lexical characteristic of *que* that it cannot appear in subject positions, or, from another point of view, cannot be in nominative case. This accounts for the fact that the sentence **que vous dérange*, see example (9), is ruled out as ungrammatical and there is no optionality in inanimate subject interrogatives.

Before going on to the proposed analysis, the *que*/*quoi* alternance needs some clarification. As can be seen from the above examples, *quoi* is the *wh*-word in *in situ* questions, but it is ungrammatical with interrogative verb forms. A possible explanation goes as follows. *Que*, as a weak form, is always cliticized on to a verb, whereas *quoi*, as a strong form does not have to be. *Quoi*, on the other hand, cannot be fronted, whereas *que* cannot appear *in situ* (*qu'est-ce qui* is used as the only possibility). In an OT-LFG analysis, this is also treated in the lexical entries: *que* cannot be a subject (as already pointed out) and *quoi* cannot be focalised (unless made heavy by an adjunct[7]).

[7]However, when modified, *quoi* can be fronted:

(i)

Quoi	*d'autre*	*as-tu*	*vu*	*?*
what	else	have you	seen	

This can be integrated into the analysis by postulating that *quoi* cannot be focused unless it is syntactically heavy (Abeillé & Godard 1999b). This is made explicit by the following equation:

(ii)

	quoi	*d'autre*
	what	else
NP→	NP	AP
	↑=↓	↓=(↑ADJUNCT)
		(↑WEIGHT)=c heavy

The extraction rule is:

(iii)

S→	NP	S
	(↑FOC)=↓	↑=↓
	$(\uparrow Q)=_c$ +	(↑Q)= +
	(↑FOC)= GF(↑SUBJ/OBJ/...)	
	(↑WEIGHT)= heavy	

4 The proposed OT-LFG analysis

The OT principles are used in the present analysis[8] in order to account for the optionality between the simplex and complex versions of the interrogatives. However, as has already been shown, certain factors (interrogative verb forms in French, *qui/que* as *wh*-word and complementizer and the *que/quoi* difference) necessitate lexical specifications that would be problematic to include in an OT framework.

In OT-LFG (Sells 2001, Kuhn 2001) the OT framework is completed by elements of Lexical-Functional Grammar. The Input is built from the lexical entries of the particular items and is presented as an LFG-type feature matrix, containing the common information content of the candidates. From this, G_{inviol}, comprising a set of universal rewrite rules, constructs various c-structures with a corresponding, more detailed f-structure. In this version of the theory the Generator component is conceived as a function between the set of f-structures and that of the candidates (the power set of the analyses in G_{inviol}). The evaluation of these candidates happens in an OT manner. Let us have a look at the lexical entries of the already treated wh words:

qui$_1$	OP	(↑PRED)='pro'
		(↑Q)=+
		(↑ANIM)=+
qui$_2$	COMP	(↑Q)=−
que$_1$	OP	(↑PRED)='pro'
		(↑Q)=+
		(↑ANIM)=−
		(↑CASE)≠nom
		(FOC↑)= ↓
		(SUBJ↑)¬= ↓
que$_2$	COMP	(↑Q)=−
quoi	OP	(↑PRED)='pro'
		(↑Q)=+
		(↑ANIM)=−
		(↑CASE)≠nom

As shown above, different entries belong to *qui/que* as *wh*-words and complementizers: Q+ and Q−, respectively, referring to the interrogative or non-interrogative nature of the given element. Moreover, que is specified as non-subject, and the lexical entry of quoi is neutral with respect to focus status.

[8]Based on Gazdik 2006

In what follows we turn to the core of the analysis. It is proposed that the simplex and complex versions of the questions belong to different, but very similar inputs. This accounts for the fact that although their meaning is practically the same (the dummy interrogative verb in the main clause of the complex question does not contribute to it semantically), they are structurally different. The Input belonging to the complex version does not contain the dummy interrogative verb, which can be added to it in some of the candidates. Adding non-input elements to certain candidates is perfectly possible in OT-terms. Such candidates are penalized by the Faithfulness constraint which requires that the Output contain only Input elements and only those, but can, at the same time, satisfy higher-ranking constraints and thus be selected as the optimal candidate.

The input of the complex question is, therefore, an embedded clause (as indicated by the complementizer *que*−) provided with a *wh*-word, or a Q+ feature in polar interrogatives, embeddedness being the only difference between the two inputs. Due to the similarity of these inputs, Gen, in both cases, generates candidate sets that intersect with each other, i.e. the candidate set belonging to the simplex question contains the bi-clausal alternative and *vice versa*; however, in both cases, the evaluations rule out the candidates containing more faithfulness violations than the one closer to the input. The evaluation belonging to the simplex one yields the simplex question as an optimal candidate outruling the complex that is less faithful to the input and *vice versa*.

Before looking at some examples, consider the constraints used in the present analysis:

1. QMark: a question must be overtly Q (question) marked. This can be fulfilled by the presence of an interrogative (Q+) operator followed by an interrogative verb (with enclitic) in French or by subject-auxiliary inversion in English, or, in matrix yes-no questions, by clitic inversion in French or subject-auxiliary inversion in English.
2. QScope: Q+ elements must have scope over the clause they Q mark
3. Lexical verb: lexical verbs cannot Q-mark a question
4. Faithfulness: the output contains all elements that are also included in the input and only those

Proposed rankings:

Language/Order				
French	1	2	3	4
English, colloquial French	3	1	4	2

As the different rankings already reveal, formal and informal French are treated as different grammars. Interestingly, it seems that English and informal French follow the same pattern in constraint-ranking. In what follows, we will examine some examples of formal French and then compare them to informal French and English.

5 Examples

5.1 Inanimate object interrogatives

In inanimate object interrogatives, optionality can be observed between the simplex and complex versions:

(27) *Que faites-vous ? / Qu'est-ce que vous faites ?*

What are you doing?

The Inputs, differing only in the EMB+ feature are as follows:

1. Que faites-vous ?
$$\begin{bmatrix} \text{PRED} & \text{'do}\langle(\uparrow \text{SUBJ}),(\uparrow \text{OBJ})\rangle\text{'} \\ \text{TNS} & \text{pres} \\ \text{MOOD} & \text{ind} \\ \text{Q} & + \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{NUM} & \text{pl} \\ \text{PERS} & 2 \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{ANIM} & - \\ \text{FOC} & + \\ \text{CASE} & \text{acc} \\ \text{Q} & + \end{bmatrix} \end{bmatrix}$$

2. Qu'est-ce que vous faites ?
$$\begin{bmatrix} \text{PRED} & \text{'do}\left\langle\left(\uparrow \text{SUBJ}\right),\left(\uparrow \text{OBJ}\right)\right\rangle\text{'} \\ \text{TNS} & \text{pres} \\ \text{MOOD} & \text{ind} \\ \text{Q} & \text{-} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{NUM} & \text{pl} \\ \text{PERS} & 2 \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{ANIM} & \text{-} \\ \text{CASE} & \text{acc} \\ \text{Q} & + \end{bmatrix} \end{bmatrix}$$

The candidate sets are built from these inputs. Nothing prevents the structure generator (G_{inviol}) from adding or suppressing elements in the inputs. The second input is, in fact an embedded clause with a non-interrogative verb form (indicated by the complemetizer Q-), in which a Q+ *wh*-word is also present. In order for the question to get Q-marked, a dummy interrogative verb must be inserted in the optimal candidate. Given the similarity of the inputs, the two candidate sets intersect. In some candidates belonging to the simplex question, the dummy interrogative verb might appear, whereas others belonging to the complex question might be constructed with an interrogative verb, a type of faithfulness violation. A possible example of the intersection of the candidate sets is shown in the following:

The intersection of the candidate sets (a subset):

1. que_1 faites-vous
2. faites vous que_1
3. que_2 vous faites
4. que_1 est-ce que_1 vous faites

All candidates are then submitted to the evaluation, based on the constraint hierarchy. Evaluations:[9]

1.

Cand/Constr	QMark	QScope	Faith	LexV
☞ candidate 1				
candidate 2		*!		
candidate 3	*!		**	
candidate 4			**!	

[9]Legend: ☞optimal candidate, * constraint violation; !* fatal violation

2.

Cand/Constr	QMark	QScope	Faith	LexV
candidate 1			**!	
candidate 2		*!		
candidate 3	*!			
☞ candidate 4			*	

The first evaluation, belonging to the first input, selects the simplex question as the optimal candidate, whereas the complex is chosen in the second. The main reason behind this is the different number of faithfulness violations they commit with respect to the input the evaluation corresponds to. In the first case, the dummy verb is introduced in the complex candidate, which becomes Q- whereas in the second, the simplex candidate is not embedded and changes the verb interrogativity. All the other candidates violate higher-ranking constraints, such as the scope of the *wh*-word or question-marking.

5.2 Animate subject interrogatives

In animate subject interrogatives the same optionality can be observed between the simplex and complex questions.

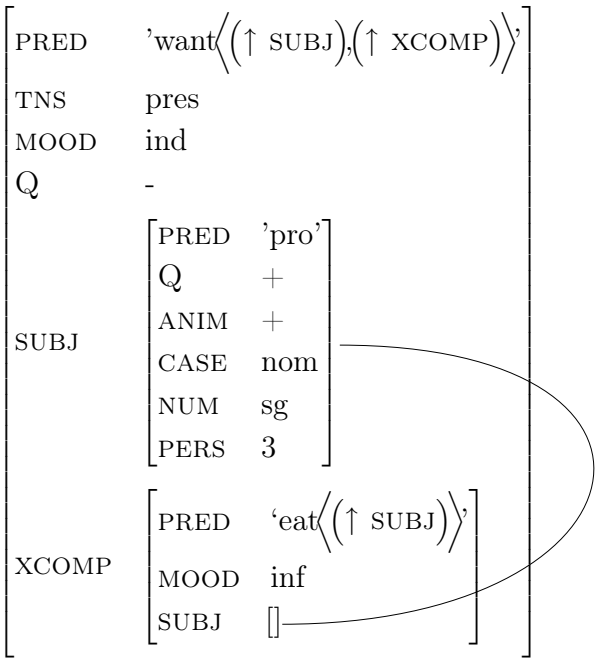
(28) *Qui*$_1$ *veut manger ? / Qui*$_1$ *est-ce qui*$_2$ *veut manger ?*
who want$_{sg3pres}$ eat
Who wants to eat?

The inputs are the following:

1. Qui veut manger ?

$$\begin{bmatrix} \text{PRED} & \text{'want}\langle(\uparrow \text{SUBJ}),(\uparrow \text{XCOMP})\rangle\text{'} \\ \text{TNS} & \text{pres} \\ \text{MOOD} & \text{ind} \\ \text{Q} & + \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{Q} & + \\ \text{ANIM} & + \\ \text{CASE} & \text{nom} \\ \text{NUM} & \text{sg} \\ \text{PERS} & 3 \end{bmatrix} \\ \text{XCOMP} & \begin{bmatrix} \text{PRED} & \text{'eat}\langle(\uparrow \text{SUBJ})\rangle\text{'} \\ \text{MOOD} & \text{inf} \\ \text{SUBJ} & [] \end{bmatrix} \end{bmatrix}$$

2. Qui est-ce qui veut manger ?



The difference is the same as for object questions, the complex candidate appears as an embedded clause, whereas the simplex is a main clause. Logically, in the case of subject questions we cannot suppose interrogative verb forms, since there is no subject to be incorporated by the complex verb form. Therefore, it is only the *wh*-word, *qui*, that question-marks the interrogative. Some examples from the intersection of the candidate sets:

1. qui_2 veut manger
2. qui_1 veut manger
3. qui_1 qui_2 veut manger
4. qui_1 est-ce qui_2 veut manger

The evaluations will bring the same results, the simplex candidate in the first case and the complex in the second, due to the different number of faithfulness violations with respect to the inputs.

1.

Cand/Constr	QMark	QScope	Faith	LexV
candidate 1	*!		**	
☞ candidate 2				
candidate 3	*!		*	
candidate 4			**!	

2.

Cand/Constr	QMark	QScope	Faith	LexV
candidate 1	*!		**	
candidate 2			**!	
candidate 3	*!		*	
☞ candidate 4			*	

The faithfulness violations committed are the following. The complex question contains the complementizer and the dummy verb (not present in the simplex input), whereas the simplex question is not embedded and does not contain the complementizer (as required by the input belonging to the complex question).

After the formal French examples let us turn to informal French and English, which operate, with the same constraint hierarchy.

5.3 Informal French

In informal French, the *wh*-word is always *in situ*. The input is similar to that of the simplex candidate in formal French, but due to the different constraint hierarchy, another candidate is selected as the optimal one.

(29) Vous cherchez qui ?

Input:

$$\begin{bmatrix} \text{PRED} & \text{'look for}\langle(\uparrow \text{SUBJ}),(\uparrow \text{OBJ})\rangle\text{'} \\ \text{TNS} & \text{pres} \\ \text{MOOD} & \text{ind} \\ \text{Q} & + \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{NUM} & \text{pl} \\ \text{PERS} & 2 \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{ANIM} & + \\ \text{CASE} & \text{acc} \\ \text{Q} & + \end{bmatrix} \end{bmatrix}$$

A subset of the candidate set:

1. tu vois qui
2. qui$_2$ tu vois
3. vois-tu qui
4. est-ce que tu vois qui
5. qui vois-tu

The Evaluation:

	Cand/Constr	LexV	QMark	Faith	QSc
☞	candidate 1		*		*
	candidate 2		*	*!	
	candidate 3	*!			
	candidate 4	*!			
	candidate 5	*!			

As can be seen from the tableau, interrogative verb forms are penalized by the first constraint in the hierarchy, thus the formal French-type question is out. The winner is the candidate in which the verb form is non-interrogative, but it is question-marked and more faithful to the input.[10] Let us now turn to English, which we propose has the same constraint hierarchy in the evaluation as informal French.

5.4 English

In English, we will examine a polar interrogative with do-insertion. The analysis offered here differs from that of Grimshaw (1995) in that it does not imply movement and from that of Grimshaw (2001) as well. In this latter, structure itself is submitted to economy (although Head and Specifier are obligatory, their absence violate the corresponding constraints) and word order is accounted for by alignment constraints (ex. Head Left or Specifier Left). The same goal is attainable in the present approach by the flexible c-structures, where no constituent is obligatory, they are present in order to satisfy more abstract requirements, such as Q-marking (that can be done in several ways).

(30) Do you speak French?

[10] A challenge to the analysis is the question *qui tu vois ?*, which is an amalgamation of formal and informal French (the verb form is not interrogative, and the wh word is not in situ). This type is present in informal French, which points towards the reconsideration of the role of the QScope constraint in the grammar of informal French.

The input looks as follows:
Input:

$$\begin{bmatrix} \text{PRED} & \text{'speak}\langle(\uparrow \text{SUBJ}),(\uparrow \text{OBJ})\rangle\text{'} \\ \text{TNS} & \text{pres} \\ \text{MOOD} & \text{ind} \\ \text{Q} & + \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{NUM} & \text{sg} \\ \text{PERS} & 2 \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'French'} \\ \text{PERS} & 3 \\ \text{NUM} & \text{sg} \end{bmatrix} \end{bmatrix}$$

A possible subset of the candidate set:

1. do you speak French
2. you speak French
3. speak you French
4. you do speak French

Evaluation:

Cand/Constr	LexV	QMark	Faith	QScope
☞ candidate 1			*	*
candidate 2		*!		
candidate 3	*!			
candidate 4		*!	*	

Since candidate c violates the LexV constraint, ranked high in English, and candidates b and c are not question-marked, the question with *do*-insertion is selected as the optimal candidate.

6 Conclusion

Going back to the main problems such an analysis has to account for, we can draw finally the following conclusions. Optionality in formal French between the simplex and complex

questions is accounted for in an OT manner, by the different number of faithfulness violations with respect to the different but very similar inputs. On the other hand, problems, such as that of *que* and *quoi* and thus that of inanimate subject interrogatives are treated in the lexical entries, specifying *que* as a non-subject and *quoi* as a non-focus, justifying the role of a lexicalist theory in the analysis. Finally, we have also shown that the differences between languages cannot only come from the different constraint rankings, but from lexical differences as well, as English does not possess interrogative verb forms, unlike French.

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TENSE AND ASPECT FOR GLUE SEMANTICS: THE CASE OF PARTICIPIAL XADJ'S

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Abstract

In the first part of this paper, I present a general model for tense and aspect in glue semantics based on Wolfgang Klein's time relational analysis (Klein, 1994). In the second part, I analyse the temporal reference of participial XADJs in Ancient Greek within this system and show how information structure interacts with aspectual marking to constrain temporal relations between secondary events and the event of the main clause.

1 Introduction

Event semantics has proven a very succesful approach to the analysis of tense and aspect phenomena, but it offers many challenges to the traditional Montagovian view of semantic compositionality as a strict rule-to-rule isomorphism between syntax and semantics. Glue semantics, on the other hand, offers a flexible approach to the syntax-semantics interface which is especially suitable to deal with event semantics; but tense and aspect have hardly been analysed in the extant glue semantics literature. In the following I will therefore attempt to provide the outlines of a general framework for treating temporality in glue. The proposed framework is not in itself new, but represents a formalization of Klein's time relational analysis and also builds on earlier formalizations of Klein in Montagovian settings, such as in Paslawska and von Stechow (2003).

According to a common and rather intuitive view, grammatical tense serves to relate events to time. But as pointed out by Klein (1994), this cannot be right. Consider the following exchange

(1) a. Do you know where John is?

b. Well, he was in the garden.

The answerer does not intend to place the situation of the John's being in the garden in the past, but rather to restrict his claim to the past, while leaving open (and perhaps implying) that the claim might still hold. In other words, the speaker makes the assertion about a time in the past to the effect that John's being in the garden includes this time. We will refer to this "time in the past" as the *topic time* of the sentence, since it is the interval the sentence "is about".

Following Klein, then, I will assume that tense serves to relate topic times, and not events or situations, to utterance time. The events themselves, on the other hand, are not linked directly to the utterance time, but only to the topic time. This linking is done by aspect, as we will see in section 2.3.

[†]Sincere thanks go to Ash Asudeh for having evoked my curiosity about glue semantics during a talk in Oslo, and to Ash Asudeh and Mary Dalrymple for having read preliminary versions of this paper. The glossing in this paper follows the Leipzig standard, except that I use the abbreviations AP for aorist participle and PP for present participle. In the Greek examples, participles are underlined.

2 Tense and aspect for glue-based event semantics

2.1 Templates and the event variable

In neo-Davidsonian event semantics, verbs denote sets of events, i.e. they have meanings like $\lambda e.run(e)$, and the arguments of verbs are represented by relations between individuals and events which act as intersective modifiers on such sets of events.

In approaches to compositionality which rely on a strict rule-to-rule correspondence between syntax and semantics, it has proven difficult to model this approach to events while keeping functional application as the only means of combining meanings: the event variable cannot be existentially quantified before the application of event-modifying adverbials since that would make the event inaccessible to the adverbial; on the other hand, the event variable should be quantified *before* the application of the arguments of the verb, since the quantification over the event would otherwise outscope quantifiers in argument positions, leading to nonsensical representations like of 'John killed no one with his shotgun' as $\exists e.\neg\exists x.kill(e) \wedge ag(e, john) \wedge theme(e, x) \wedge with(e, the\ shotgun)$.

Glue semantics, on the other hand, offers several interesting ways of assuring the right scope relations. In this paper, I will adopt the approach of Asudeh et al. (2008) which relies on construction templates to introduce subcategorization frames, i.e. to create slots for the arguments of the verb in the semantic representation, while at the same time quantifying over the event variable. Thus, the transitive template will take a set of events and turn it into a function looking for a subject and an object to produce a meaning for the sentence:

(2) $\lambda R.\lambda x.\lambda y.\exists e.R(e) \wedge agent(e) = x \wedge theme(e) = y :$
$(\uparrow_\sigma \text{EV}) \multimap (\uparrow \text{SUBJ})_\sigma \multimap (\uparrow \text{OBJ})_\sigma \multimap \uparrow_\sigma$

As will be apparent below, we will need to modify (2) slightly to allow it to pass on a temporal variable as well, and to allow us to distinguish between the event variable e and the predicate on events R.

Subcategorization frames are just one, very general type of constructional template. Constructional templates can also be more specific and in (27) in section 4.4 we define a template for predicative participles.

2.2 Events and times

Events clearly have relations to times: they are located in time, and they have duration. From this it follows that they can be ordered by the same relations as times: precedence, simultaneity, proximity, inclusion and others. Events can have such relationships not only to other events, but also to temporal intervals. There is no reason to assume that events and temporal intervals behave differently with regard to temporal relations and I will assume that precedence ($\prec$) and inclusion ($\supseteq$ and $\subseteq$) indiscriminately take times and events as arguments. Possibly, events can

also be related via mereological inclusion or ontological part-whole relationships, but this is a different relation which probably presupposes temporal inclusion but is otherwise not related to it. In this paper, $\supseteq$ and $\subseteq$ always stand for temporal inclusion.[1]

2.3 Aspect

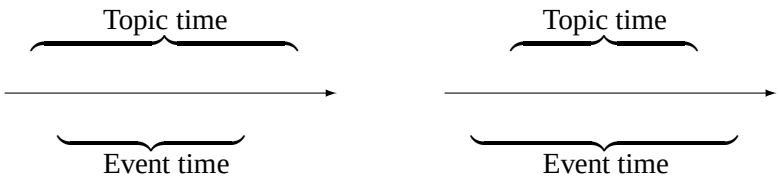
Using the notion of topic time, Klein is able to provide a definition of aspect which is intuitive, captures the insights of traditional, informal definitions and allows for a formalization in terms of the inclusion relation:

(3) a **Perfective** aspect says that the topic time *includes* the event time

b **Imperfective** aspect says that the topic time *is included* in the event time

The difference between *I mowed the lawn* and *I was mowing the lawn* can be illustrated as follows:

(4)



a. *I mowed the lawn* b. *I was mowing the lawn*

This approach neatly reconstructs the classical definition of perfective aspect as viewing the event from outside and imperfective aspective as viewing the event from inside: the topic time represents the speaker's viewpoint which is either internal to the event or lies outside it. Following Paslawska and von Stechow (2003) the contribution of aspect can then be formalized as a function from sets of events to sets of topic times such that they include or are included in the event time.

In formalizations of Klein's theory of tense and aspect it is standardly assumed that the aspect operator quantifies over the event variable. In the template approach to subcategorization, however, we need to pass on the event variable to the template so it can bind the thematic roles to the event correctly. We therefore modify the approach of Paslawska and von Stechow (2003) slightly and model aspect as a function from events, to pairs of events and topic times, to sentence meanings. Perfective aspect will then be:

(5) $\lambda P.\lambda\langle e \times t\rangle.P(e) \wedge e \subseteq t : ((\uparrow_\sigma \text{EV}) \multimap \uparrow_\sigma) \multimap (((\uparrow_\sigma \text{EV}) \otimes (\uparrow_\sigma \text{TT})) \multimap \uparrow_\sigma)$

[1] I have chosen not to use *proper* inclusion in the definition of aspect since in many languages (including Ancient Greek), it is marginally possible to use the imperfective aspect to refer to complete events, which means that there is a certain overlap in the semantics of perfective and imperfective aspect. In most cases, though, this use of the imperfective is blocked by the competing perfective aspect.

This necessitates some changes in the meaning constructor for the subcategorization template. TRANSITIVE will now be:

(6) $\lambda R.\lambda x.\lambda y.\lambda t.\exists e.R(\langle e \times t \rangle) \wedge agent(e) = x \wedge theme(e) = y :$
$(((\uparrow_\sigma \text{EV}) \otimes (\uparrow_\sigma \text{TT})) \multimap \uparrow_\sigma) \multimap (\uparrow \text{SUBJ})_\sigma \multimap (\uparrow \text{OBJ})_\sigma \multimap (\uparrow_\sigma \text{TT}) \multimap \uparrow_\sigma$

Instead of taking a simple event description and returning a function from the verbal arguments to a truth value, it now takes pairs of events and topic times which stand in some relationship defined by aspect, and returns a function from the verbal arguments and the topic time to a truth value.

To see how this works, consider a verb like *read*. This denotes a set of reading events. If imperfective aspect is applied to this meaning, we get a set of pairs of reading events and times which are included in these events. Note that these times need not include a reading event at all: they could just be intervals in which a page is turned. The transitive template then takes this set of pairs of events and times and returns a set of times, agents and themes of a particular reading event.

This approach requires that all verbs have aspect, since aspect is the crucial factor which relates events to time. For an explanation of how the model works in cases where there is no overt aspect, see Bohnemeyer and Swift (2004): essentially, the default aspect operator chooses the minimal interval for which the predicate is true, unless there is information to the contrary. This leads to a default interpretation of atelic predicates as imperfective and telic predicates as perfective.

2.4 Tense

Tense serves to place the topic time in relation to the utterance time. We can model its contribution as a simple intersective modifier on sets of topic times. For example, past tense will be:

(7) $\lambda P.\lambda t.P(t) \wedge t \prec u : ((\uparrow_\sigma \text{TT}) \multimap \uparrow_\sigma) \multimap ((\uparrow_\sigma \text{TT}) \multimap \uparrow_\sigma)$

where u is the utterance time. In our example with *read* above, the transitive template gave us a set of topic times, agents and themes; past tense would restrain the set of topic times to those preceding the utterance time.

2.5 Sample derivation

We are now ready to consider the derivation of a simple sentence like *John had left*. For expository purposes we will adopt Klein's semantics for the perfect, regarding it as an aspect which says that the event time precedes the topic time. This analysis is more or less like Reichenbach's classical account (Reichenbach, 1947), with the topic time in the role of Reichenbach's reference time. A past perfect, then, says that the event precedes a topic time which itself precedes the utterance time.

The analysis is in some respects too simple, since it does not take into account the interaction between perfect and other aspects (as in *John had been leaving*), but it is sufficient for the present purposes. As we will see in the next section, the

perfect also provides particularly clear examples of how temporal adverbials can interact both with the topic time and the event time.

The semantic derivation is shown in figure 1 in the appendix. In the first step, *leave* combines with aspect, in this case PERFECT, to produce a set of pairs of events and temporal intervals such that the event precedes the temporal interval. Next, the intransitive template is applied, existentially quantifying over the event variable while leaving the topic time slot open and introducing an agent slot. Next, the agent and the past tense are applied. The result is a function from topic times to sentence meanings, and the declarative sentence-type feature turns this into a sentence-type meaning by existentially quantifying over the topic time.

3 Temporal adverbials and information structure

Consider now the same sentence augmented with a temporal adverbial: *John had left at ten*. Temporal adverbials like *at ten* are modifiers and on the most salient reading of this sentence it modifies the event time, i.e. it acts as an intersective modifier on sets: $\lambda P.\lambda a.P(a) \wedge at(ten, a)$. The variable a can range over all kinds of entities which can bear temporal relations, most obviously events and intervals. In this particular sentence, it restricts the set of events:

(8) $\lambda P.\lambda a.P(a) \wedge at(ten, a) : ((\uparrow_\sigma \text{EV}) \multimap \uparrow_\sigma) \multimap ((\uparrow_\sigma \text{EV}) \multimap \uparrow_\sigma)$

But in the sentence *At ten, John had (already) left*, the more natural reading is that *at ten* modifies the topic time, i.e. it gives the time *before which* John had left. Still, the *meaning* of the adverbial is the same: it still restricts a set of entities to those which are 'at ten' in some sense. It is just that it now combines with a set of topic times instead of a set of events, i.e. we have something like

(9) $\lambda P.\lambda a.P(a) \wedge at(ten, a) : ((\uparrow_\sigma \text{TT}) \multimap \uparrow_\sigma) \multimap ((\uparrow_\sigma \text{TT}) \multimap \uparrow_\sigma)$

On the meaning side, these are identical. But the glue side now tells us to apply the modifier to sets of topic times instead of sets of events.

How do we get from (8) to (9)? The key difference between the two sentences lies the scope of the adverbial, which in example (9) restricts not the run time of the event but rather the topic time, i.e. the "interval the sentence is about". In other words, we have exactly one of Chafe's "scene-setting expressions"(Chafe, 1976): "a spatial, temporal or individual framework within which the main predication holds". Such expressions have variously been called scene-setters, frame-setters and stage topics. I will adopt the latter term here. Their precise status within a complete theory of i-structure and their relation to "normal" ("aboutness") topics is beyond the scope of this paper. I will just assume that any adequate theory of i-structure will have to include a stage topic attribute: adverbials which are the value of this attribute are marked in several different ways in c-structure (e.g. by adjunction to IP in English) or prosodic structure (deaccentuation): for example, if *John*

had left at ten is pronounced with stress on the nonfinite verb and corresponding destressing of the adverbial.

Crucially, then, information structure can change the meaning of a sentence by providing manager resources (Asudeh, 2004) which guide semantic composition without influencing meaning. In particular, when the i-structure marks temporal adverbials as stage topics, it will provide the following semantic resource:

(10) $\lambda P.P : (((\uparrow_\sigma \text{EV}) \multimap \uparrow_\sigma) \multimap ((\uparrow_\sigma \text{EV}) \multimap \uparrow_\sigma)) \multimap$
$(((\uparrow_\sigma \text{TT}) \multimap \uparrow_\sigma) \multimap ((\uparrow_\sigma \text{TT}) \multimap \uparrow_\sigma))$

Figure 2 in the appendix shows how the semantic derivation proceeds when the i-structure provides such a manager resource, which assures that the adverbial modifies the topic time and not the event.

The ability to modify either the event or the topic time is not limited to temporal adverbials. We find a similar phenomenon with participles:

(11) Jumping on a horse, grandma rode off to her dad's house.
$jump \prec ride$ (temporal adjunct, sequential events)

(12) Grandma rode off to her dad's house jumping on a horse.
$jump \supseteq ride$ (manner adjunct, overlapping events)

These examples show a complex interaction with the aspect of the participle, which seems to be perfective in (11) and imperfective in (12), but there is also a clear intuition that the first participle is a sentence-level temporal adjunct and the last one an event modifier. Similar effects are found in other languages, like Russian:

(13) *xlopnuv* *dver'ju,* *on* *vyšel*
slamming.PFV.GRD door.ACC he.NOM went out.PFV.PST
He slammed the door and went out.
$slam \prec$ *go out*

(14) *on* *vyšel,* *xlopnuv* *dver'ju*
he.NOM went out.PFV.PST slamming.PFV.GRD door.ACC
He went out slamming the door.
$slam \subseteq$ *go out*

Iconicity cannot be the whole story: while it could conceivably explain precedence it cannot explain inclusion. Nor does the lexical semantics of the verbs explain everything since it is possible to construct minimal pairs with the same verbs. This suggests that there is a semantic component to the effect and not just pragmatic inferencing of temporal relations. In particular, we will argue that fronted participles act as stage topics or frame-setters for the rest of the sentence.

A glue semantics implementation of Klein's theory of tense and aspect is well equipped to handle the generality of these phenomena, since it allows us to associate the event and the topic time with two different semantic structures $(\uparrow_\sigma \text{EV})$ and

$(\uparrow_\sigma \text{TT})$, to control the application of adjuncts to these via manager resources provided by the i-structure (itself presumably projected off c-structure and prosodic structure) and to assure the correct scope relations without relying on a one-to-one correspondence with linear order or c-structure.

The relationship between information structure and semantic composition is known from other areas of the grammar as well. For example, it is known that i-structure influences scope relations between quantifiers in argument position. Sæbø (1997) argues that focal object QPs cannot scope over topical subject QPs but a topical object QP can scope over a focal subject QPs as in:

(15) - How many candidates attended the meetings?
- [SEVERAL]$_F$ candidates attended [EVERY]$_T$ meeting.

In the approach of Sæbø (1997), topicality triggers quantifier raising, whereas in glue semantics it would be natural to have information structure provide a manager resource which ensures the correct scoping of the quantifiers.

4 Predicative participles in Ancient Greek

We are now ready to study Ancient Greek examples similar to examples (11)-(14) in more detail. Ancient Greek offers interesting data since it makes extensive use of predicative participles which have overt aspectual marking and interacts with information structure via word order which is generally very free. Also, a corpus of Hellenistic Greek with syntactic annotation is available, which is based on the well-studied and understood text of the New Testament.[2] Thus, while the sometimes intangible phenomena of information structure can be hard to capture in a dead language (and even a living one), its manifestation in temporal relations between events is in most cases easy to interpret.

4.1 Ancient Greek word order

Ancient Greek has a very free word order: all six permutations of major constituents are permissible and phrases can be discontinuous. These discontinuities are hard to capture in terms of syntactic movement since the "landing sites" would often be ill-defined sentence-internal positions. For the same reason, a purely discourse configurational approach fails (Welo, 2008), since it proves impossible to define precise c-structural positions that would assign discourse functions. Rather, c-structure seems to be governed by several i-structural constraints whose interplay is at present not fully understood. Despite the difficulties, it is commonly agreed (Dik (1995), Matić (2003), Welo (2008)) that backgrounded material, whether thematic or rhematic, tends to come after the finite verb, whereas foregrounded (i.e.

[2] `www.hf.uio.no/ifikk/proiel/corpus.html`. The corpus is under creation and was accessed on September, 2, 2008.

topical and focal) material precedes the verb. As we will see, this corresponds to a major divide in the distribution of participles.

4.2 The data

The corpus used in this article contains the New Testament in Ancient Greek as well as translations into Latin, Gothic and Old Church Slavic (eventually also Classical Armenian) marked up with morphological as well as syntactic annotation. The syntax is dependency based, and similar to LFG in its set of relations as well as in the use of secondary dependencies to capture structure sharing. The corpus makes it easy to retrieve all constructions of interest here, since all relevant participles bear an XADV-relation (corresponding to LFG's XADJ) to the main verb; the participles also have a secondary edge pointing to their subject. All words have linearization indices, which make it easy to retrieve their positions relative to other sentence constituents.

The Greek part of the corpus consists of 88400 lexical tokens and 10271 sentences. These sentences offer 2271 cases of predicative participles, showing how productive the construction is in Ancient Greek and offering a more than sufficient sample to study its function. Here are two examples from the corpus:

(16) *ekeinoi* *de* *exelthontes* *ekêruxan*
they.NOM.PL PTC going out.AP.N.PL preach.3.PL.AOR
They went out and preached.

(17) *husteron* *anakeimenois* *autois* *tois* *endeka*
later be at table.PP.DAT.PL they.DAT.PL ART.DAT.PL eleven
ephanerôthe
appear.3.SG.AOR.
Afterward, as they were at table, he appeared to the eleven.

These two examples behave rather as expected: the perfective participle denotes an event preceding that of the matrix verb, and the imperfective participle denotes a simultaneous event. Moreover, the perfective participle refers to a completed event: (16) clearly asserts that there was a complete event of going out, whereas in (17), it is not clear that the state of being at table is finished. As the narration proceeds to the next sentence, *and he told them that . . .* , the eleven are still at table, so to speak.

We might think that simultaneity with the main verb entails incompleteness, but this is not necessarily so. Consider the following example:

(18) *Petros* *êgeiren* *auton* *legôn*
Peter.NOM.SG wake up.AOR.3SG him.ACC.SG saying.PP.NOM.SG
'anastêthi'
stand up.IMPV
Peter woke him up (by) saying 'stand up'.

Here, the event of saying ‘stand up’ is clearly simultaneous with the waking up; the latter event seems to be an achievement without duration, so the saying-event probably includes it temporally. However, the event of saying ‘stand up’ is clearly completed: unlike in (17), the narration cannot go on to describe more things that Peter did while saying ‘stand up’. The saying-event is incomplete within the event time of *êgeiren*, but it is completed within the topic time of the whole sentence.

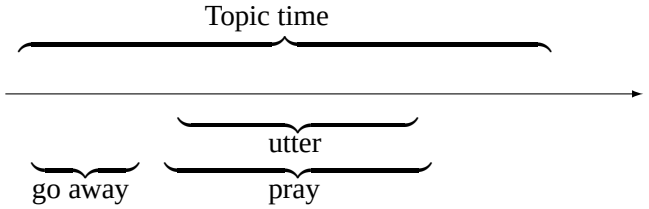
Perhaps even more striking is what can happen to perfective participles:

(19) *ti* *gar* *ofeleitai* *anthrôpos* *kerdêsas*
what for gain.3SG.PRS man.NOM.SG winning.AP.NOM.SG
ton kosmon holon
the whole world.ACC.SG
What does a man gain by winning the whole world?

In such examples, the perfective participle does not refer to an event preceding that of the main verb, but rather a *simultaneous* event, though one which is certainly completed, not only within the topic time of the sentence, but even within the event time of the main verb. The contrast is neatly brought out by the following example:

(20) *kai* *palin* *apelthôn* *prosêuxato* *ton auton logon*
and again going.away.AP.NOM.SG pray.3SG.AOR the same word.ACC
eipôn
saying.AP.NOM
He again went away and prayed saying the same words.

Although both *apelthôn* and *eipôn* are perfective participles, the first one refers to a preceding event and the second one to a simultaneous event so that we get the following temporal relations:[3]



(21)

Traditional grammar of Ancient Greek would in fact have us expect an imperfective participle for *eipôn* in (20), just like in (18). But this ignores that fact that in (18), the saying event *includes* the event of waking someone up, whereas in (20) it *is included* in the event of praying.

In other words, word order interacts with the temporal structure in subtle ways. A preliminary investigation of the examples shows that the most important factor is

[3] Assuming that the event of uttering the same words does not entirely coincide with the praying event, which could also include kneeling etc.

the position of the participle relative to its matrix verb: a perfective verb refers to a preceding event if it precedes the main verb, but to a simultaneous event if it comes after the main verb. Since by far the most common use of a perfective participle is to refer to a preceding event, this shows up in the distribution of aspectual stems:

(22)

	Before the verb	After the verb	Total
Perfective	1238	100	1338
Imperfective	203	647	850
Perfect	22	55	77
Future	1	5	6
Total	1464	807	2271

Thus, the traditional rule that aorist participles refer to preceding events is not completely off the mark, but it does not capture all the facts: exceptions are found among the 7.5% of perfective participles which occur post-verbally.

4.3 Syntax

Participles in Ancient Greek have two major functions, as noun modifiers and as secondary predicates, which is the function we concentrate on here: in LFG terms they are either ADJuncts of f-structures headed by nouns or XADJuncts of f-structures headed by verbs.[4]

As noun modifiers they normally form phrases with their nouns; as secondary predicates they appear to be sisters of their verbs. Though it is hard to demonstrate phrasehood in a language with such free word order as Greek, the difference shows up in statistics on their distribution:

(23)

	Average distance (words)	Standard deviation
ADJ ptcpl and noun	2.72	2.37
XADJ ptcpl and noun	4.06	4.19
XADJ ptcpl and verb	3.73	4.10

We see that attributive participles cluster around their nouns to a much higher degree than predicative ones. A further syntactic difference is that as adnominal modifiers, participles can attach to all kinds of nouns bearing all kinds of functions. As XADJs, however, they are more restricted in that the subject must bear an argument role in the matrix clause: overwhelmingly, this is the SUBJect of the matrix clause, but OBJects and OBLiques are also found:

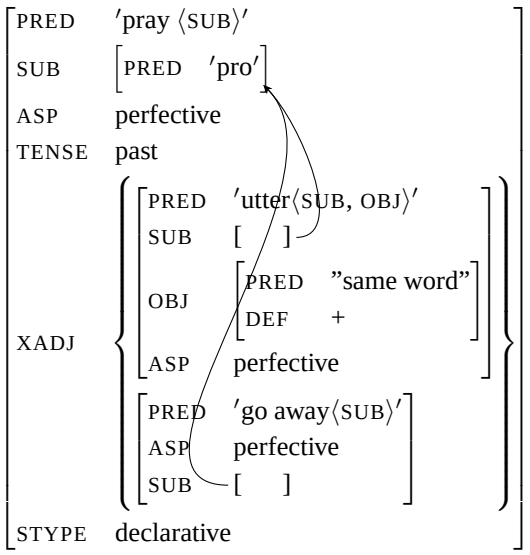
(24) SUBJ (1019) > OBJ (121) > OBL (35)

[4]Theoretically, the participial adjuncts of nouns could also have functionally controlled subjects. On such an analysis we would have to alter the conditions on the ATR-PART and PRED-PART templates in (26).

Unfortunately, the design of the corpus does not make it possible to find the grammatical relations of pro-dropped controllers of the participle subject, a case which is very frequent.As subjects are pro-dropped more often than other arguments, it is likely that the subject relation is in reality even more dominant than these numbers suggest.

4.4 Semantic analysis

In this section we are going to analyse the meaning of example (20). Its f-structure is:

(25)


As we saw in (21), the example means 'He went away and prayed, uttering the same words' - so the two participles clearly have different temporal relationships to the main verb. However, the f-structure does not contain information which distinguishes these. This is as it should be, I argue, since the there is nothing to prove that there is any difference is syntactic status between the two participles.

Intuitively, participles are rather similar to relative clauses, both in their syntax (the adnominal use corresponding to restrictive relative clauses and the predicative one to non-restrictive relative clauses) and also in their semantics. They are both event descriptions with one free argument slot to be filled (always the subject in the case of participles); bearing aspect (as well as tense in the case of relative clauses), they also need reference to a set of times. This is difficult to achieve in a traditional rule-to-rule approach to semantic compositionality; but on the glue approach we can have the participle access for example the event time of the main clause.

It is reasonable to assume that participles should start out denoting sets of events like all verbs; they then undergo modification in the normal way, aspect is applied and the result is inserted into a subcategorization template and combines with its arguments except the subject, which is unexpressed. The result is an ex-

pression of type $(\uparrow \text{SUBJ})_\sigma \multimap (\uparrow_\sigma \text{TT}) \multimap \uparrow_\sigma$, i.e. a function from subjects and topic times to truth values.

From this point attributive and predicative participles differ, depending on the construction they are inserted into. Exploiting the approach of Asudeh et al. (2008) we can model as constructional meaning, i.e. as template calls. The ability to enter into such constructions is part of what it takes to be a participle in Greek, so we will assume that is part of the lexical entry, i.e. :

(26) **eipôn**
CASE = NOMINATIVE
$\lambda e.utter(e) : (\uparrow_\sigma \text{EV}) \multimap \uparrow_\sigma$
@ TRANSITIVE
$(\text{ADJ} \in \uparrow) \rightarrow$@ATR-PART
$(\text{XADJ} \in \uparrow) \rightarrow$@PRED-PART

We will not go into the @ATR-PART-template here. The @PRED-PART will need to be:

(27) $((\text{XADJ} \in \uparrow)\{\text{SUBJ}|\text{OBJ}|\text{OBL}\}) = (\uparrow \text{SUBJ})$
$(\uparrow \text{SUBJ CASE}) = (\uparrow \text{CASE})$
$\lambda\langle y \times P\rangle.\langle y \times \lambda Q.\lambda t.(P(y))(t) \wedge (Q(t)\rangle :$
$((\uparrow \text{SUBJ})_\sigma \otimes ((\uparrow \text{SUBJ})_\sigma \multimap (\uparrow_\sigma \text{TT}) \multimap \uparrow_\sigma)) \multimap$
$(\uparrow \text{SUBJ})_\sigma \otimes (((\text{XADJ} \in \uparrow)_\sigma \text{EV}) \multimap (\text{XADJ} \in \uparrow)_\sigma) \multimap$
$(((\text{XADJ} \in \uparrow)_\sigma \text{EV}) \multimap (\text{XADJ} \in \uparrow)_\sigma)$

The meaning constructor part of @PRED-PART takes the conjunction of a participle construction without a subject and a subject as input. It returns a pair whose first member is a copy of the subject and the second member is a modifier of the matrix event. This modifier is obtained by applying the subject to the participle ($P(y)$) so that we get a function $\lambda t.R(t)$ (where $R = P(y)$): this defines a set which is made to intersect with the set of events defined by the matrix predicate.

The composition of a meaning for the main verb then proceeds in the same manner: aspect is applied and then a subcategorization template, leading to a glue term $(u \text{ SUBJ})_\sigma \otimes (p \text{ SUBJ})_\sigma \multimap (p \text{ TT}) \multimap p_\sigma$. But because of the structure sharing, $(u \text{ SUBJ})$ and $(p \text{ SUBJ})$ are just different names for the same f-structure which projects to a unique semantic structure. So we can apply the second conjunct on the first one, yielding the last stage of the derivation presented in figure 3.

At this point we have a set of topic times; if no other lexical elements of the sentence remained, existential closure would give us a sentence type meaning. But we still need to consider the meaning of the second participle, *apelthôn* 'going away'.

4.5 Information structure and predicative participles

I will argue that the key to understanding the semantics of *apelthôn* in this sentence is to see that it functions as a frame setter or a stage topic, i.e. it restricts

the time interval that the sentence is about. How this is actually marked in the Ancient Greek sentence structure is an intricate question which cannot be fully answered here — and perhaps never, since we do not have access to the Ancient Greek prosody. But the correlation with position before or after the verb, as shown in table (22), is rather clear. It also corresponds to the widespread view that the finite verb marks the beginning of the background domain of the Greek sentence: topics and foci precede the verb, whereas other material follows it. This is a simplification, since topics can certainly be found in post-verbal position (just like in English when combined with deaccentuation), but it is sufficient for our purposes, where we focus on the semantic effects of this marking. These are so clear that they are easy to agree on, even when there is disagreement about how the actual marking happens.

The semantic derivation of a stage topic meaning for a participial XADJ is illustrated in figure 4. First, the normal meaning of a predicative participles is derived in the same way as in figure 3, yielding a pair consisting of a subject and a modifier of the matrix event. Then the meaning constructor of the stage-topic construction is applied to the second member of this pair, changing it into a modifier of the matrix clause topic time instead.

This modifier can apply to the calculated meaning of the matrix clause (the final line of figure 3), as illustrated at the top of figure 5. This yields a pair consisting of a subject and a function from topic times to sentence meanings. However, the derivation of the second member of the pair depends on a hypothetical subject (1 in figure 3); this hypothesis can now be discharged to create a dependency on a subject resource. Again, all the subjects are identical because of the structure sharing, so we can apply the dependency on $(u\ \text{SUBJ})_\sigma$ to $(g\ \text{SUBJ})_\sigma$. We then discharge the hypothesised subject from 2 in figure 4 and apply the real subject resource provided by the pro-dropped subject of the main verb. Finally, the declarative sentence operator existentially closes the topic time.

The semantics thus yields the temporal relations $g \subseteq t \wedge u \subseteq p \wedge p \subseteq t$ which are compatible with the relations we suggested in (21). On the other hand it is obvious that our semantics is underspecified, since it allows for numerous other configurations than the one in (21): g and p are only linked to the topic time and not to each other, although it is clear that in example (20) g precedes p.

However, it is not obvious that $g \prec p$ derives from the semantics of the construction with a predicative participle as stage topic. In our corpus we also find examples like the following:

(28)

kai	*pempsas*	*autous*	*eis*	*Bethleem*	*eipen*
and	send.AP.NOM.SG	them.ACC.PL	to	Bethlehem	say.AOR.3SG

And he sent them to Bethlehem and said

Here, it is obviously not the case that he (Herodes) first sent them (the wise men) away and then spoke to them, so there is no precedence relation. If anything, it is rather the case that saying-event is part of the sending-event, which could have included other parts such as giving directions to Bethlehem etc.

In fact the ambiguity of the stage topic construction as we derive it here is reminiscent of the ambiguity of finite temporal clauses with underspecified subjunctions such as *when*. As observed by Kamp and Reyle (1993) this is compatible with numerous temporal relations:

(29) a. When they built the new bridge, they placed an enormous crane right in the middle of the river.

b. When they built the new bridge, a Finnish architect drew up the plans.

c. When they built the new bridge, the prime minister came for the official opening.

In both (28) and (29) it is therefore wise to leave the semantics of the construction underspecified. The temporal relations are instead inferred by pragmatic principles similar, although probably not identical, to the ones that operate between sequential main clauses. These rely heavily on the lexical semantics of the relevant verbs and should probably be dealt with within an SDRT framework (Asher and Lascarides, 2003).

But note that the truth-conditions which derive from the semantics cannot be overridden by pragmatic inferencing. The possibility of creating minimal pairs such as (11)-(14) show that particular constructions can lock the temporal relations. And the temporal relations can influence the inferred event relations, so that we get a manner adjunct reading of the participles in (12) and (14). In Ancient Greek, we are not able to construct such minimal pairs, but there is no reason believe they could not exist, since the distribution is otherwise so clear.

5 Conclusion

We have seen how Klein's time relational analysis of tense and aspect can be used within the glue semantics. The flexibility of this framework allows fine-tuned control over the access to the event and time variables.

To account for the semantic interpretation of adverbials and participial adjuncts, we let i-structure provide semantic resources. Typically such resources will only affect composition, and not the meaning itself. Again this is something which is easily modeled in glue semantics, with its separation of composition and meaning.

Having i-structure introduce semantic resources directly also has the advantage of abstracting away from the surface representation of i-structure features. Typically, strategies for expressing information structural categories are very complex, and different constructions, like fronting and prosodic deaccentuation, can sometimes express the same meaning, viz. topicality. To avoid having to postulate different semantic analyses of such constructions, we need to base our semantics on something more abstract than c-structure — and glue semantics provides an excellent way of doing so.

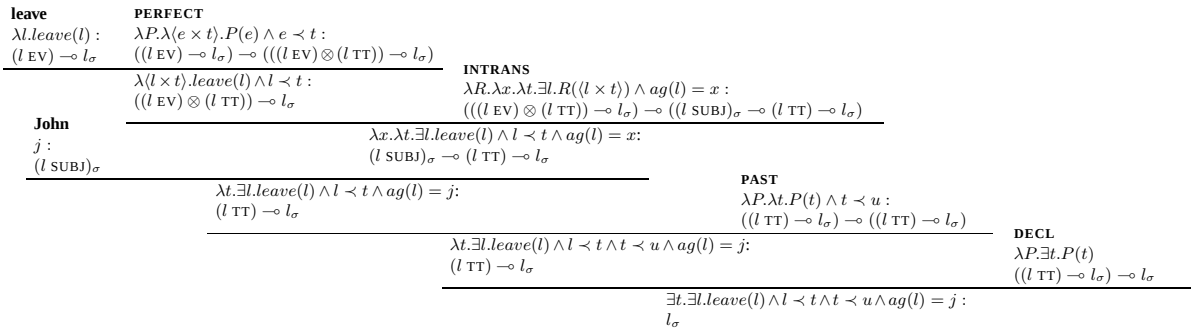


Figure 1: Semantic derivation of *John had left*

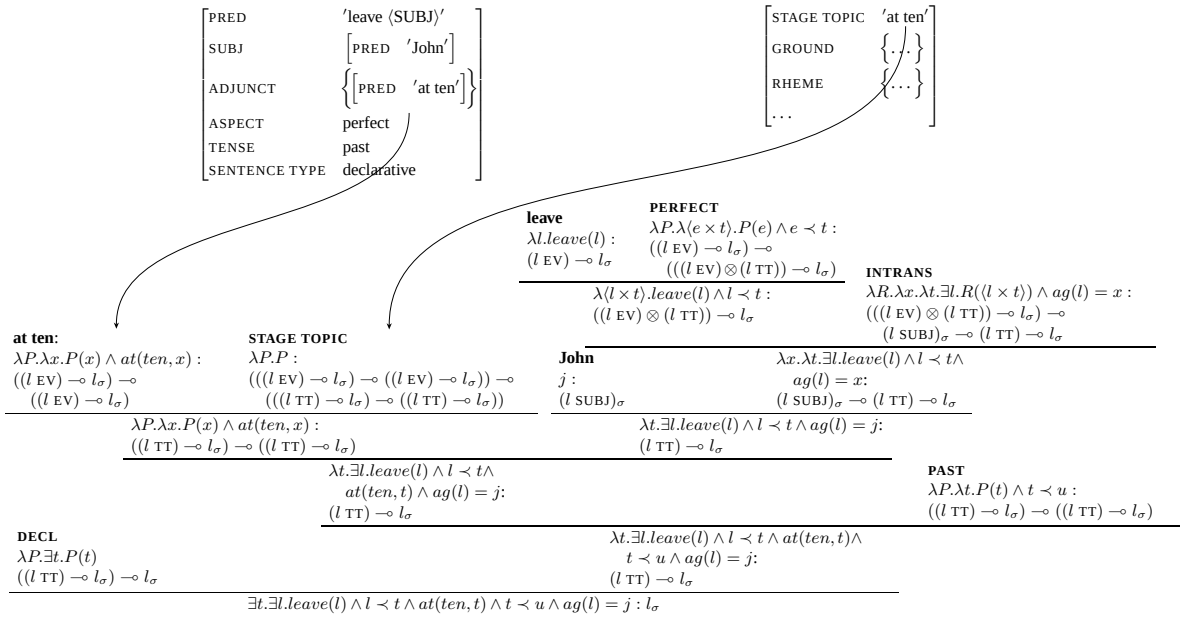


Figure 2: f-structure, abbreviated i-structure and semantic derivation of *At ten, John had left*

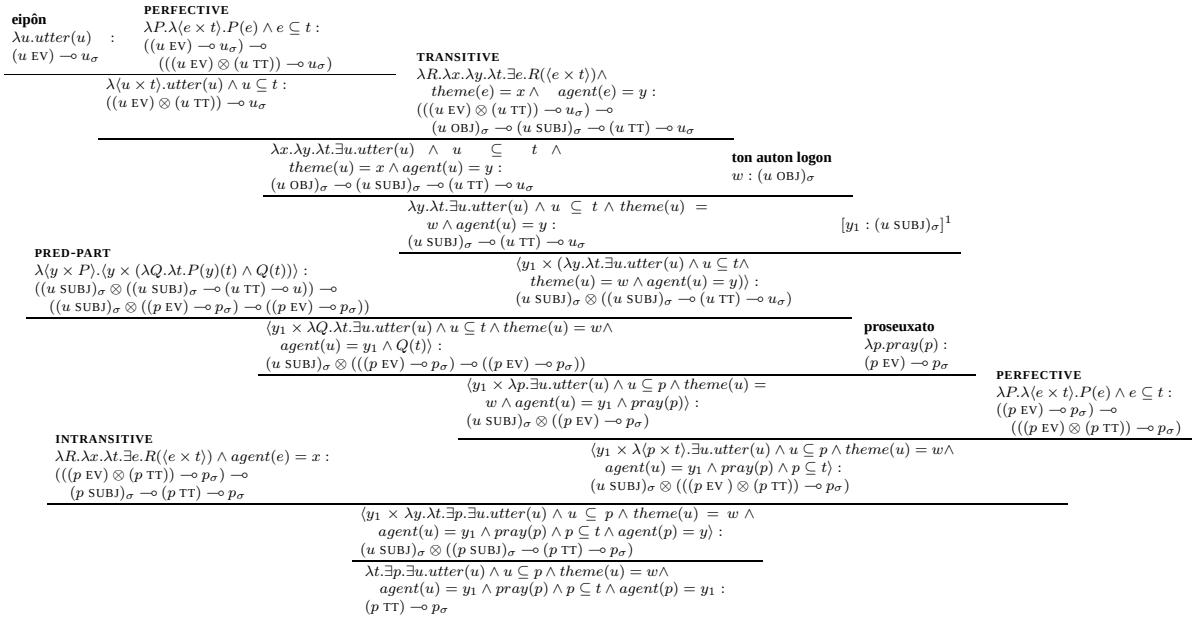


Figure 3: Partial semantic derivation of example (20)

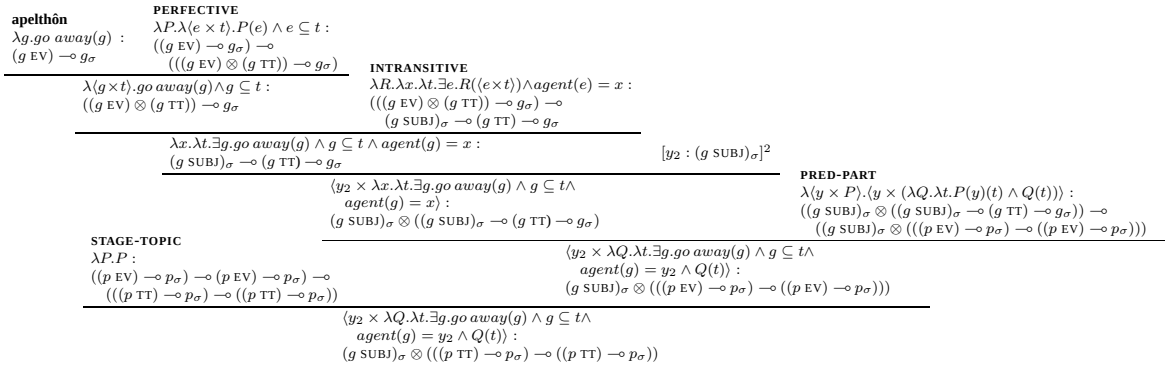


Figure 4: Semantic derivation of stage topic participle apelthôn in example (20)

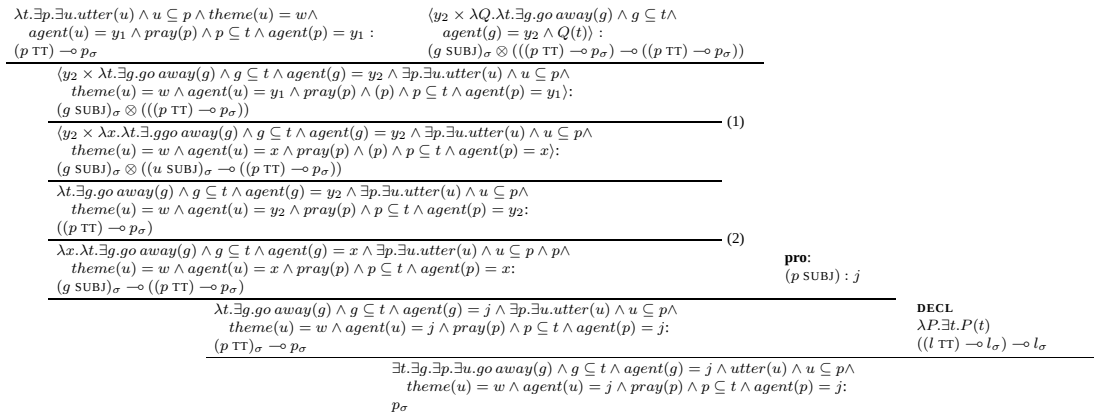


Figure 5: Combining stage topic and main predication in the semantic derivation of in example (20)

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ON THE SYNTAX OF DITRANSITIVE CONSTRUCTIONS

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Abstract

This paper deals with modelling the argument structure of constructions with two internal arguments expressing a beneficiary/recipient and a patient/theme. It offers an analysis of the dative shift which captures both the alternative grammatical function mappings and the altered semantics of the participants of the related predicates. The LMT variant used assumes that semantic participants are sets of semantic entailments of the predicate (Dowty 1991, Ackerman & Moore 2001) and that it is the syntactic representation of the predicate's valency, rather than a hierarchy of thematic roles, that remains constant in the model (Zaenen 1993, Ackerman & Moore 2001). Specifically, instead of fixing the thematically ordered participants and allowing them to change syntactic pre-specifications (which can lead to violations of monotonicity), the proposed model keeps constant the syntactic argument positions with their fixed pre-specifications and allows the semantic participants to re-align with them. Such alternative alignments represent changes in the semantics of the predicate which are recognised when the predicate undergoes dative shift or applicative transitivisation. Since in the proposed model only those objects which are capable of becoming passive subjects are [–r] (other objects are [+o]), the model straightforwardly supports the correct prediction of the theory of object asymmetries (Baker 1988, Bresnan & Moshi 1990) that, when an argument can be a passive subject, it can also be expressed as an object marker in the active – but it does not make the incorrect prediction that the reverse will hold, too. It also concurs with Alsina's (1996a) account of the distribution of objective properties other than passivisability; this is regulated by additional constraints which are often semantic in nature and have to be determined on a language-by-language basis. Finally, by unifying analyses of the non-applied dative and benefactive applicatives, the model provides LMT support for the special morphosyntactic status of the dative as the 'third structural position'.

1 The argument structure of ditransitive predicates

The constructions under consideration are those which are generally accepted to have two arguments in addition to the subject: a 'recipient/beneficiary/addressee' argument, and a 'theme' argument. Typical ditransitive verb meanings are 'give', 'sell', 'bring', and 'tell' (Haspelmath 2005:426), though in many languages a wide range of verbs can occur in a ditransitive valency frame with a 'recipient' argument. The aim of this paper is to revisit the argument structure model underlying ditransitive constructions. In particular, I offer new analyses of the dative alternation and constructions with applied recipients/beneficiaries.[1]

By focusing on the syntax of the alternating and applicative constructions, I aim to complement the recent discussion of the dative alternation undertaken by Bresnan and colleagues (Bresnan 2003; Bresnan & Nikitina 2003/2007; Bresnan, Cueni, Nikitina & Baayen 2007). Their work has stemmed from two observations: first, that Lexical Mapping Theory appears incapable of adequately accounting for the dative alternation (Bresnan 2003:19, commenting on Bresnan & Moshi 1990 and Evans 1997); and second, that the 'classical' form of generative syntactic theory in general does not offer appropriate apparatus to explain the gradience in the natural uses of the dative alternation

[1] I wish to thank Cynthia Allen, Alex Alsina, Matthew Baerman, Dunstan Brown, Greville Corbett, Mary Dalrymple, Helge Lødrup, and Joan Maling for their very helpful questions, comments and discussion, which have led to clarifications and improvements. That is not to say that they share all the views presented here.

(Bresnan 2003:71; Bresnan & Nikitina 2003/2007). In response to the second observation, Bresnan and colleagues apply a probabilistic approach to the dative alternation phenomenon, and successfully model the constraints behind the choice of the alternating variant – that is, they explain what drives the dative alternation. In the present paper, I offer a solution to the first problem by providing a theoretically satisfactory model of the dative alternation within Lexical Mapping Theory (LMT). In this way, the probabilistic approach gains an adequate lexical-syntactic representation of the modelled variants. With the revised theoretical tools, I also locate the dative alternation within the range of ditransitive constructions.

Bresnan (2003:20) argues that the problem with the standard LFG account of the dative alternation (Bresnan 1978, 1982) is the assumption that the rules deriving the alternation are restricted to the information available in the lexical entries of verbs. However, the principles of function-argument correspondence proposed in LMT do exploit the semantics of lexical argument structures and allow us to tackle the polysemy of the alternating variants of ditransitive verbs. The problem lies in the fact that the most widely accepted models of LMT collapse the syntactic level of argument positions and the semantic level of thematic roles into one level of representation, which renders such models incapable of capturing any complex relationship which involves both a semantic and a syntactic alternation between related lexemes. On the widely accepted LMT analysis of the dative alternation, the arguments (identified by their thematic roles) are assumed to be the same between the two variants, therefore the same thematic roles, the beneficiary/recipient and the patient/theme, have to be pre-specified differently for the two variants to achieve the required grammatical function mappings. The following analysis is from Bresnan (2003:14-15), but see also Bresnan (2001:315), Falk (2001:113), and others:

(1) a. *I gave them cheques.*

b.

$gave_1$	⟨ *ag*	*ben*/*rec*	*pat*/*th* ⟩
	[–o]	[–r]	[+o]
	|	|	|
	SUBJ	OBJ	OBJ_θ

(2) a. *I gave cheques to them.*

b.

$gave_2$	⟨ *ag*	*ben*/*rec*	*pat*/*th* ⟩
	[–o]	[–o]	[–r]
	|	|	|
	SUBJ	OBL_θ	OBJ

This theoretical shortcoming becomes even more apparent in another situation, found in Kanuri and discussed by Bresnan (2003:17-20), where two different argument structure representations, such as (1b) and (2b), are required for a verb with no change of meaning other than the change of the person of the recipient (1st & 2nd persons versus 3rd person, respectively; see section 4.3 below).

Another problematic solution is widely adopted for applied benefactives in so-called symmetric languages such as Kichaga (Bresnan & Moshi 1990/1993) which have an alternating passive (this term is due to Alsina 1996a). In Kichaga, a transitivising applicative adds a beneficiary/recipient (assumed to be pre-specified as [–r]) to the argument structure of the predicate, but passivisation patterns show that both the beneficiary/recipient and the patient/theme must be pre-specified as [–r], since either argument can become a passive subject. The standard analysis of the Kichaga benefactive

offers the argument structure in (1b) for the active (Bresnan & Moshi 1993:76-77, ex. 69), and a 'symmetric' argument structure as in (3), with two [–r] arguments, for the passive (Bresnan & Moshi 1993:77, ex. 70):

(3) 'eat-for$_{passive}$' ⟨ *ag* *ben*/*rec* *pat*/*th* ⟩
[–o] [–r] [–r]
∅ | |
OBJ SUBJ
or: SUBJ OBJ

The main problem with this analysis, so far overlooked, is that it requires a non-monotonic change of information by assigning different pre-specifications ([+o] or [–r]) for the active and passive variants of the same applicative predicate. Even though LMT does allow either the [+o] or the [–r] pre-specification for a 'patient-like' argument, the active and passive variants of a predicate cannot normally arise from two different argument structures, that is, from two predicates with different sets of pre-specifications.

A further issue with this analysis is due to the fact that two alternative a-structures are posited for one of the passive variants of the applicative, the one with the beneficiary as a passive subject. One of the a-structures is that given in (3), with the beneficiary expressing the SUBJ and the patient/theme expressing the OBJ. However, since passivisation is normally also expected to operate on the active represented in (1b) (see e.g. Bresnan & Moshi 1993:78, ex. 71), the passive of (1b) has the same lexical outcome as the passive mapping option in (3) just described, even though there does not appear to be any empirical evidence to support two different a-structure analyses of that outcome.

In the following sections I outline an alternative model of the argument structure of ditransitives and the dative alternation, which accounts for the data discussed in the literature without having to compromise monotonicity.

2 The choice of an a-structure model

It is generally accepted that the dative alternation brings about a change in the morphosyntactic manifestation of the (same set of) semantic dependents of a predicate – see for example Sadler & Spencer (1998:209-210), who for this reason call the dative alternation 'morphosyntactic'.[2] However, it is also agreed (e.g. Bresnan 2001:315, 2003:9) that, apart from resulting in a different grammatical function mapping, the alternation should also be regarded as meaning-altering – hence 'morphosemantic'. It can also be valency-increasing (e.g. in the applicative).

In order to capture these properties of the dative alternation, I use a slightly revised model of LMT. I follow Ackerman & Moore (2001:48ff) in assuming that argument positions (i.e. the valency slots of the predicate) constitute an independent level of representation which mediates the relation between semantic participants and grammatical function assignment (see also Falk 2001:101-105, and others), and that semantic participants should be understood as sets of semantic entailments of the predicate but not as discrete thematic roles which are part of the lexical entry of verbs (see also Dowty 1991, Hudson 1991, Primus 1999, and Beavers 2006). Following Zaenen (1993:151) and Ackerman & Moore (2001:44ff), I argue that the point of reference which should remain constant in modelling argument structure is the *syntactic* representation of the predicate's

[2] Alternatively, 'morphosyntactic' can refer to operations such as passivisation, which affect only the 'default' argument-to-function mapping but not the lexical or semantic levels of representation of the predicate (hence are not meaning-altering). In this case, the dative alternation is better termed 'morphosemantic', since it is also meaning-altering. See Kibort (2007) for discussion.

valency rather than the *semantic* representation of thematic roles with which argument positions are linked. I assume that the following valency template is available to a base predicate:

(4)

< arg_1	arg_2	arg_3	arg_4	...	arg_n>
[–o/–r]	[–r]	[+o]	[–o]		[–o]

Note that the pre-specification of the ordered valency slots corresponds to LFG's hierarchy of syntactic functions, but it is based on LMT's atomic values instead of final grammatical functions. As in all widely used models of LMT, the syntactic pre-specification of the arguments determines their availability for the mapping of particular grammatical functions. In order to retain the principle of monotonicity for the tractability of syntactic information (e.g. Bresnan 2001:45-46), I assume that the only mechanism that can intervene at the level of argument-to-function mapping is a mechanism of increasing markedness, but the primitives [+/– r/o] cannot be either changed or deleted.[3]

Argument positions are linked with particular types of predicate entailments corresponding to semantic participants; if the predicate does not have a particular set of entailments, the slot corresponding to that set of entailments is not invoked. Thus, for a particular predicate, the angled brackets contain all and only the selected valency slots for the arguments associated with that predicate, both core and non-core (arg_n [–o] indicates the availability of multiple non-core arguments), and there are no 'empty slots' in any particular predicate's argument structure.

Within such a model of LMT, a ditransitive predicate projects three sets of semantic entailments which align with the available argument positions in the template following a well-formedness condition on linking (Ackerman & Moore 2001:44-45), as is exemplified in (5). I refer to the three key participants in a ditransitive event as: *x*, *y*, and *b*. These participants are capable of representing different possible sets of entailments of a ditransitive predicate, for example: *x* = participant with the most proto-agentive properties; *y* = participant with the most proto-patientive properties; and *b* = participant with the most proto-beneficiary/recipient properties (see Dowty 1991, Primus 1999, Ackerman & Moore 2001):

(5)

	x	*y*	*b*	
	|	|	|	
<	arg_1	arg_2	arg_3	>
	[–o]	[–r]	[+o]	

Note, however, that in a derivationally related predicate, the same participants may express different semantic roles, corresponding to different sets of entailments projected by the predicate. Therefore, in representations of related predicates, the letters (which are kept the same) indicate that the participants in the event remain the same, even though they may be expressing different semantic roles in the two predicates.

Changes in the semantics of related predicates which result from an addition (as in applicatives, for example) or deletion (as in anticausatives or inchoatives) of a participant role, are not regarded in mainstream LFG as breaking monotonicity.[4] If it is accepted that

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[3] See Kibort (2007) for a more detailed account of the revised model of argument structure and Lexical Mapping Theory. Note also that subscripts here are only a memory aid, helping visualise and later recall the ranking of the argument slots. It is the linear order in the representation of the argument structure that gives us the ranking information, not the subscripts.

[4] See section 5, and also Baker (1983/2005:26-27), Levin & Rappaport Hovav (1995:108), Ackerman & Moore (2001:11), and other LFG work on mapping from lexical semantics to a-structure, or on morphosemantic as opposed to morphosyntactic operations.

the dative alternation results from a change at the semantic level of the predicate, where the same participants can alternate between two different sets of semantic roles, this change can also be captured with a pre-syntactic mechanism which does not compromise monotonicity, such as a mechanism re-aligning participants with argument positions.

It is worth noting that some mainstream LFG analyses already implicitly adopt re-evaluation of the semantics of the participants between related predicates.[5] For example, representations given in (1b) and (2b), from Bresnan (2003:14-15), could be interpreted as representing the fact that the same two participants, identified as *ben*/*rec* and *pat*/*th*, express somewhat different roles in the two variants: Bresnan expands her label for *them* in (1a) as 'recipient/possessor', and the label for *to them* in (2a) as 'recipient/goal'. Therefore, if $gave_1$ and $gave_2$ have related lexical entries, the relation has to be accounted for at some level involving semantics (for example the lexical-conceptual structure). It is at this level that at least one of the participants has to be allowed to change its semantic interpretation, and this level obviously has to interface with the syntactic argument structure represented in (1b) and (2b). Similarly, Alsina (1996a:699, ft. 12) suggests that in applied instrumentals in Fula, the applied instrument participant must be syntactically pre-specified as 'non-objective' (non [–r]) when it co-occurs with another internal argument (patient/theme), but may bear a different pre-specification in other contexts in the same applicative predicate. This suggestion also implies a re-evaluation of participant semantics that has to occur at a semantic or lexical-conceptual level interfacing with argument structure, and thus supports the dissociation of argument positions and semantic roles, as proposed here.

3 Patterns of alignment in ditransitives

Keeping constant the (fixed) valency template which was given in (4), and the three participants which are relevant for a ditransitive event, we find three different patterns of alignment between participants and argument slots in ditransitive predicates, indicated [1], [2], and [3]. The patterns are identified on the basis of morphosyntactic behaviour, such as the ability to passivise, and also morphological expression, such as marking with a particular structural case:

(6)

	x	*y*	***b***	
	|	|	|	
<	arg_1	arg_2	arg_3	>
	[–o]	[–r]	**[+o]**	

[1] beneficiary as a canonical dative

(7)

	x	*y*	***b***	
	|	|	|	
<	arg_1	arg_2	arg_4	>[6]
	[–o]	[–r]	**[–o]**	

[2] beneficiary as an oblique

[5] This can only be done implicitly in most commonly used models of LMT because of the fusion of the syntactic level of argument positions and the semantic level of thematic roles.

[6] The gap in the representation of this argument frame is another memory aid. Theoretical significance is attributed to the rank of a particular argument position, and the gap only serves as a reminder to the reader that the third encountered argument of this predicate occupies an oblique slot – the argument only qualifies for an oblique, but not for a structural dative (the third argument position).

(8) *x* ***b*** ***y*** **[3]** beneficiary as a shifted dative

	<	arg_1	arg_2	arg_3 >
		[–o]	**[–r]**	**[+o]**

I suggest that the third argument position in the valency template, that of the 'secondary object', is perfectly suited to the expression of what is often referred to as the 'structural dative'. I concur with numerous researchers who believe that the dative has special status, between a core argument (it has morphosyntactic properties that clearly distinguish it from obliques – see further below) and an oblique (it is not obligatory). It can be regarded as a 'structural' argument if its morphological expression does not follow from an idiosyncratic (semantic) property of a particular class of verbs, but instead it fills a regular structural position which is available to all predicates in languages that have a dative.

If no suppression or morpholexical/morphosyntactic operation (such as passivisation) intervenes, by LMT's Mapping Principles arg_1 becomes SUBJ, arg_2 becomes OBJ, arg_3 becomes OBJ_θ, and arg_4 becomes OBL – regardless of which participants they express (it is assumed that the semantic properties of each participant match the appropriate set of entailments projected by the predicate). If, however, passivisation is applied to the predicates, the argument in the primary object position (arg_2) becomes the passive subject, and so on, following the Mapping Principles.

4 Constructions with non-applied beneficiaries

In this section I discuss patterns [1]-[3] as they are found in non-applicative constructions.

4.1 'Plain dative'

Pattern [1], repeated here from (6), is found in many familiar languages which distinguish the beneficiary/maleficiary argument from the patient/theme by case or other marking. For example, in most Slavonic languages beneficiaries are distinguished from themes by their dative case (Primus 1998:450),[7] and in Catalan beneficiaries expressed through third person pronominal clitics are marked for dative case, while nominal beneficiaries are marked with a preposition (Alsina 1996b:149-169). Evidence provided by Allen (2001:44-48, 55, 57) demonstrates that pattern [1] was also present in Old English until the beginning of the 13th century, becoming less frequent after that time and finally disappearing by the last quarter of the 14th century:

(9) *x* *y* ***b*** **[1]** beneficiary as a canonical dative

	<	arg_1	arg_2	arg_3 >
		[–o]	[–r]	**[+o]**

[7] According to Primus (1998:450), the dative is found in Belarusan, Czech, Kashubian, Polish, Russian, Serbo-Croat, Slovak, Slovene, Ukrainian, and Upper Sorbian. It is also found in Lower Sorbian (Greville Corbett, personal communication). Moreover, full pronouns and clitics of Bulgarian and Macedonian have dative forms and therefore these languages may also be using pattern [1], like Catalan – however, I leave this hypothesis for further study. Since pronominal arguments often behave differently from full-NP arguments (see, for example, Haspelmath 2005), it is also possible that different syntactic patterns may be available for these two types of expression within a language.

Morphosyntactic properties of arg_3 as the structural dative include: dedicated morphology (usually dative case); availability for all predicates (with a benefactive/malefactive or other related meaning, e.g. an ethic dative); impossibility of promoting it to subject (as in passivisation) or changing its status to object (as in 'dative shift') through any argument-structure alteration in the predicate; unavailability for raising; optionality; typically, resistance to multiplication (e.g. in Polish); and importantly, the ability to retrieve the causer/instigator after lexical detransitivisation (specifically, by presenting the causer as an experiencer).

Below are some examples of datives in Polish, where (10a) is the active variant of pattern [1], (10b) is the passive variant of this pattern, (10c) illustrates the impossibility of making arg_3 a passive subject, and (10d) illustrates that the dative argument can be placed pre-verbally for topicalisation or focus purposes, both in active and passive clauses (this example shows the passive) and any other type of clause (e.g. a morphological impersonal, or a clause with a raised subject); however, if the participant expressed through the dative were to become the syntactic pivot of the clause, a different verb would have to be selected to achieve the required (SUBJ) mapping for this participant (e.g. '[Peter] received'). Finally, (10e) shows a randomly chosen different verb, not typically ditransitive, with a dative; the sentence on the right exemplifies a dative referring to 'self' which can be added to any predicate:

(10) a. *Jan wręczył kartę Piotrowi.*
John.NOM handed.MASC card(FEM).ACC Peter.DAT
'John handed the card to Peter.'

b. *Karta została wręczona Piotrowi* (*przez Jana*).
card(FEM).NOM became.FEM handed.FEM Peter.DAT (by John)
'The card was handed to Peter (by John).'

c. **Piotr został wręczony kartę* (*przez Jana*).
Peter.NOM became.MASC handed.MASC card(FEM).ACC (by John)
(intended) 'Peter was handed the card by John.'

d. *Piotrowi została wręczona karta* (*przez Jana*).
Peter.DAT became.FEM handed.FEM card(FEM).ACC (by John)
'To Peter was handed the card (by John).'

e. *Czytam tobie/ci wiersz. / Czytam sobie/se*[8] *wiersz.*
read.1SG you$_{strong/weak}$.DAT poem.ACC / read.SG self[REFL]$_{strong/weak}$.DAT poem.ACC
'I am reading you a poem.' / 'I am reading to myself a poem.'

Examples in (11) below, also from Polish, are all anticausative and show how a deleted causer/instigator can be retrieved and brought back to the syntax through the dative argument. (11a) has anticausatives without a dative – I argue that, at least for Polish, these should be analysed as derived from the transitive variants of 'break' and 'spill' (see Kibort 2004:33-48 for discussion). In (11b-c), the dative expresses the causer/instigator of the event: it is the participant who 'broke' and 'spilt', even though unwillingly. Thus, while the causative variants of 'break' and 'spill' entail a wilful causer (i.e. agent), the anticausative variants of these predicates may entail an unwilful causer. If it is agreed that the causative and anticausative variants of these predicates are related, the causer participant is the same in both, even though it bears two different roles to match the different sets of entailments projected by the two predicates. Example (11d) illustrates a dative in a middle clause, which is a variant of the anticausative (see Kibort 2004:203-205), and (11e) is an example of an anticausative formed from an intransitive verb ('to

[8] *Se* is colloquial, as well as found in dialects.

gain weight'), also with a dative; indefinitely many more such examples could be provided, as the dative in Polish is very productive:

(11) a. *Szklanka się zbiła. / Wylała się zupa.*
glass(FEM).NOM REFL broke.FEM / spilt.FEM REFL soup(FEM).NOM
'A/The glass broke.' / 'The soup has spilt.'
b. *Zbiła mi się szklanka.*
broke.FEM me.DAT REFL glass(FEM).NOM
'A/The glass broke to/on me.' (= I broke a/the glass unintentionally.)
c. *Piotrowi wylała się zupa.*
Peter.DAT spilt.FEM REFL soup(FEM).NOM
'Soup has spilt to Peter.' (= Peter has spilt the soup unintentionally.)
d. *Ten sweter dobrze nam się pierze.*
this.MASC jumper.MASC well us.DAT REFL washes
'This jumper washes well to us.' (= We find it easy to wash this jumper.)
e. *Ale się Piotrowi utyło.*
how REFL Peter.DAT gained-weight.3SG.NEUT
'How it has gained weight to Peter.' (= How Peter has gained weight!)

The dative as described here – that is, as the third structural case – appears to be a typologically restricted phenomenon (see also Primus 1998). Many languages with rich case systems lack this structural position. In such languages, all other cases apart from those expressing the subject and the object are treated as semantic cases (and a morphological dative case may be expressing a semantic case). Conversely, since in this and other models of LMT morphological cases and grammatical relations are treated as distinct concepts, it is also possible that an argument morphologically marked for dative case in the active may be a subject or an object, and as an object it may be passivisable.

I propose that pattern [1] is also exceptionally found in English, in the following marginally grammatical constructions which are dispreferred but borderline acceptable. First, it is found in the active, with several typically ditransitive verbs including *give*, *send*, and *tell*, though only with pronominal objects and datives (*give it me*, *tell it you*, etc.), as in *When you come home, you can give it me back*, *A good policeman will sit you down and tell it you his way*. In the British National Corpus (BNC) examples of this type come mostly from spoken English, or they are quotes of older, pre-20th century texts. Second, pattern [1] is also exceptionally found in English passive clauses, with the same type of verbs as above. The following examples, drawn from various sources, were compiled by Hudson (1992:257):

(12) a. ?*Those sweets were given the children by Anne.* (Hudson 1992:257)
b. ?*A book was given John.* (Jaeggli 1986:596)
c. ?*A gold watch was given Jones by the railway when he retired.* (Anderson 1988:300)
d. ?*No information is given the model about word classes.* (Arbib & Hill 1988:63)
e. ?*The fault was forgiven him by me.* (Nesfield 1916:46)
f. ?*Two pounds were allowed him by us.* (Nesfield 1916:46)

It is worth noting that the two examples using verbs other than *give* come from 'a very traditional grammar' (Hudson 1992:257) published in 1916. Although most English speakers find sentences in (12) unacceptable, some – particularly British speakers – accept them quite happily. A handful more examples can be found in the BNC, by searching for strings such as *was*/*were*/*be*/*been* + $\text{verb}_{\text{pass.part}}$ + *me*/*you*/*him*/*her*/*us*/*them*. The verb *given*

in this combination currently returns 11 examples (e.g. *He was given them for what he himself described as a ridiculously cheap price*), *told* returns 9 examples (e.g. *Sweeting also confirmed that the Miss Johnson story originated from his aunt who, as he wittily put it, 'could only know what was told her'*), *sent* returns 4 examples (e.g. *He asked them to do their homework with the schemata to be sent them, for the Church had no time to lose*), and *shown* returns 3 examples (e.g. *Another small farm was shown me as the place where...*). Similar examples are also readily found online.

As suggested by Allen (2001), the loss of case marking in English (particularly the loss of the distinction between the nominative and the dative which had already been in progress in the second half of the 11th century and was completed in the majority of extant texts outside of Kent by around 1200) may have encouraged subsequent generations of learners to rely more and more on constituent order for matching up the grammatical and semantic relations of a clause. For nearly two and a half centuries we find examples of two orders of postverbal bare nominals: verb + theme + recipient; and verb + recipient + theme, alongside two orders in which the recipient is expressed through a prepositional phrase. However, already at the beginning of the 13th century, when the accusative versus dative distinction had disappeared from most dialects of English, verb + recipient + theme gradually becomes the preferred order, and eventually the verb + theme + recipient order disappears from texts by the last quarter of the 14th century. Allen argues convincingly that it was the loss of this order that led to the fixing of constituent order in English and the reanalysis of the recipient argument as a direct object, as in (1b) – which corresponds to pattern [3] (example (8)).

Allen's analysis lends support to the model of ditransitives proposed here. Through a series of changes described by Allen, English has largely lost the category of the dative with its special morphosyntactic properties, and has to resort to pattern [2] (example (7)) to express the order verb + theme + recipient. Dative shift in modern English demonstrates, however, that English has retained the usability of the syntactic slot for the dative in its argument structure template: the third argument position of the dative can normally be resurrected through the dative alternation, which results in pattern [3].

Furthermore, just as it is possible for a special form to persist in a language as a fossil of old morphosyntax, I suggest that examples such as *You can give it me back* and *Those sweets were given the children*/*them by Anne* can be analysed as fossils of the structural dative in English, corresponding to Polish (10a) and (10b), respectively. It appears that the non-derived structural dative, as in pattern [1], may have persisted in English with a restricted number of predicates, especially when their objects are expressed through pronouns.

4.2 'Non-dative-shifted' predicates with an oblique beneficiary

Pattern [2] repeated from (7), corresponding to the mainstream LFG analysis in (2a), is found in English 'non-dative-shifted' clauses:

(13)

	x	*y*	***b***	
	|	|	|	
<	arg_1	arg_2	arg_4	>
	[–o]	[–r]	**[–o]**	

[2] beneficiary as an oblique

I suggest that the third argument position is not normally invoked in modern English for base verbs; English has lost the morphological means to distinguish this argument from the primary object, lost the pattern in [1], and switched to recovering syntactic relations on the basis of configuration. Hence most base predicates in modern English express

beneficiaries only as obliques:

(14) a. *Peter gave/handed a drink to John.*
b. *Both parents cooked (supper) for the children.*

Besides languages with a structural dative, like Polish, and languages with dative shift, like English, languages may lack restricted objects altogether and be able to express their beneficiaries/recipients only through a prepositional phrase.[9] On the other hand, pattern [2] is also found as an option in Slavonic. Compare the following Polish sentences, one with a dative, and another with an oblique argument expressing the beneficiary:

(15) *Zrób mi ciasto.* / *Zrób dla mnie ciasto.*
make.IMPER me.DAT cake.ACC / make.IMPER for me cake.ACC
'Make me a cake.' / 'Make a cake for me.'

When two different participants in the event have similar semantics – let us call them a 'beneficiary' and a 'recipient' – and each qualifies for both sets of entailments (of arg_3 and arg_4), the valency frame can accommodate both:

(16) a. *Zrób mi ciasto dla gości.*
make.IMPER me.DAT cake.ACC for guests.
'Make me a cake for my guests.'
b. *Zrób dla mnie ciasto gościom.*
make.IMPER for me cake.ACC guests.DAT
'Make for me a cake for my guests.'

4.3 'Dative-shifted' predicates with a primary object beneficiary

Pattern [3], repeated from (8), is found in English 'dative-shifted' clauses and concurs with the widely accepted LFG analysis in (1b):

(17)

	x	***b***	***y***	
	|	|	|	
<	arg_1	arg_2	arg_3	>
	[–o]	**[–r]**	**[+o]**	

[3] beneficiary as a shifted dative

Within the model of LMT proposed here (see section 2), the 'shift' can be understood as the re-alignment of two of the participants in the event, in order to match different sets of entailments projected by the altered predicate.

Specifically, I propose that the dative shift is an operation on the argument structure of a base predicate, such as the structure represented by pattern [2], which 're-maps' the beneficiary/recipient participant onto the primary object position (arg_2) and 'downgrades' the theme/patient to the secondary object position (arg_3). Within the proposed model, the re-alignment of the participants is pre-syntactic – it is a derivation at lexical-conceptual structure that alters the semantics of the predicate – hence monotonicity need not be jeopardised. The proposed analysis accounts correctly for the passivisability patterns of both non-dative-shifted and dative-shifted predicates.

[9] According to Primus (1998:441), this situation is found in many European languages including Romance languages, Bulgarian and Macedonian, Modern Greek, Maltese, Welsh and Irish. However, this statement is not true if pronouns in any of these languages have dative forms and may occur in pattern [1]. As before, I leave this issue for further research.

The mechanics of the dative shift within the proposed model can be elaborated as follows: dative shift increases the transitivity of the base (mono-)transitive predicate by adding an 'objective' [+o] argument to its valency frame. Note that before such an addition, the predicate's valency frame, represented in pattern [2], contains an oblique argument and no argument in the third argument position. Thus, for a predicate which is lexicalised as in pattern [2], the arg_3 position exists only as an option in the general template, but is not invoked in the predicate itself (hence, there is no 'empty slot' in the predicate's argument structure). For a dative-shifted predicate, the three semantic participants (*x*, *y*, and *b*) map onto the new set of argument positions in a way that matches the sets of semantic entailments projected by the derived predicate (e.g. *handed-to*, or *cooked-for* in *Peter handed John a drink*, *Both parents cooked the children supper*; cf. Bresnan 2001:315-316). The argument slots in the valency template are ordered according to LMT's atomic values [+/– r/o], so when new sets of entailments are projected by the altered predicate including a new core argument, the new argument's valency slot (arg_3) is found occupying a position that conforms to this ranking.

Like the non-derived dative, the shifted patient/theme in arg_3 position in pattern [3] also has some distinctive properties. Even though it is the argument in arg_2 ([–r]) position which is capable of becoming the passive subject, this is its only objective property – that is, the shifted beneficiary's only objective characteristic is its passivisability. Objective properties of the shifted patient/theme in arg_3 position include availability for (long-distance) extraction and availability to be substituted in idioms (see Hudson 1991, 1992 for a detailed account of the differences between the two objective arguments in the dative shift construction in English).

According to Primus (1998:440ff), the dative shift is found in English, Dutch, Swedish, Norwegian, and Frisian – all of which have lost the morphological distinction between dative and accusative. Although the dative shift is not an applicative construction, it has also been observed in an otherwise applicative language, Kanuri (Hutchison 1981, Bresnan 2003, and Bresnan & Nikitina 2003/2007), but only with respect to one verb ('give'), and only when the beneficiary is 1st or 2nd person:

> The verb *yí*+ 'give' (group 3 of class 1 verbs) is very commonly used with the object affixes applied to its basic form (I). In this use it is a bit irregular since one would expect the object affixes to indicate direct objects. For this verb however they indicate the indirect objects or recipients of the action of the verb, even though the verb is **not** also marked with the applied (II) derivational morpheme. (Hutchison 1981:136)

The proposed analysis of constructions represented by patterns [2] and [3] is only slightly different from the most widely accepted LFG analyses, but offers some clear advantages. First, it captures the special morphosyntactic status of the dative as the third structural case, both in languages that currently have it (Slavonic) and those that have lost the morphology to distinguish it (languages with the dative shift).

Second, it accounts for fossils such as *A book was given John*, which are treated here as pattern [1] with *John* occupying the position of a canonical dative, but are problematic for standard LMT. In mainstream LMT, the bare nominal *John* (a beneficiary expressed as the primary object) should normally be analysed as [–r], while, by comparison, *to John* (a beneficiary as an oblique) is normally analysed as an [–o]. However, *John* in *A book was given John* cannot be pre-specified as [–r], since this pre-specification is already borne by the passive subject *a book*, and English is claimed to obey the Asymmetrical Object Parameter (AOP) which disallows argument structures with two unrestricted [–r] arguments (Alsina & Mchombo 1988, Bresnan & Moshi 1990). The analysis proposed

here avoids this problem, and the only requirement is that some typically ditransitive predicates such as 'give' are allowed optionally to project an alternative set of entailments which invokes the third argument position in the valency template without resorting to dative shift.

Finally, when considered a part of a larger system of phenomena which includes benefactive applicatives, the proposed analysis avoids the problems (mentioned in section 1) found with the mainstream LFG analysis of symmetric languages which have an alternating passive, e.g. Kichaga. These problems include allowing an argument to change its intrinsic classification for the active and passive variants of the applicative (i.e. breaking monotonicity), and positing two alternative a-structures for the same passive variant of the applicative. The solution offered here will be discussed further in section 5.3.

5 Constructions with applied beneficiaries

Many languages do not have the option of expressing the beneficiary as an oblique argument, as in pattern [2], and their strategy to bring beneficiaries and other peripheral participants (instruments, locations) into the verb's lexical meaning is the transitivising applicative.

In standard LMT, the applicative is analysed as adding a new role to the theta structure of a verb, below the highest role. Semantic roles of applied arguments normally receive the [–r] classification, so that they can emerge as passivisable objects; furthermore, theme/patient and applied roles except the applied beneficiary can alternatively be classified as [+o] (Alsina & Mchombo 1989; Bresnan & Moshi 1993:71-72).

Within the model of LMT proposed here, I suggest that the transitivising benefactive applicative adds an argument pre-specified as [+o] to the valency frame of the base predicate. In this respect, it is like the dative shift (section 4.3 above), except that it is accompanied by dedicated verbal morphology. It has been likened to the dative shift in the literature, though typically with the added emphasis that the morphosyntax of applicatives is much more complex (like a 'game of chess [is] to checkers', Bresnan & Moshi 1993:48).

The mechanics of the applicative formation within the model of LMT proposed here can be elaborated as follows: the applicative increases the transitivity of the base verb, and allows the semantic participants to map onto the new set of argument positions in a way that matches the entailment sets projected by the derived predicate (e.g. 'eat-for' when a beneficiary is added; 'eat-with' with an instrument is added; 'eat-at' when a location is added; 'eat-because-of' when a motive is added).[10]

In the sections below, I first deal with pattern [2], then move on to pattern [3], and finally discuss pattern [1], as they are found in applicative constructions.

5.1 'Non-dative-shifted' predicates with an oblique beneficiary

Pattern [2], repeated here from (7), is not usually available in languages which have to use applicative derivation to introduce their beneficiary (or other peripheral participant) to the verb's valency frame:

[10] The account of applicative formation proposed here does not preclude analyses of other (possibly but not necessarily applicative) constructions where it may be appropriate to suggest that instead of an argument pre-specified as [+o], an argument pre-specified as [–r] or [–o] is added to the valency frame of the predicate.

(18) *x* *y* ***b*** **[2]** beneficiary as an oblique

<	arg_1	arg_2	arg_4	>
	[–o]	[–r]	**[–o]**	

The identification of the beneficiary as a core, rather than oblique, argument can usually be achieved independently of the type of marking used for the applied argument, which can be case or an adposition.

It remains to be investigated whether pattern [2] can be found in an applicative construction in any language. One area of investigation might perhaps be the so-called 'modal' applicative *-ir* in Fula, which adds an instrument argument to the verb's valency frame, and where the added argument may be expressed either as a prepositionally marked oblique or a prepositionless core nominal (object) (e.g. Klaiman 1991:51-52).

5.2 'Dative-shifted' predicates with a primary object beneficiary

In constructions with applied beneficiaries, the applied participant is typically (though not necessarily – see next section) mapped onto the second argument position of the primary object (arg_2), and the resulting construction can be modelled as pattern [3], repeated here from (8):

(19) *x* ***b*** ***y*** **[3]** beneficiary as a shifted dative

<	arg_1	arg_2	arg_3	>
	[–o]	**[–r]**	**[+o]**	

For some languages, this may be the only option available for the mapping of the beneficiary participant. When pre-specified as [–r], the beneficiary argument is a primary object in the active, and can become a subject in the passive.

Languages which allow only one of their internal arguments – the beneficiary, but not the patient/theme – to have these properties, were in an earlier literature referred to as asymmetric (e.g. Bresnan & Moshi 1990, and references therein). Examples included Chichewa (though only with regard to the benefactive and instrumental applicatives, not the locative applicative – see next section), as well as English (even though its beneficiaries are not applied). The reason for classifying English as asymmetric is that its other option for the expression of the beneficiary is as an oblique – hence pattern [3] is the only way in which both a beneficiary and a patient/theme can be realised in English as internal arguments (except for a handful of typically ditransitive verbs through which some speakers have fossilised the Old English morphosyntax, i.e. pattern [1] which also involves two internal arguments, as discussed in section 4.1).

A difficulty that has been identified with this characterisation of 'asymmetry' is that in some languages, despite the fact that only one of the objective arguments (the applied beneficiary or the applied instrument, but not the patient/theme) can become a passive subject, other properties associated with primary objects in the active are not always found on the applied argument, but may instead be found alternately either on the applied argument, or the patient/theme. Specifically, in Bantu languages primary objects are usually identified on the basis of a cluster of 'classical' diagnostics for objecthood including: (a) passivisability – the ability to become the subject when the verb acquires passive morphology; (b) object agreement – the possibility of being expressed by means of a pronominal object prefix on the verb; and (c) word order – the ability to follow the verb immediately (see e.g. Bresnan & Moshi 1990/1993:47; Alsina & Mchombo 1993:20; Alsina 1996a:674). Furthermore, it is often assumed that the cluster of these properties

constitutes a single underlying property which is responsible for the ability of an argument to passivise, be expressed as an object marker, and be adjacent to the verb (e.g. Baker 1988, Bresnan & Moshi 1990, Alsina 1996a). However, several phenomena have been found which demonstrate that some of the correlations predicted by clustering these properties together do not hold.

The first example of a problem for the hypothesised cluster of properties is the Chichewa instrumental applicative (Alsina & Mchombo 1993; Alsina 1996a:683). In brief, a passive verb with an instrument argument in Chichewa can only have the instrument argument as its subject (not the patient/theme; Alsina & Mchombo 1993:23), and a passive verb does not allow any object markers – hence the patient/theme cannot be expressed as an object marker while the instrument is a passive subject (Bresnan & Moshi 1993:56); however, in the active, either the instrument or the patient/theme can be expressed as an object marker, and either argument can appear immediately after the verb (Alsina & Mchombo 1993:20-22). Hence the classical diagnostic (a) identifies the instrument argument as the 'primary object', but diagnostics (b) and (c) give inconclusive results.

The second example of a problem for the cluster of primary object properties comes from languages such as Runyambo, which goes one step further than Chichewa in compromising the Bantu diagnostics for objecthood. Runyambo is usually considered to be symmetric because of the ability of both of its internal arguments to be expressed as object markers simultaneously (see Alsina 1996a:692, ex. 23a, cited from Rugemalira 1991:202) and because the patient/theme is expressed as an object marker on a passive verb with a beneficiary subject – even though only the beneficiary has the ability to be a passive subject (in Alsina's 1996a terms Runyambo has a 'non-alternating passive'). In other words, in Runyambo benefactive applicatives only the beneficiary argument (not the patient/theme) can be a passive subject, but a passive verb can – in fact, has to – have an object marker expressing the patient/theme, and in the active both arguments can be expressed as object markers on the verb; the beneficiary, however, still has priority over the patient/theme in terms of word order and the ability to be expressed as a full NP as opposed to an object marker (Alsina 1996a:692-694). Hence, in Runyambo, the classical diagnostic (a) also identifies only the beneficiary argument as the 'primary object', but diagnostics (b) and (c) give inconclusive results (although they identify both internal arguments as objects in most contexts, there is some imbalance towards prioritising the beneficiary argument).

Finally, it is also worth remembering that the two internal arguments in the English dative shift construction (i.e. pattern [3] in the model offered here) have also been scrutinised for their objective properties and that it has been established that the only objective characteristic of the shifted beneficiary in English is its passivisability; the patient/theme argument in the English dative shift retains several other characteristics of an English primary object such as the availability for extraction and the unavailability to be substituted in idioms (e.g. Hudson 1992). Hence, in English, passivisability (corresponding to the classical diagnostic (a) for Bantu) clearly distinguishes one of the objective arguments of a dative-shifted clause from the other objective argument.

All the above suggest that properties associated (in a particular language or language group) with primary objects do not carry equal weight within the identified cluster of properties, and therefore may not constitute a single property which can be associated wholesale with one or more arguments of the predicate, as has often been assumed (e.g. Baker 1988; Bresnan & Moshi 1990). Furthermore, it seems clear that passivisability consistently identifies some property of an objective argument which distinguishes it from other objective arguments in an unambiguous way regardless of any other factors (in

particular, any semantic factors). On the other hand, analyses of different Bantu languages show clearly that the object agreement diagnostic and the word order diagnostic (as well as derivatives of these diagnostics, such as the order of object markers, and the availability of an objective argument to be expressed as a full noun phrase while another objective argument is expressed as an object marker) often identify contrasts between objective arguments which are due to factors such as animacy, humanness, or thematic prominence. (For detailed accounts of complex constraints due to a variety of factors of this type, in several Bantu languages, see Alsina 1996a).

Detailed analysis of Runyambo prompts Alsina (1996a:679ff, esp. section 3) to conclude that a theory which clusters object properties together does make incorrect predictions. Specifically, while an argument which can be a passive subject seems always to be able to be expressed as an object marker in the active, the reverse does not hold: there are languages such as Runyambo which allow an object marker (expressing the patient/theme) on the passive verb, and more than one object marker (expressing the beneficiary and the patient/theme arguments) on the active verb, even though only one of the internal arguments, the beneficiary, can become a passive subject. However, it is desirable, as Alsina argues, to retain the theory of object asymmetries which correlates passivisability with other objective properties, as it does enable us to capture certain strong correlations (such as the first one listed earlier in this paragraph) which would otherwise be an unexplained coincidence. The lack of correlation going in the reverse direction, observed in some languages, can be explained with additional constraints motivated by factors (usually with semantic basis) which are often independently found at work elsewhere in these languages.

The LMT model of ditransitive constructions offered here is independent of the hypothesis of whether the cluster of so-called primary object properties in a particular language or language group constitutes a single property or not. However, it does support a theory of object asymmetries which predicts that passivisability implies the ability of an internal argument to be represented by means of an object marker in the active (Alsina 1996a:681-682).

Although the LMT model proposed here is neutral about the clustering of object properties, I suggest that there is no a priori reason for assuming that the object properties that have been identified for various languages or language groups always apply wholesale. In LMT terms, both the [–r] and [+o] internal arguments are expected to have some recognisable objective properties; however, only the [–r] argument is capable of becoming a passive subject, due to its syntactic pre-specification. Therefore, when proposing a theory of object asymmetries within LMT, there is no reason to build in the additional assumption that a [–r] argument has to be expressible as an object marker and be adjacent to the verb, since the [–r] pre-specification has a consequence only for the availability of the argument to passivise; otherwise, not only the [–r] argument, but also the [+o] argument(s) may be regarded as objects in some sense (i.e. with regard to object agreement, word order, long-distance extraction, etc.).

Hence, the model offered here enables a clear distinction between languages with non-alternating passives such as Chichewa (regarded as asymmetric) and Runyambo (regarded as symmetric), and languages with alternating passives such as Kichaga (regarded as symmetric) and Kitharaka (regarded as asymmetric) – see next section for the latter. In languages with non-alternating passives, the beneficiary (or other applied argument) can only be mapped onto the primary object (arg_2) position in the language, but not the secondary object position (arg_3), with the resulting argument structure as in (19) (pattern [3]). This model also predicts correctly that an argument which can be a passive subject will be able to be expressed as an object marker in the active, but that the reverse

need not hold. In this way, the proposed model preserves the key insights of the theory of object asymmetries (specifically, that some languages may be able to alternate their passive subject, while others may not, and that the correlation between passivisability and object marking will go at least in one direction, though not necessarily in the other), and is compatible with proposals of supplementary constraints (which mostly have a semantic basis) which regulate the expressibility of arguments as object markers, the order of object NPs, and the order of object markers (see especially Alsina 1996a).

Thus, the present model correctly specifies that Runyambo benefactive applicatives – which employ pattern [3] but not pattern [1] – have a passive only with the beneficiary argument as their subject. However, as for object marking, Runyambo evidently allows both objects to be expressed as object markers. Therefore, as argued by Alsina (1996a:693-698), two additional constraints have to be posited to account for the particular pattern of expression of Runyambo's internal arguments. Alsina characterises them both by appealing to participant semantics: one constraint specifies that an object argument cannot be expressed as a full NP (but only as an object marker) unless the subject is the 'external argument', that is the argument of the active predicate with the highest thematic role; the other constraint appeals to a semantic hierarchy of thematic functions and specifies that morphologically encoded arguments cannot exhibit a mismatch in prominence between the thematic hierarchy and the grammatical function hierarchy.

Similarly, by specifying that the Chichewa instrumental applicative is also restricted only to pattern [3], the model accounts for the fact that the passive of an instrumental applicative in Chichewa can only have the instrument argument as its subject. Furthermore, I speculate that in this construction, the availability of the patient/theme argument to be adjacent to the verb or to be expressed as an object marker instead of the instrument argument may also be due to ultimately semantic (and possibly independently motivated) factors, which would not be surprising.[11]

5.3 Predicates with a secondary object beneficiary

In some languages with applied participants, for example Kichaga or Kitharaka, the entailment sets corresponding to the two object positions (arg_2 and arg_3) allow the peripheral participant and the patient/theme to re-align and map onto the argument positions in either way: either as in pattern [3] discussed in the section above, or as in pattern [1], repeated here from (6):

(20)

	x	*y*	***b***	
	|	|	|	
<	arg_1	arg_2	arg_3	>
	[–o]	[–r]	**[+o]**	

[1] beneficiary as a canonical dative

Although in languages with non-applied datives this pattern underlies non-derived predicates, in languages with applicative constructions it models derived (applicative) predicates. When pre-specified as [–r], the patient/theme participant is a primary object in the active, and may become a passive subject. I argue, therefore, that languages whose applicative constructions allow alternating passives (as defined by Alsina 1996a) are those

[11] I believe that looking for a solution to the problem of the Chichewa instrumental applicative in this direction is less controversial than the assumption made by Alsina & Mchombo (1993) that the instrument argument in this construction alternates its specification between [–r] and [+o], but the patient/theme still cannot be the passive subject of an instrumental applicative (i.e. while being [–r]) for an unexplained reason (1993:31, ft. 9).

which have both patterns [3] and [1] available for the mapping of their participants.

The following diagram (with thematic labels used to represent the participants only in order to facilitate reading) illustrates schematised mapping options in Kichaga, for a base predicate which has been subjected to applicative transitivisation:

(21)

agent	*benef*	*pat/theme*	
agent	*instr*	*pat/theme*	
agent	*loc*	*pat/theme*	
agent	*motive*	*pat/theme*	
agent	*pat/theme*	*benef*	
agent	*pat/theme*	*instr*	
agent	*pat/theme*	*loc*	
⟨ arg_1	arg_2	arg_3	⟩
[– o]	[– r]	[+ o]	

Grammatical function mappings reveal that the two non-agentive participants compete for the primary object position. Although the primary object argument is privileged (can become a passive subject, is adjacent to the verb, and is available for long-distance extraction in Kichaga), Kichaga treats both objects in the same way with respect to object marking on the verb (Bresnan & Moshi 1993).

For comparison, the following diagram illustrates mapping options available in Chichewa:

(22)

agent	*benef*	*pat/theme*	
agent	*instr*	*pat/theme*	
agent	*loc*	*pat/theme*	
~~*agent*~~	~~*pat/theme*~~	~~*benef*~~	
~~*agent*~~	~~*pat/theme*~~	~~*instr*~~[12]	
agent	*pat/theme*	*loc*	
⟨ arg_1	arg_2	arg_3	⟩
[– o]	[– r]	[+ o]	

Within the model of LMT proposed here, languages with double object constructions which only employ pattern [3] can be analysed as imposing restrictions, or limitations, on their secondary object position ([+o]); for example, it can be inferred that in those languages this argument slot is considered unsuitable for the mapping of the beneficiary participant (whether a dative-shifted beneficiary as in English, or an applied beneficiary as in Chichewa).[13]

The LMT model offered here also supports the correct analysis of languages such as Kitharaka (Harford 1991; Alsina 1996a:679-683, who labels it 'alternating asymmetric'), whose applicative beneficiary construction has an alternating passive, but which does not allow both internal arguments to display any of the primary objective properties

[12] In a previous citation of this diagram, in Kibort (2007:263), I mistakenly left the mapping options indicated in this line as available in Chichewa. The present version of the diagram corrects that omission by crossing out the line.

[13] Additionally, since Chichewa is an asymmetric language, only its primary ([–r]) object is treated as an object with respect to object marking on the verb, and the secondary ([+o]) object cannot be 'dropped' (left unspecified) in the transitivised predicate. The latter restriction applies also to the secondary ([+o]) object in English, hence it may be a generalisation that applies regardless of whether the predicate has undergone applicative transitivisation or dative shift.

simultaneously. The proposed model concurs with the prediction formulated by Alsina (1996a:681) that '[i]f a construction allows two arguments to alternate as the passive subject (an alternating passive), it allows either of them freely to be represented by means of an object marker in the active form (an alternating object marker)'. In the proposed model, this correlation is straightforwardly captured by the fact that either of the participants in Kitharaka may map onto the primary object position and, while in this position, it displays all the primary object properties. Kitharaka differs from Kichaga in that, in the former language but not in the latter, the classical Bantu object properties are restricted only to the argument in the primary object (arg_2) position.

Before concluding this section, it is important to note the consequences of the proposed analysis of ditransitives for the Asymmetrical Object Parameter mechanism in mainstream LFG (Alsina & Mchombo 1988; Bresnan & Moshi 1990/1993). The AOP was proposed to handle the differences in the observed patterns of passivisability and object marking between asymmetric non-alternating languages like Chicheŵa and symmetric alternating languages like Kichaga. Specifically, it is argued that the AOP, which regulates the occurrence of argument structures with two unrestricted [–r] arguments, is present in asymmetric languages, but lacking in symmetric languages. On the analysis offered here, there is no need for the AOP because the particular options of grammatical function mappings that the parameter was designed to regulate are already achieved by the more general, and independently motivated, principles which are at work at argument structure. Specifically, while alternating languages can be defined simply as those which allow both their applied participant and their patient/theme to be mapped onto either of the object argument positions ([–r] or [+o]), symmetric languages can be defined as those which, under specific circumstances, allow both of their objective arguments (the primary and the secondary object) to display properties of objects other than passivisability. Not having a constraint such as the AOP is desirable, since the consecutive pre-specification of two arguments as [–r] should not be ruled out in principle: transitive unaccusatives such as 'cost', 'last', 'weigh' etc. are best analysed as having both their core arguments pre-specified as [–r] (as was first proposed, in different terminology but the same spirit, in Relational Grammar, see for example Perlmutter & Postal 1984:98-99), cf. *The book cost £10*, but **£10 was/were cost by the book.* Considering arguments other than the two internal ones, the parameter holds vacuously if it is understood as following from the fixed order of argument positions: only arg_1 and arg_2 may be pre-specified as [–r], but no other argument may receive this pre-specification. In other words, the valency template already specifies that it is not possible for there to be any doubling of [–r] arguments except when it occurs in the set of arguments in the first and second positions.

5.4 Multiple applicatives

In some languages, the transitivising applicative can add up to two core arguments, both in symmetric and asymmetric languages (Bresnan & Moshi 1993:52). In the proposed scheme, the second applied argument position will also be pre-specified as [+o] (which is in accordance with all widely used versions of LMT), and the grammatical function mapped onto this argument will be OBJ_θ. The two secondary objects will be distinguished by their subscripts.

6 Conclusions

The proposed model of ditransitive constructions solves the hidden problems of previous

proposals, captures the special morphosyntactic status of the 'third structural position' (the dative), and unifies the analyses of the non-derived dative, dative shift, and constructions with applied beneficiaries.

It also allows a systematic classification of languages depending on the patterns they employ for the expression of their beneficiaries. The options represented through the three argument structure patterns help make sense even of systems with mixed strategies for making ditransitives. For example, we find interesting languages such as Kanuri (Hutchison 1981; cited in Bresnan 2003, and Bresnan & Nikitina 2003/2007) which uses the transitivising applicative for all verbs except the verb 'give'; however, for the verb 'give', the non-applied pattern [1] is used when the beneficiary is 3rd person, and the non-applied patterns [2] and [3] are used when the beneficiary is 1st or 2nd person.[14]

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LOCAL BINDING WITHOUT COARGUMENTHOOD: NORWEGIAN NOUN PHRASES

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Abstract

Coargumenthood has been a central concept in binding theory both in Lexical Functional Grammar and other frameworks. Binding is then basically a relation between arguments of the same predicate (see for example Hellan 1988, Dalrymple 1993, Reinhart and Reuland 1993, Pollard and Sag 1994, Bresnan 2001, Safir 2004). Coargumenthood has also been claimed to be decisive to binding in noun phrases. This paper shows that this is not correct for Norwegian noun phrases, which turn out to provide new arguments against the coargument theory. Based mainly upon examples from texts, its is shown that a possessive can bind a reflexive without the requirement that the possessive or the reflexive is (part of) an argument of the noun. It is also shown that the distribution of simple and complex reflexives in noun phrases is different from what has been claimed, and that their distribution is incompatible with their traditional analysis in Hellan 1988.

0 Introduction[1]

Coargumenthood has been a central concept in several versions of binding theory, where binding is basically a relation between arguments of a predicate (called 'strict coarguments' in Hellan 1988:69). Reflexives that are not bound by a coargument are then considered either long distance or exempt (or 'logophoric') reflexives. (See for example Hellan 1988, Dalrymple 1993, Reinhart and Reuland 1993, Pollard and Sag 1994, Bresnan 2001, Safir 2004.)

A typical representative of the coargument view is Hellan 1988, whose view of the distribution of reflexives in Norwegian can be summarized as follows: The complex reflexive *seg selv* is used in local binding, understood as binding by a coargument, while the simple reflexive *seg* is used in non-local binding. In this theory, it is necessary to assume that sentences like (1)

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with a reflexive in an adjunct have long-distance reflexives, required because Norwegian personal pronouns are anti-subject oriented (Hestvik 1992).[2]

(1) **Per** så en slange bak *ham / **seg**.
Per saw a snake behind him/ REFL
Per saw a snake behind him.

However, reflexives in adjuncts behave just like reflexives in complements (Lødrup 2007b), for example, they can be complex, as in (2). This makes it impossible to maintain the long distance analysis of reflexives in adjuncts.

(2) **Mobberne** må stanses (…) av hensyn til **seg selv**.
harassers-DEF must stop-PASS out-of concern for REFL SELF
The harassers must be stopped out of concern for themselves.

Lødrup 2007b presents an alternative view of the distribution of reflexives in Norwegian, which can be summarized as follows: The local binding domain is the minimal clause. Both simple and complex reflexives can be locally bound. Only simple reflexives can be long distance bound (but this concept now has a more narrow definition). The choice between simple and complex reflexives in local binding is semantically determined; the simple reflexive is used when the physical aspect of the referent of the binder is in focus, while the complex reflexive is an elsewhere form.

The 'size' of the local domain must be considered a parameter of variation in binding theory. Norwegian is not unique in requiring that the local binding domain be the clause; another case is Polish (Przepiórkowski 1999:327-342). And even if English usually does not include adjuncts in the local binding domain, this is only a main rule, with problems and exceptions (se for example Büring 2005:57, 231).[3]

Coargumenthood has also been claimed to be decisive to binding in noun phrases in, for example, Norwegian (Hellan 1988) and German (Zifonun 2003). This article will show that this theory is not correct for Norwegian noun phrases. Based upon examples from texts and native speakers' intuitions, I will show that a possessive can bind a reflexive without the requirement that the possessive or the reflexive is (part of) an argument of the noun. The relevant local binding domain must therefore be the whole noun phrase, and coargumenthood is not relevant.

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[2] In all example sentences, boldfacing is used for traditional coindexing.

[3] Norwegian has a somewhat marginal option of excluding adjuncts from the local domain; a bound pronoun in an adjunct can sometimes be found, especially when the adjunct is peripheral to the main proposition. An example is (26) below.

This article will also show that the distribution of simple and complex reflexives in noun phrases is different from what has been claimed in the literature, and that their actual distribution is incompatible with their traditional analysis[4] (as in Hellan 1988).

1 The coargument analysis of reflexives in noun phrases

It has sometimes been remarked that binding in noun phrases is a difficult topic, which we know too little about, for example in Zifonun 2003:285. She summarizes what she calls the minimal consensus concerning binding in German noun phrases, saying that a reflexive can be bound by a genitive when the genitive is a kind of subject argument, and the reflexive is inside an argument / complement. The reflexive cannot be inside a modifier / adjunct. She even says that this generalization about coargument binding is valid without limitations (Zifonun 2003:288).

Zifonun's generalizations are very similar to those given for Norwegian in Hellan 1988. Hellan 1988:154 contrasts the sentences (3)-(4) with (5)-(6).

(3) **Jons** bok om **seg selv** solgte godt.
Jon's book about REFL SELF sold well
Jon's book about himself sold well.

(4) Her ser vi **kongens** gave til **sitt** folk.
here see we king-DEF's gift to REFL's people
Here we see the king's gift to his people.

(5) ***Jons** venner fra **sin** studietid skrev en vakker nekrolog over ham.
Jon's friends from REFL's study-time wrote a nice obituary on him
Jon's friends from his student days wrote a nice obituary on him.

(6) ***Jons** egne bøker i ryggsekken **sin** ble for tunge for ham.
Jon's own books in backpack-DEF REFL's got too heavy for him
Jon's own books in his backpack got too heavy for him.

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[4] This article does not cover all aspects of binding in noun phrases. Implicit argument binders, as in (i), from Hellan (1988:190), raise many questions that are not discussed. The same is true of binders in PPs, as in (ii), from Hellan (1988:154).

(i) Jon gjorde [kveldens **IMPL-ARG** inngrep på **seg selv**].
Jon made evening-DEF's operation on REFL SELF
Jon made the evening's operation on himself.

(ii) en gave fra **Jon** til **sin** mor
a gift from Jon to REFL's mother
a gift from Jon to his mother

Hellan 1988:154 claims that (3)-(4) are only possible if the genitives are interpreted as author and donator, respectively. His generalization is given in (7) (where 'host' means the noun phrase containing the anaphor).

(7) "In NP-internal binding (i.e. when the binder is in an argument position relative to a noun) of a *seg*-reflexive, a host of the reflexive and the binder must be semantic co-arguments." Hellan 1988:154

The term '*seg*-reflexive' includes reflexives with *seg* and the possessive reflexive *sin* (*sitt*, *sine*). Semantic coarguments are "NPs which are either theta-role related to the same noun, or relation-bound to the same noun" (Hellan 1988:154). (The relation-bound part covers nouns like *friend*, *picture*.)

Hellan's generalization puts constraints both on the binder and the reflexive. It will be shown that these constraints are too restrictive for both of them.

2 The Norwegian facts

2.1 Reflexives in adjuncts

A reflexive that is part of an uncontroversial adjunct represents a regular, productive, and acceptable option in Norwegian noun phrases. Examples are (8)-(11).

(8) **Solskjærs** konklusjon på **sin** egen hjemmeside
Solskjær's conclusion on REFL's own home-page
Solskjær's conclusion on his own home page

(9) **Gjelstens** svar på vegne av **seg selv** og kona
Gjelsten's answer on behalf of REFL SELF and wife-DEF
Gjelsten's answer on behalf of himself and his wife

(10) **hans** medaljer fra **sin** tid i Liverpool
his medals from REFL's time in Liverpool
his medals from his time in Liverpool

(11) **hans** blandede følelser vedrørende **sin** tyske herkomst
his mixed feelings concerning REFL's German origin
his mixed feelings concerning his German origin

Hellan's coargument condition must be interpreted to exclude sentences in which the reflexive is a part of an embedded noun phrase with argument structure. This is normal, however, cf. (12)-(13).

(12) **hennes** reaksjoner på [opptak av **seg selv**]
her reactions to shots of REFL SELF
her reactions to shots of herself

(13) **Befolkningens** rett til [informasjon om **sitt** miljø]
people-DEF's right to information about REFL's environment
people's right to information about their environment

Note that the embedded noun phrases in (12)-(13) do not have implicit arguments that are coindexed with the possessive of the superordinate noun phrase. (The meaning of (13) cannot be that people have a right to inform themselves.) The possessive in the superordinate noun phrase is the only possible binder.

We see, then, that a reflexive that is bound by a possessive does not have to be in a coargument of the possessive. It can be in an adjunct, and it can also be in an embedded noun phrase with argument structure. This is expected under the assumptions made here, because it makes binding by a possessive in a noun phrase parallel to binding by a subject in a clause (see the introduction, and Lødrup 2007b).

In discussions of binding in clauses, the use of reflexives in adjuncts has been connected to the anti-subject orientation of Norwegian personal pronouns (Hestvik 1992). However, to my knowledge, nobody has proposed that personal pronouns can be 'anti-possessive-oriented'. This would be an impossible position within the coargumenthood theory, which predicts that a possessive can bind a non-coargument pronoun. (See also section 3, where personal pronouns bound by possessives are discussed).

2.1.1 Implicit arguments binding reflexives in adjuncts

Implicit binders raise many difficult questions that cannot be discussed here. Many speakers allow implicit arguments to be binders, even if they don't have a realized antecedent (Lødrup 2007a). The point to be made here is that they can also bind reflexives in adjuncts, as in the constructed examples (14)-(15) (where "IMPL-ARG" is the implicit argument binder).

(14) [Litt **IMPL-ARG** skyting rundt **seg**] hjelper.
little shooting around REFL helps
A little shooting around one helps.
(15) [Et **IMPL-ARG** stup i svømmebassenget **sitt**] er bra.
a dive in swimming-pool-DEF REFL's is good
A dive in one's swimming pool is good.

There is also some kind of implicit binder in a noun phrase like (16).[5] This binder differs from the implicit arguments in (14)-(15) by not being a part of the meaning of the head noun. It occurs in indefinite noun phrases with a propositional interpretation (Lødrup 2007a). Again, the reflexive can be in an adjunct.

(16) [**IMPL** Et helt hus for **seg selv**] er et slit.
a whole house for REFL SELF is a toil
A whole house for oneself is hard work.

2.2 Non-argument possessive binders

The requirement for coargumenthood in Hellan 1988 ((7) above) puts constraints both on the binder and the reflexive. Even if the constraint on the reflexive is wrong, it might be correct that the possessive must be an argument to bind a reflexive. This is the position of the Norwegian reference grammar, Faarlund et al. 1997:1166-67, which has no restriction on the reflexive, but states informally that a possessive must be understood as a "subject" to bind a reflexive. (Anward 1974:22 makes the same claim for Swedish.)

The question is then if a possessive can bind a reflexive when it does not realize a semantic argument of the noun. It was mentioned that the literature gives unacceptable sentences intended to show that this is not possible (discussed below). However, sentences in which a non-argument possessive binds a reflexive represent a regular, productive, and acceptable option in Norwegian, cf. (17)-(20).

(17) **deres** tid til **seg selv**
their time to REFL SELF
their time for themselves
(18) **hennes** første jul borte fra **sitt** hjemland
her first Christmas away from REFL's home-country
her first Christmas away from her home country
(19) **Braathens** tall for **sin** utenlandstrafikk
Braathen's figures for REFL's foreign-traffic
Braathen's figures for their foreign traffic

[5] Some younger speakers also allow a reflexive form with a generic interpretation to occur with no binder, cf. Lødrup (2007a). An example is (i).
(i) En motorsag kan skade **seg selv** og andre.
a chain-saw can hurt REFL SELF and others
A chain saw can hurt oneself and others.
For these speakers, (14)-(16) (or (16) only) might not involve a binder at all.

(20) **LOOCs** regler for **sine** egne
LOOC's rules for REFL's own
LOOC's rules for their own people

We see, then, that a non-argument possessive can bind a reflexive. This fact is interesting in itself, and it has consequences for our understanding of the grammar of possessives. One striking fact is that they can be thematic or non-thematic, without a corresponding difference in form. The nature of possessives, their grammatical relation, thematic role, etc. has been discussed again and again in different frameworks (for example Barker and Dowty 1993, Barker 1995, Taylor 1996, Asudeh and Keller 2001, Chisarik and Payne 2003, Laczkó 2007). The fact that Norwegian possessives can be binders independently of thematicity could be taken as an argument that all possessives have the same grammatical relation, which is often assumed in Lexical Functional Grammar (see for example Bresnan 2001:293-95).

2.3 Binding domains

The coargument theory predicts that an argument taking head is required for a noun phrase to count as a binding domain. The data given shows that this requirement cannot be maintained.

It is often assumed that a binding domain for a reflexive must contain something that can bind it (for example Huang 1983; this requirement is not in Hellan 1988). This possible binder is sometimes called a subject; in a noun phrase it will be the possessive. For Norwegian, a possible generalization could be that a noun phrase with a possessive is a separate binding domain, while a noun phrase without a possessive is not. In practice, however, there would be numerous exceptions from both parts of this rule, as will become clear in section 4.2.

3 Problems with the data

3.1 The unacceptable cases

Both Hellan 1988:154 and Faarlund et al. 1997:1167 give unacceptable sentences that are intended to show that a possessive cannot bind a reflexive when there is no coargumenthood. (The condition in Faarlund et al. 1997 is actually weaker, only requiring the possessive to be subjectlike.[6]) Hellan's examples are (5)-(6) above, repeated as (21)-(22).

[6] The Swedish reference grammar, Teleman et al. 1999:333, gives an even weaker condition, saying that a noun phrase can be a binding domain "if the

(21) *__Jons__ venner fra __sin__ studietid skrev en vakker nekrolog over ham.
Jon's friends from REFL's study-time wrote a nice obituary on him
Jon's friends from his student days wrote a nice obituary on him.
(22) *__Jons__ egne bøker i ryggsekken __sin__ ble for tunge for ham.
Jon's own books in backpack-DEF REFL's got too heavy for him
Jon's own books in his backpack got too heavy for him.

The question is what makes these sentences unacceptable when (8)-(11) and (17)-(20) are acceptable. Note first that these sentences would not be perfect with the reflexives replaced by non-reflexive possessives. On the other hand, they would be acceptable if the possessives were deleted. Norwegian generally prefers less use of possessors than for example English (Lødrup 2008). For example, it would be unacceptable to use possessors with the nouns in the Norwegian translation of (23).

(23) They had their hands in their pockets.

The unacceptability of (21)-(22) could maybe be related to the "peripherality" of the modifier containing the reflexive. Examples (21)-(22) and similar sentences given in the literature have in common that it does not seem to be clear if this modifier has a restrictive or non-restrictive interpretation. Example (21) could be compared to the constructed example (24), which is structurally similar to (21), except that the modifier can only get a restrictive interpretation. Example (24) is clearly acceptable with a reflexive.

(24) Pers bekjentskaper fra fjellturene __sine / hans__
Per's acquaintances from mountain-hikes REFL's / his
er mer interessante enn bekjentskapene fra kontoret.
are more interesting than acquaintances-DEF from office-DEF
Per's acquaintances from his mountain hikes are more interesting than his acquaintances from the office.

In example (25) on the other hand (which is also constructed), the reflexive is a part of a modifier that can only get a non-restrictive interpretation. The pronominal possessive is best in (25).

(25) __presidentens__ livvakt John fra __sin / hans__ private styrke
president-DEF's body-guard John from REFL's / his private militia
the president's body guard John from his private militia

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noun is a nomen actionis or another noun with a relational content" (my translation HL).

A possible generalization is that reflexives are less acceptable in non-restrictive modifiers. If this is correct, it must be a part of the tendency found in many languages that more 'peripheral' constituents can be reluctant to let binding go into them. For example, even if adjuncts in Norwegian sentences normally behave like parts of the local binding domain, this is sometimes not the case with adjuncts that are peripheral to the main proposition. An example with a personal pronoun is (26), which is acceptable to me and other linguists I have asked.

(26) Ifølge **ham selv** var han ikke aktiv i opprøret.
according-to him SELF was he not active in rebellion-DEF
According to him, he was not active in the rebellion.

3.2 Optionality

It is not clear to what extent it is obligatory for a possessive to bind a reflexive. Informant testing in Aass 1979:404-6 indicates that many speakers accept personal pronouns bound by possessives.[7] Examples with pronouns can also be found in texts, cf. for example the pronominal possessives in (27)-(28).

(27) **Dag Solstads** opplesning av **hans** siste roman
Dag Solstad's reading of his last novel
Dag Solstad's reading of his last novel
(28) **Clintons** versjon av **hans** turbulente år
Clinton's version of his turbulent years
Clinton's version of his turbulent years

Optional binding raises many difficult questions. In general, several properties can influence the choice between a reflexive and a personal pronoun. Thematic roles represent one well known case (Jackendoff 1972:ch. 4, Hellan 1988:ch 4). In addition, binding can be sensitive to properties like definiteness, animacy, topicality, point of view, etc. (see for example Kuno 1987, Lødrup 2007c). This is not easy to investigate in practice, however, because intuitions tend to be uncertain, and there is variation between informants.

It is not clear what properties are relevant for binding in noun phrases. Topicality and/or point of view might be relevant. The constructed examples (29) and (30) differ in these respects. Example (29) has a pronominal

[7] It should be mentioned, however, that the test sentences were not optimal, possibly allowing for more than one analysis (the crucial PP could be taken as a separate constituent in the clause).

possessive as binder, and the point of view is with its referent. The personal pronoun seems to be less acceptable in (29) than in (30), in which a genitive noun phrase is the binder, and the point of view is not with its referent.

(29) Ludvig Karsten gikk lykkelig omkring.
Ludvig Karsten walked happy around
Ludvig Karsten walked around happy.
Hans bilde av **hans / sin** kone var endelig ferdig.
his picture of his / REFL's wife was finally finished
His picture of his wife was finally finished.
(30) Vakten gikk fortvilet omkring.
guard-DEF walked desperate around
The guard walked around desperate.
Ludvig Karstens bilde av **hans / sin** kone var stjålet.
Ludvig Karsten's picture of his / REFL's wife was stolen
Ludvig Karsten's picture of his wife was stolen.

4 Simple and complex reflexives in noun phrases

Another important question concerning binding in noun phrases concerns the distribution of simple and complex reflexives. Hellan 1988 proposed that the complex reflexive is used in local binding, while the simple reflexive is used in non-local binding. Combined with the analysis of local binding as coargument binding, this theory generates two predictions concerning the distribution of simple and complex reflexives in noun phrases:

1) A reflexive in a noun phrase with argument structure should be simple if it is bound by the subject of the sentence (Hellan 1988:69). This follows from its not being a coargument with the subject, which makes it a long distance reflexive.

2) A possessive should not bind a simple reflexive in a noun phrase. This follows from the conception of the simple reflexive as a long distance reflexive, and the well known fact that only subjects can be long distance binders (Pica 1987).

Sections 4.1 and 4.2 will show that these predictions are not correct.

4.1 Simple reflexives

Hellan 1988 does not discuss binding of simple reflexives in noun phrases. However, Faarlund et al. 1997:1166 say that a possessive cannot bind a

simple reflexive. They don't give any reason or explanation. (They cannot relate it to the simple reflexive's status as a long distance reflexive, because they don't share this view.)

However, simple reflexives bound by possessives represent a regular option in Norwegian. Examples are (31)-(33).

(31) **hans** verden rundt **seg**
his world round REFL
his world around him
(32) **hans** ville skyting rundt **seg** (constructed)
his wild shooting around REFL
his wild shooting around him
(33) **hans** famling bak **seg** (constructed)
his feeling behind REFL
his feeling behind him

The choice between simple and complex reflexives bound by possessives follows the same rule as when they are locally bound by subjects. In the theory of Lødrup 2007b, the relevant generalization is the following: In a PP, the simple reflexive is used when the preposition is locational, while the complex reflexive is used when the preposition is non-locational.[8] When a preposition is used with a non-locational meaning, the complex reflexive is the only option, as in (34).

(34) **Wittgenstein's** betraktninger omkring **seg selv**
Wittgenstein's reflections around REFL SELF
Wittgenstein's reflections on himself

Note that the reflexives in (31)-(33) cannot be long distance reflexives. One important argument for this is that they can be substituted by the complex reflexive, which is not used in clear cases of non-local binding (Faltz 1985:153-154, Lødrup 2007b, 2007c). An example is (35).

(35) **hans** ville skyting rundt **seg selv** (constructed)
his wild shooting around REFL SELF
his wild shooting around himself

[8] This generalization for PPs is part of a broader generalization (Lødrup 1999, 2007b): The simple reflexive is used when the physical aspect of the referent of the binder is in focus. It is an inalienable denoting the body of the referent of the binder, while the complex reflexive is an elsewhere form.

It is clear, then, that possessives can bind simple reflexives in local binding. This fact runs counter to the traditional view of the simple reflexive, but it is predicted by the theory in Lødrup 2007b.

4.2 Non-coargument complex reflexives

The analysis in Hellan 1988 predicts that a reflexive in a noun phrase with argument structure should be simple if it is bound by the subject of the sentence (Hellan 1988:69). This follows from its not being a coargument with the subject, which makes it a long distance reflexive in his analysis. Hellan 1988:69 gives (36) as an example (his question marks).

(36) ??**Jon** leste [noen omtaler av **seg selv**].
Jon read some reviews of REFL SELF
Jon read some reviews of himself.

However, searching the web shows that the complex reflexive is commonly used in similar sentences with *omtale* 'review' and other nominalizations. Before giving examples, it should be pointed out that sentences like (37), from Hellan (1988:177), are not relevant in this context.

(37) Jon begikk [et **IMPL-ARG** overgrep mot **seg selv**].
Jon committed an offense against REFL SELF
Jon committed an offense against himself.

In (37), the only possible interpretation (which follows from the meaning of the verb) is that the noun phrase has an implicit argument that is coindexed with the subject. This implicit argument is a local binder within the noun phrase. (A parallel interpretation of (36) would be that the subject reads what he has written about himself. To the extent that this interpretation is possible, it is irrelevant in this context.[9])

Sentences (38)-(42) have complex reflexives that are bound by the subject, not by implicit arguments. This makes them genuine counterexamples to

[9] Also not relevant is a sentence like (i).
(i) **Naboen** hørte et rop fra [leiligheten over **seg**].
neighbor-DEF heard a cry from apartment-DEF above REFL
The neighbor heard a cry from the apartment above him/her.
In (i), the noun does not have argument structure, and the local preposition takes a simple reflexive, regardless of whether the binder is a possessive or a subject. (This follows from the rule for simple and complex reflexives mentioned in section 4.1.)

Hellan's generalization.[10] They represent a regular, productive, and acceptable option in Norwegian.

(38) **Hun** (..) støvsuger nettet etter artikler og [omtale av **seg selv].**
she vacuums net-DEF after articles and mentions of REFL SELF
She vacuums the net for articles and mentions of her.
(39) **Arbeidsfolk** (..) støtter [angrep mot **seg selv**].
workers support attacks on REFL SELF
Workers support attacks on them.
(40) **Sheriffen** tar (...) lett på [truslene mot **seg selv**].
sheriff-DEF takes easy on threats-DEF against REFL SELF
The sheriff does not care about the threats against him.
(41) (**Han**) opplevde virkelig [overgrep mot **seg selv**].
he experienced really harassment against REFL SELF
He really experienced harassment against him.
(42) **Han** fant [et bilde av **seg selv**] i avisen.
he found a picture of REFL SELF in paper-DEF
He found a picture of himself in the paper.

It would not be possible to save Hellan's analysis by saying that sentences like (38)-(42) have the simple reflexive plus an emphatic *selv* 'self'. The reason is that his analysis must treat binding in these sentences as long distance binding, and there can never be a *selv* part in clear cases of long distance reflexives, cf. section 4.1.

The subject can even bind a complex reflexive in a noun phrase with argument structure embedded in a noun phrase with argument structure, as in (43). This option also exists for possessives (as mentioned in section 2.1) and implicit argument binders, as in (44)-(45). This fact gives an additional argument against involving long distance binding here, because of the standard assumption that only subjects can be long distance binders.

(43) å **PRO** kontrollere [bruken av [opplysninger om **seg selv**]]
to control use-DEF of information about REFL SELF
to control the use of information about oneself

[10] Reflexives in picture noun phrases are sometimes claimed to be outside binding theory; they are exempt anaphors (or 'logophors') in for example Pollard and Sag 1994, Reinhart and Reuland 1993, and Hestvik and Philip 2001 (on Norwegian). It is not clear, however, that picture noun phrases should be singled out in an account of binding in Norwegian; they seem to behave like other relational nouns. There also seems to be no reason to assume that Norwegian has exempt anaphors (Lødrup 2007b).

(44) [**hennes** reaksjoner på [opptak av **seg selv**]]
her reactions to shots of REFL SELF
her reactions to shots of herself
(45) Ellefsen har aldri gitt [**IMPL-ARG** samtykke til [eksponering av **seg sjølv**]].
Ellefsen has never given consent to exposure of REFL SELF
Ellefsen has never given his consent to exposure of himself.

The simple reflexive can sometimes be found in similar sentences.[11] Examples are (46)-(47), which have simple reflexives in nominalizations with the same head nouns as (39)-(40).

(46) **Man** blir (..) GAAAL av [alle angrepene mot **seg**].
one gets maaad from all attacks-DEF against REFL
One gets mad from all the attacks against one.
(47) **Delva** har anmeldt [alle truslene mot **seg**].
Delva has reported all threats-DEF against REFL
Delva has reported all the threats against him.

It is difficult to find systematic differences between sentences with simple and complex reflexives (and personal pronouns, cf. footnote 11). There seem to be a variety of factors involved, including point of view, emphasis, expectedness, etc.

It must be concluded that the coargument theory of the complex reflexive cannot account for its use in noun phrases. It has been shown that both the simple and the complex reflexive can be used in noun phrases with argument structure when the binder is outside the noun phrase.

Even if the factors that condition this choice between simple and complex reflexives are not understood, its technical aspects can be described using insights from the literature. One important insight that must be kept is that complex reflexives are locally bound — given a proper definition of local binding (Faltz 1985:153-154, Lødrup 2007b, 2007c). It is then necessary to assume that a noun phrase is not necessarily a separate binding domain, even if its head has argument structure. Consider a sentence like (36) again, repeated as (48).

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[11] To some extent, a personal pronoun is also possible, violating the general anti-subject orientation of personal pronouns in Norwegian (see discussion in Hestvik 1992:583-85). An example is (i).
(i) **Yasser Arafat** fnyser av [de israelske truslene mot **ham**].
Yasser Arafat snorts at the Israeli threats-DEF against him
Yasser Arafat snorts at the Israeli threats against him.

(48) **Jon** leste [noen omtaler av **seg selv** / **seg**].
Jon read some reviews of REFL SELF / REFL
Jon read some reviews of himself.

When the simple reflexive is used, it must be assumed (as in Hellan's analysis) that the noun phrase is a separate binding domain, which means that this is a case of long distance binding.[12] However, when the complex reflexive is used, it must be assumed that the subject is a local binder, and the noun phrase is not a binding domain.

When noun phrases as binding domains were discussed in section 2.3, it was mentioned as a possible rule that a noun phrase with a possessive is a separate binding domain, while a noun phrase without a possessive is not. This rule would have many exceptions to both its parts. In a sentence like (48) with the simple reflexive, the noun phrase will be a binding domain even if there is no possessor. In a sentence like (49), with the complex reflexive, the noun phrase will not be a binding domain even if there is a possessor.

(49) I går svarte **NN** på [MMs beskyldninger mot **seg selv**].
in yesterday replied NN to MM's accusations against REFL SELF
Yesterday, NN replied to MM's accusations against him.

The assumption that noun phrases with argument structure are sometimes binding domains and sometimes not might seem ad hoc, but there is independent motivation.[13] Research on binding in English has shown that it is possible for a subject to bind a reflexive in a noun phrase, even if the noun

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[12] In the theory of simple and complex reflexives assumed here (cf. Lødrup 2007b), a simple reflexive can be locally bound, and it is predicted that a local preposition takes a simple reflexive. This means that it is not necessary to assume long distance binding in examples like (i) or (ii).
(i) **Per** fortalte om [skytingen rundt **seg**]. (constructed)
Per told about shooting-DEF around REFL
Per told about the shooting around him.
(ii) **Pers** fortelling om [skytingen rundt **seg**] (constructed)
Per's story about shooting-DEF around REFL
Per's story about the shooting around him

[13] Implicit arguments complicate the picture. They can make the noun phrase a separate binding domain (Lødrup 2007a), as in (i), but most often they do not.
(i) Forståelsen for andre springer ut av [**IMPL-AG** forståelsen av **seg selv**].
understanding-DEF for others springs out of understanding-DEF of REFL SELF
The understanding for others comes from the understanding of oneself.

phrase has a possessive (at least with picture nouns, see Keller and Asudeh 2001, Asudeh and Keller 2001, Runner and Kaiser 2005, see also Rappaport 1986:106-7 on Russian). Cf. (50)-(51).

(50) Hanna found Peter's picture of her.
(51) Hanna found Peter's picture of herself.

Keller and Asudeh 2001:6 write about sentences like (50)-(51): "pronouns and anaphors are both highly acceptable; no significant acceptability difference could be detected"

In terms of binding theory, example (51) would correspond to the Norwegian version with the complex reflexive, in which the noun phrase is not a separate binding domain. Example (50) would correspond to the Norwegian version with the simple reflexive, in which the noun phrase is a separate binding domain. (The reason English can use a pronoun here is that English personal pronouns are not anti-subject oriented, differing from Norwegian.)

5 Conclusion

The coargument theory of binding cannot account for the distribution of reflexives in Norwegian noun phrases.

The facts about binding in noun phrases support an alternative theory in which both simple and complex reflexives can be locally bound, and the local domain for binding is the whole noun phrase (and the whole sentence).

A possessive can bind a reflexive without being an argument of the noun, and a reflexive in an adjunct can be locally bound.

A noun phrase without argument structure can be a binding domain, and a noun phrase with argument structure does not have to be one.

However, one still has to say, with Zifonun 2003:285 and others, that binding in noun phrases is a difficult topic, which we know too little about. This is true both of theory and data — for example optionality and the choice between reflexives and personal pronouns.

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CLITICS ON THE MOVE: FROM DEPENDENT MARKING TO SPLIT MARKING

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Abstract

This paper examines differential object marking (DOM) in non-standard Limeño Spanish contact varieties (LSCV). It explores the multiple effects of DOM (Aissen 2003) in LSCV, more specifically its correlation with patterns of information packaging with respect to secondary topic (Dalrymple and Nikolaeva 2007) and transitivity marking (Alsina 1996, 2001, Andrews 2007). Starting with the fact that Spanish already shows mixed marking, it argues that in non-standard varieties grammaticized non-agreeing object clitics promote split marking even further suggesting a typological new development through a new accusative case marker (Bossong 1991, 2003, Company 2001).

1 Introduction

Standard Spanish requires DOM for human direct objects and optionally *a*-marks personified animate and inanimate direct objects (DO). Clitic doubling (CLD) of a pronominal DO is obligatory in all Spanish dialects as demonstrated in (1).

(1) Pedro lo_i vió a $él_i$.
Peter DOCL.MSG saw.3SG OM PRO.MSG
Peter saw him.

Liberal CLD dialects not only push the scale for DOM to include inanimate DOs but also extend CLD to specific and topic DOs. The role of topicality in agreement systems and DOM is particularly evident in synchronic variation data, and can be seen as a source of historical change.[1] LSCV displays a principled distinction between grammatical agreement with non-agreeing clitics (non-Agr PRO) that have developed into TOP(icality) markers co-occurring with morphological object marking, and anaphoric agreement with mostly agreeing clitics. Synchronic variation of canonical and non-canonical object marking by cross-referencing clitics and syncretic morphological case marking of both the direct and the indirect object, produce conflicting analyses with regard to their syntactic distinction and classification. The conditions in LSCV are summarized below, the arrows represent the grammaticalization paths:

- Optionality of DOM → semantic marking based on specificity and animacy.
- Grammaticized non-agreeing contact direct object clitics (DOCL) devoid of referential information → decreased semantic marking → increased pragmatic marking → secondary topic marker (TOP2).

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[1]See Morimoto 2002 for an OT analysis for Bantu agreement systems.

- Information structure role → move from DOM → a new accusative marker, or [DAT +] (Alsina 1996) → OBJ$_\theta$.

The aim of this paper is to present and discuss the intrinsic relationship of object agreement by clitic doubling and DOM with regard to topic marking in non-standard variation data from Limeño Spanish contact varieties. It can be hypothesized that if DOM extends even further, it will make way for a new accusative marker denoting the direct object as the primary object and secondary topic in monotransitive clauses. This prediction is, in fact, borne out in the following analysis of the non-standard contact data.[2]

Section 2 argues for a split between grammatical and anaphoric agreement in LSCV. The transfer hypothesis in section 3 accounts for some diachronic facts and exposes object marking in the contact languages. Section 4 addresses briefly the concept of affectedness and shows that semantic based reasoning does not fully account for the variation. Section 5 clarifies the motivation for a TOP marker instead of FOC(us) marker. This leads up to a comparison of dative and accusative objects in Spanish in section 6 prompting the emergence of a new accusative marker. A short conclusion is given in 7.

2 Variation in Non-Standard Dialects

This section exposes the range of variation found in LSCV to show how exhaustive the variation patterns are and how they relate to argument marking in general. LSCV shows a hybrid clitic system with the reduced pronominal form *lo* grammaticized to a TOP marker in grammatical agreement. This new development is not restricted to Peruvian contact varieties but can be found in Mexican contact varieties (Company 2003).

2.1 Grammatical Agreement vs. Anaphoric Agreement

Examples (2-4) represent a short discourse within a single context. In LSCV the gender agreeing DO CL *la* has been replaced by a grammaticalized clitic analyzed as TOP as shown in (2a). This leads to a failure of coindexing which produces ungrammatical results by failing the test for completeness and coherence. The strong PRO in (2b) is not affected by any change, always displaying overt gender.

(2) a. Yo lo$_i$/*la$_i$ ví a la chica$_i$.
1PRO.SG TOP/DOCL.FSG saw.1SG OM DET.FSG girl
I saw the girl.

b. Allí estaban ellas$_j$.
There were.3PL 3PRO.FPL
They were there.

[2] All data if not acknowledged otherwise are from digitally recorded naturally occurring data from Fieldwork in Lima, Peru.

The non-agreeing anaphoric direct object clitic in (3) varies with agreeing clitics in a typical case of synchronic variation of the gender feature. However number is still present.

(3) Los chicos los_j/las_j ignoraban.
DET boys DOCL.MPL/DOCL.FPL ignored.3PL
The boys ignored them.

The prediction following from example (2) that in utterances with *lo* as a TOP marker number must also be lost is borne out in (4). In accordance with Bresnan (2001a:134, fn 5)[3] *lo* when analyzed as TOP has only a single, 'marked' value where TOP is a privative feature. Greenberg (1966:61) also noted that featurally unmarked forms 'can act as a surrogate for the entire category'.

(4) Y ahora en la mañana no lo_i/*$la(s)_i$ ví a
And now PREP DET morning not TOP/DOCL.F(PL) saw.1SG OM
$ellas_i$.
3PRO.FPL
And this morning I did not see them.

Whereas in Peninsular Spanish agreement of person 3 OBJ CLs is upheld with minor exceptions, in Basque regions due to a comparable contact situation,[4] the emergence of non-agreeing person 3 clitics is found in the corresponding American Spanish contact situations despite normative educational efforts. However, in the short discourse example anaphoric recoverability seems to obtain for communicative purposes.

2.2 Anaphoric Agreement and Object Alternation in LSCV

Preposing seems to enhance agreement as demonstrated in (5). In this impersonal passive utterance, the left dislocated pronominal IO is not *a*-marked but taken up by a resumptive DOCL in the main clause. The sole inanimate goal object *a la barriga* of the transitive verb is *a*-marked, promoting it to secondary topic. Note the gender agreement in the direct anaphor.[5] The external topic function, the primary topic here, is anaphorically linked to an integrated function in the clause; the extended coherence condition is met. In this particular case the pronominal dislocated topic *ella* shares not only the f-structure with the internal function, the DOCL *la*, but also the referential index of the discourse function; hence functional uniqueness is observed (Bresnan 2001:63).

[3] See section 3 for the grammaticalization path of clitics.

[4] The contact languages Basque in Spain and the Amerindian languages Quechua and Aymara in Peru are typologically similar. See Landa (1995) for Basque.

[5] There is synchronic variation of agreeing and non-agreeing clitics in direct anaphors but notable agreement in highly affected themes in continuing topics.

(5) Cuando ella$_i$, la$_i$ cortaban a la barriga para
When PRO.FSG DOCL.FSG cut.3PL OM DET stomach PREP
sacarla$_i$ al bebe.
take.out.DOCL.FSG OM.DET baby
When they cut her stomach open to take out the baby.

The agreeing anaphoric pronoun *la* continues the relevance of the primary topic here in the text. In a minimalist account Zubizarreta (1998) analyses constructions like (5) as hanging topics which are not linked to any element in the IP and are base-generated at the left periphery. Hanging topics are different from preposed constructions as they shift the attention to a new topic taken up by a resumptive pronoun (clitic) in the matrix clause.

2.3 The Dative-Accusative Alternation in LSCV

LSCV simultaneously applies a double strategy to mark the single inanimate, specific object of transitive verbs that preferably require an active agent and a theme argument.

2.3.1 Leísmo

The first strategy involves replacing the accusative clitic with the dative, a well known phenomenon called leísmo. In this case the DO can be doubled and *a*-marked as in the examples in (6) producing apparent clitic doubled (CLD) IO constructions. Leísmo is ambiguous with regard to grammatical function; for Standard Spanish the features [+human] and/or [+affected] are required, goal arguments are optionally CLD.

Both examples in (6) show a non-standard IO CLD construction with the Ecuadorian Spanish example in (6b) representing a typical example for the extensive leísmo conditions in Ecuador having all but replaced the DOCL with the IOCL. The LSCV example in (6a) is symptomatic of the struggle of the IO and the DO for primary object status.

(6) a. Pero ya no le$_i$/*la$_i$ frito a la yuca$_i$.
But again not IOCL.SG/DOCL.FSG fry.1SG OM DET cassava
But I do not fry the cassava again.

b. Ya le$_i$ veo a la camioneta$_i$. Ecuadorian Sp
Already IOCL.SG see.1SG DOM DET minibus
I can already see the minibus.
(Suñer and Yépez 1988)

In standard Peninsular and Limeño Spanish, leísmo constructions with theme arguments as in (6) above are considered ungrammatical, and only the non-doubled clause in (7a) would be possible. However, Standard Limeño for disambiguation purposes prefers liberal DO CLD with agreeing clitics as shown in (7b).

(7) a. Pero ya no frio la yuca.
but again not fry.1SG DET cassava
But I do not fry the cassava again.

b. ¿La$_i$ frio a la yuca$_i$ o solo la$_i$
DOCL.FSG fry.1Sg OM DET cassava or only DOCL.FSG
caliento?
heat-up.1SG
Do I fry the cassava or shall I only heat it up?

2.3.2 Extended DOM

The second strategy and innovation in LSCV is apparent liberal DO CLD with non-Agr PRO and DOM with inanimate topical objects as exemplified in (8a). [6] Note the move from liberal DO CLD with Agr PRO in Standard Limeño in (8b), and the non-doubled and unmarked version in the Standard Spanish example in (8c).

(8) a. Lo$_i$/*la$_i$ frio a la cebolla$_i$. LSCV
DOCL.MSG/DOCL.FSG fry.1SG OM DET onion
I fry the onion.

b. La$_i$ frio a la cebolla$_i$. Standard Limeño
DOCL.FSG fry OM DET.FSG onion
I fry the onion.

c. Frio la cebolla. Standard Spanish

Examples (6a) and (8a) demonstrate the syntactic motivation for the dative-accusative alternation in monotransitive clauses in LSCV. They show the semantic and pragmatic strategies non-standard dialects apply to make the accusative the primary object and secondary topic by extending DOM to inanimates and using non-Agr PRO as TOP marker and/or transitivity marker.[7]

3 Transfer Through Contact

Due to contact the syncronic variation in LSCV cannot be reduced to internal changes arising as a homogeneous development. Contact as an external factor together with internal factors, in particular with evidence of an inherently diachronically instable dative and accusative case paradigm since early Latin, is known to accelerate language change (Croft 2001). Linguistic change is motivated by an increase in pragmatic function in particular at the initial stage. An example for completed change would be the monocasual clitic system, extensive leísmo (Vincent 2001), in Ecuador and Paraguay.

[6] The featurally unmarked form *lo* surfaced as sole clitic in regions in contact with Amerindian languages mainly in Peru and to a lesser extent in Bolivia and Northwestern Argentine.

[7] Judging from my data I think that *lo* when co-occurring with DOM is in the process of evolving from TOP to transitivity marker, eventually giving rise to a new ACC case marker.

3.1 Grammaticalization

In Standard Spanish the dative clitic displays both agreement (number and person) and case in one morpheme whereas the accusative shows gender distinction instead of case. Both are clitics in the sense of Zwicky (1977) but have come to differ in pronominality through diachronic change. The grammaticalization path in LSCV starts with number incongruence, next clitics no longer carry gender information and finally become a specialized topic-anaphoric pronominal. The evolution and range of variation of pronominal content is illustrated in the markedness hierarchy reproduced in (9) (Bresnan 2001a:116). The dative is a bound pronominal grammatical agreement marker, whereas the accusative, stripped of its referential properties, is reduced to TOP, and has become 'a specialized topic-anaphoric pronominal which lacks any agreement classifications'. According to Bresnan (1998:119) 'Pronominals are reduced if and only if they are specialized for topic anaphoricity'.

(9) $\begin{bmatrix}\text{TOP}\\ \text{AGR}\\ \text{PRO}\end{bmatrix}$ $\begin{bmatrix}\text{PRO}\\ \text{AGR}\end{bmatrix}$ $\begin{bmatrix}\text{TOP}\\ \text{PRO}\end{bmatrix}$ ...

In Standard Spanish, object arguments are optionally cross-referenced on the verb with agreeing clitics, and marked with a syncretic case marker *a*[8] for IO and DO, both internal arguments. DAT-ACC case syncretism is a very well known fact and is found in some Romance languages (Rumanian *pe* and others) and also in the Semitic languages. A striking parallel to Spanish *a* is Hindi/Urdu *ko* in marking specificity when appearing on DOs (Mohanan 1994). The correlation between specificity, topicality and i-structure is discussed in the next paragraph as well as in section 5. In the Romance languages the extension of the dative preposition to a new differential accusative is attributed to normal typological behavior (Bossong 1991:158). In Romance languages with grammaticized clitics (stage II), the ACC or second actant in Bossong's terms, extends from unilateral marking or nominal marking to bilateral marking, resulting in nominal plus verbal marking.

Modern Spanish *a* is the result of a reanalysis of the locative preposition *ad* as a grammatical marker used originally to mark human direct objects and extended in LSCV to topical specific inanimates. Hindi *-ko* shares a common locative origin and similar evolution with Spanish *a*. Dalrymple and Nikolaeva (2007:38) analyze the spread of *-ko* marking to definite inanimates as not only optional but 'determined by the topicality of the object'. Butt (2008) analyses *ko*-marked DOs as specific objects, the event is placed on a path showing a specific endpoint but no attainment.

The morphological change in the clitic paradigm is likely to trigger syntactic change. Grammaticized clitics evolve into topicality and transitivity markers and,

[8] In Mayer (2003) I called it the formative *a* due to its multiple roles: it can be a locative preposition with full semantic content, or an object marker to (a) case mark the IO and (b) optional DOM for the DO (personal *a*, broadly known as prepositional accusative).

when co-occurring with inanimate *a*-marked objects in transitive constructions, denote secondary topics.

3.2 Contact

Note that transfer in Peru flows from Quechua through Andean Spanish (AS) as the mediating language to Spanish giving rise to featureless forms and *a*-marking of inanimates.

3.2.1 Quechua *-ta*

Quechua is a left branching SOV language with free word order inside main clauses (Lefebvre and Muysken 1988), where arguments are extensively marked by case and agreement. Spanish on the other hand is a right branching (S)VO language that uses free word order to configure the information structure roles topic and focus (Zubizarreta 1998). The typological differences and even more the similarities between both languages are of particular importance with regard to argument marking and potential transfer through Andean Spanish to LSCV.

Quechua has a very complex postverbal agreement system. Subjects show case through agreement markers, and only special subjects receive case-marking (NOM, GEN by inflection). Objects are marked on the verb either in terms of the non-subject function, or according to the semantic roles theme, source and goal, or in relation with the subcategorization frame. The object marker *-ta* has a double function: it marks (a) the accusative (patient, theme), the dative (except recipients which are marked by prepositions), and goal and locative arguments and (b) it acts as a transitiviser. As Lefebvre and Muysken (1988:261) remark 'object marking is sensitive to argument status: not only must the NP be a constituent of the matrix VP, it has to be an argument of the matrix verb.' The verbal inflection shows morphological marking of DO and IO person 1 and 2; person 3 is not cross-referenced on the verb. The similar status of transitive and intransitive verbs is particularly interesting.

Primary topics in Quechua do not get dislocated but are obligatorily morphologically marked as in the example in (10). LSCV monotransitive clauses look very much the same in having extended DOM to topic inanimates, whereas Standard Spanish restricts DOM to specific and animate objects.[9]

(10) Wasi hunt's-ta riku-ni.
house full.ACC see.1SG
I see a full house.
(Lefebvre and Muysken 1988:105)

Secondary topics can appear on the left or on the right periphery of the verb. The object marker *ta* and a co-indexed lexical pronoun can only co-occur in the same clause if the pronoun is in topic position as in (11) below.

[9]However personal *a*-marking can be extended to inanimate objects to topicalize them.

(11) Hamu-q warma-(ta)-qa, Santiyagu riku-n.
come.A girl.(ACC).TOP Santiago see.3
Santiago sees the girl that is coming.
(Lefebvre and Muysken 1988:138)

In Quechua double object constructions we find objective and dative case alternation with animate objects. In some varieties, such as Imbabura Quechua and Tarma Quechua absence of morphological marking of DOs is permitted under adjacency conditions, this is not the case for Cuzco Quechua. Lefebvre and Muysken analyze all elements marking case, number, tense and person on nominalized verbs as affixes and not clitics.

3.2.2 Andean Spanish

Andean Spanish (AS) is a non-discrete variety that emerged during 500 years of contact with indigenous languages, mainly Quechua and Aymara. We find a partial clitic inventory on a continuum based on case, leísmo and the TOP *lo* as given in (12). AS speakers have basically collapsed the person 3 clitic paradigm, and reanalyzed the gender, number and case discerning Spanish object agreement system as a unique category with free variation of all three possibilities. All Andean examples are borrowed from Pérez (1997).

(12) Juan le_i/lo_i/la_i conoce a mi $mamá_i$.
Juan IOCL.SG/DOCL.MSG/DOCL.FSG knows.3SG OM POSS mother
Juan knows my mother.

Pérez ascribes the absence of the obligatory DOCL in the preposed construction in Andean Spanish in (13b) to a direct transfer from the Quechua OV agreement system as in example (13a). In the Standard Spanish preposed construction in (13c) the clitic is obligatory.

(13) a. Huwan-ta riqis-ni llaqta-y-manta. Quechua
Huwan.ACC know.1SG town.POSS.1SG.from
I know Huwan from my town.

b. A Juan conozco de mi pueblo. AS
OM Juan know-1.SG PREP POSS village
I know Juan from my village.

c. A Juan *(lo) conozco de mi pueblo. StaSp
OM Juan DOCL.MSG know.1SG PREP POSS village
I know Juan from my village.

I assume that the multiple grammaticalization processes and contact linked to discourse-pragmatic function are responsible for a typological change to primary object/secondary topic in LSCV monotransitive constructions.

4 The Affectedness Issue

Affectedness indirectly correlates with the semantic features animacy and definiteness of the object as these features in turn are strongly associated with individuation of the referent (Hopper and Thompson 1980, Naess 2004, Dalrymple and Nikolaeva 2007). Semantic based dative-accusative alternations can be found in many other languages. The Icelandic example in (14) exemplifies affectedness differences with the same verb where the accusative in (14a) marks an almost painful act with the intention to hurt; the dative marking in (14b) means that somebody helped out and scratched a place the person cannot reach on her own.

(14) a. Hann klóraði mig.
he.NOM scratched me.ACC
He scratched me (ACC).

b. Hann klóraði mér.
he.NOM scratched me. DAT
He scratched me (DAT).
(Naess 2004:1205)

LSCV data in (15) corroborate the same, however with a slight but significant semantic difference in the verbal lexical semantics. LSCV marks the thematic role of the beneficiary with the dative and the goal/target with the accusative.

(15) a. Y el doctor le sobaba, la sobaba y le
And DET doctor IOCL massage.3S, DOCL.F massage.3S and IOCL
calmaba los dolores.
soothed DET pain
And the doctor massaged her, massaged her some more and soothed her pain.

b. ..que le rasque la cabeza, que le rasque la
..that IOCL scratch.1S DET head that IOCL scratch.1S DET
espalda, basta con que lo rasque.
back enough with that DOCL.M scratch.1S
..that I scratch his head, that I scratch his back, it is good as long as I scratch him.

Some verbs change lexical meaning depending on selection of DO and IO. The relationship to leísmo here is not clear cut, however, I assume that the examples above do not represent a case of leísmo.

5 Correlation of Case-marking and I-Structure

Classical markedness theory (Hopper and Thompson 1980, Givón 1976) and affectedness as in the previous section fail to account fully for the range of variation

pertinent to LSCV marked DOs. Recall, for Standard Spanish, marking of DOs obtains in terms of presence and absence of *a* based on a distinction of definiteness and animacy. For languages with extended DOM such as LSCV, Persian, Hindi and Rumanian, which are all very similar in terms of the distribution of marking, the presence of case-marking yields a more marked entity which can be explained in terms of information structure (Croft 1988:165, Dalrymple and Nikolaeva 2007).

5.1 Agreement

In a previous analysis (Sánchez 2006, based on Kiss 1998) marking of the sole object of the transitive clause in the Standard Spanish example in (16) has been identified as informational focus [+def], and the CLD example (17) in River Plate as identificational focus [+spec].

(16) Vi a Ana. [+def]
Saw.1SG OM Ana
I saw Ana.

(17) La$_i$ vi a Ana$_i$. [+spec]
DOCL.FSG saw.1SG OM Ana
I saw Ana.

Liberal clitic doubling in dialects such as River Plate (Suñer 1988) and Limeño (Mayer 2003, Sánchez 2006) is licensed by specificity and definiteness of the doubled NP and saliency of the object NP. The agreeing co-occurring clitic is seen in a unified account. The DOCL in (17) is an agreement marker and shares the same grammatical function with the object in a cleft structure. DO CLD of this kind is considered ungrammatical in Standard Spanish (Zwicky 1977, Jaeggli 1986) but accepted in American Spanish varieties where it can be linked to Kayne's Generalization. Kayne (1994:153) disprefers the explanation of the DOM marker *a* licensing the doubled clause as a case marker for the NP, but rather ascribes it to *a* somehow licensing the '(partial) dativization of the apparently accusative clitic' thus creating a parallel to dative clitic doubling. Recall the motivation for the dative alternation from section 2.3.

Specificity here is understood as intrasentential referential anchoring of a DP to another discourse object in the sense of von Heusinger (2002); it overrides animacy in these cases. For the purpose of these data I suggest characterizing specificity as the pragmatic strategy for the speaker to deliberately topicalize an object either in canonical postverbal focus position or through word order restructuring. This assumption is partially based on Torrego's (1999:1785) hypothesis that only the class of verbs that takes an agent as semantic subject role can *a*-mark the DO.[10]

The discourse configuration of Spanish, an SVO pro-drop language, reserves the clause-initial position for topics; it is tacitly assumed that the postverbal position is the canonical focus position. However, topicality is a property subjects and

[10]For a detailed discussion about accusative case in Spanish see Torrego (1998).

objects have in common, as Dalrymple and Nikolaeva (2007:29) argue 'objects are just as likely to be topics as to be in focus.' As we can appreciate in the grammatical function hierarchy in (18), the object located in the middle of the hierarchy can be both, topic and focus. In general, focus tends to associate with lower ranking arguments, and topics with arguments high on the hierarchy scale. As clitic doubled examples as in (17) are highly topical arguments I associate them with TOP rather than FOC in accordance with the hierarchy.

(18) SUBJ > OBJ > OBL
TOP > FOC

Consider the following examples in (19) from Ibizan (Balearic Catalan), where DOM consistently appears on all dislocated topical objects but not on focused objects; according to Escandell-Vidal (2007) they are never marked.

(19) a. Vaig ficar (*an) es ganivets an es calaix.
have.1SG put OM DET knives PREP DET drawer
I put the knives into the drawer.

b. An es ganivets, els vaig ficar an es calaix.
OM DET knives them have.1SG put PREP DET drawer
The knives, I put them in the drawer.

c. Els vaig ficar an es calaix, an es ganivets.
them have.1SG put PREP DET drawer OM DET knives
I put them into the drawer, the knives.
Escandell-Vidal (2007:31)

Ibizan Spanish codes information structure roles by word order restructuring and DOM marking specifically topical objects. Further evidence comes from the Hindi-Urdu postposition *ko* which is strongly dispreferred in focus (wide and narrow), and preferably used 'in contexts where the object is salient and the utterance updates the addressee's knowledge about the relation that holds between the subject and the object referents' (Dalrymple and Nikolaeva 2007:37).

The evidence from Ibizan, a closely related dialect of the same language family, as well as evidence from Hindi-Urdu, an unrelated and typologically different language, strengthen the hypothesis that it is not an unfounded assumption to make a similar case for DO CLD constructions with non-Agr PRO in LSCV.

5.2 TOP marker

Grammaticality judgments based on prescriptive standard grammars judge examples (20, 21) from non-standard dialects as sharply ungrammatical, however they seem to be pragmatically acceptable.

(20) Lo$_i$ vi a las chicas$_i$. [+anim] [+spec]→[top]
TOP saw.1SG OM DET.FPL girls
I saw the girls.

(21) Lo$_i$ frio a la cebolla$_i$. [-anim] [+spec]→[top]
TOP fry.1SG OM DET.FSG onion
I fry the onion.

These non-standard examples can be related to topicalization devices whereby a preverbal non-agreeing non referential clitic introduces the subsequent new information in the post-verbal object DP as the secondary topic. Such pragmatic marking strategies are typical of head-marking Amerindian languages LSCV is in contact with.[11] The *a*-marked inanimate object in (21) exemplifies nicely the typological restructuring through the combination of the topic marker 'naming the topic referent in the discourse' and the new accusative *a* expressing 'a semantic relationship between a topic referent and a predicate' (Lambrecht 1994:335). This is another example for DOM marking not only a specific object but also the agentive subject at the same time (Bossong 2003, Dalrymple and Nikolaeva 2007). Using the system of Dowty (1991) and Alsina (1996:41), the event in (21) is construed as a planned event with a volitional causer (SUBJ) P-A and a prototypical P-P undergoing some change of state. Another important factor in LSCV is identifiability of the object by both hearer and speaker.

Defining secondary topics is not straightforward, for one the information is not new but familiar and known to both speaker and hearer or at least identifiable from the context. In Dalrymple and Nikolaeva (2007) secondary topics are marked, they must have been mentioned in the previous discourse and must be specific. Objects that have not been mentioned previously but can be specific and not *a*-marked are in the domain of wide focus which does not receive marking. This definition works fine for Standard Spanish where the agreeing clitic unifies with the direct object NP, and displays topicality inside the finite clause building on the 'individuation-presuppositionality' traits of the marked DO (Torrego 1999). Morimoto (2002) divides Bantu topics into external topics (preverbal dislocated objects in topic position) and internal topics (secondary topics in postverbal focus position). For contact Spanish however I propose tentatively that secondary topic marking refers only to monotransitive clauses triggering accusative marking.[12]

The non agreeing TOP2 marker resists a unifying analysis with the integrated function in the clause. Completeness and coherence as well as functional uniqueness would be violated unless we assume (a) the functional uncertainty equation in (22) which allows identification of TOP2 and OBJ and (b) an extended coherence condition such as Bresnan (2001:72) that allows for 'looser constraints of discourse coherence' for external or dislocated TOP or FOC functions. Otherwise in an incoherent f-structure the TOP2 could not be integrated. Kayne's Generalization can be linked to TOP2 and primary object in contact Spanish as shown in (23). Note,

[11] Further Quechua uses evidentiality markers to *witness* an activity. The TOP marker in the LSCV data points to a highly salient object undergoing an immediate action performed by the highly topical and agentive speaker-subject and to be witnessed by the hearer.

[12] I suspect that durative aspect or boundedness could also trigger accusative *a*. This is an avenue yet to be explored.

(22) and (23) are both existential requirements and not assigning ones.

(22) lo: CL, (TOP2↑)

(23) a: P, (TOP↑)

The verb phrase-structure rules in (24) account for LSCV and Standard Spanish CLD DO constructions. Selection between TOP and TOP2 here is covered by Morphological Blocking (Andrews 1990) in choosing the most compatible and specific candidate.

(24)
$$\begin{array}{lcccc} \text{VP} & \rightarrow & \overline{V} & & \text{DP} \\ & & \uparrow = \downarrow & & (\uparrow \text{OBJ}) = \downarrow \\ \overline{V} & \rightarrow & \text{CL} & & \text{V} \\ & & (\uparrow \text{TOP}|\text{TOP2}) = \downarrow & & \uparrow = \downarrow \\ & & (\uparrow \text{OBJ}_\theta) = \downarrow & & \end{array}$$

Non-agreeing clitics have been analyzed as marking TOP2 in LSCV showing more core grammatical functions as exemplified in (25) below.

(25) Default alignment (Dalrymple and Nikolaeva 2007:35)

i-structure	TOPIC	TOPIC2	FOCUS
f-structure	SUBJ	OBJ	OBJ_θ/OBL

The innovation in LSCV is after all not totally unexpected but can be seen as a natural consequence of extending DOM from specific (topical) animate objects to specific (topical) inanimate objects.

6 A New Accusative Marker?

Crosslinguistically the gradation of direct objecthood is based on a 'well documented semantic and pragmatic overlap between the categories definite patient (Hebrew), dative and human patient (Spanish), dative and pronominal (Provençal), and dative and topical (Newari, Nepali) (Givón 1997:25). Recall, that in Spanish marking of the DO and the IO is morphologically undistinguishable due to syncretism of the formative *a*. As we have seen, in contact varieties pragmatic marking takes precedence over semantic marking. The featureless form *lo* has been analyzed as a TOP2 marker which seems to be a natural extension of diachronically well attested personal *a* marking human, animate and inanimate DOBJ arguments in specific/topical contexts.[13] Extending DOM to specific topical objects can be seen as a natural consequence giving rise to a new accusative marker. In this case *lo* will have to be reanalyzed as a transitivity marker.[14]

[13] Another option would be to take object properties à la Deal (2005) into account and analyze unmarked DO as [-property], that is non specific, and marked DOs as [+property] which are specific.

[14] A. Andrews p.c. does not think that *lo* should be analyzed as TOP marker but as a transitivity marker instead.

6.1 Two Theories in Competition

6.1.1 The [DAT ±] hypothesis

Alsina (1996) proposes a binary case distinction [DAT ±] for Spanish and other Romance languages such as Catalan for example, where both objects are internal arguments, direct functions distinct from SUBJ and OBL. They are morphologically marked by presence and absence of a case marker, for Spanish *a*. He argues for the IO to be the [DAT +] marked member in this case opposition and analyses the DAT as a PP. The unmarked DO becomes the nondative or [DAT−]. Third person pronominal clitics show morphological case-marking [DAT +] in the dative (*le*) and gender [DAT−] for the accusative (*lo, la*). The distinction [DAT ±] would also allow for DOM for the accusative. However it does not explicitly accommodate a new accusative marker, that is it does not allow for typological change. In adopting this distinction, the marked DO becomes the secondary object or thematically restricted OBJ_θ.

6.1.2 Information Structure

DOM optionally marks direct objects ranked for their prominency on two scales, animacy and definiteness, or on a two-dimensional scale based on the interaction of both (Bossong 1991, Aissen 2003). DOM based on these semantic strategies is motivated by trying to disambiguate core arguments in transitive clauses. In Aissen's account information structure does not play an important role, she assumes that the prototypical role of a transitive object is in focus. This functional approach however does not account for languages that prefer pragmatic marking strategies over semantic marking. Dalrymple and Nikolaeva (2007) analyze the difference between marked and unmarked objects as different information structures expressed in syntactic terms representing two different grammatical functions. This allows for a gradual change in DOM from original marking of i-structure to incorporate partially or in some languages even completely the referential properties of the object.

The spread of DOM in LSCV to include topical inanimates co-occurring with a non-agreeing clitic is not an isolated occurrence. Hindi and Persian, for example, have extended DOM to incorporate specific elements that are topical. If we analyze the extension of DOM creating a new accusative marker through its information structure role, then the *a*-marked DO could be seen as a primary object/secondary topic based on the semantic roles theme/patient. Andrews (2007:43) proposes the option of semantic marking (animacy and definiteness) and pragmatic marking (information structure roles topic and focus) of patients for Spanish. DOM solely based on an animacy marking strategy is troubled by sustained evidence of marking of inanimate themes in Standard Spanish. Explaining the extension of DOM in contact varieties based on purely semantic role is troubled by the fact that, by extending marking to inanimate themes, any difference between themes and patients

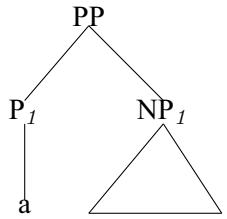
is obliterated.[15]

The next section applies Alsina's theory to the objects to highlight similarities and differences.

6.2 Dative and Accusative Objects

The skeletal c-structure representations below, borrowed from Alsina (1996:165), show that the IO in (26) and the DO in (27) are morphologically identical structures. The IOCL is a case marker, different from the DOCL below.

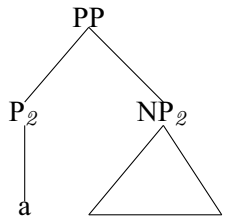
(26)



DAT: a
P_1 $[DAT +]_1$
Lexical entries:
a P_1 $(\uparrow CASE) = DAT$
le CL $(\uparrow CASE) = DAT$

Accusative objects as shown in (27) below, or nondative in Alsina's terms, can be analyzed as a regular PP.[16] However, different from the IO, the preposition here provided by the lexicon is tentatively analyzed as a new accusative case marker for the contact data. Case-marking is constrained to the DOCL as a TOP2 marker.

(27)



ACC: a
P_2 $[DAT-]_2$
Lexical entries:
a P_2 $(\uparrow CASE) = ACC$
lo CL $(\uparrow OBJ) = (TOP2\uparrow)$

Next we look at differences and similarities in the syntactic behavior of these objects.

6.3 Object Behavior

Spanish codes syntactic functions through word order arrangements, such as preposing and left dislocation, DOM with specific DPs and clitics to cross-reference

[15] It is anyway very difficult if not impossible to draw a clear line between themes and patients (Miriam Butt, pc).

[16] See Bresnan 2001: 329 for such an analysis.

agreement and case. These different techniques can be used in almost any combination to mark grammatical relations and configure or signal pragmatic functions. We have already seen that objecthood is not clear cut but gradable. Alsina (1996:150) argues 'that all that distinguishes direct from indirect objects is morphological case: indirect objects are objects marked with dative case, whereas direct objects are objects without dative case.' However as Bossong (1991) notes, DOM is applied differentially and dative case not. The table below summarizes the apparent similar behavior of the DO and the IO in passing tests for objecthood.

SYNTACTIC PROPERTIES	DO	IO
passivization	yes	no
impersonal/middle passive	yes	yes
adjacency	yes	yes
agreement	yes	yes
personal *a*	yes	no
case and clitic doubling	$_c$TOP	yes
cliticization	yes	yes

Table 1: Syntactic properties of DO and IO in Spanish

Both objects can appear adjacent to the verb, can be cross-referenced on the verb with agreeing clitics and can be replaced by clitics. The major differences constitute the inability of IOs (and OBLs) to become the grammatical subject of a passive clause and the absence of personal *a*. The passive morpheme *se* which is homophonous with the reflexive clitic *se* produces superficially identical passives for all three passive forms. However, they can be distinguished (a) on argument structure where only the passive has an implicit agent and (b) through aspectual differences. The case and clitic doubling constraints on the DO are not a new development but have been extended to include inanimate specific (topical) arguments.[17]

6.4 Double Object Constructions

Alsina argues that in DOCs the DO is the primary object and the IO the restricted secondary object, co-occurrence is regulated by the Restricted Argument Parameter (RAP) 'in an argument structure with two morphosyntactically distinct internal arguments, one must be [R]'(Alsina 2001:670). This principle is active in asymmetrical languages, Spanish is one of them. In Spanish DOC, (SUBJ) V DO IO is considered the default word order with *a*-marking restricted to the [R] object. The constraint is due to the Linear Precedence Principle (Alsina 1993), the Spanish accusative patient is usually a bare NP while the dative recipient or goal is a PP. Restrictedness is represented at the level of a-structure and the concept of object is represented at f-structure. The external argument maps onto the subject function

[17] See Kittilä 2006 for a crosslinguistic survey of extended DOM: SDOM and EDOM.

indexed with 1, and both other arguments are assigned object function with the one adjacent to the verb being the unrestricted object and the restricted argument mapping onto the secondary object as shown in (28).

(28) dar: 'give $<[]_1 \quad []_2 \quad [R]_3>$' a-structure

$[SUBJ_1 \ OBJ_2 \ OBJ_3]$ f-structure

The diagram in (29) below shows the mapping from c-structure to a-structure to f-structure. Optionality of presence and absence of the clitic is due to a contrast between the DOC and the locative alternation.[18]

(29)	c-structure	(NP)	(CL)	V	NP	a NP
	a-structure				THEME	GOAL
	f-structure	(SUBJ)			OBJ	OBJ_θ

DOCs are by and large not affected by the change we are seeing in monotransitive constructions, however the restructuring of word order into (SUBJ) V a NP NP is also considered 'grammatical' but pragmatically marked. This is a development similar to the one in various dialects of Chicheŵa where, according to Kanerva (in Alsina 2001:376), the order can be reversed and the restricted object would precede the unrestricted object as exemplified in (30).

(30)	(NP)	CL	V	a NP	NP
				GOAL	THEME
	(SUBJ)			OBJ_θ	OBJ

The information structure role in ditransitives is marked through word order in accordance with the thematic hierarchy where the recipient precedes the theme and not through case-marking. The RAP remains active even with pragmatically motivated word order restructuring. This word order variation is often called the prepositional dative construction (Demonte 1995, Bleam 2003 and Kayne 1975 for the French counterpart). In these IO DO constructions the IOCL is obligatory with the *a*-marked referential object. Note also that in DOC both objects can be replaced by a clitic cluster with the fixed order of IO>DO.

From the above discussion follows that both objects in Spanish are internal arguments, and that word order restructuring motivated by information packaging does not change object status or mapping relations.

7 Conclusion

In this paper I discuss the the intrinsic relationship of object agreement, DOM and secondary topic marking in non-standard variation data from Limeño Spanish contact varieties. The evolution of grammaticized non-agreeing direct object clitics

[18] In this construction the case marker *a* is replaced by a true preposition and the clitic is lost.

into a secondary topic marker has been ascribed to multiple co-occurring factors, namely, inherent diachronic variation of the clitic paradigm, transfer through contact and extended DOM regulated by pragmatic strategies. Based on these converging conditions I have argued that fierce competition between the dative and accusative for the same space in monotransitive clauses may give rise to a new accusative case, marking topical, individuated objects according to semantic roles and information structure role. It can be assumed that multiple grammaticalization processes and contact linked to discourse-pragmatic functions are responsible for a typological change to primary object/secondary topic in monotransitive constructions.

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NP WOULD LIKE TO MEET GF: A WELSH ADJECTIVAL CONSTRUCTION

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Abstract

In this article we examine a Welsh adjectival construction which superficially looks simple but on closer examination proves to be somewhat challenging. The construction contains an NP constituent whose GF status is far from clear. We consider various analyses of this NP, as SUBJ, OBJ and ADJ and suggest that on balance the evidence favours the OBJ analysis. Beyond the purely parochial Welsh or Celtic interest, it may provide a useful case study of how difficult it is to determine the correct identification of grammatical functions beyond core cases.

1 Introduction

We initially describe the syntactic, morphosyntactic and semantic properties of an AP construction in Welsh which, somewhat unusually, contains a bare NP as a constituent. Our main interest is in determining the functional status of the AP-internal NP, and we discuss a number of possible analyses, presenting a selection of arguments for and against each. We try to compare and evaluate the different analyses on their respective merits and try to identify the reasons why an LFG analysis of this construction turns out to be so problematic.

2 Data

An intriguing and puzzling AP construction exists in Welsh, neutrally describable as consisting of (at least) an A(djective) followed by an NP containing a possessive clitic pronoun:

(1) *byr ei thymer*
short her temper
'short-tempered'

(2) *trwm ei chlyw*
heavy her hearing
'hard of hearing'

Jones (2002) (henceforth BMJ), following Morris-Jones (1931), calls this the 'genitive of respect' construction. Given the absence of case inflection in Welsh, we prefer the term *in-respect-of* construction. As can be seen in the attributive use in (3)-(4) the post-A NP delimits the respect in which the A applies to the N which it modifies. The fact that the A is delimited/restricted to the "dimension" expressed by the following NP means that (3)-(4) are not contradictory.

(3) *merch dal byr ei thymer*
girl tall short her temper
'a tall short-tempered girl'

[†]We are grateful to the audiences at CLC5 and LFG08 and especially to Kersti Börjars, Milan Rezac, Joan Maling and Nigel Vincent for comments and suggestions.

(4) *menyw lân frwnt ei thafod*
woman clean dirty her tongue
'a clean foul-mouthed woman'

2.1 Constituent Structure

BMJ establishes a number of key aspects concerning the syntactic (phrase) structure of this construction, which we summarize here.

The construction occurs in typical AP environments, both attributively and predicatively. As an attributive modifier it is found in the usual post-N position, as in (3)-(4), and predicatively it occurs either following the SUBJ in the basic verb-initial word order and preceded by the predicative particle *yn* as in (5), or sentence-initially, without the particle, as in (6).

(5) *Mae Siân yn fyr ei thymer.*
is Siân PRED short her temper
'Siân is short-tempered.'

(6) *Mawr eu dawn yw 'r gwŷr*
big their talent is the men
'hugely talented are the men'

There is substantial evidence, discussed in detail by BMJ, that the sequence A-NP is a constituent, and is headed by the A. For one thing, (5) provides evidence that the construction is headed by the A (with the NP being a subconstituent of the construction), because definite/specific NPs such as *ei thymer* 'her temper' are disallowed after the predicative particle *yn*. Additionally, the expected position for an adjectival modifier is post-N, so if *byr* 'short' modified *ei thymer* 'her temper' in (1) we would expect it to occur after the N. Evidence from coordination further corroborates the analysis of the NP as a subconstituent: the examples below show that the NP can be coordinated.

(7) a. *Mae'r gwŷr yn fawr eu dawn a'u parch.*
is-the men PRED big their talent and-their respect
'The men are hugely talented and (hugely) respected.'

b. *Mae Siân yn fyr ei thymer a'i choesau.*
is Siân PRED short her temper and-her legs
'Siân is short-tempered and (short-)legged.'

c. *Y mae'r dalgylch yn fawr ei werth amgylcheddol a'i amrywiaeth.*
PT is-the catchment PRED big its value environmental and-its diversity
'The catchment is rich in terms of its environmental value and diversity.'
(`http://www.asiantaeth-yr-amgylchedd.cymru.gov.uk/regions/wales/858612/1317944/1325232/315631/?version=1&lang=_w`)

The following examples provide some information about how the adjectival head interacts in this construction with dependents of various sorts. The A, the head of the construction, can be modified in the expected manner by the normal range of adverbial/intensifier material.[1]

(8) a. *Mae hi'n rhy fyr ei thymer.*
is she-PRED too short her temper
'She is too short-tempered.'

b. *Mae hi'n fyr iawn ei thymer.*
is she-PRED short very her temper
'She is very short-tempered.'

The following examples seem to show that the NP dependent of the A ('her temper') comes closer to the head A than the "complement" of the comparative itself, which may point to the fact that the *respect*-NP is an argument of the A.

(9) *Mae hi'n fyrrach ei thymer na'i brawd.*
is she-PRED shorter her temper than-her brother
'She is shorter-tempered than her brother.'

(10) *Mae Sioned yn fyrrach o lawer na'i brawd.*
is Sioned PRED shorter of much than-her brother
'Sioned is much shorter than her brother.'

(11) *Mae hi'n fyrrach ei thymer o lawer na'i brawd.*
is she-PRED shorter her temper of much than-her brother
'She is much shorter-tempered than her brother.'

The relationship between the post-A NP (NP2) and the attributively modified N or SUBJ (NP1) seems to be best describable as one in which NP1 inalienably possesses NP2. Compare the description of the construction in (Mac Cana, 1966, p. 91): "The thing or quality denoted by the [NP2] pertains to or is a part of the person or object denoted by [NP1] ...". However further research into the exact relationship between NP1 and NP2 is needed.

The post-A NP has the form of a possessor-possessed construction. The clitic shows the properties of a pronoun bound by a syntactic antecedent. Most importantly, unlike unbound clitics (12a), it cannot be doubled by a post-N pronoun.

(12) a. *ei thymer (hi)*
her temper (PRON.3SG.F)
'her temper'

[1](8 a) and (8 b) raise some interesting issues with regard to c-structure assumptions, independent of this construction itself. The assumption that (post-posed) *iawn* 'very' and (pre-posed) *rhy* 'too' form a small (non-projecting, X^0) construction with an adjectival head may explain the intervention of *iawn* before any complements of the N (Sadler, 1997; Toivonen, 2003).

b. *merch fyr ei thymer *hi*
girl.F short her temper PRON.3SG.F
'a short-tempered girl'

c. *Mae Siân yn fyr ei thymer *hi*
is Siâ PRED short her temper PRON.3SG.F
'Siân is short-tempered'

Overall, then, the observations above suggest that this construction is an AP in which the adjectival head takes the NP as some sort of dependent.

2.2 Adjectival Properties

Two different "agreement" processes, namely (morphosyntactically conditioned) initial consonant mutation (ICM) and morphosyntactic agreement, are relevant to attributive APs. First, post-N APs are subject to mutation of the initial segment, depending on the GEND/NUM of the modified N: soft mutation occurs after FEM SG Ns, otherwise the radical appears, as in (13)-(14).[2]

(13) *athro* *mawr*
(athro.M.SG) (RAD.mawr)
teacher great
'a great (male) teacher'

(14) *athrawes* *fawr*
(athrawes.F.SG) (SM.mawr)
teacher great
'a great (female) teacher'

This type of morphosyntactically conditioned ICM targets the entire AP, that is, in practice the first word of the AP, and does not constitute morphosyntactic agreement *per se*. Note that in (15)-(16) where the attributive A *caredig* 'kind' is preceded by the adverb *tra* 'very', the AP mutation (triggered by the FEM SG N) appears on the adverb, and not on the A, which itself is subject to a different mutation (AM) triggered by the adverb.

(15) *athro* *tra* *charedig*
(athro.M.SG) (RAD.tra) (AM.caredig)
teacher very kind
'a very kind (male) teacher'

[2] RAD = radical; SM = soft mutation; AM = aspirate mutation. For the Welsh system of initial mutations see, for instance, King (1993, pp. 14-20), Williams (1980, pp. 174-177) and Mittendorf and Sadler (2006). We largely omit initial mutation glosses in the following.

(16) *athrawes* *dra* *charedig*
(athrawes.F.SG) (SM.tra) (AM.caredig)
teacher very kind
'a very kind (female) teacher'

As far as attributive AP mutation is concerned, the *in-respect-of* construction is inconspicuous and behaves as expected for a post-N AP:

(17) *athro* *mawr* *ei* *barch*
(athro.M.SG) (RAD.mawr) (ei) (SM.parch.M.SG)
teacher big his respect
'a highly-respected (male) teacher'

(18) *athrawes* *fawr* *ei* *pharch*
(athrawes.F.SG) (SM.mawr) (ei) (AM.parch.M.SG)
teacher big her respect
'a highly-respected (female) teacher'

Second, while most Welsh As themselves do not inflect for GEND or NUM, a relatively small subset does have distinct FEM SG and/or (gender-indeterminate) PL forms. MASC SG and FEM SG forms differ in their vocalism,[3] while PL As are characterized by a suffix and/or vowel change:

(19)

M.SG	F.SG	PL	
byr	*ber*	*byrion*	'short'
gwyn	*gwen*	*gwynion*	'white'
dwfn	*dofn*	*dyfnion*	'deep'
trwm	*trom*	*trymion*	'heavy'

This type of agreement is shown in (20)-(21) for the A *trwm* 'heavy'. The usual attributive AP mutations also apply.

(20) *eira* *trwm*
(eira.M.SG) (RAD.trwm.M.SG)
snow heavy
'heavy snow'

(21) *cawod* *drom*
(cawod.F.SG) (SM.trwm.F.SG)
shower heavy
'a heavy shower'

[3] <w> = /u/ and /w/; <y> = /ɨ∼i/ in monosyllabic words and final syllables, /ə/ in non-final syllables.

For some time in the history of Welsh, there has been an increasing tendency to avoid discrete FEM SG and PL forms and use the "MASC SG" form as a default form instead. Nowadays, FEM SG/PL forms are unusual in predicative position even in more formal types of Welsh, and impossible in informal varieties; in attributive position, FEM SG / PL forms are increasingly restricted to set expressions (such as *stori fer* FSG 'short story').

It is here that the *in-respect-of* construction parts way with "plain" AP constructions: in contemporary Welsh the A heading the *in-respect-of* construction never agrees with the N it modifies—nor does it agree with the post-A N; instead it must be in the (default) MASC SG form in both more and less formal varieties of Welsh (thus aligning, in this instance, with predicative AS).[4]

(22) *bachgen* *trwm* *ei* *glyw*
(bachgen.M.SG) (RAD.trwm.M.SG) (ei) (SM.clyw.M.SG)
boy heavy his hearing
'a boy hard of hearing'

(23) *merch* *drwm/*drom* *ei* *chlyw*
(merch.F.SG) (SM.trwm.M.SG/*F.SG) (ei) (AM.clyw.M.SG)
girl heavy her hearing
'a girl hard of hearing'

(24) *Mae Siân* *yn* *fyr/*fer* *ei* *thymer.*
is Siân.F.SG PRED short.M.SG/*F.SG her temper.F.SG
'Siân is short-tempered.'

The fact that the A remains uninflected in both predicative position and in the *in-respect-of* construction raises the possibility that the latter construction constitutes a reduced relative clause, in which case the A would be essentially predicative.

In English, the position of an AP might be argued to be a good diagnostic for a reduced relative clause (post-N vis-à-vis pre-N with plain APs). Since in Welsh attributive APs generally appear in post-N position, this diagnostic cannot be applied. Even so, reduced relative clauses arguably exist in Welsh. (25 b) is a possible alternative to (25 a). The A *gwell* 'better' is preceded by an adverbially used quantifier (*ychydig* 'little'). In (25 b) the A follows the predicative marker *yn*, a fact that is hard to explain unless one assumes that (25 b) is a reduced relative clause; cf. (25 c) with a non-reduced relative clause. In comparison with examples like (25 b), the attributive *in-respect-of* construction offers nothing which would argue strongly in favour of an analysis as a reduced relative clause, and so we assume that it is in fact no such thing.

(25) a. *ateb* *ychydig gwell*
answer little better
'a slightly better answer'

[4]However, a corpus search using Mittendorf and Willis (2004) shows that obligatory non-agreement in form seems to be a (relatively) recent rule. Confusingly, in earlier texts, an attributive A may either agree with the head N *or* the N that follows, with the latter case perhaps more common.

b. *ateb ychydig yn well*
answer little PRED better
'a slightly better answer'

c. *ateb sydd ychydig yn well*
answer is.REL little PRED better
'an answer that is slightly better'

In summary:

1. The adjectival *in-respect-of* construct is a construction that is headed by the A and contains a (definite) NP.
2. It occurs in typical predicative and attributive positions (see (3)-(6)).
3. In attributive position it shows normal AP mutation, but the A itself does not agree with either the head N or the following N.
4. The NP contains an obligatory (possessor) clitic, which cannot be doubled by an overt post-N pronoun—that is, the pronominal argument, if such it is, cannot be expressed by means of an overt copy pronoun but has a local antecedent.[5]
5. The NP appears (almost immediately) post-head in direct argument position.
6. The relationship between the post-A NP and the external N is one of inalienable possession: "The thing or quality denoted by the [post-A NP] pertains to or is a part of the person or object denoted by [the SUBJ or head N], the latter being represented by the poss[essive] pronoun" (Mac Cana, 1966, p. 91).

In terms of the grammar of Welsh, the major question which this construction raises is that of determining what the correct f-structure analysis is of the post-A NP. Beyond the purely parochial Celtic interest the issue provides a useful case study on just how difficult it is to determine the correct identification of grammatical functions beyond the core cases.

3 *In-respect-of* AP: F-Structure

It seems that any reasonable f-structure analysis of the *in-respect-of* construction must take account of the following descriptive observations:

1. The *in-respect-of* AP is a constituent and functions both attributively and predicatively. It should either receive the same f-structure analysis in both uses, or differ only insofar as attributive and predicative APs differ generally in the grammar (that is, in terms of the presence or absence of a SUBJ).

[5]This observation does not entirely settle the analysis of the clitic—it may correspond to a GF (as in Welsh long-distance wh-constructions and relative clauses involving a "resumptive" pronoun) or it may directly express agreement features of the antecedent as in certain Welsh periphrastic passives.

2. The NP's POSS is anaphorically linked to an antecedent (the head N or SUBJ). This linkage must, in one way or another, be established.

3. The A must appear in the default MASC SG form: FEM SG / PL forms must therefore be constrained to exclude them from the construction while still permitting them to occur in 'ordinary' attributive constructions.

The biggest open question here is the status in terms of grammatical function of the AP-internal NP, which is far from clear. Abstracting away from the issue of the nature of the GF of the internal NP, what seems uncontroversial about the basic f-structures for the attributive and predicative uses of the construction (26) is shown in (27).

(26) a. *merch fyr ei thymer*
girl.FSG short.MSG POSS.3SG temper.FSG
'a short-tempered girl'

b. *Mae'r ferch yn fyr ei thymer.*
is-the girl.FSG PRED short.MSG POSS.3SG temper.FSG
'The girl is short-tempered.'

(27) a.
$$\begin{bmatrix} \text{PRED} & \text{GIRL}_i \\ \text{ADJ} & \left\{ \begin{bmatrix} \text{PRED} & \text{SHORT} \\ \textbf{RESP} & \begin{bmatrix} \text{PRED} & \text{TEMPER} \\ \text{POSS} & \begin{bmatrix} \text{PRED} & \text{PRO}_i \end{bmatrix} \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix}$$

b.
$$\begin{bmatrix} \text{PRED} & \text{SHORT} < \text{SUBJ} > \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{GIRL}_i \end{bmatrix} \\ \textbf{RESP} & \begin{bmatrix} \text{PRED} & \text{TEMPER} < \text{POSS} > \\ \text{POSS} & \begin{bmatrix} \text{PRED} & \text{PRO}_i \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Note that there are a number of ways in which the basic structures could differ from those in (27), but these matters are (mostly) orthogonal to the key question of determining what GF the label RESP is standing for. One of these alternatives is whether attributive As subcategorize a SUBJ.[6] Another is whether the copula verb in predicative constructions such as (26 b) introduces a PRED value or not. In the following, all f-structures where the AP under discussion is predicative are presented as single-tiered; the alternative two-tiered XCOMP (*be*-as-raising-verb) analyses are equally viable. Third, in predicative f-structures the SUBJ may be thematic or non-thematic (and it is not entirely unlikely that it is).

[6]Whether attributive As generally subcategorize for SUBJ becomes an issue in one (variant of) analysis of RESP as SUBJ; cf. footnote 9

We think that *a priori* the most promising candidates for RESP are the following: (i) the NP is an argument of the A, and is either SUBJ or OBJ/OBJ$_\theta$; (ii) NP is an ADJUNCT of the A.[7] In the rest of the paper we explore these possibilities, to determine to what extent each of them permits an analysis of the construction which is at the same time consistent with the wider grammar of Welsh, and come to some tentative conclusions.

4 RESP as SUBJ?

Let us first examine the possibility that RESP is the A's SUBJ. Given that in examples like (28), the A *brwnt* 'dirty' in fact seems to (primarily) predicate a quality of the post-A NP *tafod* 'tongue', not the modified N *menyw* 'woman' (it is, primarily, the tongue which is dirty, and only indirectly the woman), may well suggest that NP2 is the A's SUBJ.[8]

(28) *menyw lân frwnt ei thafod*
woman.F.SG clean dirty.(M.SG) her tongue.M.SG
'a clean foul-mouthed woman' (BMJ)

(29) *merch fyr ei thymer*
girl.FSG short.MSG POSS.3SG temper.FSG
a short-tempered girl

(30)
$$\begin{bmatrix} \text{PRED} & \text{GIRL}_i \\ \text{ADJ} & \left\{ \begin{bmatrix} \text{PRED} & \text{SHORT}\!<\text{SUBJ}> \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{TEMPER}\!<\text{POSS}> \\ \text{POSS} & \left[\text{PRED} \quad \text{PRO}_i\right] \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix}$$

Despite some initial plausibility, stemming from the sense that the A is predicated of the RESP, the fact that the construction can also be used predicatively rules this analysis out if predicative constructions are represented as in (27b), as it causes a violation of the uniqueness condition.

(31) *Mae'r ferch yn fyr ei thymer.*
is-the girl PRED short.M.SG her temper.F.SG
'The girl is short-tempered.'

[7] This may not seem to cut down the space of possibilities very substantially, but nonetheless we have excluded some possibilities. COMP/XCOMP have been excluded on the assumption that they are "clausal functions" (Dalrymple, 2001, p. 24) whose head subcategorizes for an (overt or non-overt) SUBJ. And after previously exploring TOPIC (or topicalised ADJUNCT), we have excluded this possibility as unlikely in this syntactic position.

[8] It may be precisely because NP2 seems to be inalienably possessed, and often part of a whole, that the possessor can appear as SUBJ instead of the possessum—a sort of *totum pro parte* construction. Even if strictly speaking only the tongue is dirty, because the tongue is a body part, the woman by implication is also, partly, dirty, and the predication can be transferred from the part to the whole.

(32)
$$\begin{bmatrix} \text{PRED} & \text{SHORT} < \text{SUBJ} > \\ \textbf{SUBJ} & \begin{bmatrix} \text{PRED} & \text{GIRL}_i \end{bmatrix} \\ \textbf{SUBJ} & \begin{bmatrix} \text{PRED} & \text{TEMPER} < \text{POSS} > \\ \text{POSS} & \begin{bmatrix} \text{PRED} & \text{PRO}_i \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

On the other hand, RESP as SUBJ is apparently unproblematic under the PREDLINK analysis of predication structures (Dalrymple et al., 2004), giving the structure (33), perhaps consistent with an interpretation along the lines of "The girl is such that her temper is short".

(33)
$$\begin{bmatrix} \text{PRED} & \text{BE} < \text{SUBJ PREDLINK} > \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{GIRL}_i \end{bmatrix} \\ \text{PREDLINK} & \begin{bmatrix} \text{PRED} & \text{SHORT} < \text{SUBJ} > \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{TEMPER} < \text{POSS} > \\ \text{POSS} & \begin{bmatrix} \text{PRED} & \text{PRO}_i \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

The agreement facts (non-agreement/default MASC SG form in predicative use and generally in the *respect* construction) can be captured in the following way: Assuming attributive and predicative f-structures for the SUBJ analysis as in (30) and (33) respectively, and assuming that attributive AS ordinarily do not subcategorize for SUBJ,[9] non-agreement of an A falls out from the fact that it subcategorizes for SUBJ. In other words, FEM SG and PL forms cannot subcategorize for SUBJ, while there is no such restriction on MASC SG forms.

(34) a. *trwm* $\{ (\uparrow \text{PRED}) = \text{SHORT}$
$\mid (\uparrow \text{PRED}) = \text{SHORT} < \text{SUBJ} > \}$
no GEND/NUM *constraints*

b. *trom* $(\uparrow \text{PRED}) = \text{SHORT}$
$((\text{ADJ} \in \uparrow) \text{GEND}) =_c \text{F}$
$((\text{ADJ} \in \uparrow) \text{NUM}) =_c \text{SG}$

c. *trymion* $(\uparrow \text{PRED}) = \text{SHORT}$
$((\text{ADJ} \in \uparrow) \text{NUM}) =_c \text{PL}$

The SUBJ-PREDLINK analysis would involve a c-structure rule along the lines of the following, in which the SIND feature in the semantic projection is intended to capture the coreference relations.

(35) $\text{AP} \longrightarrow \begin{matrix} \text{A}' \\ \uparrow = \downarrow \end{matrix} \begin{pmatrix} \text{NP} \\ (\uparrow \text{SUBJ}) = \downarrow \\ ((\downarrow \text{POSS})_\sigma \text{ SIND}) = (\{ ((\text{PREDLINK} \uparrow) \text{SUBJ})_\sigma \mid ((\text{ADJ} \in \uparrow)_\sigma \} \text{ SIND}) \end{pmatrix}$

[9] If all attributive AS are assumed to subcategorize for SUBJ, the approach outlined here is not feasible, in which case an approach as presented in section 6 for an analysis of RESP as ADJUNCT, suitably adapted, may have to be chosen.

We must admit that we do not find this PREDLINK analysis all that appealing, and by and large remain sceptical about the need for and characterisation of the PREDLINK function. Here it seems something of an ad hoc solution to a construction for which ultimately some better analysis should be found. In short, we would consider PREDLINK as an analysis of last resort. Overall, then, we suggest that RESP is not to be equated with SUBJ.

5 RESP as OBJ?

Examples (29) and (31) would be associated with the following structures on this view:

(36)
$$\begin{bmatrix} \text{PRED} & \text{GIRL}_i \\ \text{ADJ} & \left\{ \begin{bmatrix} \text{PRED} & \text{SHORT}< \text{OBJ} > \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{TEMPER}< \text{POSS} > \\ \text{POSS} & \begin{bmatrix} \text{PRED} & \text{PRO}_i \end{bmatrix} \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix}$$

(37)
$$\begin{bmatrix} \text{PRED} & \text{SHORT} < \text{SUBJ OBJ} > \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{GIRL}_i \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{TEMPER} < \text{POSS} > \\ \text{POSS} & \begin{bmatrix} \text{PRED} & \text{PRO}_i \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Recall that only MASC SG (the default form) A*s* occur in this construction. The failure of the A to agree with the controller N in this construction is captured if MASC SG forms (and non-inflecting A forms in general) have an additional lexical form in which they subcategorize for an OBJ, while FEM SG and PL forms lack this additional subcategorization frame. See (38) for the A *trwm* 'heavy'. As far as (at least) informal Welsh is concerned, FEM SG and PL A forms are also disallowed in predicative use, where the A additionally subcategorizes for a SUBJ. Consequently, FEM SG and PL A forms also lack subcategorization frames including SUBJ. Given that MASC SG forms can also optionally be used where the agreement controller is FEM SG or PL, constraints targeting GEND or NUM are absent from their lexical entries.

(38) a. *trwm*
$$\begin{array}{l} \{\ (\uparrow \text{PRED}) = \text{SHORT} \\ \mid (\uparrow \text{PRED}) = \text{SHORT} < \text{OBJ} > \\ \mid (\uparrow \text{PRED}) = \text{SHORT} < \text{SUBJ} > \\ \mid (\uparrow \text{PRED}) = \text{SHORT} < \text{SUBJ OBJ} > \ \} \\ \textit{no } \text{GEND/NUM } \textit{constraints} \end{array}$$

b. *trom*
$$\begin{array}{l} (\uparrow \text{PRED}) = \text{SHORT} \\ ((\text{ADJ} \in \uparrow) \text{GEND}) =_c \text{F} \\ ((\text{ADJ} \in \uparrow) \text{NUM}) =_c \text{SG} \end{array}$$

c. *trymion*
$$\begin{array}{l} (\uparrow \text{PRED}) = \text{SHORT} \\ ((\text{ADJ} \in \uparrow) \text{NUM}) =_c \text{PL} \end{array}$$

The 'special' occurrence of the grammatical function OBJ in lexical entries such as (38 a) would be associated with a particular *respect* semantics.

The linkage between the NP-internal bound pronoun and the modified head N/SUBJ can be established in the c-structure as shown in (39).

(39) $\text{AP} \longrightarrow \begin{matrix} \text{A}' \\ \uparrow=\downarrow \end{matrix} \left(\begin{matrix} \text{NP} \\ (\uparrow \text{OBJ})=\downarrow \\ ((\downarrow \text{POSS})_{\sigma} \text{ SIND}) = ((\{\uparrow \text{ SUBJ} \mid \text{ADJ} \in \uparrow\})_{\sigma} \text{ SIND}) \end{matrix} \right)$

While an f-structure analysis of the post-A NP as OBJ presents none of the difficulties associated with its analysis as SUBJ, it is far from unproblematic. The fundamental issue is that of motivating the notion that Welsh As can take OBJs.

Nominal complements of As in Welsh are (almost) invariably PPs, that is, OBLs. Bare NPs are a rare exception. The A *llawn* 'full' allows both PP complements headed by the preposition *o* 'of' (40 a) and bare NPs (40 b); *gwerth* 'worth' [10] is always followed by bare NPs.

(40) a. *llawn o ddŵr*
full of water

b. *llawn dŵr*
full water
'full of water'

(41) *Nid yw'n werth y drafferth.*
not is-PRED worth the trouble
'It's not worth the trouble.'

However, support for an analysis of the post-A NP as OBJ may come from Welsh *tough*-constructions, to which the *in-respect-of* construct bears some striking similarities. The non-finite verb form appearing in the Welsh tough construction is a "verbal noun" (VN); VNs are the only non-finite verb form in Welsh and exhibit the properties of a mixed category (Bresnan, 1997; Mugane, 2003): in its verbal incarnation it serves as a non-finite form, but it can also be used as a N (see, for instance, Williams (1980, pp. 113-115), King (1993, pp. 130-133)). Moreover the same set of proclitic pronouns functions as the OBJ of the non-finite verb (VN) and as the nominal POSS—which increases the similarities between the *in-respect-of* construction (with a nominal POSS) and the *tough*-construction (with a verbal OBJ).

(42) a. *merch fyr ei thymer*
girl.F.SG short CLITIC.3SG.F temper
'a short-tempered girl'

[10] The behaviour of English 'worth' is (also) quite exceptional: Pullum and Huddleston (2002) argue that it is an adjective which takes an SC NP complement, rather than a preposition while Maling (1983) argues that it is synchronically reanalyzed as a preposition. In Welsh, *gwerth* can also be a noun. In (41) it is certainly not a preposition since it is preceded by the predicative marker *yn*, which only appears before adjectives and nouns; it cannot be a noun either since *gwerth y drafferth* in the sense 'the worth of the trouble' would be a definite NP, which are ungrammatical after *yn*.

b. *bwyd* *anodd* *ei* *dreulio*
food.M.SG. difficult CLITIC.3SG.M digest.VN
'food difficult to digest'

(43) a. *Mae'r ferch* *yn* *fyr* *ei* *thymer*
is-the girl.F.SG PRED short CLITIC.3SG.F temper
'The girl is short-tempered.'

b. *Mae'r bwyd* *yn* *anodd* *ei* *dreulio*
is-the food.M.SG. PRED difficult CLITIC.3SG.M digest.VN
'The food is difficult to digest.'

Tough constructions in some languages are unbounded dependency constructions, modelled as either functional or anaphoric control as applicable to the language in question. Dalrymple and King (2000) argue that since (in English) they fail to show connectivity (case mismatch), then they should be analysed as involving anaphoric control between the within-clause functions, mediated by functional control involving a discourse relation.

In the *tough*-construction the post-A constituent is usually analysed as an argument, COMP, of the A; (44) and (45) show f-structure analyses for (42) and (43) respectively. Provided that the similarities between these and the *in-respect-of* construction are not just superficial and deceptive, the post-A constituent in the *in-respect-of* construction should perhaps, like the post-A constituent in the *tough*-construction, be analysed as an argument. The primary difference between *tough* and *respect* constructions is that the post-A constituent is propositional in *tough* and non-propositional in *respect*, with OBJ, perhaps, being the closest non-propositional equivalent to propositional COMP. Note that other differences, such as the fact that the SUBJ/head N is coindexed with OBJ in *tough* and POSS in *respect*, is a consequence of the different lexical categories (verbal/nominal) that head the constituent.

(44)
$$\begin{bmatrix} \text{PRED} & \text{HARD} < \text{SUBJ COMP} > \\ \text{SUBJ} & \left[\text{PRED} \quad \text{FOOD}_i\right] \\ \text{COMP} & \begin{bmatrix} \text{PRED} & \text{DIGEST} < \text{SUBJ OBJ} > \\ \text{OBJ} & 1{:}\left[\text{PRED} \quad \text{PRO}_i\right] \\ \text{TOPIC} & 1{:} \\ \text{SUBJ} & \left[\text{PRED} \quad \text{PRO}_{arb}\right] \end{bmatrix} \end{bmatrix}$$

(45)
$$\begin{bmatrix} \text{PRED} & \text{FOOD}_i \\ \text{ADJ} & \left\{ \begin{bmatrix} \text{PRED} & \text{HARD} < \text{COMP} > \\ \text{COMP} & \begin{bmatrix} \text{PRED} & \text{DIGEST} < \text{SUBJ OBJ} > \\ \text{OBJ} & 1{:}\left[\text{PRED} \quad \text{PRO}_i\right] \\ \text{SUBJ} & \left[\text{PRED} \quad \text{PRO}_{arb}\right] \\ \text{TOPIC} & 1{:} \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix}$$

Nonetheless questions remain about taking this to be an OBJ, and these are related to somewhat wider questions (see Börjars and Vincent (this volume)). How should OBJ be defined or is it effectively the GF which corresponds to the absence of definition? How can we establish whether the Welsh *in-respect-of* NP corresponds to a $-r$ argument (OBJ) (consistent perhaps with its delimiting role) or a $+r$ argument OBJ_θ? Why do adjectives in Welsh have OBJ in just *this* construction?

There is some cross-linguistic support for the notion of transitive As, which may or may not be relevant to the Welsh construction (see Maling (1983) for some discussion). In languages such as Swedish As can have bare NP complements (compare (46)).[11]

(46) a. *kvitt honom*
rid him.OBJ
'rid of him'

b. *sin chef behjälplig*
his boss helpful
'helpful to his boss'

c. *sina bröder underlägsen* $\sim$ *underlägsen sina bröder*
his brothers inferior $\sim$ inferior his brothers
'inferior to his brothers'

Many languages such as German use case inflection rather than prepositions for thematically restricted arguments, as shown in (47) and in these languages As probably govern OBJ_θ. Note that one language's OBJ_θ may be another language's OBL (compare the English translations of the German examples): the commonality here between OBJ_θ. and OBL is $+r$.

(47) a. *Johann war seiner Freundin nicht immer treu.*
Johann was his.F.SG.DAT girl-friend.F.SG.DAT not always faithful
'Johann was not always faithful to his girl-friend.'

b. *Peter war des Lebens müde.*
Peter was the.NEUT.SG.GEN life.NEUT.SG.GEN tired.
'Peter was tired of life.'

c. *Ich bin diesen ganzen Quatsch satt.*
I am this.M.SG.ACC entire.M.SG.ACC rubbish.M.SG.ACC full
'I'm fed up with all this rubbish.'

All in all, however, it is very much an open question how relevant these adjectival complementation patterns are to the Welsh construction.

[11]We would like to thank Kersti Börjars for providing us with these examples. Note that the complement either follows or precedes, with some As allowing both orders.

6 RESP as ADJUNCT?

A third possibility is that the internal NP does not correspond to a syntactic argument of the A but is analysed as an ADJUNCT. Under an ADJUNCT analysis for RESP the attributive example would have the structure (48) and the predicative example the structure (49).

(48)
$$\begin{bmatrix} \text{PRED} & \text{GIRL}_i \\ \text{ADJ} & \left\{ \begin{bmatrix} \text{PRED} & \text{SHORT} \\ \text{ADJ} & \left\{ \begin{bmatrix} \text{PRED} & \text{TEMPER} < \text{POSS} > \\ \text{POSS} & \begin{bmatrix} \text{PRED} & \text{PRO}_i \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix} \right\} \end{bmatrix}$$

(49)
$$\begin{bmatrix} \text{PRED} & \text{SHORT} < \text{SUBJ} > \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{GIRL}_i \end{bmatrix} \\ \text{ADJ} & \left\{ \begin{bmatrix} \text{PRED} & \text{TEMPER} < \text{POSS} > \\ \text{POSS} & \begin{bmatrix} \text{PRED} & \text{PRO}_i \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix}$$

Since the ADJUNCT in this analysis is not subcategorized, constraining the agreement properties of the construction and barring FSG and PL A forms is not as straightforward as it is with the OBJ analysis, where the absence of a subcategorization frame including OBJ from the lexical entries for FSG and PL plural forms prevents these from being used. Some other feature is required.

One possibility is to constrain the different A forms via an AFORM feature. AFORM distinguishes inflected and uninflected A forms. FSG and PL forms are inflected (AFORM INFL=+). MSG forms (and forms without GEND/NUM inflection) double as inflected (these can appear in syntactic environments permitting FSG/PL forms) and uninflected (in environments where FSG/PL forms are ungrammatical). Given that the "inflected" MSG form can also be used with FSG and PL Ns, and thus does not place any GEND/NUM constraints, the MSG form can in fact be considered as underspecified in terms of its AFORM INFL value; that is, it does not place any AFORM constraints.[12]

(50) a. *trwm* (↑ PRED) = SHORT
no further constraints

[12] Alternatively, the dual nature of MSG forms could be made explicit via an AFORM disjunction:

Since the MSG form is not underspecified, the annotation on A´ in the PS rule must specify a default; otherwise vacuous ambiguities would result. On the other hand, this approach allows a constraining equation on the post-A NP, something which is often advisable to prevent unintended feature values from appearing unexpectedly.

(i) AP $\longrightarrow$
$$\begin{array}{c} \text{A}' \\ \uparrow{=}\downarrow \\ \{\ (\uparrow \text{AFORM INFL}){=}+ \\ |\ (\uparrow \text{AFORM INFL}){=}_c\ -\} \end{array} \quad \left(\begin{array}{c} \text{NP} \\ \downarrow \in (\uparrow \text{ADJUNCT}) \\ (\uparrow \text{AFORM INFL}){=}_c\ - \\ ((\downarrow \text{POSS})_\sigma \text{ SIND}) = ((\{\uparrow \text{ SUBJ} \mid \text{ADJ} \in \uparrow\})_\sigma \text{ SIND}) \end{array} \right)$$

On the whole the approach in (50)-(51) requires fewer constraints and is therefore preferable.

b. *trom* (↑ PRED) = SHORT
((ADJ ∈ ↑) GEND)=$_c$ F
((ADJ ∈ ↑) NUM)=$_c$ SG
(↑ AFORM INFL)=+

c. *trymion* (↑ PRED) = SHORT
((ADJ ∈ ↑) NUM)=$_c$ PL
(↑ AFORM INFL)=+

The AFORM value of an AP is initially underspecified, allowing all A forms. (There is no risk of vacant ambiguities since the MSG form is underspecified as well.)

The AFORM constraint on the optional post-A *respect*-NP sets the value for the AP to 'minus'. This does not affect the MSG form since it is underspecified in terms of its AFORM value, but the constraint excludes FSG and PL forms.

(51) AP ⟶ A´ (NP)
↑=↓ (↓ ∈ (↑ ADJUNCT))
((↑ AFORM INFL)=−)
(((↓ POSS)$_\sigma$ SIND) = (({↑ SUBJ | ADJ ∈ ↑ })$_\sigma$ SIND))

An approach along these lines would be motivated by the intuition that the AP-internal NP functions as a kind of adverbial modifier of the A, as the term *in-respect-of* construction suggests.

Bare NPs, headed by a N denoting time or measure, can be used adverbially in Welsh as in (52). The connection between these adverbially used NPs and the *respect*-NP, however, seems rather tentative.

(52) a. *Arhosodd yno fis.*
stayed there month
'He/She stayed there a month.'

b. *Cerdodd filltiroedd.*
walked miles
'He/She walked for miles.'

7 Evaluation

We have seen that an analysis of RESP as SUBJ is not viable, unless the AP when predicative is analysed as PREDLINK—an analysis that we think should be a last resort. This leaves two analyses for RESP: as an ADJUNCT or as a (non-SUBJ) argument, in the latter case as OBJ (or possibly OBJ$_\theta$, depending on whether there are grounds for considering this to be an OBJ restricted to a particular thematic role and hence $+r$).

Deciding whether a constituent is an adjunct or an argument is, of course, often difficult (compare, for instance, (Dalrymple, 2001, pp. 11-13)). The ADJUNCT analysis is technically unproblematic and

might be considered relatively benign in that it makes no particular substantive claim. But the fact that the internal NP seems obligatory in this construction (see below) may tell against it, and as noted above in (11), regarding the respective order of the *respect*-NP and the complement of a comparative A, where the *respect*-NP precedes the comparative complement, its failure to show typical adjunctival behaviour (in terms of position) would also be anomalous on this analysis.

The idea that As may select an OBJ argument is somewhat surprising (though see the examples from Swedish above), but on balance we think that there is a reasonable case, given LFG resources, for equating RESP with OBJ.[13] The major grounds for this are (i) the very similar *tough* construction seems to suggest a post-A argument (COMP in the case of the *tough*-construction), and (ii) the fact that the post-A argument is indispensable to the construction, that is, omission of this argument may radically change the meaning of the proposition, sometimes to such a degree that it becomes nonsensical. Consider again (4), here repeated as (53 a). Omission of the post-A NP *ei thafod* 'her tongue' makes the construction almost meaningless.

(53) a. *menyw lân frwnt ei thafod*
woman clean dirty her tongue
'a clean foul-mouthed woman'

b. *menyw lân frwnt*
woman clean dirty
'a clean dirty woman'

8 Beyond Welsh

The reader might have reached the conclusion that the construction discussed here is idiosyncratically Welsh and cross-linguistically isolated. This, however, may not be the case.

First, a similar construction exists in the closely related language Breton (cf. Hemon (1976, pp. 65-66), Mac Cana (1966, pp. 101-102)); interestingly in Breton the *respect*-NP can either follow or precede the A. The construction is also attested from Cornish (Brown, 2001, 78). Breton and Cornish constitute the other members of the Brittonic branch of the Celtic languages.

There are constructions in the Semitic languages which bear certain resemblances to the Welsh construction we discuss here. One such construction is the adjectival versions of the Construct State in Hebrew. Construct state constructions express a genitive relation between a head N and a dependent by linear proximity rather than by (overt) case marking or the occurrence of a preposition.

(54) *Yalda yefat mar'e nixnexa la-xeder*
girl.FSG beautiful.FSG.CONSTRUCT look.MSG entered to.the-room
'A good looking girl enters the room.' Siloni (2002, Hebrew)

[13]Note in this connection the observations made by Börjars and Vincent (2008) on the difficulties in defining OBJ, the "lack of independently specifiable content for OBJ" and their basic conclusion that " OBJ is a grammatical relation with no intrinsic content".

Two important aspects of this construction (from the Welsh perspective) are that the non-head member is absolutely obligatory and the construction is limited to cases of inalienable possession. We refer the reader to (Siloni, 2002) for a more detailed discussion of this construction.

A similar construction to the Welsh one appears in Modern Standard Arabic (MSA) where interestingly the A agrees in CASE and DEFiniteness with the head N, but in GEND and NUM with the post-A NP. This is potentially of interest if the agreement facts cast any light on the synchronic GFs of the NPs, and may suggest that the internal NP is a direct argument. In his minimalist account, Kremers (2003) suggests that the internal NP is the SUBJ of the A.

(55) *[ra'aytu] imra'at-an ğamīl-an waǧhu-hā.*
[saw.1SG] woman.F.SG.ACC.IDF beautiful.M.SG.ACC.IDF face.M.SG.NOM.DEF=her
'[I saw] a woman with a beautiful face.' Kremers (2003, MSA)

Note that, unlike the Welsh construction, this construction in MSA cannot be used predicatively. It may be that the split agreement reflects A-SUBJ agreement in the INDEX features GEND and NUM and agreement between A and the head N (as the head of an attributive modifier) in the CONCORD features CASE and DEF.

Another area that deserves exploration in connection with the Welsh construction discussed here, but which we can only briefly mention, are predicative possession constructions and, more specifically, constructions usually termed Possessor Raising or External Possessor constructions, such as (56) from Sumerian and (57) from the Mayan language Tz'utujil. Constructions as in (56) show similarities to the Welsh construction in predicative use (and may in fact present similar difficulties regarding their LFG analysis). For an overview over various External Possessor construction see especially (Payne and Barshi, 1999); (Stassen, 2006) gives a brief overview (with further references) of predicative possession constructions.

(56) *Igi=zu=Ø huš=me-en zapaǧ=zu-Ø maḫ=me-en.*
face=POSS.2SG=ABS awesome=COP-S.2SG cry=POSS.2SG=ABS majestic=COP-S.2SG
'Your face is awesome, your cry is majestic' (Sumerian, cf. Zólyomi (2005, pp. 177-178))
[lit.: 'You are awesome your face, you are majestic your cry.']

(57) *Ja jun wajkax le' qas ee nimaq r-aab'aaj.*
the a bull DEM very 3PL big.PL POSS.3SG-testicles
'The bull has very big testicles.' (Tz'utujil, cf. Aissen (1999, pp. 180-1))

9 Conclusion

We have presented a Welsh AP construction whose internal NP constituent presents problems in terms of determining its GF within the framework of LFG. We have tentatively come down in favour of taking this GF to be OBJ, and thus admitting a construction type in Welsh within which adjectives show transitive behaviour. Beyond the specific analysis of the Welsh construction (and possibly similar constructions in other languages) discussed here, a wider issue is that of how the grammatical functions on LFG's GF "menu" are best understood in non-core areas off the beaten track of verbal

subcategorization frames. Whatever the ultimate analysis of problematic constructions such as the one presented here may turn out to be, better, more specific and better founded definitions of LFG's grammatical functions—which after all are its basic building blocks—are called for.

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FROM JUXTAPOSITION TO INCORPORATION: AN APPROACH TO GENERIC-SPECIFIC CONSTRUCTIONS

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Abstract

In this paper, we present an analysis of classifier noun incorporation in Gunwinyguan languages from northern Australia, focussing particularly on generic specific constructions. We show how the analysis of Sadler and Nordlinger (2006) for generic-specific constructions forms through nominal juxtaposition can be extended to account for incorporated generic-specific constructions also. In this analysis, each nominal (or incorporated noun) is treated as belonging to a set at f-structure, on a par with the standard LFG treatment of coordination. The difference between the various set-based constructions (including coordinations, generic-specific constructions and part-whole constructions) arises in the mapping to the semantic structure. We show how this provides a single unified analysis for all generic-specific constructions in these languages, whether incorporated or juxtaposed. In doing so, we provide the first LFG analysis of classifier incorporation with doubling.

1 Introduction

Sadler and Nordlinger (2006) (henceforth SN06) discusses a range of uses of nominal juxtaposition in various Australian languages in which a single syntactic structure is common to a range of different construction types, including coordination, generic-specific and part-whole constructions, and hence associated with a number of different semantic interpretations. This paper presents an analysis in which these uses of nominal juxtaposition are treated as having a single set-based syntactic structure with the different interpretations arising in the mapping to the semantics. In polysynthetic Australian languages, many of these same construction types (especially generic-specifics and part-whole constructions) may also be formed through noun incorporation, with one of the nominals incorporated into the verb and the other nominal (optionally) expressed externally in the syntax. In the descriptions of these languages, the incorporated version is argued to be equivalent to the phrasal incarnation (e.g. Evans 1996, 2003), both functionally and in terms of relational syntax, despite the evident differences in 'expression structure'. Noun incorporations of this sort are not accounted for by previous LFG approaches to (classifer) noun incorporation (e.g. Manning 1996, Bresnan 2001, Mohanan 1995), since the external nominal is not a modifier of the incorporated nominal and so a PRED clash in the f-structure should result once the f-structure of the external nominal is unified with the f-structure associated with the nominal incorporated into the verb. In this paper, we show how the SN06 approach can be extended to account for these incorporated examples also, thereby providing an integrated analysis of these construction types across Australian languages, and also the first LFG account of classificatory noun incorporation with NP doubling.

2 Sadler and Nordlinger 2006

SN06 argue that nominal juxtapositions covering a range of interpretations essentially share a single syntax, so that part-whole constructions, generic-specifics, nominal-nominal appositions and coordinations share a common set-based representation. Consider the following examples of a generic-specific (1) and a part-whole (2) from Kayardild:

(1) *Dathin-a dangka-a niya wumburung-kuru raa-ja wanku-ya kulkiji-y.*
that-NOM man-NOM 3SG.NOM spear-PROP spear-ACT elasmobranch-MLOC shark-MLOC

[†]We are grateful to Avery Andrews, Brett Baker and Mary Dalrymple and the audience at LFG08 for comments and suggestions.

'That man speared a shark with a spear.' (Evans, 1995, 244: Kayardild)

(2) *kawuka jardiyali*
bundle fighting.stick
'a bundle of fighting sticks' (ibid, 249: Kayardild)

In SN06 we treated these juxtaposed part-whole and generic-specific constructions as sets at f-structure, as in (3) and (4).

(3)
$$\begin{bmatrix} \text{INDEX} & \begin{bmatrix} \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \\ \left\{ \begin{bmatrix} \text{PRED} & \text{'ELASMOBRANCH'} \\ \text{INDEX} & \begin{bmatrix} \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{'SHARK'} \\ \text{INDEX} & \begin{bmatrix} \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix}$$

(4)
$$\begin{bmatrix} \text{INDEX} & \begin{bmatrix} \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \\ \left\{ \begin{bmatrix} \text{PRED} & \text{'BUNDLE'} \\ \text{INDEX} & \begin{bmatrix} \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{'FIGHTING.STICK'} \\ \text{INDEX} & \begin{bmatrix} \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix}$$

On the view proposed in SN06, the f-structure representation of these different construction types is essentially the same, differing only in the overall INDEX feature of the set itself. In coordinate structures, the the INDEX features of the set are the set union of the INDEX features of the coordinands, following the proposal of Dalrymple and Kaplan (2000) for syntactic resolution. In generic-specific and part-whole constructions, on the other hand, the INDEX features of the set are not resolved, but are generally identified with the members of the set.[1] This is reflected in the following phrase structure rule for non-coordinated N-N juxtapositions, in which the agreement constraints are stated in the template 'NP-APPOS' given in (6) (see Dalrymple et al. (2004) on the use of templates to capture linguistic generalizations):

(5) X $\longrightarrow$ X X
$\downarrow \in \uparrow$ $\downarrow \in \uparrow$
@NP-APPOS @NP-APPOS
appos

[1]This assumption is a slight oversimplification in that we abstract away from several nitty-gritty issues here. In particular, there are a number of open questions concerning GENDER in generic-specific and part-whole constructions, and concerning the analysis of 'possessive' part-whole constructions. See SN06 for some discussion.

(6) NP-APPOS*:* (↓ IND) = (↑ IND)

Given their c-structure identity, and their essentially identical f-structure representation, the primary distinction between coordination on the one hand, and appositions (including generic-specifics and part-wholes) on the other, emerges in the semantics. In SN06 we modelled the semantics of nominal apposition on the semantics of nominal modification, where each nominal introduces a property, that is a restriction over the (nominal) variable.[2,3]

(7) **appos** $\lambda Q.\lambda P.\lambda x.Q(x) \wedge P(x)$:
[(%NOM1$_\sigma$ VAR) $\multimap$ (%NOM1 $_\sigma$ RESTR)] $\multimap$
[[(%NOM2$_\sigma$ VAR) $\multimap$ (%NOM2$_\sigma$ RESTR)]
$\multimap$ [(↑ $_\sigma$ VAR) $\multimap$ (↑ $_\sigma$ RESTR)]]
%NOM1 ∈ ↑
%NOM2 ∈ ↑

On the meaning side, this is a function which applies to two nominal ($< e, t >$) meanings and produces an abstraction over a logical conjunction of predications holding of this individual (so it takes two nominal meanings and produces a nominal meaning, where nominal meanings are of type $< e, t >$). On the glue side the meaning constructor consumes one nominal contribution and then the other nominal contribution to produce the meaning of the structure as a whole. Note that the meaning which results from this process is a nominal meaning, that is a property or function of type < e, t>, rather than a generalized quantifier or typical DP meaning. This meaning cannot be of course be consumed directly by the verbal meaning constructor (given standard assumptions about the latter), but must be type-shifted to produce a full referential NP meaning. This is consistent with the fact that in these languages a bare nominal may be interpreted predicatively, but may also be interpreted as a full NP in context.

In order to illustrate how the analysis comes together, we begin with a straight-forward nominal apposition, in which two nominals specifying the same referent are juxtaposed in a single NP. The lexical entries are shown in (9) and (10).

(8) *Garidi-ni* *bungmanyi-ni* *gin-amany* *yanybi.*
husband.I-ERG old.man.I-ERG 3SG.M.A-P.TWD get
'(Her) old man husband came and got (her).' (Nordlinger, 1998, 133: Wambaya)

(9) *garidi-ni* (husband.I-ERG):

$\lambda x.husband(x)$: (↑ $_\sigma$ VAR) $\multimap$ (↑ $_\sigma$ RESTR)

[2]Some caveats are in order here. The approach that we propose is intended for nominal appositions as they occur in the languages we are concerned with, and should not be interpreted as a proposal for treating apposition in general crosslinguistically. Unlike the constructions we focus on, many structures called appositions in the literature seem to be best understood as (non-restrictive) parentheticals. One view of parenthetical material, which has gained considerable currency, is that such material is not integrated into the truth conditional semantics at all but are as conventional implicatures (Potts, 2005). Amongst those 'appositional' structures which *are* integrated, rather than orphaned, in many languages what you see is apposition at the level of NP, which does not immediately suggest an approach at the level of properties. Nonetheless, there are approaches to nominal apposition in the literature which are closer to the sort of approach we adopt: we note that Doron (1992) treats non-restrictive NP appostions as properties and our treatment has quite a bit in common with the spirit of the approach to close apposition and polydefinites in Modern Greek in Marika Lekakou and Kriszta Szendröi (2007) which uses syntactic R role identification.

[3]The formulation in (7) corrects a technical inaccuracy in the statement in SN06 by using local names (%NOM1 and %NOM2) to refer to the members of the set of f-structures.

(10) *bungmanyi-ni* (old.man.I-ERG):

$\lambda x.old.man(x)$: ($\uparrow_\sigma$ VAR) $\multimap$ ($\uparrow_\sigma$ RESTR)

The meaning constructor (7) consumes (9) and (10) to produce another nominal meaning:

(11) *garidi-ni bungmanyi-ni* (husband.I-ERG old.man.I-ERG):

$\lambda x.[old.man(x) \wedge husband(x)]$:
($\uparrow_\sigma$ VAR) $\multimap$ ($\uparrow_\sigma$ RESTR)

For the juxtaposed generic-specific construction in (1), the semantic information associated with the lexical items is given in (12) and 13), the result of combination in (14) and the f-structure in (15).

(12) *wanku-ya* (elasmobranch.MLOC): $\lambda x.elasmobranch(x)$: ($\uparrow_\sigma$ VAR) $\multimap$ ($\uparrow_\sigma$ RESTR)

(13) *kulkiji-y* (shark.MLOC): $\lambda x.shark(x)$: ($\uparrow_\sigma$ VAR) $\multimap$ ($\uparrow_\sigma$ RESTR)

(14) *wanku-ya kulkiji-y* (elasmobranch-MLOC shark-MLOC)
$\lambda x.elasmobranch - fish(x) \wedge shark(x)$: ($\uparrow_\sigma$ VAR) $\multimap$ ($\uparrow_\sigma$ RESTR)

(15)
$$\begin{bmatrix} \text{INDEX} & \begin{bmatrix} \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \\ \left\{ \begin{bmatrix} \text{PRED} & \text{`ELASMOBRANCH'} \\ \text{INDEX} & \begin{bmatrix} \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{`SHARK'} \\ \text{INDEX} & \begin{bmatrix} \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix}$$

In the case of the generic-specific constructions, there is an additional relationship between the properties that the nominal predicates introduce, in that one (the 'generic' term) is (typically) a hypernym whose reference properly includes that of the other ('specific') term. We abstract away from this here but we think this could be captured by an additional meaning postulate specifying that an appropriate relationship must hold between the two nominal restrictor properties.

To summarize, on this approach we capture the syntactic similarities between these construction types which are expressed by means of simple juxtaposition at c-structure, by modelling all of them using sets at f-structure: neither nominal heads the combined phrase. The account captures the semantic differences by specifying different mappings from the f-structure to the semantic structure for the different construction types.

3 From Juxtaposition to Incorporation

Many polysynthetic languages also allow the expression of part whole and generic-specific constructions through nominal incorporation (i.e. in the morphology), as well as by means of nominal juxtapositions in the syntax. Nominal incorporation (NI) of this type is found in a number of northern

Australian languages, including Bininj Gun-Wok (Evans, 2003), Ngalakgan (Baker, 2008), Wubuy (Heath 1984), among others. Here we present data from Bininj Gun-wok, for which the phenomenon is most thoroughly described.

The following examples demonstrate incorporated generics in generic-specific constructions. In Bininj Gun-wok (and in other northern Australian languages) generic incorporation is possible with only a small subset of nominals. Evans (2003) reports that there are approximately 60 nouns in Bininj Gun-wok that are incorporated in this way. Some of these have suppletive forms: e.g. *bo-* is the Gun-djeihmi incorporated form for 'water, liquid', but the external nominal is *gukku* (Evans 2003: 332).[4] Crosslinguistically, it is quite common for the phonological shape of incorporated nominal stems to differ quite substantially from their free form counterparts, and this in itself would seem to constitute quite a strong argument for the lexicalist over the syntactic approach to noun incorporation. As we show below, there is clear evidence that the incorporated nominal is syntactically active in the languages which we focus on here.

(16) *Ga-rrulk-di an-dubang/an-bernbern*
3-tree-stand.NP VEG-ironwood.tree/VEG-ghostgum
An ironwood/ghostgum tree is there. (Evans, 2003, 334)

(17) *Ba-bo-yakm-inj gukku / gun-gih / an-bang*
3P-liquid-disappear-PP water / NEUT-mud / VEG-grog
'The water/mud/grog is all gone' (ibid, 334)

(18) *Warramurrungundji ∅-dulk-wakwam ngalengarre kun-barlkbu*
[name] 3/3P-stick-forgotPP her NEUT-digging.stick
'Warramurrungundji forgot her digging stick.' (ibid, 452)

Below, we see examples in which the part is incorporated in part-whole constructions.

(19) *Makkakurr ba-rrang-danjbo-n djenj*
pelican 3/3-mouth-spear-PI fish
'The pelican "speared" the fish in the mouth'[5] (ibid, 455)

(20) *Abanmani-bid-garrme-ng daluk*
1/3du-hand-grasp-PP woman
'I grabbed the two women by their hands.' (ibid, 458)

In terms of Rosen's (Rosen, 1989) typology of noun incorporation, there is substantial evidence that what we are dealing with here is best classified as non-valency reducing or classifier incorporation. Rosen's typology makes a fundamental distinction between two types of NI, *Compounding* and *Classifier*. The major criterion for establishing the distinction between these types of NI is whether

[4] As in all languages with incorporation of this kind, there are a number of discourse and pragmatic based restrictions on what type of nominal can be incorporated, and when incorporation may or may not be preferred over the alternative non-incorporated equivalent (see, for example, Mithun 1984 for general discussion, and Evans 2003 for discussion specific to Bininj Gun-Wok). Since these are not issues relevant to the core morphosyntax of the constructions, we abstract away from such issues here.

[5] Evans (2003:455) notes explicitly that the incorporated nominal cannot be referring to the pelican's mouth here, since it can never be construed with the transitive subject.

or not the incorporated argument is syntactically visible: in cases of Compounding NI there is valency reduction and (for Rosen) there is no structural representation of the incorporated nominal in the syntax. Classifier NI, on the other hand, does not involve valency reduction.[6]

The most prototypical examples of NI involve the incorporation of the noun stem corresponding to the OBJ of a transitive verb, but some languages also permit incorporation of SUBJ arguments (most often of Unaccusative predicates) and there are also cases of ADJUNCT incorporation in the literature.

There are several further distinctions which can be established between various different cases of classifer NI. Rosen takes the most canonical instance of classifier NI to be exemplified by Mohawk, which permits external doubling of the incorporate by an NP, and also (stranded) external modifiers of the NI. The following example shows a case of doubling.

(21) *shakoti-ya't-í:sak-s ne ronú:kwe*
they/them-body-seek-ing the they.MPL.person
They were looking for the men (Mithun, 1984, 864: Mohawk)

Much of the LFG discussion of classifier NI has been about West Greenlandic, which is a language which allows only stranding of modifiers (of the nominal) but not doubling.[7]

(22) a. *Suulut ataatsi-mik ammassat-tor-poq*
Suulut.ABS one-MOD sardine-eat-IND.3SG
Suulut ate one sardine

b. *Tuttu-p neqi-tor-pu-nga*
reindeer-GEN meat-eat-IND-1SG
I ate reindeer meat (Manning 1996, 118: West Greenlandic)

Mohanan (1995, 1994) argues that Hindi provides an example of a language with classifer NI in which neither doubling NPs nor external modifiers are permitted: a major plank in her argument that Hindi does indeed have classifier NI (as opposed to some sort of valency-reducing or compounding NI) comes from the fact that the incorporate controls agreement, and Wescoat (2002) discusses dialects of Hindi in which NI does permit modifier stranding.

(23) *anil kitaabẽ becegaa*
Anil-NOM(M) book-NOM-PL(F) sell-FU.M.SG
Anil will do book selling (Mohanan 1994, 106: Hindi)

A further way in which languages with NI may differ concerns the interpretation of the incorporate itself. In Hindi, as indicated by the translation above, the incorporated noun receives what Mohanan calls a 'generic' interpretation, in that it fails to refer to any (specific) book or books. In other languages, for example Southern Tiwa and Nahuatl (modifier stranding, no doubling) and Mohawk (doubling), the incorporate may be interpreted referentially, as for example in the Mohawk example (24) in which reference is made to a specific indefinite (Anderson, 2000).

[6]Mithun's (Mithun, 1986, 1984) well-known four-way classification takes into account various discourse functions of NI: three of Mithun's subtypes fit into Rosen's Compounding NI. See Rosen (1989) and also Wescoat (2002) for further discussion.

[7]As frequently noted in the literature, the process in West Greenlandic is quite non-canonical (at least morphologically) in that for the verbs in question the process is obligatory, suggesting an analysis closer to denominal verbalization rather than stem-compounding, although of course many of the same issues concerning syntactic valency are relevant.

(24) *Kanekwarúnyu wa'-k-akya'tawi'tsher-ú:ni*
it.dotted.DIST PAST-I-dress-make
I made a polka-dotted dress (Anderson, 2000, 12: Mohawk)

As extensively argued by Evans (2003) for Bininj Gun-wok, the evidence is strong that these languages show classifer NI: the agreement data suggests that the syntactic valency of the verb remains unchanged irrespective of whether or not the object nominal is external (25a) or incorporated (25b); and the incorporated nominal can be externally modified (26) or doubled (27). As is evident from at least some of the examples in this paper, such as (18), NI in these languages does not preclude referentiality in these languages.

(25) a. *Barri-ngune-ng gun-ganj*
3a/3P-eat-PP IV-meat
'They ate the meat.' (Evans (2003, 330))

b. *Barri-ganj-ngune-ng.*
3a/3P-meat-eat-PP
'They ate the meat.' (Evans, 2003, 330)

(26) *Ga-yau-garrme al-daluk.*
3-child-haveNP FE-woman
'She has a female child.' (Evans, 2003, 452)

(27) *na-marrgon an-djal-dulk-gudji ga-rrulk-do-ng*
MASC-lightning VEG-only-tree-one 3-tree-strike-NP
'Lightning always strikes just that one tree.' (Evans, 2003, 178)

Despite the differences in morphosyntactic structure, these incorporated generic-specific and part-whole constructions are functionally analogous to the appositional (juxtaposed) equivalents. Evans (2003, 450) notes that noun incorporation in Bininj Gun-Wok is "grammatically optional" and thus there exist "near-synonymous alternatives" in which the noun root appears as an external nominal. The following examples demonstrate this for generic-specific constructions.

(28) a. **An-barnadja** **an-mim** *ngarri-bowo-ni*
VEG-owenia:vernicosa VEG-fruit 1a-put.in.water-PI
'We used to put the owenia vernicosa fruit in the water (to poison the fish).' (Evans, 1996, 73)

b. **An-barnadja** *ngarri-***mim**-*bowo-ni*
VEG-owenia:vernicosa 1a-fruit-put.in.water-PI
'We used to put the owenia vernicosa fruit in the water (to poison the fish).' (ibid)

Evans (1996, 2003) argues extensively that both generic-specific constructions and part-whole constructions have the same appositional syntax irrespective of whether or not one of the nominals is incorporated: "[i]t is possible to incorporate one of the apposed pair, for discourse purposes, but this does not alter the basic appositional argument structure." (p. 89) In the interests of time and space,

we will focus in this paper on generic-specific constructions. However, we assume that part-whole incorporation will also be accounted for under this general approach.[8]

This functional similarity between incorporated and juxtaposed constructions is captured straightforwardly by extending the SN06 account of nominal juxtapositions to allow for set membership to also be constructed from the morphology, as we show in section 5 below. But first, we provide a brief overview of previous LFG approaches to noun incorporation and show that none of these are adequate to account for the Bininj Gun-wok data.

4 Previous LFG Accounts of NI

Previous accounts of noun incorporation in LFG do not account for the Bininj Gun-wok incorporation facts since they are either specific to valency-reducing noun incorporation (Ball, 2004; Asudeh, 2007; Duncan, 2007), or have no way of accommodating non-modifier doubling (as in examples (16)-(18), and (27) above) (Mohanan, 1995; Manning, 1996; Bresnan, 2001; Wescoat, 2002). There is no previous LFG treatment of classifer NI with doubling.

4.1 Accounts of Valency Preserving NI

In LFG accounts of valency-preserving noun incorporation, the incorporated nominal heads and introduces a grammatical function (GF) – normally an OBJ (though as noted above, in some languages unaccusative SUBJ and also some ADJ are found morphologically incorporated). Any modifiers (or possessors) appear within the (headless) NP. The following treatment of West Greenlandic from Manning (1996) will serve to exemplify the general approach, though the GF is question is taken to be OBL not OBJ in this account (and note also that *morphologically* what seems to be involved is denominal verbalization rather than stem compounding). The NP rule in (29) has slots for the stranded ADJUNCT and POSS ('one' and 'reindeer' respectively in (22)).

(29) NP $\longrightarrow$ (NP) $(\uparrow \text{POSS}) = \downarrow$ (N) $\uparrow = \downarrow$ (NP) $(\uparrow \text{ADJ}) = \downarrow$ $(\uparrow \text{CASE}) = \downarrow$ $(\uparrow \text{NUM}) = (\downarrow \text{NUM})$

(30) $V^{-1} \longrightarrow$ N_{stem} $(\uparrow \text{OBL}_{mod}) = \downarrow$ Aff_{vrblz} $\uparrow = \downarrow$

(31) *-tor: Aff*$_{vrblz}$ $(\uparrow \text{PRED}) = \text{use/eat}\langle(\uparrow \text{PIVOT})\ (\uparrow \text{OBL}_{mod})\rangle$
$(\uparrow \text{OBL}_{mod}\ \text{CASE}) = \text{MOD}$

On this approach, the incorporated nominal contributes the PRED of the GF (here OBL but more generally, OBJ) directly, with external modifiers contributing information to the same f-structure. A problem would arise, of course, when the external nominal is not a modifier but a doubling head (as in the generic-specific and doubling constructions above), since in this case the external nominal may also contribute a PRED feature to the same GF, resulting in a feature clash. Similar issues would

[8]It is worth noting that Evans (2003:325) states that it is possible for the same incorporated nominal to be interpreted as either the part in a part-whole construction, or the generic in a generic-specific construction, lending weight to our general approach which treats these constructions as identical in the f-structure, with the differences in interpretation arising in the semantics.

arise in other accounts: for example Mohanan (1995)'s account of Hindi NI which treats the NI = V combination as a morphological unit projecting both the verb's and an OBJ f-structure. In sum, existing LFG accounts of classifer NI cannot deal adequately with valency-preserving NI with doubling, as we see in Bininj Gun-wok, such as is found in the Gunwinyguan languages.

4.2 Accounts of Valency Reducing NI

Other LFG analyses of NI in various languages focus in fact on valency-reducing (compounding) rather than classifier NI hence are not relevant in terms of the f-structure assumptions that they make, because the incorporate is not a syntactic argument. Nonetheless, we briefly discuss here the proposal of Asudeh and Ball (2005), outlined in Asudeh (2007), which is of particular interest because it makes a specific proposal in relation to the semantic interpretation of the case of valency-reducing NI in Niuean it is concerned with, while the LFG literature on classifier NI is very largely concerned only with the syntax.

The basic elements of this approach are as follows. In (32) the string *kofe* 'coffee' is an incorporated nominal: although it is a separate word in the syntax, it must appear in this verb-adjacent position and the case marking reflects the intransitive nature of the clause (case marking in Niuean follows an ergative-absolutive pattern).

(32) *Ne inu kofe a Sione.*
PAST drink coffee ABS Sione
Sione drank coffee

The incorporate is integrated into the semantics but is not a syntactic argument (i.e. a subcategorised GF). Rather, it appears in the f-structure as a new GF, labelled INCORPORATE. In terms of c-structure, Asudeh and Ball (2005) treat the incorporated element as a non-projecting word. These elements of the approach are captured in the following c-structure rule. The f-structure for (32) is given in (34).

(33) $\mathrm{V}^0 \longrightarrow$ V^0 ($\uparrow = \downarrow$) $\hat{\mathrm{N}}$ ($(\uparrow \text{INCORPORATE}) = \downarrow$, $(\uparrow_\sigma \text{ARG}) = \downarrow_\sigma$)

(34)
$$\begin{bmatrix} \text{INCORP} & \begin{bmatrix} \text{PRED} & \text{'COFFEE'} \end{bmatrix} \\ \text{PRED} & \text{'DRINK}< \text{SUBJ}>\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'SIONE'} \\ \text{CASE} & \text{ABS} \end{bmatrix} \end{bmatrix}$$

A lexical process takes a normal transitive verb and makes of it an incorporating verb - from (35) to (36) - reducing the valency of the verb stem. The verbal meaning constructor in the lexical entry which is the output of this lexical rule, that is, (36) is one which will consume a nominal meaning to create a function from the SUBJ meaning to the meaning of the sentence. That is, it will consume a nominal meaning to create a standard intransitive verb meaning. A lexical rule also applies to make $\hat{\mathrm{N}}$ (non-projecting N) from common noun N, without changing their semantics: as the (partial) lexical entry in (37) shows, the (incorporated) nominal has the normal nominal (N) meaning constructor.

(35) *-inu: V* ($\uparrow$ PRED) = drink<($\uparrow$ SUBJ) ($\uparrow$ OBJ) >
$\lambda x \lambda y.drink(x, y)$: ($\uparrow$ SUBJ$_\sigma$) $\multimap$ ($\uparrow$ OBJ$_\sigma$) $\multimap \uparrow_\sigma$

(36) *-inu: V* (↑ PRED) = drink<(↑ SUBJ) >
$\lambda P \lambda x. \exists y[drink(x, y) \wedge P(y)]$:
[(↑ $_\sigma$ ARG VAR) $\multimap$ (↑ $_\sigma$ ARG RESTR)] $\multimap$ [(↑ SUBJ$_\sigma$) $\multimap$ ↑ $_\sigma$]

(37) *kofe:* $\hat{N}$ $\lambda x.coffee(x)$: (↑ $_\sigma$ VAR) $\multimap$ (↑ $_\sigma$ RESTR)

On the meaning side of the meaning constructor, the meaning expression abstracts over the property which the incorporate introduces, and also uses existential closure (of the entity restricted by the nominal property expressed by the incorporate, here 'coffee'), in a manner reminiscent of van Geenhoven (1998)'s semantic approach to incorporation and narrow scope indefinites, to close off this argument to further saturation (ie through doubling), following a suggestion in Chung and Ladusaw (2003).[9]

Finally, some modifiers may occur with an incorporated noun in Niuean (as in (38)) and these are separately introduced in the c-structure under the NP in the rule (39). (40) is a partial lexical entry showing the standard semantics for the modifier *kono* 'bitter'.

(38) *Ne inu kofe kono a Sione*
PAST drink coffee bitter ABS Sione
Sione drank bitter coffee

(39) S $\longrightarrow$ V^0 NP KP$^+$
↑ = ↓ (↑ INCORPORATE) = ↓ (↑ GF) = ↓

(40) *kono:* $\hat{N}$ $\lambda P \lambda x.P(x) \wedge bitter(x)$:
[((ADJ $\in$ ↑)$_\sigma$ VAR) $\multimap$ ((ADJ $\in$ ↑) $_\sigma$ RESTR)] $\multimap$
[((ADJ $\in$ ↑)$_\sigma$ VAR) $\multimap$ ((ADJ $\in$ ↑) $_\sigma$ RESTR)]

Finally, note that though the issue is not addressed in Asudeh (2007), the approach to the f-structure and semantics of valency-reducing NI does not appear to hinge critically on the syntactic nature of the incorporate and its treatment as a non-projecting word, and could in principle be extended to more 'standard' cases of morphological incorporation.

5 Our Proposal

Our approach to the semantics has some aspects in common with the approach above, and indeed most approaches to the semantics of NI view it (grossly) in terms of introducing a nominal restriction (or its equivalent) over the semantic argument (van Geenhoven, 1998; Chung and Ladusaw, 2003; Farkas and de Swart, 2003).[10]

In this section we demonstrate how the SN06 analysis of juxtaposed nominal constructions can be extended to generic noun incorporation constructions, thereby (i) providing an LFG account of classifier NI that can deal with doubling with an external (non-modifier) nominal; and (ii) capturing the functional equivalence between these constructions and the analogous juxtaposed constructions by providing a unified account. The proposal developed here is preliminary in many respects, and

[9] As Asudeh (2007) notes, alternative ways of closing off this argument would be appropriate in cases where the incorporate is not referential.

[10] This is not, of course, to deny that there are significant differences between all these various accounts: see Farkas and de Swart (2003) for an illuminating comparison of a number of approaches.

a number of questions and avenues for investigation are left for future work. Our approach builds directly on the idea that the following as fundamentally equivalent at the f-structure level:[11]

(41) a. **An-barnadja** **an-mim** *ngarri-bowo-ni*
VEG-owenia:vernicosa VEG-fruit 1a-put.in.water-PI
'We used to put the owenia vernicosa fruit in the water (to poison the fish).' (Evans (1996, 73))

b. **An-barnadja** *ngarri-***mim**-*bowo-ni*
VEG-owenia:vernicosa 1a-fruit-put.in.water-PI
'We used to put the owenia vernicosa fruit in the water (to poison the fish).' (Evans (1996, 73))

The common f-structure is as follows (but note that the incorporated nominal does not encode noun class morphologically). For present purposes we simplistically flag the 'generic' semantics of the incorporated nominal in the PRED value. Note that it is the more general term which incorporates. In this connection Anderson (2000) observes that crosslinguistically languages which permit doubling always permit a *more specific* external doubling NP, and many permit a doubling NP which is as specific or synonmyous with the incorporated nominal, but none seem to permit the equivalent of **John trout-caught a fish* in which the more specific term is incorporated. We adopt his view that: "These facts appear to result from a requirement (semantic or pragmatic, depending on one's view of where the line between these is to be drawn) that overt expressions be at least minimally informative with respect to the information already provided by the Verb's semantics..... Languages apparently differ on the basis of whether they consider an essentially equivalent expression 'informative' or not (perhaps by virtue of the possibility it introduces of independent referentiality)."(Anderson, 2000, 135)

(42)
$$\begin{bmatrix} \text{INDEX} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{VEG} \end{bmatrix} \\ \left\{ \begin{bmatrix} \text{PRED} & \text{'OWENIA.VERNICOSA'} \\ \text{INDEX} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{VEG} \end{bmatrix} \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{'FRUIT (GENERIC)'} \\ \text{INDEX} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{VEG} \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix}$$

Set membership for the external nominal is determined by the c-structure annotations, just as for the juxtaposed versions: NP nodes in the syntax are annotated $(\uparrow \text{GF}) = \downarrow | \downarrow \in (\uparrow \text{GF})$, an annotation which also accounts for the occurrence of syntactically discontinuous appositional structures.

An incorporated nominal may or may not be doubled by an external nominal — (25b) above, repeated here as (43) exemplifies the latter circumstance.

[11] As noted above, there are likely pragmatic and discourse differences between the two, but we abstract away from these here.

(43) *Barri-ganj-ngune-ng.*
3a/3P-meat-eat-PP
'They ate the meat.' (Evans, 2003, 330)

An incorporated nominal therefore *optionally* constructs a set for the OBJ, as shown in the extract below from the lexical entry for a fully inflected verb:[12]

(44) *-mim-bowo-* (↑ PRED) = 'put.in.water< (SUBJ)(OBJ)>'
$\lambda x \lambda y.put.in.water(x,y)$: (↑ SUBJ)$_\sigma$ ⊸ (↑ OBJ)$_\sigma$ ⊸ ↑ $_\sigma$
(↑ OBJ (∈)) = ↓
(↓PRED) = 'fruit (generic)'
(↓INDEX PERS) = 3
(↓INDEX NUM) = SG
(↓INDEX GEND) = VEG
$\lambda x.fruit(x)$: (↓$_\sigma$ VAR) ⊸ (↓$_\sigma$ RESTR)

According to this lexical entry, the incorporated nominal can either provide the PRED for the OBJ (i.e. when there is no external nominal), or it can provide the PRED for one member of a set-valued OBJ (i.e. when there is an external nominal). To illustrate, we begin with a case of (straightforward) NI:

(45) *Al-ekge al-gohbanj ba-gurlah-bimbu-ni*
FE-DEM II-old.person 3/3PL-skin-paint-PI
That old lady used to paint (buffalo) hides (Evans (2003, 451))

The lexical information associated with the verb stem plus incorporated nominal is as follows, producing the associated f-structure in (47):

(46) *-gurlah-bimbu-* (↑ PRED) = 'paint< (SUBJ)(OBJ)>'
$\lambda x \lambda y.paint(x,y)$: (↑ SUBJ)$_\sigma$ ⊸ (↑ OBJ)$_\sigma$ ⊸ ↑ $_\sigma$
(↑ OBJ) = ↓
(↓ PRED) = 'skin'
(↓ INDEX PERS) = 3
$\lambda x.skin(x)$: (↓$_\sigma$ VAR) ⊸ (↓$_\sigma$ RESTR)

(47)
$$\begin{bmatrix} \text{PRED} & \text{'PAINT} < (\text{SUBJ})\ (\text{OBJ}) > \text{'} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'SKIN'} \\ \text{INDEX} & \begin{bmatrix} \text{PERS} & 3 \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

As it stands the verbal meaning won't be able to consume the meaning of the nominal because it is of type <e,t>, that is, the type appropriate to a common noun. We assume some general type shifting (or equivalent) process applies quite generally (and independently of incorporation) in these languages to convert N to NP meanings.[13]

The(incorporating) generic specific construction is repeated as (48) and (49):

[12]Bininj Gun-wok also allows incorporation of an intransitive subject, but we leave that aside for now.

[13]An alternative is to lexicalize this by taking the verbal semantics to consume a nominal property (or collection of nominal properties) directly as sketched in (i).

(48) **An-barnadja** *ngarri-***mim**-*bowo-ni*
VEG-owenia:vernicosa 1a-fruit-put.in.water-PI
'We used to put the owenia vernicosa fruit in the water (to poison the fish).'

(49) *-mim-bowo-* (↑ PRED) = 'put.in.water< (SUBJ)(OBJ)>'
$\lambda x \lambda y.put.in.water(x, y)$: (↑ SUBJ)$_\sigma$ ⊸ (↑ OBJ)$_\sigma$ ⊸ ↑ $_\sigma$
(↑ OBJ (∈)) = ↓
(↓PRED) = 'fruit (generic)'
(↓INDEX PERS) = 3
(↓INDEX NUM) = SG
(↓INDEX GEND) = VEG
$\lambda x.fruit(x)$: (↓$_\sigma$ VAR) ⊸ (↓$_\sigma$ RESTR)

The equation (↑ OBJ (∈)) = ↓ permits the f-structure of the incorporated nominal (↓) to be either the OBJ as in (50) or a member of the set of f-structures which is the OBJ as in (51). If the syntax contributes a nominal for the OBJ, then given PRED uniqueness, the incorporate must be a member of a set (↑ OBJ ∈). The phrase structure rules will provide the NP-APPOS template, as in (5) above, which associates the INDEX of the external nominal with the INDEX of the set.[14]

(50)
$$\begin{bmatrix} \text{PRED} & \text{'PUT.IN.WATER} < (\text{SUBJ})\ (\text{OBJ}) > \text{'} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'FRUIT}\ (\text{GENERIC})\text{'} \\ \text{INDEX} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{VEG} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

(i) *-gurlah-bimbu-* (↑ PRED) = 'paint< (SUBJ)(OBJ)>'
$\lambda P \lambda x \exists y.paint(x, y) \wedge P(y)$: [((↑ OBJ$_\sigma$) VAR) ⊸ ((↑ OBJ$_\sigma$) RESTR)] ⊸ [(↑ SUBJ)$_\sigma$ ⊸ ↑ $_\sigma$]
(↑ OBJ) = ↓
(↓ PRED) = 'skin'
(↓ PERS) = 3
$\lambda x.skin(x)$: (↓$_\sigma$ VAR) ⊸ (↓$_\sigma$ RESTR)

The use of existential closure raises a number of issues, and in particular interprets the incorporated argument as a narrowest scope indefinite. Further research would be required to determine whether this is justifiable, and so we leave this question open.

[14]In the case where the phrasal syntax contributes no additional member(s) to the set, it may be that nothing so far excludes the single incorporate being analyzed as a singleton set. Given that the correct semantics will be constructed, it is unclear to us whether this is a problem which should be addressed by additional constraints.

(51)
$$\begin{bmatrix} \text{PRED} & \text{`PUT.IN.WATER} < (\text{SUBJ})\ (\text{OBJ}) > \text{'} \\ \text{OBJ} & \begin{bmatrix} \text{INDEX} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{VEG} \end{bmatrix} \\ & \left\{ \begin{bmatrix} \text{PRED} & \text{`OWENIA.VERNICOSA'} \\ \text{INDEX} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{VEG} \end{bmatrix} \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{`FRUIT (GENERIC)'} \\ \text{INDEX} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{VEG} \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix} \end{bmatrix}$$

This is the same f-structure as SN06 provide for the juxtaposed construction in (28a), thus capturing the functional similarity between the incorporated an non-incorporated versions.

However, there is a third logically possible option, which is that an external nominal induces a set, but the $\downarrow$ in the above lexical entry is equated with the set itself, rather than with a member of the set. If PRED were non-distributive, this would provide a PRED feature for the set itself, as in (52):

(52)
$$\begin{bmatrix} \text{PRED} & \text{`PUT.IN.WATER} < (\text{SUBJ})\ (\text{OBJ}) > \text{'} \\ \text{OBJ} & \begin{bmatrix} \text{INDEX} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{VEG} \end{bmatrix} \\ \text{PRED} & \text{'FRUIT (GENERIC)'} \\ & \left\{ \begin{bmatrix} \text{PRED} & \text{`OWENIA.VERNICOSA'} \\ \text{INDEX} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{VEG} \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix} \end{bmatrix}$$

Clearly this is not a sensible-looking f-structure and so we want to be able to rule it out. We therefore assume that PRED is distributive, so that PRED uniqueness will rule out this possibility due to the PRED feature clash with the external nominal ('owenia.vernicosa' in the above). This ensures that $\downarrow$ will always be equated with a member of the set, not the set itself, in the event that there is an external nominal.

Thus, by simply allowing the incorporated nominal to optionally construct a set for the OBJ we can extend the SN06 analysis to account for these incorporated constructions, thereby capturing the functional equivalence between these constructions and the juxtaposed equivalents.

In Gunwinyguan languages the incorporated nominal in instances of 'general' NI (that is, beyond the cases of generic-specific and part-whole constructions which we focus on here) can be doubled with an external nominal expressing essentially equivalent information, an option which is found crosslinguistically but less frequently than doubling with more specific content. On our approach, this

possibility is accounted for, since the external nominal and the incorporated nominal jointly construct a set for the OBJ, as follows:

(53) *Bi-yaw-melme-ng* *na-beywurd*
3/3an-child-touch.with.foot-PP MASC-child
'He kicked the child' (Evans (1996, 88))

(54)
$$\begin{bmatrix} \text{PRED} & \text{'TOUCH.WITH.FOOT} < (\text{SUBJ})\ (\text{OBJ}) > \text{'} \\ \text{OBJ} & \begin{bmatrix} \text{INDEX} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{MASC} \end{bmatrix} \end{bmatrix} \\ & \left\{ \begin{bmatrix} \text{PRED} & \text{'CHILD'} \\ \text{INDEX} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{MASC} \end{bmatrix} \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{'CHILD (GENERIC)'} \\ \text{INDEX} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix}$$

6 Further Research: Coordination and Incorporation?

Note that it was the shared external syntax of juxtaposed coordinations and generic-specifics, part-whole constructions and other appositions which provided a substantial part of the original motivation for the SN06 analysis, which in turn underlies the current approach to incorporation. So far, our approach to NI assumes that incorporation is limited **semantically** to the sorts of appositional construction types we discuss here, excluding coordinate constructions, but the question remains: Do conjuncts incorporate?

There are a couple of highly suggestive examples that may indicate that it is in fact possible to incorporate one nominal in a coordinated structure, thereby making the parallel with juxtaposed nominal constructions virtually complete. These examples are provided below:

(55) *Oo gunak gare* *yi-yerrng-ma-ng, gun-boi.*
oh fire perhaps 2-wood-get-NP IV-cooking.stone
'Well maybe you should get some firewood and cooking stones'. (Evans (2003, 453))

(56) *Bene-dalk-mey* *man-dalk-buk dja kun-dulk, bene-worrhme-ng bene-kinje-ng na-wu*
3uaP-grass-getPP VE-grass-dry and IV-stick 3uaP-make.fire-PP 3uaP-cook-PP MA-DEM
wirlarrk.
goose.egg
'Gathering dry grasses and sticks, they made a fire to roast the eggs' (Evans (2003, 453))

However, neither of these is a clear cut example of incorporated coordination since the comma suggests that 'cooking stone' may be an afterthought in (55), and the incorporated nominal in (56) is

actually in a generic-specific construction within one of the conjuncts, rather than being the conjunct itself. However, note that the nominal that is incorporated into the **adjective** *duk* 'dry' is clearly conjoined with the external nominal, suggesting that incorporated coordinations are indeed possible here (see Baker and Nordlinger (this volume) for detailed discussion of nominals incorporated into adjectives in these languages).

7 Conclusion

In this paper we have shown how the SN06 analysis can be extended to provide a single unified account of generic specific constructions which captures the functional and structural similarities between both juxtaposed and incorporated construction types. In doing so we also provide the first LFG account of classifier incorporation with doubling. There are a number of advantages to this analysis of noun incorporation. Firstly, it doesn't require the postulation of new grammatical functions to deal with the doubled NP. Secondly, we don't need to postulate null pronominals for the object in the event that there is no external nominal (cf. Rosen 1989). More importantly, we don't force asymmetrical structure on the data (i.e. by calling either the incorporated nominal or the external nominal a modifer) when there is no empirical reason for doing so. Finally, this analysis allows for a seamless and integrated account of the interaction of verbal incorporations and adjectival incorporations in these languages, as discussed in Baker and Nordlinger (this volume).

Nonetheless, this paper represents no more than a toe in the water in terms of developing a treatment of incorporation in these languages. Many areas, especially those concerning the semantics of these constructions, still need much more investigation and our proposals are very preliminary. For example, it appears to be a cross-linguistically stable fact about incorporation that incorporated nominals can never take wide scope over other elements, such as negation and universal quantifiers elsewhere in the sentence, but matters of this sort are yet to be investigated for these languages. In addition, a much clearer understanding is needed of the discourse transparency of incorporated elements, so that firmer proposals can be made concerning the semantic treatment of the incorporate itself, and the same is true of nominals in juxtaposed constructions in general in these languages.

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FUNCTIONAL FEATURES IN DATA-DRIVEN DEPENDENCY PARSING

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Abstract

This article relates results in data-driven dependency parsing of Swedish to linguistic generalizations regarding syntactic argument status, such as tendencies regarding animacy and definiteness, as well as properties more specific to the Scandinavian languages, such as finiteness. We show how data-driven modeling in combination with labeled dependency representations enable the acquisition of functional preferences that are evident as statistical tendencies in language data. We present an in-depth error analysis of a data-driven dependency parser with a particular focus on assignment of core syntactic arguments and show how a data-driven parser provides an experimental setting where the influence of various linguistic properties may be evaluated and investigated further.

1 Introduction

The separation of functional structure from constituent structure is motivated largely by cross-linguistic variation in degree of configurationality: languages differ in the extent to which grammatical functions may be equated with a specific structural position. F-structure constraints capture generalizations regarding grammatical functions regardless of their c-structure realization. In functional-typological Optimality Theory (Aissen, 2003; Bresnan and Aissen, 2002) constraints targeting grammatical functions have been centred around a notion of prominence and harmony, which have been shown to capture both categorical generalizations, as well as frequency effects observed in a range of languages (Bresnan et al., 2001). The idea that grammars are inherently probabilistic in nature has been motivated by empirical evidence observed as frequency effects in linguistic studies ranging from computational, psycholinguistic, typological to more theoretical (Bresnan, 2006; Manning, 2003). In computational linguistics, data-driven, statistical methods show impressive results for a range of NLP tasks, including syntactic parsing. There exists an expressed interest in a deeper understanding of the results obtained using data-driven methods and how these relate to generalizations from more theoretically oriented work.

Syntactic arguments express the main participants in an event, and hence are intimately linked to the semantics of a sentence. Syntactic arguments also occur in a specific discourse context where they convey linguistic information. For instance, the subject argument often expresses the agent of an action, and will therefore tend to refer to a human being. Moreover, subjects typically express the topic of the sentence and will tend to be realized by a definite nominal. These types of generalizations regarding the linguistic properties of syntactic arguments express soft constraints, rather than absolute requirements on syntactic structure. In language data, we observe frequency effects in the realization of syntactic arguments and a range of linguistic studies emphasize the correlation between syntactic function and various linguistic properties, such as animacy and definiteness.

The realization of a predicate-argument structure is furthermore subject to surface-oriented and often language-specific restrictions relating to word order and morphology. In many languages, the structural expression of syntactic arguments exhibits variation. The Scandinavian languages, for instance, are characterized by a rigid verb placement and a certain degree of variation in the positioning of syntactic arguments. Work in syntactic theory which separates the function-argument structure from its structural realization highlights exactly the mediating role of arguments between semantics and morphosyntax.

The use of distinguishing, linguistic properties of arguments, such as animacy, definiteness and finiteness, in automatic analysis of syntactic arguments has been shown to give improved results for Swedish (Øvrelid and Nivre, 2007; Øvrelid, 2008c). In this article, we relate these results, which were obtained using a data-driven dependency parser for Swedish to linguistic generalizations regarding argumenthood and the expression of syntactic arguments in Scandinavian. In particular, we propose that the use of dependency representations, which operate on a flat structure and a separate level of grammatical functions, allows for the acquisition of linguistic generalizations regarding syntactic argumenthood, irrespective of structural realization. A detailed error analysis is provided in order to pinpoint the effect of the various, linguistically motivated features during parsing. We investigate the relation of syntactic arguments to semantic interpretation, as well as to explicit, formal marking such as case and word order.

2 Arguments

A distinction between *arguments* and *non-arguments* is made in some form or other in all syntactic theories.[1] The distinction can be expressed through structural asymmetry or stipulated for theories where grammatical functions are primitives in representation. For instance, in LFG (Kaplan and Bresnan, 1982; Bresnan, 2001), grammatical functions are primitive concepts and arguments or governable functions (SUBJ, OBJ, OBJ_θ, OBL_θ, COMP, XCOMP) are distinguished from non-arguments or modifiers (ADJ, XADJ). HPSG (Pollard and Sag, 1994) similarly distinguishes the valency features (SPR, COMPS) from modifiers (MOD). In most versions of dependency grammar, (see, e.g, Mel'čuk, 1988), grammatical functions are also primitive notions and not derived through structural position.

2.1 Argument differentiation

Syntactic arguments may be distinguished by a range of linguistic factors related to structural, semantic as well as more discourse-related properties.

The dimension of **animacy** roughly distinguishes between entities which are alive and entities which are not; however, other distinctions are also relevant and

[1] We adopt the more theory-neutral term of 'non-argument', rather than 'adjunct', which is closely connected to the structural operation of adjunction.

the animacy dimension is often viewed as a continuum. Animacy is a grammatical factor in a range of languages and is closely related to argument realization and differentiation. A recent special issue of the linguistic journal *Lingua* was dedicated to the topic of animacy and discusses the role of animacy in natural language from rather different perspectives, ranging from theoretical and typological to experimental studies (de Swart et al., 2008). These various perspectives all highlight animacy as an influencing factor in argument differentiation. For instance, in the Mayan language MamMaya, a transitive sentence is ungrammatical if the object is higher in animacy than the subject, as in *The dog sees the woman* (de Swart et al., 2008). In Navajo, such a construction is clearly avoided and an alternative construction (*The woman is seen by the dog*) is chosen instead.[2] In many languages this tendency is reflected in language data as a frequency effect, even though these types of transitive constructions are perfectly grammatical (Dahl and Fraurud, 1996).

The property of **definiteness** is not as commonly recognized as a factor in argument differentiation as animacy. A tendency towards definite subjects has, however, been noted for several languages, both as a categorical constraint influencing morphological marking and as a statistical tendency. Common to these is the same generalization, namely a tendency for subjects to be definite or specific and for objects to be indefinite. In Turkish and Persian, we find Differential Object Marking which is sensitive to definiteness and where definite objects are marked with accusative case, but indefinite objects are not (Croft, 2003). A range of languages have been noted to categorically exclude or strongly disprefer non-specific indefinite subjects (Aissen, 2003).

(1) pronoun > proper name > common noun

This sense of referentiality, then, relates to the extent to which semantic interpretation requires access to the context of the utterance. This is related to the expression of definiteness, or level of cognitive status. Pronouns have to be resolved by the context, proper nouns rely on a conventional mapping to a referent, whereas the interpretation of common nouns relies the least on context and more on denotation.

Syntactic arguments differ with respect to their referentiality. As mentioned earlier the definiteness or cognitive status of an element influences its referentiality. In particular, subjects are likely to be pronominal and objects are more likely to express a lower referentiality (Keenan, 1976). The category of pronouns may be further subdivided along the dimension of *person* which distinguishes reference to the speaker and hearer (i.e. discourse participants) from others (Croft, 2003, 130).

[2]The *inverse* construction in Navajo can be paraphrased by the English passive construction and is expressed by the verbal affix *bi* and employed when the subject is lower in animacy than the object (Dahl and Fraurud, 1996).

2.2 Arguments in Scandinavian

Scandinavian languages have limited morphological marking of syntactic functions, but allow for variation in word order which makes for an interesting comparison with more configurational languages, like English.

2.2.1 Morphology

The Scandinavian languages make limited use of case marking, and, in this respect, resemble English. Pronouns are marked for case, but exhibit syncretism and syntactic variation, whereas nouns distinguish only genitive case and are otherwise invariant for case. The distinction between various types of arguments is, however, partially encoded through *case* marking in Scandinavian. Nominal arguments are furthermore inflected for other categories, such as definiteness.

2.2.2 Word order

The classical descriptive model for Scandinavian word order is based around organization into so-called *topological fields* . The topological fields approach separates the clause into, roughly speaking, three parts: the *initial* field, the *mid field* and the *end field*:

(2)

	Initial	**Mid**	**End**
MAIN	*I morgon* tomorrow	*kan hon inte* can she not	*vara med vid sammanträdet.* be with at meeting-DEF
SUBORD	*eftersom* since	*hon inte kan* she not can	*vara med vid sammanträdet.* be with at meeting-DEF

Initial variation The initial position is characterized by a great deal of variation. It has been claimed to mark the syntactic-semantic type of the clause and is closely related to the speech act expressed by the clause (Platzack, 1987). Moreover, the initial constituent is often topical, in the sense that it links the sentence to the preceding context. Most clausal constituents may occupy initial position in declarative main clauses, e.g., subjects (3), direct objects (4) and adverbials (5).[3]

(3) *Statsministern* *håller* *talet* *i* *morgon.*
prime minister-DEF holds speech-DEF in tomorrow
'The prime minister gives the speech tomorrow.'

(4) *Talet* *håller* *statsministern* *i* *morgon.*
speech-DEF holds prime minister-DEF in tomorrow
'The speech, the prime minister gives tomorrow.'

[3]The examples in the current section (section 2) are constructed. All other examples in the article are authentic and taken from the Talbanken05 treebank of Swedish, see section 3.1.

(5) *I* *morgon* *håller* *statsministern* *talet.*
in tomorrow holds prime minister-DEF speech-DEF
'Tomorrow, the prime minister gives the speech.'

Rigid verb placement Like the majority of Germanic languages, but unlike English, the Scandinavian languages are *verb second (V2)*; the finite verb is the second constituent in declarative main clauses, see (3)–(5) above. Non-finite verbs follow the finite verb, but precede their complements.[4] The presence of a non-finite verb introduces a greater rigidity in terms of positioning and interpretation of the clausal constituents. Main clauses consisting of a finite, transitive verb along with its arguments are structurally ambiguous, as in (6), whereas the placement of a non-finite verb in the same clause clearly indicates syntactic functions, as in (7)–(8):

(6) *Vem* *såg* *Ida?*
who saw Ida
'Who saw Ida / Who did Ida see?'

(7) *Vem* *har* *sett* *Ida?*
who has seen Ida
SUBJ OBJ
'Who has seen Ida?'

(8) *Vem* *har* *Ida* *sett?*
who has Ida seen
OBJ SUBJ
'Who has Ida seen?'

Variable argument placement The generalization that most constituents may occupy sentence-initial position entails that arguments have two alternative positions – initial position and a non-initial position. A schematized version of the predictions of the fields analysis with respect to the linearization of verbs and (non-initial) arguments in main clauses is provided in (9) below (Engdahl et al., 2004):

(9) Linearization of grammatical functions in declarative, main clauses:
XP | V_{fin} SUBJ S-ADV | $V_{non-fin}$ OBJ_{ind} OBJ_{dir} ADV

The subject, for instance, may occupy either the initial position or the position immediately following the verb. Note that the fields analysis does not capture the generalization that the subject is the most common initial constituent.

In recent years, proposals have been made for a considerably flatter c-structure representation for Scandinavian, due partly to the variation described above (Börjars et al., 2003; Engdahl et al., 2004; Andréasson, 2007). In these proposals, the ordering of arguments is rather determined by OT-like constraints expressing the interaction of various structural, semantic and pragmatic generalizations.

[4] In this respect Scandinavian differs from German, which positions non-finite verbs in clause final position.

3 Data-driven dependency parsing

A distinction is often made between grammar-driven and data-driven approaches to parsing, where the former is characterized by a generative grammar which defines the language under analysis and the latter is not. This distinction has, however, become less clear-cut due to the extensive use of empirical methods in the field in recent years. Most current parsers are data-driven in the sense that they employ frequencies from language data to induce information to improve parsing. Data-driven parsing may thus be characterized, first and foremost, by the use of inductive inference, rather than by the use or dispension of a grammar in the traditional sense (Nivre, 2006).

The availability of treebanks has been crucial to the development of data-driven parsing, supplying data for inductive inference in terms of estimation of parameters for statistical parse models or even for the induction of whole grammars (Charniak, 1996; Cahill et al., 2008). A system for data-driven parsing of a language L may be defined by three components (Nivre, 2006, 27):

1. A formal model M defining permissible analyses for sentences in L.
2. A sample of text $T_t = (x_1, \ldots, x_n)$ from L, with or without the correct analyses $A_t = (y_1, \ldots, y_n)$.
3. An inductive inference scheme I defining actual analyses for the sentences of any text $T = (x_1, \ldots, x_n)$ in L, relative to M and T_t (and possibly A_t).

In strictly data-driven approaches, a grammar, whether hand-crafted or induced, does not figure at all. It follows that the formal model M is not a grammar and the sample of text T_t is a treebank containing the correct analyses with respect to M, which constitutes the training data for the inductive inference scheme I. Parsing in this respect does not rely on a definition of the language under analysis independently of the input data. Without a formal grammar, data-driven models condition on a rich context in the search for the most probable analysis.

The use of dependency representations in syntactic parsing has recently received extensive attention in the NLP community (Buchholz and Marsi, 2006; Nivre et al., 2007). One of the arguments in favour of parsing with dependency representations is that dependency relations are much closer to the semantic relations which figure between words in a sentence than a tree is. As automatic parsing often is viewed as a means to a semantic interpretation of a sentence, dependency analysis represents a step in the right direction.

Common to all dependency-based grammar theories is the notion of *dependency* – a binary, asymmetrical relation between lexical items or words. Each word in a sentence has a head or governor of which it is a dependent (Mel'čuk, 1988). The dependency relation which holds between two words may or may not be labeled and its participants, the head and dependent, may or may not be ordered. Many of the theoretical proposals of dependency grammar separate dependency

structure from word order (Mel'čuk, 1988). Figure 1 shows the labeled dependency graph of example (10), taken from the Swedish treebank, Talbanken05, described in section 3.1 below.

(10) *Därefter betalar patienten avgift med 10 kronor om dagen.*
thereafter pays patient-DEF fee with 10 kronas in day-DEF
'Thereafter, the patient pays a fee of 10 kronas a day.'

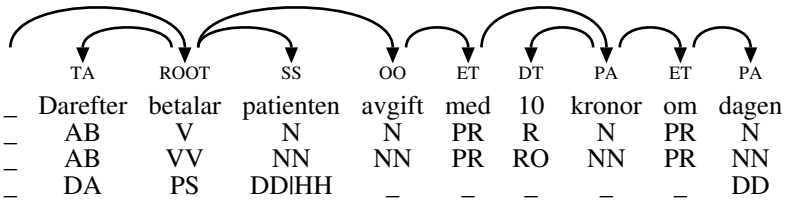

Figure 1: Dependency representation of example from Talbanken05.

3.1 Parsing Swedish

In the remaining sections we will present experiments in data-driven dependency parsing of Swedish. The focus will be on the analysis of syntactic arguments and, in particular, on argument differentiation: the process by which functional arguments are distinguished along one or more linguistic dimensions. In a data-driven parser, parsing is by definition guided by frequencies in language and there is no explicit grammar. This allows us to make as few assumptions as possible with respect to formulations of constraints on arguments, as well as their interaction. Due to the variation identified above, we do not want to commit to a strictly structural definition of argument status. Rather, a view of grammatical functions as primitive notions, separated from surface linguistic properties, enables investigations also into mismatches between levels of linguistic analysis.

Talbanken05 is a Swedish treebank converted to dependency format, containing both written and spoken language (Nivre et al., 2006a).[5] For each token, Talbanken05 contains information on word form, part of speech, head and dependency relation, as well as various morphosyntactic and/or lexical semantic features. The nature of this additional information varies depending on part of speech:

NOUN:	*definiteness, animacy, case* (Ø/GEN)
PRO:	*animacy, pronoun type, case* (Ø/ACC)
VERB:	*tense, voice* (Ø/PA)

We use the freely available **MaltParser**,[6] which is a language-independent system for data-driven dependency parsing. MaltParser is based on a deterministic

[5]The written sections of the treebank consist of professional prose and student essays and amount to 197,123 running tokens, spread over 11,431 sentences.

[6]http://w3.msi.vxu.se/users/nivre/research/MaltParser.html

parsing strategy, first proposed by Nivre (2003), in combination with treebank-induced classifiers for predicting the next parsing action. Classifiers can be trained using any machine learning approach, but the best results so far have been obtained with support vector machines, using LIBSVM (Chang and Lin, 2001). MaltParser has a wide range of parameters that need to be optimized when parsing a new language. As our baseline, we use the settings optimized for Swedish in the CoNLL-X shared task (Nivre et al., 2006b), where this parser was the best performing parser for Swedish. The only parameter that will be varied in the later experiments is the feature model used for the prediction of the next parsing action. We will therefore describe the feature model in a little more detail.

MaltParser uses two main data structures, a stack (S) and an input queue (I), and builds a dependency graph (G) incrementally in a single left-to-right pass over the input. The decision that needs to be made at any point during this derivation is (a) whether to add a dependency arc (with some label) between the token on top of the stack (*top*) and the next token in the input queue (*next*), and (b) whether to pop *top* from the stack or push *next* onto the stack. The features fed to the classifier for making these decisions naturally focus on attributes of *top*, *next* and neighbouring tokens in S, I or G. In the baseline feature model, these attributes are limited to the word form (FORM), part of speech (POS), and dependency relation (DEP) of a given token, but in later experiments we will add other linguistic features (FEATS). The baseline feature model is depicted as a matrix in Table 1, where rows denote tokens in the parser configuration (defined relative to S, I and G) and columns denote attributes. Each cell containing a plus sign (+) corresponds to a feature of the model. Examples of the features include part-of-speech for the top of the stack, lexical form for the next and previous (*next-1*) input tokens and the dependency relation of the rightmost sibling of the leftmost dependent of *top*.

	FORM	POS	DEP	FEATS
S:*top*	+	+	+	+
S:*top*+1		+		
I:*next*	+	+		+
I:*next*−1	+			+
I:*next*+1	+	+		+
I:*next*+2		+		
G: head of *top*	+			+
G: left dep of *top*			+	
G: right dep of *top*			+	
G: left dep of *next*	+		+	+
G: left dep of head of *top*			+	
G: left sibling of right dep of *top*			+	
G: right sibling of left dep of *top*	+			+
G: right sibling of left dep of *next*		+	+	

Table 1: Baseline and extended (FEATS) feature model for Swedish; S: stack, I: input, G: graph; $\pm n$ = n positions to the left ($-$) or right ($+$)

4 Error analysis of baseline

An error analysis is crucial for obtaining a better understanding of the types of generalizations regarding syntactic argumenthood that are being acquired by our data-driven parser. The data for the error analysis of argument assignment in Swedish was obtained by parsing the written part of Talbanken05 with MaltParser. We employed the settings optimized for Swedish in the CoNLL-X shared task (Nivre et al., 2006b), with the feature model presented in the first three columns in Table 1. As we can see, the features employed during parsing are part-of-speech (POS), lexical form (FORM) and structural properties of the dependency graph under construction (DEP).

Table 2 provides an overview of the parser performance for the various argument relations in the treebank[7] It is quite clear that there is a direct relation between the frequency of the dependency relation in the treebank and the parser performance. The most frequent relations are also the relations for which the parser performs best – subject SS (90.25), predicative SP (84.82), and object OO (84.53).

Deprel		Gold	Correct	System	Recall	Precision	F-score
SS	subject	19383	17444	19274	90.00	90.51	90.25
SP	subject predicative	5217	4416	5196	84.65	84.99	84.82
OO	direct object	11089	9639	11718	86.92	82.26	84.53
IO	indirect object	424	276	301	65.09	91.69	76.14
AG	passive agent	334	249	343	74.55	72.59	73.56
VO	object infinitive	121	84	112	69.42	75.00	72.10
ES	logical subject	878	562	687	64.01	81.80	71.82
FS	formal subject	884	578	737	65.38	78.43	71.31
VS	subject infinitive	102	47	58	46.08	81.03	58.75
FO	formal object	156	70	91	44.87	76.92	56.68
OP	object predicative	189	42	112	22.22	37.50	27.91
EO	logical object	22	2	3	9.09	66.67	16.00

Table 2: Dependency relation performance: total number of gold instances (Gold), system correct (Correct), system proposed (System), recall, precision and F-score

Table 3 shows the most frequent error types involving argument relations. We find frequent error types involving different kinds of subjects (SS, FS , ES), objects (OO, IO) and predicatives (SP). We find that the two most frequent error types involving argument relations are errors analyzing subjects as objects (SS_OO) and vice versa (OO_SS).

In addition to the confusion of subjects and objects, which constitutes the most common error type for both relations, we find that both subjects and objects are quite commonly assigned status as the root of the dependency graph (ROOT). For both argument relations we also observe error types indicating confusion with other argument relations. For subjects we observe confusion with the other main argu-

[7]These are evaluated by the standard class-based evaluation measures of precision, recall and a balanced F-score: 2PR/P+R (P=precision: true positives / true positives + false positives, R=recall: true positives / true positives + false negatives)

Gold	System	#
SS	OO	446
OO	SS	309
FS	SS	281
SS	ROOT	265
SP	SS	240
SS	DT	238
OO	ROOT	221
SS	SP	206
DT	SS	146
SS	CC	137

Table 3: 10 overall most frequent argument error types.

ment functions, such as subject predicatives (SP) and expletive subjects (FS), as well as confusion with determiners (DT) and prepositional complements (PA). For objects we observe primarily confusion with various oblique, adverbial relations (AA, ET, OA), as well as confusion with prepositional complements (PA) and determiners (DT).

There are various sources of errors in subject/object assignment. Common to all of them is that the parts of speech that realize subjects and objects are compatible with a range of dependency relations. Pronouns, for instance, may function as subjects, objects, determiners, predicatives, conjuncts, prepositional objects, etc. In addition, we find "traditional" attachment ambiguity errors, for instance in connection with coordination, subordination, particle verbs, etc. These represent notorious phenomena in parsing, and are by no means particular to Swedish. Scandinavian type languages, however, also exhibit ambiguities in morphology and word order which complicate the picture further. The confusion of subjects and objects follows from lack of sufficient formal disambiguation, i.e., simple clues such as word order, part-of-speech and word form do not clearly indicate syntactic function. The reason for this can be found in ambiguities on several levels.

With respect to word order, we have seen that subjects and objects may both precede or follow their verbal head, but these realizations are not equally likely. Subjects are more likely to occur preverbally, whereas objects typically occupy a postverbal position. Based only on the word order preferences discussed above, we would expect postverbal subjects and preverbal objects to be more dominant among the errors than in the treebank as a whole (23% and 6% respectively), since they display word order variants that depart from the canonical, and hence most frequent, ordering of arguments. This is precisely what we find. Table 4 shows a breakdown of the errors for confused subjects and objects and their position with respect to the verbal head.

We find that postverbal subjects (After) are in a clear majority among the subjects erroneously assigned the object relation. Due to the V2 property of Swedish,

		Before		After		Total	
Gold	System	#	%	#	%	#	%
SS	OO	103	23.1	343	76.9	446	100.0
OO	SS	103	33.3	206	66.7	309	100.0

Table 4: Ordering relative to verb for the SS_OO and OO_SS error types.

the subject must reside in a position following the finite verb whenever another constituent occupies the preverbal position, as in (11) where a direct object resides sentence-initially or (12) where we find a sentence-initial adverbial:

(11) *Samma erfarenhet gjorde* **engelsmännen**.
same experience made Englishmen-DEF
'The same experience, the Englishmen had.'

(12) *År 1920, och först då, fick den gifta* **kvinnan**
year 1920, and first then, got the married woman-DEF
fullständig myndighet.
complete rights
'It was not until 1920 that the married woman recieved full civil rights.'

For the confused objects we find a larger proportion of preverbal elements than for subjects, which is the mirror image of the normal distribution of syntactic functions among preverbal elements. As table 4 shows, the proportion of preverbal elements among the subject-assigned objects (33.3%) is notably higher than in the corpus as a whole, where preverbal objects account for a miniscule 6% of all objects.

The preverbal objects are topicalized elements which precede their head verb as in (13)–(14).

(13) **Detta** *anser tydligen inte Stig Hellsten.*
this means apparently not Stig Hellsten
'This, Stig Hellsten apparently does not believe.'

(14) *Kärlekens innersta* **väsen** *lär inte något politiskt parti*
love-DEF.GEN inner nature seems not any political party
kunna påverka.
can-INF influence
'The inner nature of love, it seems that no political party can influence.'

Contrary to our initial hypothesis, however, we find a majority of postverbal objects among the objects confused for subjects. These objects are interpreted as subjects because the local preverbal context strongly indicates a subject analysis. This includes verb-initial clauses as in (15), as well as constructions where the immediate preverbal context consists of an adverbial and the subject is non-local, as in (16) and (17) below.

(15) *Glöm aldrig det* **löfte** *om trohet för livet.*
forget never that promise of faithfulness for life-DEF
'Never forget that promise of faithfulness for life.'

(16) *Ungdomarna blir med barn och det sociala trycket*
teenagers become with child and the social pressure-DEF
nästan tvingar **dem** *att gifta sig.*
almost forces them to marry themselves
'The teenagers become pregnant and social pressure almost forces them to get married.'

(17) *Eftersom man har full frihet att enkelt och snabbt ingå*
because one has full freedom to easily and quickly enter
äktenskap.
marriage
'Because one has the freedom to easily and quickly get married.'

The example in (16) is particularly interesting as it violates the V2-property, assumed to be a categorical constraint of Swedish. We may note that the examples in (15)–(17) above indicate acquisition of argument ordering resulting from the V2 requirement; when there is no preverbal argument or when the preverbal argument is not a good subject candidate, the argument following the verb is analyzed as subject. Recall, however, that the parser does not have information on tense or finiteness, and hence it overgeneralizes for examples like (17), where the verb is non-finite.

In addition to the word order variation discussed above, Swedish also has limited morphological marking of syntactic function. Recall that nouns are only marked for genitive case and only pronouns are marked for accusative case. There is also syncretism in the pronominal paradigm. There are pronouns which are invariant for case, e.g. *det/den* 'it', *ingen/inga* 'no', and furthermore may function as determiners. This means that with respect to word form, only the set of unambiguous pronouns clearly indicates syntactic function. We may predict that subject/object confusion errors frequently involve elements whose syntactic category and/or lexical form does not disambiguate, i.e., nouns or ambiguous pronouns. Table 5 shows the distribution of nouns, functionally ambiguous and unambiguous pronouns and other parts of speech for confused subjects/objects.[8] Indeed, we find that nouns and functionally ambiguous pronouns dominate the errors where subjects and objects are confused. Since case information is not explicitly represented in the input, this indicates that case is acquired quite reliably through lexical form. The fact that we find a higher proportion of ambiguous pronouns among the objects erroneously assigned subject status indicates that the parser has acquired a

[8]The 'other' category consists mainly of verbs (heads of subordinate clauses), adjectives, participles and numerals functioning as nominal heads.

Gold	System	Noun		Pro_{amb}		Pro_{unamb}		Other		Total	
SS	OO	324	72.6%	53	11.9%	29	6.5%	40	9.0%	446	100%
OO	SS	215	69.6%	74	23.9%	9	2.9%	11	3.6%	309	100%

Table 5: Part of speech for the SS_OO and OO_SS error types – nouns, ambiguous pronouns, unambiguous pronouns and other parts of speech.

preference for subject assignment to pronouns compatible with the difference in frequency for pronominal realization (SS_{pro} 49.2%, OO_{pro} 10.1%).

The initial error analysis shows that the confusion of different types of argument relations, in particular subjects and objects, constitutes a frequent and consistent error during parsing. It is caused by ambiguities in word order and morphological marking and we find cases that deviate from the most frequent word order patterns and are not formally disambiguated by part-of-speech information. In order to resolve these ambiguities, we have to examine features beyond part-of-speech category and linear word order.

5 Parse experiments

In the following we will experiment with the addition of morphosyntactic and lexical semantic features that approximate the distinguishing properties of the core argument functions discussed earlier. We will isolate features of the arguments and the verbal head, as well as combinations of these, and evaluate their effect on overall parsing results as well as on subject/object disambiguation specifically.

5.1 Linguistic features for argument disambiguation

Argument relations tend to differ along several linguistic dimensions. These differences are found as statistical tendencies, rather than absolute requirements on syntactic structure, and are therefore highly suitable for data-driven modeling.

In table 6 we find an overview of the linguistic dimensions discussed above with their corresponding treebank feature. It distinguishes between the features discussed earlier, representing soft, cross-linguistic tendencies in argument differentiation, and the more language-specific features of Scandinavian discussed in section 2. We map the linguistic features to a set of empirical features representing information which is found in the annotation of the Talbanken05 treebank (see section 3.1 above).

Recall that the Talbanken05 treebank explicitly distinguishes between person- and non-person referring nominal elements, a distinction which overlaps fairly well with the traditional notion of animacy.[9] Morphological definiteness is marked for

[9]See Øvrelid (2008a) for a more detailed overview of the information on person reference in

Linguistic feature	Treebank feature
animacy	person reference
definiteness	morphological definiteness
referentiality	pronoun type, part-of-speech
finiteness	tense
case	morphological case

Table 6: Linguistic features and their empirical counterparts.

all common nouns in Talbanken05 and the treebank also contains morphological case annotation for pronouns, distinguishing nominative and accusative case, as well as genitive case for common nouns. The morphosyntactic features which are expressed for the part-of-speech of verbs in Talbanken are tense (present, past, imperative, past/present subjunctive, infinitive and supine) and voice (Ø/passive; PA).

Pronouns are furthermore annotated with a set of pronominal classes which distinguish between e.g. 1st/2nd person and 3rd person pronouns, reflexive, reciprocal, interrogative, impersonal pronouns, etc. For the third person neuter pronoun *det* 'it' and demonstrative *detta* 'this', the annotation in Talbanken05 distinguishes between an impersonal and a personal or "definite" (DP) usage. The impersonal pronominal class is employed for *non-referential* pronouns.[10] The two classes of pronouns have quite distinct syntactic behaviours. The impersonal pronouns never function as determiners (DT), whereas the definite pronouns often do (71.4%). Also, the impersonal pronouns are more likely to function as formal subjects FS (32.4%) than the definite pronoun (1.1%).

5.2 Experimental methodology

All parsing experiments are performed using 10-fold cross-validation for training and testing on the entire written part of Talbanken05. The feature model used throughout is the extended feature model depicted in Table 1, including all four columns. What is varied in the experiments is only the information contained in the FEATS features (animacy, definiteness, etc.), while the tokens for which these features are defined remains constant. Overall parsing accuracy will be reported using the standard metrics of *labeled attachment score* (LAS) and *unlabeled attachment score* (UAS), i.e. the percentage of tokens that are assigned the correct head *with* (labeled) or *without* (unlabeled) the correct dependency label. Statistical significance is checked using Dan Bikel's randomized parsing evaluation compara-

Talbanken05.

[10]Note that we here employ 'referential' in a narrow sense, which only includes reference to entities. The category of 'non-referential pronouns' consequently includes pronouns which do not refer, i.e., expletives, as well as pronouns which refer to propositions.

tor.[11] Since the main focus of this article is on the disambiguation of grammatical functions, we report accuracy for specific dependency relations, measured as a balanced F-score.

We perform a set of experiments with an extended feature model and added information on animacy, definiteness, case, finiteness and voice, where the features are employed individually as well as in combination.

5.3 Results

The overall results for these experiments are presented in table 7, along with p-scores indicating statistical significance of the difference compared to the baseline parser (NoFeats). The experiments show that each feature individually causes a significant improvement in terms of overall labeled accuracy as well as performance for argument relations. Error analysis comparing the baseline parser (NoFeats) with new parsers trained with individual features reveal the influence of these features on argument disambiguation.

	UAS	LAS	p-value
NoFeats	89.87	84.92	–
Anim	89.93	85.10	$p<.0002$
Def	89.87	85.02	$p<.02$
Pro	89.91	85.04	$p<.01$
Case	89.99	85.13	$p<.0001$
Verb	90.15	85.28	$p<.0001$
ADPC	90.13	85.35	$p<.0001$
ADPCV	90.40	85.68	$p<.0001$

Table 7: Overall results in gold standard experiments expressed as unlabeled and labeled attachment scores.

As Table 7 shows, the addition of information on animacy (Anim) for nominal elements causes an improvement in overall results ($p<.0002$). The subject and object functions are the dependency relations whose assignment improves the most when animacy information is added. There is also an effect for a range of other functions where animacy is not directly relevant, but where the improved analysis of arguments contributes towards correct identification (e.g., adverbials and determiners). If we take a closer look at the individual error types involving subjects and objects, we find that the addition causes a reduction of errors confusing subjects with objects (SS_OO), determiners (SS_DT) and subjects predicatives (SS_SP) – all functions which do not embody the same preference for animate reference as subjects.

The addition of information on definiteness (Def) during parsing causes a slight (at the $p<.03$ level) improvement of overall results. Most noteworthy is an improvement in the identification of subject predicatives (SP), which are often confused with subjects. Nominal predicatives in Swedish usually stand in a classifying

[11] http://www.cis.upenn.edu/∼dbikel/software.html

relation to their subject and are often realized by an indefinite noun (89.4%). If we examine the set of corrected errors compared to the baseline, we find that the added information causes a 14.2% reduction of the SP_SS errors, all of which are indefinite nouns.

The addition of pronoun type (Pro) information causes a general improvement in overall parsing results ($p<.01$), as we can see from Table 7. The dependency relations whose assignment improves the most are, once again, the core argument functions (SS, OO), as well as determiners (DT). We also find a general improvement in terms of recall for the assignment of the formal subject (FS) and object (FO) functions, which are both realized by the third person neuter pronoun *det* 'it', annotated as non-referential in the treebank.

When we employ case (Case) information during parsing we find a clear improvement in results ($p<.0001$). However, the improvement is not first and foremost caused by improvement in assignment of subjects and objects, but rather, the assignment of determiners and prepositional objects.

As Table 7 shows, the addition of morphosyntactic information for verbs (Verb) also causes a clear improvement in overall results ($p<.0001$). The added information has a positive effect on the verbal dependency relations – relations for finite (ROOT, MS) and non-finite verbs (VG, IV), as well as an overall effect on the assignment of subjects and objects. Information on voice also benefits the relation expressing the demoted agent (AG) in passive constructions. We experimented with the use of tense as well as finiteness, a binary feature which was obtained by a mapping from tense to a binary feature finite/non-finite. Finiteness gave significantly better results ($p<.03$) and was therefore employed in the following. See Øvrelid (2008b) for details.

		NoFeats	ADPCV
SS	subject	90.25	91.87
OO	object	84.53	86.38
SP	subj.pred.	84.82	86.10
FS	formal subj.	71.31	74.09
AG	pass. agent	73.56	79.75
ES	logical subj.	71.82	73.67
FO	formal obj.	56.68	67.65
VO	obj. small clause	72.10	84.72
VS	subj. small clause	58.75	65.56
IO	indir. obj.	76.14	77.09

Table 8: F-scores for argument relations with combined features (ADPCV).

The ADPCV experiment which combines information on animacy, definiteness, case and verbal features shows a cumulative effect of the added features with results which differ significantly from the baseline, as well as from each of the individual experiments ($p<.0001$). We observe clear improvements for the analysis of all argument relations, as shown by the third column in table 8 which presents F-scores for the various argument relations. In the error analysis of the baseline parser in section 4, we concluded that word order and morphology does not provide

sufficient information for argument disambiguation in all cases.

In tables 9 and 10 we examine word order and part-of-speech for the corrected SS_OO and OO_SS errors in the ADPCV experiment. We see that the added information contributes to the reduction of precisely the types of errors which were identified in the error analysis. In particular, improvement is centered in postverbal positions, largely occupied by nouns and case ambiguous pronouns.

		Before		After		Total	
Gold	System	#	%	#	%	#	%
SS	OO	21	10.6	178	89.4	199	100.0
OO	SS	15	10.6	127	89.4	142	100.0

Table 9: Order relative to verb for corrected SS_OO and OO_SS errors in the ADPCV experiment.

		Noun		Pro_{amb}		Pro_{unamb}		Other		Total	
Gold	System	#	%	#	%	#	%	#	%	#	%
SS	OO	144	72.4	23	11.6	18	9.0	14	7.0	199	100.0
OO	SS	111	78.2	21	14.8	6	4.2	4	2.8	142	100.0

Table 10: Part of speech for corrected SS_OO and OO_SS errors in the ADPCV experiment.

Figure 2 shows the total number of SS_OO and OO_SS errors in the various experiments and clearly illustrates the observed reduction for this error type with the chosen set of linguistic features. If we examine confusion matrices for the assignment of the subject and object relations, we find a reduction of total errors for the SS_OO and OO_SS error types with 34.3% and 30.4% respectively. With respect to the specific errors performed by the baseline parser, we observe a substantial reduction of 44.6% for SS_OO and 46.0% for OO_SS.

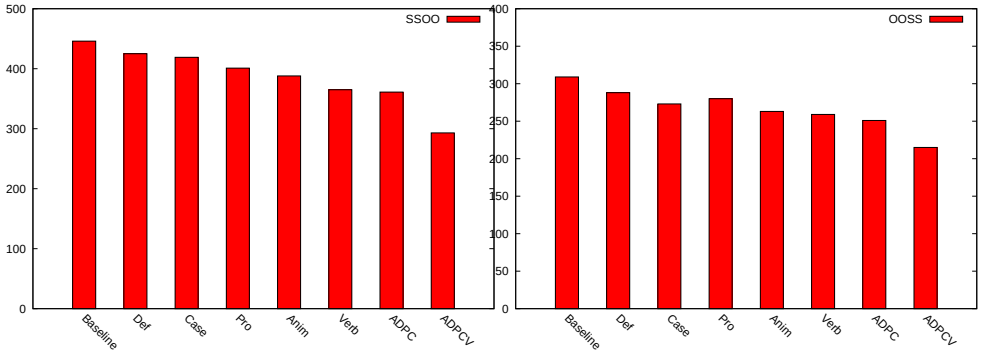

Figure 2: Total number of SS_OO errors (left) and OO_SS errors (right) in the various experiments.

6 Discussion and conclusion

An error analysis of a state-of-the-art data-driven dependency parser for Swedish revealed consistent errors in dependency assignment, namely the confusion of argument functions. The error analysis showed that further improvement of argument analysis was partly dependent on properties of argument realization other than word order and morphology. The separation of functional arguments from structural position which characterizes dependency analysis enabled the acquisition of functional generalizations irrespective of structural realization. For Scandinavian type languages, which are characterized by considerable word order variation and lack of morphological marking, the separation of function from structural realization constitutes an important property. Furthermore, the acquisition of soft, functional constraints is clear from the type of improvement which the added information incurred. We found improvement largely in labeled results caused by disambiguation of grammatical functions, rather than structural positions (attachment). For instance, for the errors confusing subjects for objects and vice versa, which were largely errors in labeling, we observed an error reduction of 44–46% of the baseline errors in the experiments combining all features. We found that a majority of the improved errors were arguments which were non-canonical in some sense, i.e., departing from the most frequent structural and morphological properties. Improvement thus relied on other properties of argument relations and the abstraction over specific realization in terms of dependency relations. The results are in line with recent proposals for a considerably flatter analysis of Scandinavian where ordering is determined by OT constraints (Engdahl et al., 2004; Andréasson, 2007).

We established a set of features expressing distinguishing semantic and structural properties of arguments such as animacy, definiteness and finiteness and performed a set of experiments with gold standard features taken from a treebank of Swedish. The experiments showed that each feature individually caused an improvement in terms of overall labeled accuracy and performance for the argument relations, in line with linguistic generalizations.

Properties of the Scandinavian languages connected with errors in argument assignment are not isolated phenomena. A range of other languages exhibit similar properties, for instance, Italian exhibits word order variation, little case, syncretism in agreement morphology, as well as pro-drop; German exhibits a larger degree of word order variation in combination with quite a bit of syncretism in case morphology; Dutch has word order variation, little case and syncretism in agreement morphology. These are all examples of other languages for which the results described here are relevant. Future work naturally extends to a multilingual setting, where similar experiments may be performed for these languages and the results may be evaluated and analyzed further.

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INDICATIONS OF URDU TETRAVALENT VERBS HAVING 'OBLIQUE AGENTS' IN THE ARGUMENT STRUCTURE

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Abstract

The data and analysis of the Urdu instrumental case marker '*se*' show that its role is quite diverse and it adopts various thematic roles in the argument structure of verbs. The marker '*se*' marks agents, instruments, time, space, postpositional phrases, adverbial phrases, etc. The analysis presents that semantic considerations about nouns help disambiguate classification of these roles. The marker '*se*' marks '*oblique agents*' for Urdu causative verbs form that ends in morpheme *-vaa*. This paper proposes that '*oblique agents*' exist as verb argument and result in tetravalent verbs. Semantic classification of case markers is used for mapping the four verb arguments.

1 Introduction

This paper presents key points from my dissertation work. The first section presents the classification of Urdu case markers and postpositions based on modeling requirement. In the second section, the data and analysis show that the role of the instrumental case marker '*se*' adopts various thematic roles in the argument structure of verbs. The marker '*se*' marks agents, instruments, time and space nouns, etc. The analysis presents that semantic considerations about nouns simplify classification of these roles. In the third section, the classification of marker '*se*' is used to mark 'oblique agents' as verb argument for certain Urdu causative verbs. These 'oblique agents' result in Urdu tetravalent causative verbs. This paper proposes this analysis and makes use of semantic case marking for their argument mapping.

2 Classification of Case Markers and Postpositions

The 'case marker' is generally attached morphologically at the lexical level for languages that employ case marking. The Urdu-Hindi nouns also change form at the lexical level, which is sometimes referred to as a case (Mohanan 1994; Arsenault 2002). However, the case markers in Urdu-Hindi, which help in mapping the verb argument structure appear as syntactic, not lexical, unit with the noun. To distinguish between syntactic case marking, morphological case marking and other postpositions, it is proposed that these may be classified based on the way they are handled or according to their function. The case marking and postposition system in Urdu/Hindi have been divided into five classes: (a) noun form, (b) core case markers, (c) oblique case markers, (d) possession markers and (e) 'pure' postpositions. The division of case markers into these categories is primarily based on the difference in the computational modeling required in each case. The division of case markers may be based on morphological (lexical), structural (syntactic) and on

functional (semantics) reasons. Therefore, the proposed division borrows heavily from the division of case markers presented by (Butt and King 1999), which includes lexical, structural, semantic and quirky case. However, the division presented here separates possession marking and also includes the use of semantic features to distinguish core and oblique verb arguments. Figure 1 shows the proposed hierarchical structure of case markers and postpositions in Urdu and Hindi.

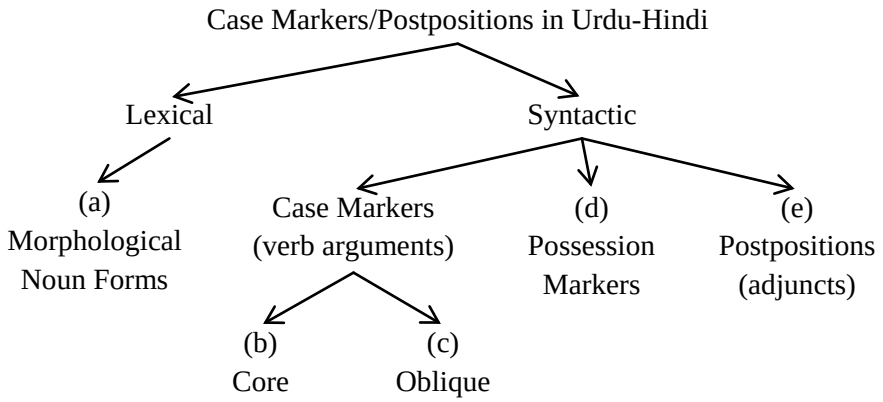


Figure 1: Classification of Case Markers/ Postpositions in Urdu-Hindi

2.1 Noun Forms

In the classification, the class (a) contain noun morphological forms. It is well known that nouns in Urdu/Hindi appear in nominative, oblique and vocative morphological forms. The syntactic coordination tests show that these noun suffixes like '*–e'* in the oblique noun forms cannot be used in coordinated structures (Butt and King 2004) as shown in (1). The suffix is tightly coupled with the word as a unit, and this suffix cannot be shared in the coordination. These suffixes are, therefore, lexical in nature and need to be handled morphologically at the lexical level, while other case markers and postposition can be coordinated and those are therefore syntactic in nature. The example (2) shows that the ergative marker '*ne*' can be used in a coordinated structure.

(1) (a) *ghoR-e or bakr-i*
horse-*sg.M.obl* and goat-*sg.M.obl*
'horses and goats'

(b) **ghoR or bakr-i*
*horse and goat-*sg.M.obl*
'horses and goats'

(2) (a) *ghoR-e=ne or bakr-i=ne*
horse=*erg* and goat=*erg*
'horses and goats'

(b) *ghoR-e aor bakr-i =ne*
horse and goat =*erg*
'horses and goats'

The lexical suffixes do not play a direct role in linking or mapping to the verb argument structure, as bare noun form cannot indicate which

grammatical function the noun may adopt. The oblique form is used with case markers and postpositions, which impart verb categorization features. However, the vocative form[1] is used as a 'subject' in the imperative mood. The nominative form appears in the absence of case marker or postposition.

2.2 Core Case Markers

The core case markers are included in class (b), which assign nouns a universal grammatical relation like subject, object and indirect object. These core grammatical relations in a sentence are directly controlled by the verbal predicate and these help noun find a position in the argument structure of the verb. These contribute to the verb transitivity and valency. The nominative, ergative, dative and accusative cases have been analyzed extensively in the literature (Mohanan 1994; Butt and King 2004). The case markers and corresponding grammatical relations are summarized as follows:

2.2.1 Nominative Case

If there is no case marker with the noun (or the noun phrase), the noun is said to be in the nominative case, which is the default case for noun phrases, as shown in (3) below. Here both 'boy' and 'book' are in the nominative form, which assume subject and object functions respectively. Both subject and object have nominative case but the 'animate' attribute helps to determine that a 'boy' is the more suitable subject.

(3) *laRk-aa* *ketaab* *xarid-e* *g-aa*
boy-*sg.M=nom* book=*nom* buy-*subj.obl* AUX-*fut-sg.M*
'A boy will buy a book'

2.2.2 Ergative Case

Noun phrases marked with the case marker '*ne*' express the role of an actor or agent that fills the 'subject' argument in the list of grammatical functions. It is well known that the ergative case appears with verbs in a perfective form having a valency greater than one. An example is shown in sentence (4) for the transitive verb '*xarid-naa*' (to buy).

(4) *laRk-e=ne* *ketaab* *xarid-i*
boy-*sg.M=erg* book.*nom* buy-*perf.sg.F*
'A boy bought a book'

The example in (4) contains one ergative and one nominative argument. The verb-noun agreement is with the highest nominative argument

[1] The vocative form is governed by the verb in the imperative mood, therefore it is the only example of 'lexical case' in Urdu or Hindi

in the argument structure of the verb. In this example, the subject NP is ergative and the object NP is nominative. Therefore, the verb agreement is with the object '*ketaab*' (the book). Some intransitive verbs are usually used without ergative case but they are also known to be acceptable in the ergative case for deliberate and purposeful actions (Abdul-Haq 1991; Mohanan 1994; Butt and King 2004).

2.2.3 Dative Case

In the dative case, a noun phrase marked with case marker '*ko*', expresses the role of an indirect object, recipient, beneficiary or receiver as the third argument in the argument structure of a ditransitive verb, where the other two arguments are the subject and the object. An Urdu sentence expressing dative case is shown in (5), where 'book' is a direct object and the receiver 'boy' is an indirect object marked with the dative case.

(5) *mañ=ne* *laRk-e=ko* *ketaab* *d-i*
I=*erg* boy-*sg.obl*=*dat* book.*nom* buy-*perf.sg.F*
'I gave the book to the boy'

(6) *laRk-e=ko* *sardi* *lag rahi hai*
boy-*sg.obl*=*dat* cold.*nom* feel-*pres.continuous.sg.F*
'The boy is feeling cold'

Urdu verbs which express some feeling or state change of someone do not take ergative or nominative subjects and employ the dative case for subjects as shown in (6). Some Urdu verbs that show 'physical feelings' like cold '*sardi*', hot '*garmi*', hunger '*bhuk*', thirst '*pe-yaas*', etc. are used in the dative case pattern shown in (6). Similarly, a state change of subjects is expressed in the dative case, for verbs like fever '*buxaar*', headache '*sar-dard*', love '*pe-yaar*', hate '*nafrat*', etc.

2.2.4 Accusative Case

The accusative case of a noun or noun phrase is represented using the case marker '*ko*', which expresses direct object, undergoer or patient, usually for transitive verbs. The accusative marker '*ko*' is phonetically the same as the dative case marker; however, it marks a different grammatical function and therefore represents a separate case. An example is sentence (7), in which 'dog' is in the accusative case and occupies the patient or 'object' grammatical function position in the argument structure of the verb. The accusative case is mostly used with transitive verbs, while dative case is used with ditransitive verbs to mark 'object' and 'indirect object' respectively. The accusative case is normally used to mark animate nouns as objects, similar to the ergative case, which is used to mark animate nouns as subjects. The accusative marker is usually necessary, especially for proper, animate nouns. The 'accusative case' of Urdu needs a much detailed analysis.

(7) *aakmal=ne* *kot't-e=ko* *maar-aa*
Akmal=*erg* dog-*sg.obl*=*acc* beat-*perf.sg.M*
'Akmal beat a dog'

2.3 Oblique Case Markers

The class (c) of case markers in Urdu includes oblique case markers, which assign nouns the oblique grammatical relation associated with a semantic role: these are governable by the verbal predicate through its argument structure. A noun phrase marked with an oblique case is not an optional phrase in a sentence, as its presence is predictable from the argument structure of the verb, in contrast to an optional postpositional phrase, which is not predictable from the argument structure. As English does not have a case marking system, the oblique arguments of the verbal predicate are treated as prepositional phrases. In strong case-marking languages, like Urdu, the oblique arguments may be treated as case marked rather than 'simple' postpositional phrases. For some Australian languages, such as Warlpiri, case marked oblique phrases have been observed (Nordlinger 1998). Some Urdu markers that act as the oblique case markers are:

se	instrument, space, time, etc.
meñ	in
par	on, at

The oblique case marked noun phrases are controlled by the argument structure of the verb and therefore these are counted in the verb's valency. '*nekaal-naa*' (to take out), '*rak*^{h}*-naa*' (to put), and '*Daal-naa*' (to put in) are transitive verbs but their argument structure contains three arguments, as shown in (8), resulting in a valency of three. For the verb '*nekaal-naa*' (to take out) one subject, one source location and one object is required, while for the verb '*rak*^{h}*-naa*' (to put) one subject, one destination location and one object is required. Two examples of oblique case markers in Urdu are shown in (9) and (10). These source or destination locations are not just bare locations in the form of post positions, because if we use destination location with '*nekaal-naa*' and source location with '*rak*^{h}*-naa*', the sentence will not be acceptable as shown in (11) and (12).

(8) *nekaal-naa*< 'agent', 'source location', 'patient'>
rak^{h}*-naa*< 'agent', 'destination location', 'patient'>

(9) *laRk-e=ne* *ferej=se* *paani* *nekaal-aa*
boy-*sg.M*=*erg* fridge=*source* water=*nom* take out-*perf.sg.M*
'The boy took the water out of the fridge'

(10) *aadmi=ne* *kamr-e=meñ* *saamaan* *rak^{h}-aa*
man-*sg.M=erg* room=*dest* luggage put-*perf.sg.M*
'The man put the luggage in the room'

(11) **laRk-e=ne* *ferej=meñ* *paani* *nekaal-aa*
boy-*sg.M=erg* fridge=*dest* water=*nom* take out-*perf.sg.M*
'The boy took out the water in the fridge'

(12) **aadm-i=ne* *kamr-e=se* *saamaan* *rak^{h}-aa*
man-*sg.M=erg* room=*source* luggage put-*perf.sg.M*
'The man put the luggage from the room'

2.4 Possession Marking

The forth class of postpositions in Urdu, class (d), contains possession markers and is represented by the genitive markers and this class is different from the classes of case markers due to the following reasons:

1. The possession markers appear between two nominals and cannot form a 'noun phrase' by combining with just one nominal
2. The possession markers change form to agree in gender and number with the second nominal
3. The possession markers designate that the first nominal is the possessor of the second nominal
4. The possession markers are not controlled by a verbal predicate and therefore do not directly mark a grammatical function

These four characteristics suggest that a 'genitive' or 'possession' marker is distinct from a case marker. Therefore, for these markers a new term 'possession marker' instead of 'genitive case marker' is proposed. There are three possession markers in Urdu, which require the first nominal in the oblique form and gender-number agreement with the second nominal.

Possession Marker	Gender	Number
kaa	masc	sg
ki	fem	–
ke	masc	pl

The possession markers define a possessor and a possessee relationship between two noun phrases. The possessive markers require that the first noun (or noun phrase) is in 'oblique' form and require number and gender agreement with the second noun (or noun phrase). The possessive noun phrases, therefore, require two nouns (or noun phrases) one each on the left and right side of the marker, as shown in noun phrases (13), (14) and (15).

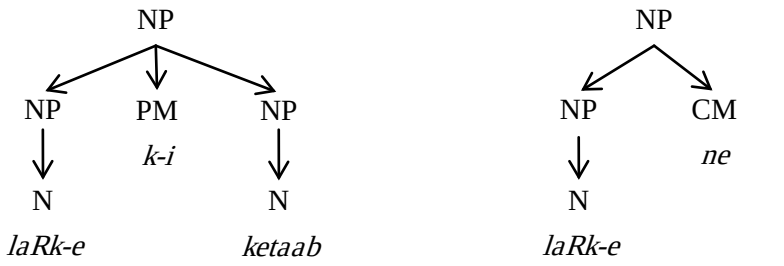
(13) NP *laRk-e* *k-i* *ketaab*
boy-*sg.obl.M* PM-*sg.F* book.*sg.F*

(14) NP *gaaR-i* *k-aa* *taal-aa*
car-*sg.F* PM-*sg.M* lock.*sg.M*

(15) NP *gaaR-i* *k-e* *taal-e*
car-*sg.F* PM-*pl.M* lock.*pl.M*

(16) NP * *laRk-e* *k-i*
boy-*sg.obl.M* PM-*sg.F*

(17) NP * *gaaR-i* *k-aa*
car-*sg.F* PM-*sg.M*



(a) Possession Marker (PM) (b) Case Marker (CM)

Figure 2: Possession Marker versus Case Marker

Figure 2 shows phrase structures of 'possession marker' (PM) and 'case marker' (CM). To make a well-formed noun phrase, a possession-marker requires two noun phrases, one on the left and one on the right side of a possession-marker, while a case marker just requires a noun phrase to its left. Using a possessive marker as a case marker results in phrases like the ones shown in (16) and (17), which cannot be used at a place where a noun phrase is required. Such phrases are incomplete 'noun phrases' and need another noun phrase for the completion. In other words, the 'possessive marker' has a valency for combining with two noun phrases, while 'case marker' has a valency for combining with one noun phrase.

2.5 Postpositions

The class (e) represents pure postpositions, these postpositions are not controlled by a verbal predicate and a sentence is complete in its meaning with or without postpositional phrases. Postpositional phrases are optional because these are not controlled by the argument structure of the verb. These, therefore, are counted neither in the transitivity nor in the valency of a verb. The semantic features of nouns, as employed for case markers, are also important for better machine translation of the postpositional adjunct phrases from one natural language to another language. Urdu has a large list of postpositions that act as adjuncts in Urdu.

(18) *aadm-i* *kamr-e=meñ* *kʰaanaa* *kʰaa rahaa hai*
man-*sg.M=nom* room=*loc* food eat-*sg.M.prog*
'The man is eating food in the room'

For example, the sentence in (18) is complete, even if the postpositional phrase '*kamr-e meñ*' (in the room) is omitted. The postpositional phrases add information to the event happening but are not directly related to the argument structure of the verbal predicate. There may be zero or more postpositional phrases, which appear as a set of adjuncts to the verbal predicate.

3 Classification of Cases Marked with '*se*'

After presenting a classification of postpositions and case markers in Urdu, the classification of cases marked with '*se*' is presented in this section. The case marked with '*se*' is usually treated as the 'instrumental case', which adopts different roles (Mohanan 1994; Butt and King 2004). The case marker '*se*' is very versatile and noun phrases marked with '*se*' occupy different grammatical relations. It fills subject, object, indirect agent and other oblique argument roles that are controlled by the verb's argument structure and also '*se*' as a postposition appears in a postpositional phrase or in an adverbial phrase, which act as an adjunct to main verb phrase. Sometimes '*se*' is used for comparison between two things and sometimes it is used with adjectives. It is proposed that it be classified according to its role function, instead of terming it a bare 'instrumental case' marker in all cases.

3.1 Marker '*se*' after an Animate Noun – (Agentive)

An animate noun (or noun phrase) marked with the case marker, '*se*', is categorized as an 'agentive case' and it occupies the 'subject' or 'oblique agent' role in the verb's argument structure. Sentence (19) shows an agent in the passive voice form, where the focus is on the object 'letter', which appears in the nominative case and therefore the gender-number agreement of the verb is with the object. In Urdu, the agent in the active voice is assigned

'nominative' or 'ergative' case, while in the passive voice it is changed to 'agentive case'. For English sentences in the passive voice, the subject and object positions are interchanged and therefore it is assumed that the object (in active voice) becomes the subject (in passive voice). While in Urdu, the position of the subject and the object are relatively less important due to the freer phrase order in Urdu.

(19) *xat* *laRk-e=se* *lek^{h}-aa* *ga-yaa*
letter.*sg.M=nom* boy-*sg.M=agent* write-*perf.sg.M* go-*perf.sg.M*
'A letter was written by a boy'

(20) *xat* *(X=se)* *lek^{h}-aa* *ga-yaa*
letter.*sg.M=nom* (X=*agent*) write-*perf.sg.M* go-*perf.sg.M*
'A letter was written (by someone)'

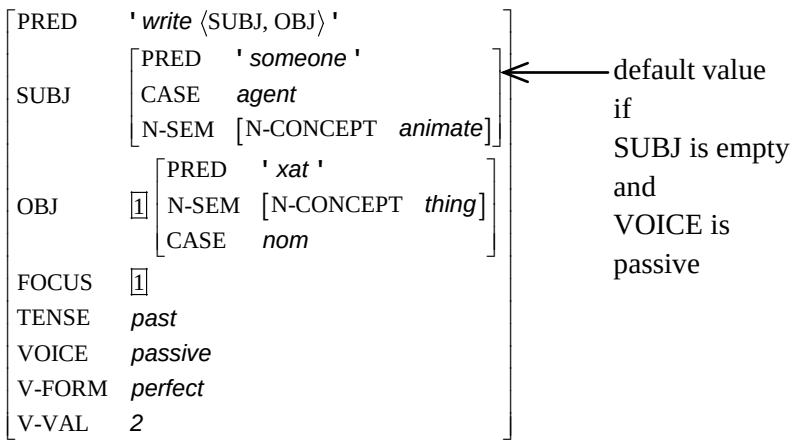


Figure 3: F-Structure of '*xat (X=se) lek^{h}-aa ga-yaa*'

For example, for the passive sentence in (19), in both English and Urdu, the 'doer of the action' is a 'boy' and the 'undergoer of the action' is a 'letter'; therefore according to the thematic hierarchy they may fill the subject and object arguments respectively. The analysis of the passive, *majhool*, presented here assumes that in the passive voice, the primary focus is on the undergoer and the agent becomes secondary, and therefore sometimes is omitted. If the agent is omitted from a passive sentence, then it is 'semantically implied' as there is a slot for an 'oblique agent' in the argument structure of the verb. We cannot assume that for an action there is no actor. Therefore, for sentence (20), an unknown agent 'X' is assumed to fill the 'writer' slot of the verb 'write'. This work analyzes the passive by assuming that there is no change in the verb's argument structure, as shown in Figure 3, the FOCUS attribute points to OBJ and a default SUBJ is assumed if it is omitted in a passive sentence.

3.2 Marker '*se*' with an Animate Noun – (Comitative)

Some verbs represent a reciprocal activity, which is performed mutually between two (or more) animate and/or human subjects and objects. In these activities, the presence of each participant is needed to perform the activity. The case marker '*se*' is used to mark animate participating nouns for grammatical 'object' position in the verb's argument structure. Here the marked noun is undergoer or experiencer of the action involved and thus occupies object position. An example sentence is shown in (21). Again, it is the argument structure of the verb, which requires an object marked with the case marker '*se*', instead of nominative or accusative case. The verb is neither causative nor is it in the passive. The verb's argument structure requires 'ergative case' for its subject and 'participant case' for its object. This case is usually translated in English as a prepositional phrase employing 'with' or 'from' as a preposition.

(21) *Haamed=ne* *Hameed=se* *baat* *k-i*
Hamid=*erg* Hameed=*participant* talk=*nom* do.*perf.sg.F*
'Hamid talked with Hameed'

3.3 Marker '*se*' with An Instrumental Noun – (Instrumental)

The inanimate nouns (or noun phrases) known as instrumental nouns in Urdu, *æsm-e-aalah*, are marked with the case marker '*se*' and these are categorized here as 'instrumental case'. These are typically used by some agent or actor as an aid to accomplish some task by himself (or herself). Example sentences are given in (22) and (23). The noun phrases in 'instrumental case' assume oblique grammatical functions and sometimes act as adjuncts to a sentence. This case is usually translated in English as a prepositional phrase employing 'with' as a preposition.

(22) *laRk-e=ne* *pensel=se* *xat* *lek^{h}-aa*
boy-*sg.M=erg* pencil.*sg.F=inst* letter write-*perf.sg.M*
'A boy wrote a letter with the pencil'

(23) *maaN=ne* *ch^{h}ur-i=se* *seb* *kaat-aa*
mother-*sg.F=erg* knife-*sg.F=inst* apple=*nom* cut-*perf.sg.M*
'The mother cut the apple with the knife'

3.4 Marker '*se*' with various Spatial Nouns

The verbs that depict activities related to movement or travel require various inanimate noun (or noun phrase) marked with the case marker *se* to convey information about 'transportation means', 'vehicle', 'path', 'passage' or 'source location'. The sentence in (24) shows an example, where someone traveled by boarding a vehicle, and the noun representing the vehicle is

marked with the case marker '*se*'. The sentence in (25) describes a *path* and the one in (26) describes a *passage* followed in a journey.

(24) *us=ne* *jahaaz=se* *safar* *ki-aa*
Hue/She-*sg=erg* plane.*sg.M=vehicle* travel.*sg.M* do-*perf.sg.M*
'He/She traveled by plane'

(25) *us=ne* *saRak=se* *safar* *ki-aa*
He/She-*sg=erg* road.*sg.M=path* travel.*sg.M* do-*perf.sg.M*
'He traveled by road'

(26) *vo* *darwaaz-e=se* *kamr-e=meñ* *aa-i*
She-*sg=nom* door-*obl.sg.m=passage* room=*loc.in* come-*perf.sg.F*
'She came into the room through the door'

3.5 Marker '*se*' with various Temporal Nouns

Temporal nouns, in Urdu known as *æsm-e-zarf-e-zamañ*, refer to 'time' or 'duration', and when these accompany the marker '*se*', they represents temporal case as shown in (27) and (28). These cases are usually translated in English as a prepositional phrase by using 'since' and 'for' as a preposition.

(27) *vo* *SobaH=se* *maqaalah* *lek^{h} rahaa hai*
He/She-*sg=nom* morning=*temporal* paper=*nom* write.*root.sg.M.cont.pres*
'He has been writing a paper since morning'

(28) *vo* *do den=se* *tomhaaraa* *entezaar kar rahi hai*
She-*sg=nom* two days=*temporal* your=*nom* wait.*root.sg.F.cont.pres*
'She has been waiting for you for two days'

3.6 Marker '*se*' with Adverbs – (Adverbial Usage)

Adverbs add information to a verb. In English adverbs could be formed morphologically from adjectives such as hurriedly, carefully, and attentively. In Urdu to form an adverbial phrase from a noun, the marker '*se*' is used, normally with those nouns that represent various 'concepts'. Examples of adverbial phrases in Urdu are shown in sentences (29) and (30). These are normally translated in English using an adverb and alternately these can be translated using prepositions such as 'in a hurry', 'with keenness' and 'with attention' instead of the adverbs 'hurriedly', 'keenly' and 'attentively'.

(29) *vo* *jaldi=se* *sakool* *pohanch-i*
He/She-*sg=nom* hurriedly=*adverbial* school reach-*perf.sg.F*
'She reached school hurriedly'

(30) *vo* *shaoq=se* *sabaq* *paṙh-taa* *hai*
He/She-*sg=nom* keenly=*adverbial* lesson read-*repeat.sg.M* AUX=*pres*
'He reads the lesson keenly'

3.7 Marker '*se*' with Infinitives

Urdu infinitives (also called 'verbal nouns') are marked with '*se*' and sometimes with other markers. Some example sentences with infinitives marked with '*se*' are shown in (31). These phrases are normally translated in English by using an infinitive (to + verb) or a prepositional phrase using English gerund form (–ing).

(31) *use* *paRh-ne=se* *nafrat* *hai*
He/She=*acc/dat* read-*inf.obl.m=inf* hatred=*nom* be.*pres*
'He/She has hatred for reading'

(32) *mojh-e* *ger-ne=se* *chaoT* *lag-i*
I=*acc/dat* fall-*inf.obl.m=inf* injury.*sg.F=nom* AUX-*perf.sg.F*
'I got an injury from falling'

3.8 Marker '*se*' for Comparison of two Similar Nouns

The marker '*se*' is also used in Urdu for the comparison between two noun phrases in the indicative. Two examples of such cases are shown in (33) and (34). The semantic concept of two nouns being compared is the same. Dissimilar nouns may not be compared.

(33) *ye* *jootaa* *us=se* *behtar* *hai*
this=*pro* shoe=*nom* that.*pro=comp* better AUX.*pres*
'This shoe is better than that (shoe)'

(34) *Zafar* *mozzafar=se* *lambaa* *hai*
Zafar=*nom* Muzzafar=*comp* taller AUX.*pres*
'Zafar is taller than Muzzafar'

4 Argument Structure of Causatives Verbs

After proposing classification of postpositions in Urdu based on modeling requirements, and especially the need of semantic information to classify cases marked with '*se*', the mapping of verb arguments of the causative verbs based on above classification may be analyzed in this section. The Urdu and Hindi languages use a morphological causative formation, in contrast to English which engages verbs like 'make', 'get', 'have', 'help' or 'let' for representing causative structures. The causative verb forms (or transitivitized verb forms) in Urdu are normally derived from intransitive and transitive verb-root-forms by adding the suffixes: *–aa* and *–vaa*. Adding these suffixes to the root-form of a verb creates the stems of new verbs. Our analysis proposes that this causativization is normally a valency increasing

process in Urdu, which changes not only the argument structure of the verb but also the semantics conveyed. The formation of higher valency causative argument structure from the univalent and bivalent verbs can be seen in the examples presented in this section.

The example in (35) shows a univalent verb '*ger-naa*' (to fall), which requires an unergative subject. The causative form 1 of the verb is '*ger-aa-naa*' (to make someone fall), which is a bivalent verb as shown in (36). It requires an ergative agent for the perfect verb form and a nominative agent otherwise. The verb '*ger-aa-naa*' requires an accusative object if the object is 'animate' and a nominative object otherwise. The causative form 2 of the verb is '*ger-vaa-naa*' (to make someone fall through someone), which is a trivalent verb as shown in (37).

(35) *Haamed* *ger-aa*
Hamid.*sg.m=nom* fall.*perf.sg.m*
'Hamid fell (down)'

(36) *Hameed=ne* *Haamed=ko* *ger-aa-yaa*
Hameed.*sg.m=erg* Hamid.*sg.m=acc* fall-make.*caus1.perf.sg.m*
'Hameed caused Hamid fall (down)'

(37) *Hameed=ne* *Haamed=ko* *aeHmad=se* *ger-vaa-yaa*
Hameed=*erg* Hamid=*acc* Ahmad=*agent* fall-make.*caus2.perf.sg.m*
'Hameed engaged Ahmad to cause Hamid fall (down)'

(38) *Hameed=ne* *Haamed=ko* *(X=se)* *ger-vaa-yaa*
Hameed=*erg* Hamid=*acc* (X=*agent*) fall-make.*caus2.perf.sg.m*
'Hameed engaged someone to cause Hamid fall (down)'

It is often argued that the 'intermediate agent' marked with '*se*' is optional and even after semantically recognizing the presence of an 'intermediate' or 'logical' agent, it is assumed that the presence of an 'intermediate agent' is not dictated by the verb's argument structure because it is syntactically optional (Mohanan 1990; Bhatt and Embick 2003; Butt 2003). However, this work proposes the following:

1. The 'intermediate agent' marked with '*se*' is governed by the argument structure of the causative verb form 2.
2. The 'intermediate agent' marked with '*se*' is *not optional*; however, it is sometimes *omitted* either because the 'intermediate agent' is already known in a discourse, requires least focus or cannot be precisely stated or does not require focus for the current discussion.

This work presents the following arguments to support the above stated assumptions:

1. The 'intermediate agent' marked with '*se*' cannot be used with the causative verb form 1. The use of an 'intermediate agent' is syntactically incorrect, because it does not act as a normal adjunct.
2. If the 'intermediate agent' marked with '*se*' is omitted, then it is semantically implied. Because, if two sentences have the same words with the same syntactic structures, such that one employs causative verb form 1 and the other uses causative verb form 2, then the interpretation of the two sentences should be different. For example, if the sentence in (36) is compared with the sentence in (38), the different interpretations are seen, because the indication of the 'intermediate agent' is embedded in causative form 2; these semantics can always be contrasted in similar sentence pairs.
3. The 'intermediate agent' marked with '*se*' when used with causative verb form 2 does not add extra meaning to the interpretation but only gives the information about the 'intermediate agent'. In (38), the 'intermediate agent' is omitted and the interpretation is 'Hameed caused Hamid fall down, *through someone*', but in (37) the interpretation is more specific about the 'intermediate agent' that 'Hameed caused Hamid fall down, *through Ahmad*'.
4. Omitting a syntactic unit is not a new concept. Urdu and Hindi are 'pro-drop' languages, i.e., sometimes these languages can form a sentence without an overt noun (or a pronoun), if the referent of the noun (or noun phrase) could be semantically implied in a discourse.

The negative sentences employing causative form 1 and 2 in (39) and (40), similar to those given in (36) and (38), have complementary interpretations. The interpretation for example (39) is that it is not Hameed who made Hamid fall down, but he might have engaged someone to do this task. In example (40), which uses causative form 2 and omits the '*se*' phrase, the interpretation is 'Hameed did not engage *any* 'intermediate agent' to cause Hamid fall down'; however he himself might have done so. In contrast, the interpretation in (41) is 'Hameed *did not engage Ahmad* to make Hamid fall down, although he *might have engaged someone else* to cause Hamid fall down.'

(39) *Hameed=ne Haamed=ko nahiñ ger-aa-yaa*
Hameed.*sg.m=erg* Hamid.*sg.m=acc* not fall-make.*caus1.perf.sg.m*
'Hameed didn't cause Hamid fall (down)'

(40) *Hameed=ne Haamed=ko (X=se) nahiñ ger-vaa-yaa*
Hameed=*erg* Hamid=*acc* (X=*agent*) not fall-make.*caus2.perf.sg.m*
'Hameed didn't engage ***anyone*** to cause Hamid fall (down)'

(41) *Hameed=ne Haamed=ko aHmad=se nahiñ ger-vaa-yaa*
Hameed=*erg* Hamid=*acc* Ahmad=*agent not* fall-make-*caus2.perf.sg.m*
'Hameed didn't engage Ahmad to cause Hamid fall (down)'

The example of a transitive verb '*son-i*' (to listen to something) is shown in the sentence (42). The examples in (43) and (44) show causative forms of the transitive verb '*son-i*'. The causative form 1 of this verb is '*son-naa-i*', which is trivalent and means 'to involve someone in listening to something, recited by the agent himself', is shown in the sentence (43). The causative form 2 of the verb is '*son-naa-i*', which is tetravalent and means 'to involve someone in listening to something, recited by some intermediate agent (including electronic devices)', is shown in (44).

(42) *Haamed=ne* *naZam* *son-i*
Hamid=*erg.sg.M* poem=*nom.sg.F* listen.*perf.sg.F*
'Hamid listened to a poem'

(43) *Hameed=ne* *Haamed=ko* *naZam* *son-aa-i*
Hameed.*sg.m=erg* Hamid.*sg.m=acc* poem=*nom.sg.F* listen-make.*caus1*
'Hameed made Hamid listen to a poem (recited by Hameed)'

(44) *Hameed=ne* *Haamed=ko* *aeHmad=se* *naZam* *son-vaa-i*
Hameed=*erg* Hamid=*acc* Ahmad=*agent* poem=*nom* listen-make.*caus2*
'Hameed made Ahmad recite and made Hamid listen to a poem (recited by Ahmad)'

For the causative form 1 (formed with *-aa*) the causee is in the 'accusative case' marked with the case marker '*ko*', while for causative form 2 (formed with *-vaa*) the causee is in the 'agent case' marked with the case marker '*se*'. The examples in (45) to (49) have been taken from (Butt and King 2004), who show that accusative case is compatible with causative form 1, while agent case is compatible with causative form 2. While using agent case with causative form 1 and using accusative case with causative form 2 is incorrect. The case selection for the verb argument is dictated by the causative form. The causative form 1, '*kat-aa-yaa*', is also sometimes used in place of '*kat-vaa-yaa*' to convey the same semantics, but actually it does not exist in formal Urdu usage, because '*kat-aa-naa*' is not compatible with the agent case as shown in (45).

(45) *anjom=ne* *Saddaf=ko/*se* *k^{h}aanaa* *k^{h}el-aa-yaa*
Anjom=*erg* Saddaf =*dat/*agent* food.*nom* eat.*caus1.perf*
'Anjom made Saddaf eat food (gave Saddaf food to eat)'

(46) *anjom=ne* *Saddaf=*ko/se* *podaa* *kat-vaa-yaa*
Anjom=*erg* Saddaf=**acc/agent* plant.*nom* cut-*caus2-perf*
'Anjom had Saddaf cut a/*the plant'

(47) *anjom=ne* *Saddaf=ko* *meSaalHah* *chak^{h}-aa-yaa*
Anjom=*erg* Saddaf=*acc* spice=*nom* taste-*caus1-perf*
'Anjom had Saddaf taste the seasoning'

(48) *anjom=ne* *Saddaf=se* *meSaalHah* *chak^h-vaa-yaa*
Anjom=*erg* Saddaf=*agent* spice=*nom* taste-*caus2-perf*
'Anjom made Saddaf *have someone* taste the seasoning', or
'Anjom made Saddaf *have herself* taste the seasoning'

(49) *anjom=ne* *Saddaf=ko* *meSaalHah* *chak^h-vaa-yaa*
Anjom=*erg* Saddaf=*acc* spice.*nom* taste-*caus2-perf*
'Anjom *made someone* have Saddaf taste the seasoning'

There is a semantic difference in the sentences in (47), (48) and (49). In (47), the meaning conveyed is 'Anjom presented 'gravy' to Saddaf and Saddaf tasted the seasoning'. In (48), the meaning conveyed is 'Anjom ordered (or requested) Saddaf to make seasoning tasted by someone (or by herself)'. In this case, Anjom has somehow initiated the action but she is not involved directly and she could even be away from the place. In (49), the meaning conveyed is 'Anjom engaged some intermediate agent and made Saddaf taste the seasoning'. It was some intermediate agent engaged by Anjom, who presented the seasoning to Saddaf and Saddaf tasted it.

The proposed argument structures of some Urdu-Hindi verbs, under the assumptions made in this work, are shown in (50).

(50) a. fall *ger-naa*<SUBJ>
ger-aa-naa<SUBJ, OBJ>
ger-vaa-naa<SUBJ, OBL$_{agent}$, OBJ>
b. laugh *hans-naa*<SUBJ>
hans-aa-naa<SUBJ, OBJ>
hans-vaa-naa<SUBJ, OBL$_{agent}$, OBJ>
c. taste *chak^h-naa*<SUBJ, OBJ>
chak^h-aa-naa<SUBJ, OBJ, OBJ$_\theta$>
chak^h-vaa-naa<SUBJ, OBL$_{agent}$, OBJ, OBJ$_\theta$>
d. eat *k^{h}aa-naa*<SUBJ, OBJ>
k^{h}el-aa-naa<SUBJ, OBJ, OBJ$_\theta$>
k^{h}el-vaa-naa<SUBJ, OBL$_{agent}$, OBJ, OBJ$_\theta$>

The causatives of ditransitive verbs shown in (50), under the analysis presented here, appear as tetravalent verbs. The semantics of well-formed sentences employing these verbs provide the following evidence for their analysis as tetravalent verbs.

1. A noun with instrument case is not optional; if it is omitted, then it is generally implied.
2. A noun with instrument case is the actual actor of the action performed, and therefore it is assigned the notion of an 'intermediate' agent.

3. A noun with instrument case is not like a bare instrument, which is typically used by the agent to perform the action, and the agent is animate having capability to perform the action itself.
4. A noun with ergative case engages someone (forcefully or by request) to perform an action but is not the actual actor of the action performed

Therefore the four arguments of a tetravalent verb in (51) are: (i) an ergative (or nominative) subject, (ii) an oblique (intermediate) agent, (iii) a direct object and (iv) an oblique object in dative case. These arguments are summarized in Table 1.

Table 1: Arguments of a Tetravalent Verb (Perfective Form)

Argument	*NP Case*	*Thematic Role*
subject	ergative	causer/initiator of the action
indirect agent	agentive	causee/agent of the action
indirect object	dative	beneficiary of the action
object	nominative	object of the action

(51) *maaN=ne baap=se bach.ch-ey=ko k^{h}aanaa k^{h}el-vaa-yaa*
mother=*erg* father=*ag* child.*obl=dat* food.*nom* eat.*caus2*
The mother caused (asked, requested) the father to give food to the child.

(52) *maaN=ne chamche=se bach.ch-ey=ko k^{h}aanaa k^{h}el-aa-yaa*
mother.*erg* spoon=*inst* child.*obl.dat* food.*nom* eat.*caus1*
The mother gave the food to the child by using a spoon, *or*
The mother made the child eat food by means of a spoon.

The sentences in (51) and (52) have four noun phrases with the same case markers, and each sentence has one verbal predicate. The tetravalent predicate, '*k^{h}el-vaa-yaa*', in (51), takes all four noun phrases as functional arguments, while the trivalent predicate, '*k^{h}el-aa-yaa*', in (52), takes only three noun phrases as functional arguments: The spoon in (52) is used as an instrument. The spoon is not animate and so cannot perform the action of its will, and therefore cannot take the position of an agent for performing the action. The mother in (52) is the actual performer of the action, making the child eat food. The spoon is used by the mother to perform the action. The instrumental argument 'spoon' is optional, and therefore it is not controlled by the predicate and acts as an adjunct. It may again be noted that the phrase '*baap=se*', cannot be used in place of '*chamche=se*' in (52); however '*chamche=se*' can be used in (51). Figure 4 shows an f-structure with a tetravalent predicate for the sentence in (51) and Figure 5 shows an f-structure with a trivalent predicate for the sentence in (52). The difference between an 'indirect agent' OBL_{agent} and an optional ADJUNCT can be seen in the f-structures.

$$\begin{bmatrix} \text{PRED} & \text{' } k^h\textit{elvaanaa } \langle \text{SUBJ, OBL}_{agent}, \text{OBJ}_\theta, \text{OBJ} \rangle \text{ '} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{' } \textit{maaN} \text{ '} \\ \text{N-SEM} & [\text{N-CONCEPT} \quad \textit{animate}] \\ \text{CASE} & \textit{erg} \end{bmatrix} \\ \text{OBL}_{agent} & \begin{bmatrix} \text{PRED} & \text{' } \textit{baap} \text{ '} \\ \text{N-SEM} & [\text{N-CONCEPT} \quad \textit{animate}] \\ \text{CASE} & \textit{agent} \end{bmatrix} \\ \text{OBJ}_\theta & \begin{bmatrix} \text{PRED} & \text{' } \textit{bachchah} \text{ '} \\ \text{N-SEM} & [\text{N-CONCEPT} \quad \textit{animate}] \\ \text{CASE} & \textit{dat} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{' } k^h\textit{aanaa} \text{ '} \\ \text{N-SEM} & [\text{N-CONCEPT} \quad \textit{thing}] \\ \text{CASE} & \textit{nom} \end{bmatrix} \end{bmatrix}$$

Figure 4: F-Structure of
'*maaN=ne baap=se bach.ch-e=ko k^{h}aanaa k^{h}el-vaa-yaa*'

$$\begin{bmatrix} \text{PRED} & \text{' } k^h\textit{elaanaa } \langle \text{SUBJ, OBJ}_\theta, \text{OBJ} \rangle \text{ '} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{' } \textit{maaN} \text{ '} \\ \text{N-SEM} & [\text{N-CONCEPT} \quad \textit{animate}] \\ \text{CASE} & \textit{erg} \end{bmatrix} \\ \text{OBJ}_\theta & \begin{bmatrix} \text{PRED} & \text{' } \textit{bachchah} \text{ '} \\ \text{N-SEM} & [\text{N-CONCEPT} \quad \textit{animate}] \\ \text{CASE} & \textit{dat} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{' } k^h\textit{aanaa} \text{ '} \\ \text{N-SEM} & [\text{N-CONCEPT} \quad \textit{thing}] \\ \text{CASE} & \textit{nom} \end{bmatrix} \\ \text{ADJUNCT} & \left\{ \begin{bmatrix} \text{PRED} & \text{' } \textit{se } \langle \text{OBJ} \rangle \text{ '} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{' } \textit{chamchah} \text{ '} \\ \text{N-SEM} & [\text{N-CONCEPT} \quad \textit{instrument}] \end{bmatrix} \end{bmatrix} \right\} \end{bmatrix}$$

Figure 5: F-Structure of
'*maaN=ne chamche=se bach.ch-ey=ko k^{h}aanaa k^{h}el-aa-yaa*'

It is proposed that 'intermediate agent', in the absence of an overt argument, can take a ***default*** value of '***someone***' in non-negative sentences and '***anyone***' in negative sentences. This satisfies the notion of completeness and the assumption that "if an intermediate agent is omitted, it is semantically implied".

5 Conclusions

In this paper, modeling-based classification of Urdu case markers and postpositions is presented. Verb forms, core case markers, oblique case markers, postpositions and possession markers are classified separately. The use of semantic features of nouns to classify and better resolve argument mapping of instrumental cases in Urdu has been proposed. The agentive case marked with '*se*' for animate nouns is used to propose the 'oblique agent' as full verb argument for the causative form 2 verbs in Urdu. Causative form 2 verbs, that end in *–vaa* suffix, are thus analyzed as having trivalent or tetravalent argument structure.

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Abstract

The English *-ing* form, also called *(verbal)* gerund, is often believed to display a mixture of verbal and nominal properties, thus posing problems for any theory of grammar. I will argue that this is actually not the case for every construction involving the *-ing* form, but only for two distinct subclasses, *-ing* forms after genitive subjects and after determiners like *no* or *any*. In the other cases, which are the majority of all cases, the *-ing* form only displays verbal properties. I show that tests traditionally considered to show nominal properties work for clausal phrases as well. Therefore, these tests have to be dismissed. A simple analysis is then proposed for the *-ing* form with accusative and null subject, as these forms do not display a mixture of properties.

1 Introduction

The usual view on the English *-ing* form in sentences like (1) challenges any kind of grammar theory as it is believed to display a mixture of verbal and nominal properties.[†] Thus, within LFG, the *-ing* form calls the principle of lexical integrity and the principle of endocentricity into question.

(1) We object to (his/him) joining the club.

The verbal properties of the *-ing* form include, for example, the governing of a direct object or the possibility of modification by adverbs. On the other hand, the use of the *-ing* form as subjects, objects and complements of prepositions is considered to indicate nominal properties.

In this paper, I argue that the traditional tests for the nominal properties of a phrase have to be revised as these tests also work for clauselike constructions, for example *to* infinitives and *that* clauses. In section 2, I look at the properties of the *-ing* form in detail with respect to the usual tests applied to distinguish between verbal and nominal properties of phrases. In section 3, the nominal properties are examined with respect to *to* infinitives and *that* clauses. It is shown that these clausal constructions also have the supposedly nominal properties and that therefore, these tests have to be dismissed.

Thus, other tests are needed to examine whether the *-ing* form really displays mixed properties. In section 4, I show that only two distinct subclasses of the *-ing* form, constructions with genitive subject and with negative determiners like *no* or *any* display mixed properties and therefore need a complex analysis. The other subclasses of the *-ing* form, forms with acusative or null subject, only display verbal properties and therefore do not pose problems for a syntactic analysis. At the end of the paper, after examining previous analyses briefly, analyses for the different constructions will be proposed.

[†]Thanks go to my supervisor Miriam Butt, who suggested this topic to me in the first place and who made it financially possible for me to attend the LFG conference.

2 Nominal and verbal properties of the *-ing* form

The usual view (e.g., Hudson 2003, Bresnan 2001, Malouf 2000) on the *-ing* form is that it displays a mixture of verbal and nominal properties. The verbal properties include the possibility of:

(2) a. **governing a direct object:** We object to joining *the club.*

b. **modification by adverbs:** We object to *immediately* joining the club.

c. **tense and voice distinctions:** We object to *having joined* the club.

d. **negation by *not*:** We object to *not* joining the club.

e. **subjects in non-genitive case:** We object to *him* joining the club.

On the other hand, the *-ing* form has the following properties, which are considered to show the nominal character of the *-ing* form. The *-ing* form can:

(3) a. **function as subject:** *Joining the club* is objected to.

b. **function as object:** We object to *joining the club*.

c. **be complement to prepositions:** We object *to* joining the club.

d. **be coordinated with an NP:** We object to joining ourselves *and* your decision to join.

e. **be replaced by *it*:** We object to *it*.

Bresnan (2001) also lists further tests which supposedly show the nominal character of the *-ing* form:

(4) a. **tough-movement:** Joining the club is hard to object to.

b. **topicalization:** Joining this club, we don't want to object to.

c. **pseudo-clefting:** What we want to object to is joining this club.

d. **clefting:** It was joining the club that we objected to.

e. **genitival subjects**: We object to his joining the club.

f. **fronting:** Whose joining the club did we object to?

3 Dismissing tests for nominal properties

The fact that gerunds can appear in subject and object positions, that they can be coordinated with a nominal phrase and that they can be complements to prepositions has led many researchers to conclude that the external distribution of gerunds is the same as that of nominal phrases and that therefore, they should be nominal at some level (Hudson 2003). However, Kim (2003) challenges this view by pointing out that constructions involving CPs like *that* clauses or *to* infinitives can also occur as subjects (5) and objects (6). Additionally, clauses with *wh*-words (7) and embedded clauses introduced by *whether* or *if* (8) can function as complements of prepositions.

(5) a. To see is to believe. (Kim 2003, 128)

b. That he arrived very early surprised everyone. (Kim 2003, 128)

(6) a. I like to play tennis. (Kim 2003, 128)

b. No one remembered that he arrived very early. (Kim 2003, 128)

(7) Let me think about what the consequences will be. (Kim 2003, 129)

(8) a. It depends on whether you have the intention to do it or not. (Kim 2003, 128)

b. We are not talking about if they get married but when. (Kim 2003, 128)

Kim (2003) does not discuss any further tests to decide on the external category of gerund constructions. However, throughout the literature, many other tests have been proposed. Hudson (2003) lists coordination of the *-ing* construction with "normal" nominal phrases as a test. This, however, also works with *that* clauses, which can be coordinated with NPs just like the *-ing* form.

(9) a. Me going to Spain and my decision to do so quickly upset my family.

b. That I would go to Spain and my decision to do so quickly upset my family.

Malouf (1996) considers a further difference between nominal phrases and clauses. According to him, "clauses, unlike NPs, are generally prohibited from occuring clause internally". He gives the following examples:

(10) a. *I believe that Pat took a leave of absence bothers you. (Malouf 1996, 255)

b. I believe that Pat's / Pat taking a leave of absence bothers you. (Malouf 1996, 255)

Looking at the data more closely reveals that while a main clause like *Pat took a leave of absence* cannot occur clause internally, an embedded clause might, at least with the appropriate intonation pattern, occur clause internally. Thus, putting (11a) and (11b) together results in the grammatical sentence in (11c).

(11) a. I believe that it bothers you.

b. That Pat took a leave of absence bothers you.

c. I believe that that Pat took a leave of absence bothers you.

Thus, it seems that the test proposed by Malouf (1996) to distinguish between nominal and clausal phrases cannot be used in this respect.

Bresnan (2001) proposes some tests to distinguish between what she calls gerundive and participial VPs where she concludes that the gerundive VP, the *-ing* form under consideration in this paper, behaves like a nominal phrase externally. I will show that these tests also work for either *that* clauses or *to* infinitives. This then shows that the tests are not useful to decide whether a phrase is nominal.

The possibility of replacing the *-ing* form with *it* at first glance seems to show the nominal character of the gerundial construction, but the replacement works for *that* clauses or *to* infinitives as well which can be seen in (12) where *it* replaces the *that* clause and the *to* infinitive.

(12) a. I decided that I should go to Spain although it upset my family.

b. I decided to go to Spain although it upset my family.

Bresnan also proposes "tough-movement" (13) and topicalization (14) as tests for the nominal character of verbal gerunds. However, these two tests work with *that* clauses or *to* infinitives as well.

(13) a. That I should go to Spain was hard for me to decide.

b. To go to Spain was hard for me to decide.

(14) a. That I should go to Spain, I decided.

b. To go to Spain, I decided.

Pseudo-clefting (15) works with all three constructions, the *to -ing* construction, *that* clauses and *to infinitives*. In contrast, clefting (16) seems strange with *that* clauses.

(15) a. What I decided was that I should go to Spain.

b. What I decided was to go to Spain.

(16) a. *It was that I should go to Spain that I decided.

b. It was to go to Spain that I decided.

To sum up, the tests proposed do not actually prove the nominal character of the verbal gerund construction, but they could also lead to the conclusion that one is dealing with a clausal construction.

4 Subclasses of the *-ing* form and their properties

In the previous section, I dismissed tests proposed to decide on the nominal properties of the *-ing* form. It was shown that the supposedly nominal properties also hold for *to* infintives and *that* clauses. However, the *-ing* form with a genitive subject behaves differently from *to* infinitives and *that* clauses. A genitive subject is not possible with these constructions. Consequently, the fronting of the *-ing* form in questions when asked for the subject is not possible with these two constructions, either.

(17) a. I decided for him/*his to go to Spain.

b. I decided that he/*his should go to Spain.

Hudson (2003) points out another purely nominal property. He observes that the *-ing* form can also be used with a restricted class of determiners in two special constructions. This is the case for *no* or *any* in constructions like (18)

(18) a. No playing loud music! (Hudson 2003, 581)

b. There isn't any telling what they will do. (Hudson 2003, 582)

This means that the claim that the *-ing* form in general has an external nominal distribution and is verbal as far as their internal structure is concerned (Hudson 2003, 583) has to be altered. In the tests discussed above, only the possibility of a genitive subject or the determiners *no* and *any* were not possible with either *to* infinitive or *that* clause. This points to a split between the *-ing* form with a genitive subject and the negative determiners on the one hand and the other forms on the other hand. In the other constructions, the external distribution does not need to be nominal. This means that there are different subclasses of *-ing* form constructions which have to be considered separately.

A distinction between three different subclasses of verbal gerund constructions has already been proposed by Malouf (2000). According to him, *POSS-ing* constructions are verbal gerunds with a genitive subject, whereas *ACC-ing* constructions have a subject in accusative case. *PRO-ing* constructions are *-ing* forms without an overt subject. I suggest establishing a fourth subtype, *DET-ing*, to accommodate the cases of the verbal gerund with the negative determiners *no* or *any*.

(19) a. **POSS-ing**: We object to his joining the club.

b. **ACC-ing**: We object to him joining the club.

c. **PRO-ing**: We object to joining the club.

d. **DET-ing**: No joining this club!

It will prove useful to group the *POSS-ing* and *DET-ing* constructions together as they have the external nominal distribution in common. The case of *PRO-ing* is controversial in the literature, with Bresnan (2001) treating it as a subclass of *POSS-ing* and Malouf (2000) stating similarities between this construction and *ACC-ing*. Thus, I will look at some of the properties that the *ACC-ing* and *POSS-ing* constructions do not share and see how the *PRO-ing* construction fits in.

That the *POSS-ing* and *ACC-ing* constructions cannot have exactly the same syntactic analysis can be seen from the fact that they cannot be conjoined.

(20) *John's joining the club and Peter quitting was not a good idea.

As Horn (1975) pointed out (cited in Malouf 2000), the two constructions also behave differently in the triggering of number agreement on the verb in conjoined constructions. While the *ACC-ing* construction triggers singular number agreement, *POSS-ing* constructions normally trigger plural number agreement. In this respect, the *PRO-ing* construction behaves like the *ACC-ing* construction:

(21) a. Me joining the club and him quitting was / *were not a good idea.

b. My joining the club and his quitting ?was / were not a good idea.

c. Joining the club and quitting shortly after was /*were not a good idea.

In these conjoined constructions, the *ACC-ing* pattern behaves like a clause while the *POSS-ing* pattern behaves like an NP.

Another distinction between *POSS-ing* and *ACC-ing* constructions involves extraction. Malouf (2000), following Horn (1975), suggests that it is possible to extract a complement out of an *ACC-ing* and *PRO-ing* construction, but not out of a *POSS-ing* construction.

(22) a. Which city do you remember him describing? (Malouf 2000, 38)

b. Which city do you remember describing?

c. *Which city do you remember his describing? (Malouf 2000, 38)

Malouf (2000), however, argues that the examples involving coordination and extraction might be ungrammatical due to the semantics of the coordinated structures and because definite NPs cannot be extracted. This challenges the view that

the distinction between *ACC-ing* as clause-like and *POSS-ing* as nominal-like is not as clear as these examples suggest. It still shows, though, that the *PRO-ing* construction is similar to the *ACC-ing* construction. As for the distinction between *ACC-ing* and *POSS-ing*, Malouf (2000) lists further evidence for the phrasal, respectively nominal, distribution of the two constructions.

He discusses the fronting of the *-ing* form with *wh*-subjects under pied piping in restricted relative clauses. While this is possible with *POSS-ing* constructions, it is not with *ACC-ing* constructions. This shows the similarity of the *ACC-ing* construction with clauses and the *POSS-ing* construction with NPs.

(23) a. The person whose being late every day Pat didn't like got promoted anyway. (Malouf 2000, 39)

b. *The person who(m) being late every day Pat didn't like got promoted anyway. (Malouf 2000, 39)

Pied piping with the *PRO-ing* construction does not work as in the *PRO-ing* pattern, the subject of the gerund construction is coreferential with the subject of the main clause. Thus, no conclusion can be drawn on how *PRO-ing* behaves from this argument.

Another difference between the two constructions can be seen in quantifier scope. While a quantified subject of a *POSS-ing* construction can have wide scope, it cannot in *ACC-ing* constructions (Malouf 2000, 33). Here again, the distribution corresponds to nominal and clausal phrases.

(24) a. Someone talked about every team's appearing on television.
$\exists x \forall y$ talk-about' (x, appear-on-tv'(y))
$\forall y \exists x$ talk-about' (x, appear-on-tv'(y))
(Malouf 2000, 33)

b. Someone talked about every team appearing on television.
$\exists x \forall y$ talk-about' (x, appear-on-tv' (y))
(Malouf 2000, 34)

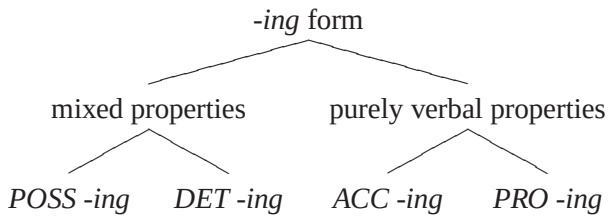
As in the pied piping example above, the test does not work with the *PRO-ing* construction as the subject of the *-ing* form is coreferential with the subject of the main clause. Consequently, (25) has only one reading.

(25) Everyone talked about appearing on television.
$\forall x$ talk-about' (x, appear-on-tv'(x))

Considering all the differences discussed, a different analysis for the constructions is justified. This has not been the case in previous analyses. Although Malouf (2000) finds differences between the constructions, he still believes the traditional tests for nominal phrases to display the nominal character of the *-ing* form. Consequently, in his approach, the differences in the different subclasses are only minor

and he claims that "any approach which is unable to give them a uniform analysis will be missing important generalizations" (Malouf 2000, 42f). This will not be the case in my analysis as the traditional tests for nominal properties have been dismissed and thus, the differences in the behavior of the different forms in the tests discussed in this section have a greater impact. Thus, while the *POSS-ing* and *DET-ing* construction really display mixed properties, the *ACC-ing* and *PRO-ing* constructions are purely verbal:

(26)



5 Previous analyses

The problem for analyzing the *-ing* form lies in the properties outlined above, the external nominal distribution of the *POSS-ing* and *DET-ing* constructions and their internal verbal structure. Many attempts have been made to find analyses for this problem, not only for gerundial constructions but for mixed categories in general as well. As Bresnan (1997) points out, mixed categories challenge grammar theories in two ways. First, they question phrasal endocentricity as to whether every category has to have a head and second, they raise the problem whether morphemes can belong to separate categories in the syntax and then be joined together into a single surface word, thus challenging lexical integrity.

Two different approaches have been taken to solve these problems: one solution were proposals within the framework of the already established lexical categories of the respective grammar theory. However, they often ran into the two problems mentioned above. The other approaches were proposals introducing a new indeterminate category for constructions with the *-ing* form. In the following, I outline some of the previous analyses and discuss some of the problems with these analyses.

Bresnan (2001) proposes a feature system for LFG with two features, *predicative* categories "which cannot stand alone as arguments but require an external subject of predication" (Bresnan 2001, 120) and *transitive* categories which "may take an object or direct complement function"(Bresnan 2001, 120). In this feature system, the following feature distribution can be assigned:

(27)

	+predicative	-predicative
+transitive	V	P
-transitive	A	N

As I have shown in the previous section, constructions with the *-ing* form take direct objects and do not need an external subject of predication. In this respect,

the *-ing* form would be [-predicative, +transitive], a cell which is already filled by prepositions. However, some researchers consider adverbs a major lexical category as well, which does not fit into this system either. Thus, the establishment of an additional category would probably be possible but, as will be seen below, not appropriate to the problem.

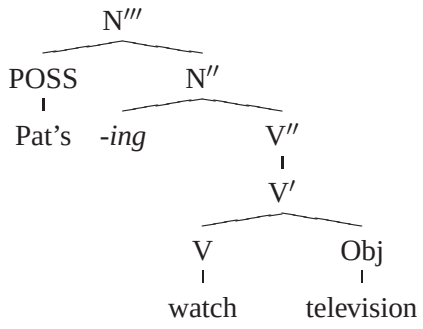
Within other grammar theories, there are a lot of different approaches to this problem. For example, Blevins (2005) uses a system with the features ± N, ± V and ± A in conjunction with the use of underspecified entries. Baker's (2005) approach is similar to Bresnan's (2001) system as he claims that the "distinctive property of verbs is that they license a specifier" and that nouns "bear a referential index in the syntax" (Baker 2005, 2). He concludes that the *-ing* form is a "purely nominal projection that exceptionally dominates a purely verbal projection" (Baker 2005, 7).

Some of the approaches to analyzing the *-ing* form as a new indeterminate category use a multiple inheritance hierarchy of categories (Malouf 2000, Chung et al. 2001, Hudson 2003). There are some differences between these proposals in placing the *-ing* form construction under either nouns and verbs on the one hand (Hudson 2003) or under nouns and relational categories, which, for example, also contain verbs and adjectives, on the other (Malouf 2000).

Bresnan (1997) lists two potential problems with what she calls indeterminate category projection theories. The first one is that in most cases the syntactic category of the form in question is morphologically clear. This is not the case with the *-ing* form as *-ing* can be used to form either a noun or an adjective, or, in my analysis, even a verb. A second problem is "that phrasal coherence constrains the mixing of categories" (Bresnan 1997, 4). This means that an indeterminate or underdeterminate analysis does not pay attention to the fact that the *-ing* constructions, more precisely the *POSS-ing* and *DET-ing* constructions, are verbal up to a certain stage and then have an external nominal distribution.

Theories which take the established categories for granted usually either assume no head or a shared head for the *-ing* construction. Approaches with no head were the very first proposals, for example as in (28), which is modeled on the theory of Jackendoff (1977), where the *-ing* "lowers onto the verb via some variation of Affix Hopping" (Malouf 2000) but they clearly violate both integrity and endocentricity principles.

(28)



To avoid this problem, it was suggested that either *-ing* (e.g., Baker 1985, Abney 1987) or the whole *-ing* form (e.g., Pullum 1991, Lapointe 1993) should be the head of the construction. The first kind of theory builds on morphological derivation in syntax and therefore violates the integrity principle. The analyses with the whole *-ing* form as head on the other hand violate the endocentricity principle.

All these approaches have in common that they assume a very similar structure for all subclasses of the *-ing* form, believing in the external nominal distribution with internal verbal properties. Kim (2003), who questions the external nominal distribution for the *-ing* form in general, proposes only an analysis for the *ACC-ing* and *PRO-ing* form. Thus, he ignores the special problems of mixed categories posed by the *POSS-ing* and *DET-ing* forms.

Within the LFG framework, different articles (Bresnan 2001, Bresnan and Mugane 2006) have been written to offer an analysis for the *-ing* form. Bresnan (2001) assumes that the *-ing* form has an external nominal distribution and that the *POSS-ing* construction is the basic form of it. She proposes to analyze the *POSS-ing* form as a VP embedded inside a DP.

Embedding the VP inside a DP rather than an NP avoids some problems previous analyses have had. First, a DP is a functional category and it is generally more accepted that functional categories do not need to have a head.

Second, if the VP is embedded inside an NP, it should be possible for the *-ing* form to be modified by adjectives or nominal negative prefixes, which is not the case (Bresnan 2001). This problem is avoided by embedding the VP inside a DP.

The genitive NP is analyzed as being in the specifier position of DP. As Bresnan (2001) points out and as was discussed in the previous section, there is evidence from quantifier scope that the genitive NP in the *POSS-ing* construction has the same properties as possessive NPs of nouns.

The 'CAT' function (Bresnan and Mugane 2006) is used as the theoretical device of how to embed the VP inside a DP.

(29) V (gerundive) $\Rightarrow n\ \varepsilon$ CAT ((PRED $\uparrow$))

The 'CAT' function adds a constraint that a nominal category n should be "among the c-structure categories of the nodes in the inverse image of the ϕ mapping from the f-structure containing the PRED" (Bresnan and Mugane 2006, 227). This means that the *-ing* form shares the categorization of the corresponding verb, but also has to occur in a nominal f-structure. For example, the *-ing* form *joining* needs a subject and an object like the verb *join*, but it functions as a nominal. Thus, *joining* has the lexical entry in (30).

(30) joining: V: 'joining$<<(\uparrow$SUBJ$)(\uparrow$OBJ$)>_v>_n$'

As the POSS function is restricted to the f-structure of nominal categories and thus cannot be linked to the subject of the *-ing* form directly, a lexical rule is needed to identify POSS with the subject of the *-ing* form.

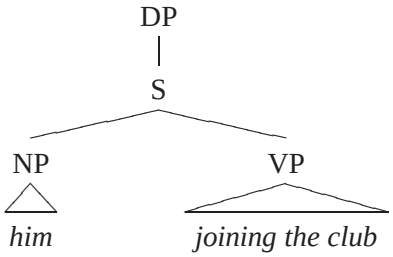
(31) **Possessor Subject of Gerundive Verbs**
V (gerundive) $\Rightarrow$ ($\uparrow$POSS) = ($\uparrow$SUBJ)

If there is no overt subject, a null subject is introduced into this structure. This means that in Bresnan's (2001) analysis, the *PRO-ing* construction is a subtype of the *POSS-ing* construction. The *DET-ing* construction could be analyzed in the same way.

The problem lies in incorporating the *ACC-ing* construction into the theory. As Bresnan (2001) claims that all *-ing* constructions have an external nominal distribution, she needs a DP which incorporates a sentence because the accusative subject cannot be in the specifier position of the DP. Thus, she suggests a c-structure as in (32b) for the embedded clause in (32a)

(32) a. Mary objected to him joining the club.

b.



To account for the subject having accusative case instead of genitive case, Bresnan (2001) has to alter the lexical rule in (31) to incorporate the alternative with the accusative as well.

(33) **Subject of Gerundive Verbs**
V (gerundive) $\Rightarrow$ ($\uparrow$POSS) = ($\uparrow$SUBJ) $\vee$ ($\uparrow$SUBJ CASE) = ACC

The problem with this account is that as was shown before, the *PRO-ing* construction has much more in common with the *ACC-ing* than with the *POSS-ing* construction. This problem is not a major one as the *PRO-ing* construction could be analyzed in the scheme of the *ACC-ing* construction as well.

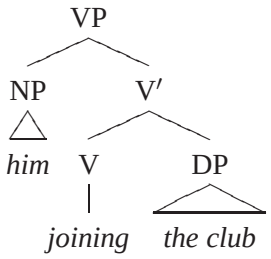
However, the *ACC-ing* construction behaves much more like a clause in coordination, extraction, pied-piping and quantifier scope. If this clause is embedded inside a DP, though, it is not clear why the DP should still behave like a clause. Embedding S inside a DP is unnecessary and results in an exocentric phrase structure.

Thus, an analysis is needed that avoids the problems presented above. The analysis should also treat the *ACC-ing* and *PRO-ing* constructions alike. As was shown in section 3 and 4, these two constructions do not need to be analyzed as having an external nominal distribution.

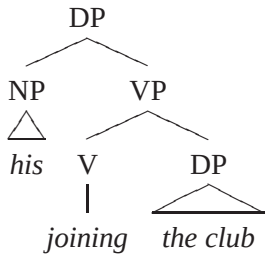
6 A new analysis of the *-ing* pattern

As was discussed in section 3 and 4, the *ACC-ing* and *PRO-ing* forms do not have to have a nominal structure, as their distribution can be clausal as well. On the other hand, the *POSS-ing* and *DET-ing* forms display a mixture of properties and therefore need a different analysis. Thus, the basic structures are:

(34) a. ***ACC-ing*** & ***PRO-ing:***



b. ***POSS-ing*** & ***DET-ing:***



I follow Bresnan's (2001) proposal in that the *ACC-ing* form is a verbal form which requires a subject in accusative case. Thus, the lexical entry for the *ACC-ing* form in the construction is given in (35).

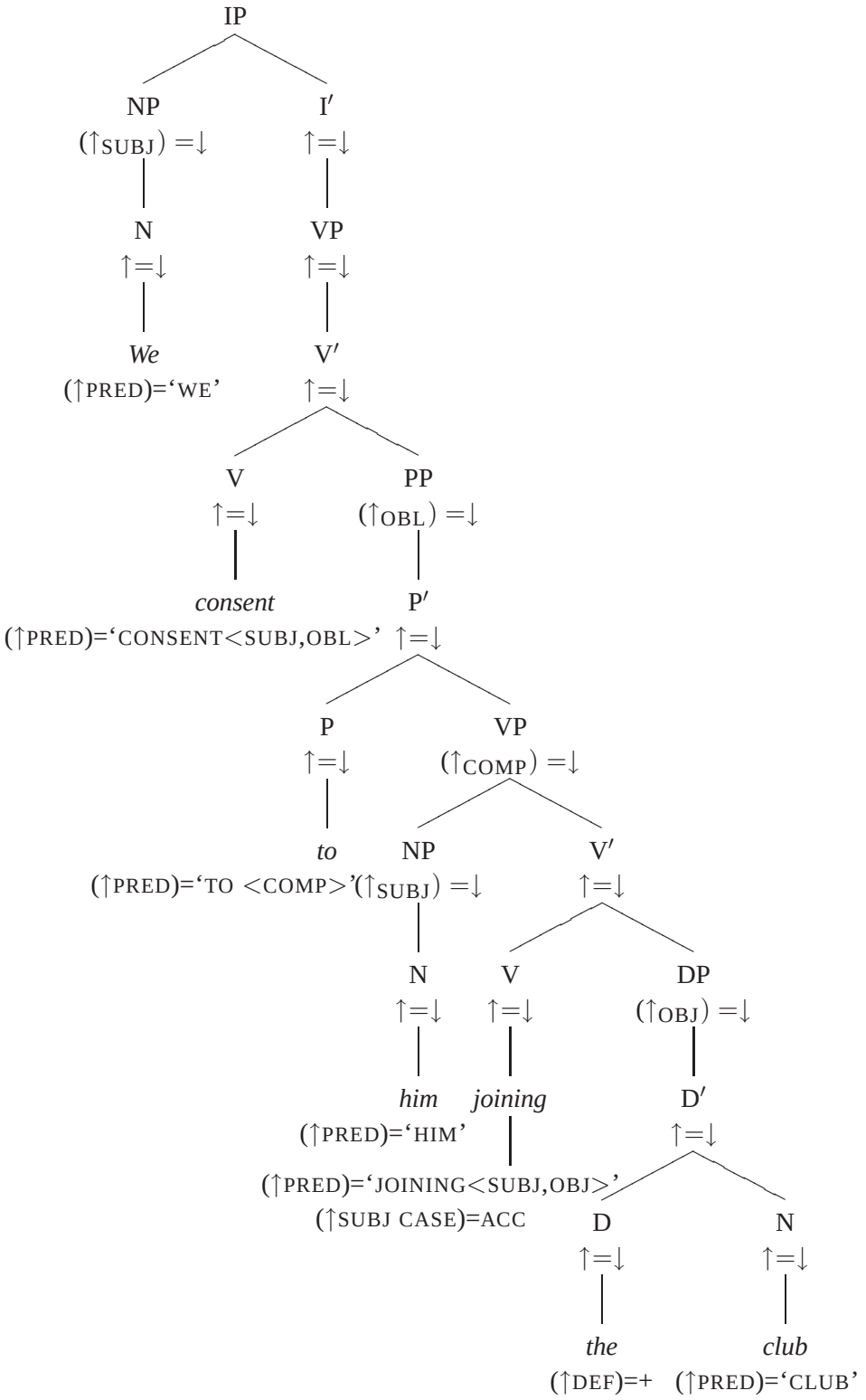
(35) *joining*: V
(↑PRED)= 'joining <(↑SUBJ)(↑OBJ)>'
(↑SUBJ CASE) = ACC

As the verb form is uninflected, I assume that the embedded clause is a VP which is headed by the *-ing* form with the accusative subject in the specifier position of the phrase. It was shown before that IPs can be complements of prepositions. Thus, it should not be impossible for other clausal phrases to function as complements of prepositions as well. With VP as complement to P, the f- and c-structure of sentence (36) are given in (37) and (38).

(36) We consent to him joining the club.

(37)
$$\begin{bmatrix} \text{PRED} & \text{'CONSENT <SUBJ, OBL>'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'WE'} \\ \text{CASE} & \text{NOM} \end{bmatrix} \\ \text{OBL} & \begin{bmatrix} \text{PRED} & \text{'TO <COMP>'} \\ \text{COMP} & \begin{bmatrix} \text{PRED} & \text{'JOINING <SUBJ,OBJ>'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'HIM'} \\ \text{CASE} & \text{ACC} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'CLUB'} \\ \text{DEF} & + \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

(38)


IP
NP
(↑SUBJ) =↓
I′
↑=↓
N
↑=↓
VP
↑=↓
We
(↑PRED)='WE'
V′
↑=↓
V
↑=↓
PP
(↑OBL) =↓
consent
(↑PRED)='CONSENT<SUBJ,OBL>'
P′
↑=↓
P
↑=↓
VP
(↑COMP) =↓
to
(↑PRED)='TO <COMP>'
NP
(↑SUBJ) =↓
V′
↑=↓
N
↑=↓
V
↑=↓
DP
(↑OBJ) =↓
him
(↑PRED)='HIM'
joining
(↑PRED)='JOINING<SUBJ,OBJ>'
(↑SUBJ CASE)=ACC
D′
↑=↓
D
↑=↓
N
↑=↓
the
(↑DEF)=+
club
(↑PRED)='CLUB'

A *PRO-ing* construction exemplifies anaphoric control and will thus have a very similar f-structure:

(39) We consent to joining the club.

(40)
$$\begin{bmatrix} \text{PRED} & \text{'CONSENT <SUBJ, OBL>'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'WE'} \end{bmatrix} \\ \text{OBL} & \begin{bmatrix} \text{PRED} & \text{'TO <XCOMP>'} \\ \text{XCOMP} & \begin{bmatrix} \text{PRED} & \text{'JOINING <SUBJ,OBJ>'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'PRO'} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'CLUB'} \\ \text{DEF} & + \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

The problem thus remains of how to analyze the *POSS-ing* and *DET-ing* constructions. As was shown above, the external distribution was that of a nominal phrase with a sentential internal structure. The analysis I propose will follow Bresnan and Mugane's (2006) analysis. Thus, we analyze the *POSS-ing* construction as a DP with an embedded VP with the possessive NP in the specifier position of the DP. Therefore, the 'CAT' function is needed. This means we have a second lexical entry for the *-ing* form when combined with a genitive subject. As the POSS function is restricted to the f-structure of nominal categories and thus cannot be linked to the subject of the *-ing* form directly, POSS has to be identified with the subject of the *-ing* form. Thus, the *POSS-ing* form has the lexical entry in (41).

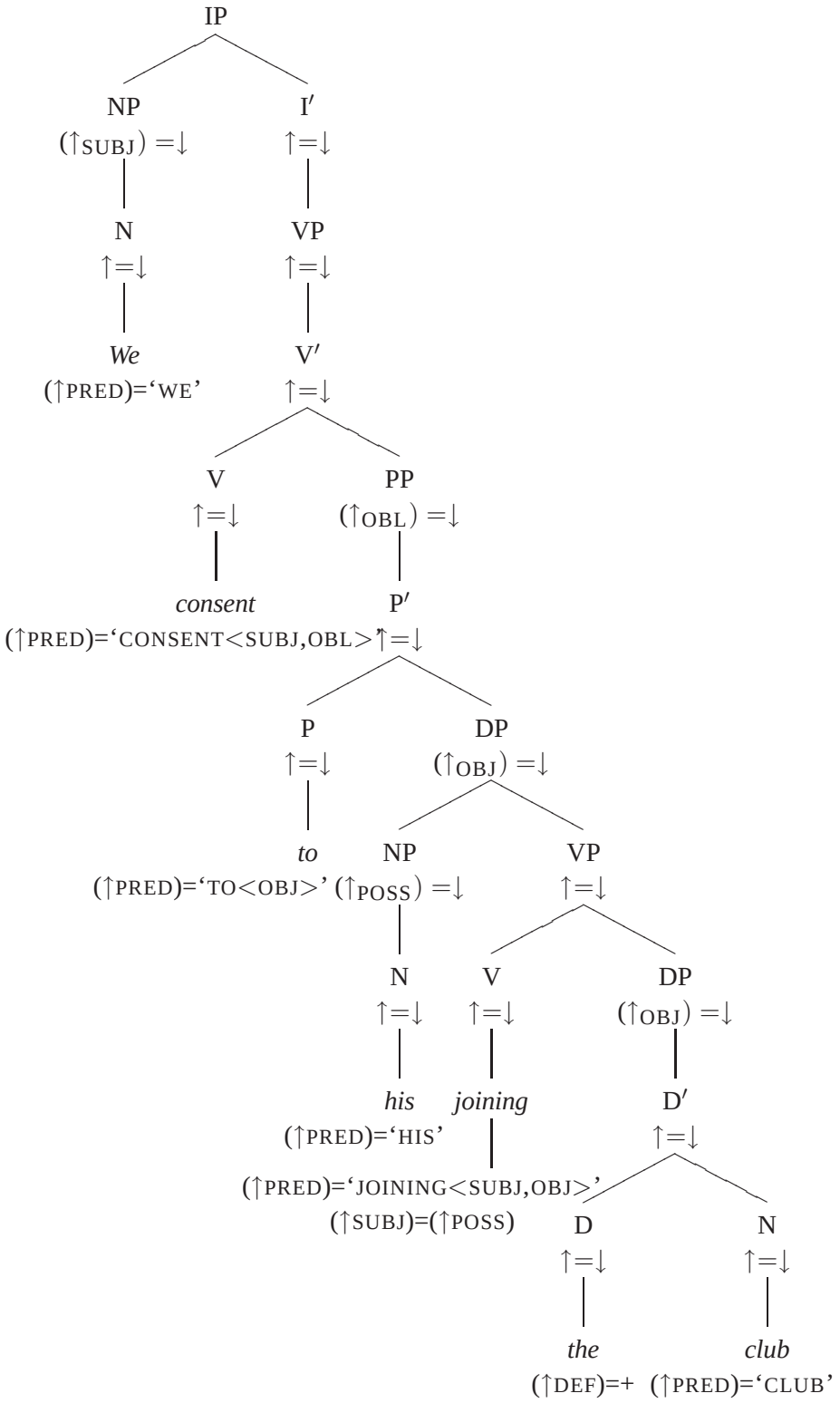
(41) joining: V: '$\text{joining}<<(\uparrow\text{SUBJ})(\uparrow\text{OBJ})>_v>_n$'
$(\uparrow\text{POSS}) = (\uparrow\text{SUBJ})$

The preposition *to* in this case takes a nominal complement as is typically the case. The analysis of a sentence like (42) is given in (43) and (44).

(42) We object to his joining the club.

(43)
$$\begin{bmatrix} \text{PRED} & \text{'OBJECT <SUBJ, OBL>'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'WE'} \end{bmatrix} \\ \text{OBL} & \begin{bmatrix} \text{PRED} & \text{'TO <OBJ>'} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'JOINING <SUBJ,OBJ>'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'HIS'} \end{bmatrix} \\ \text{POSS} & \begin{bmatrix} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'CLUB'} \\ \text{DEF} & + \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

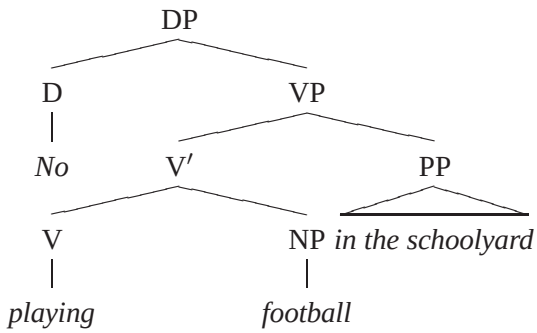
(44)


IP
NP
(↑SUBJ) =↓
I′
↑=↓
N
↑=↓
VP
↑=↓
We
(↑PRED)='WE'
V′
↑=↓
V
↑=↓
PP
(↑OBL) =↓
consent
(↑PRED)='CONSENT<SUBJ,OBL>'
P′
↑=↓
P
↑=↓
DP
(↑OBJ) =↓
to
(↑PRED)='TO<OBJ>'
NP
(↑POSS) =↓
VP
↑=↓
N
↑=↓
V
↑=↓
DP
(↑OBJ) =↓
his
(↑PRED)='HIS'
joining
(↑PRED)='JOINING<SUBJ,OBJ>'
(↑SUBJ)=(↑POSS)
D′
↑=↓
D
↑=↓
N
↑=↓
the
(↑DEF)=+
club
(↑PRED)='CLUB'

DET-ing constructions like (45) can be analyzed the same way. However, the possible determiners in the specifier position of the DP have to be limitied to *no* and *any*. A sentence with a *DET-ing* form will then have the representation in (46).

(45) No playing football in the school yard!

(46)



7 Brief Remarks on the Historical Development

The *-ing* form derived from an "abstract noun of action formed by the addition of the suffixes *-ung* or *-ing* to a verb stem" in Old English which could "take nominal dependents such as determiners, adjectives or genitive phrases" (Fanego 2004, 7). In the Middle English period, *-ung* died out and at the same time *-ing* nominals "began to acquire verbal properties"(Fanego 2004, 7). Until around 1900, it was possible for the *-ing* form to have completely mixed properties as in (47b) and (47d) (van der Wurff 1991, 367).

(47) a. the writing of this book

b. the writing this book

c. writing this book

d. writing of this book

After 1900, however, the only two possibilities were either with determiner and *of* clause (47a), often called *nominal gerund* today, or without determiner and direct object as shown in (47c) which is the form I was concerned with in this paper.

Today, the *POSS-ing* construction is, at least in British English, considered a formal alternative to the *ACC-ing* pattern, but is often felt "awkward or stilted" (Quirk et al. 1985). It cannot be used with all verbs which allow the *ACC-ing* form. Verbs like *keep, have* or *leave* and many perception verbs cannot be matrix verbs to the *POSS-ing* construction (Biber et al. 1999). Additionally, the *POSS-ing* form only occurs in less than 10 % of the cases (Biber et al. 1999). This completes the picture of the development of the *-ing* form from a nominalized verb to a structure displaying mixed properties to a now purely sentential complement, the *ACC-ing* and *PRO-ing* constructions which do not display any nominal characteristics any more.

8 Conclusion

In this paper, I have looked at the properties of the different subclasses of the English *-ing* form. The view that the *-ing* form displays mixed verbal and nominal properties in general has been questioned. Instead, it was found that the *-ing* form with accusative or null subject only displays verbal properties. A simple, straightforward LFG analysis has thus been proposed for these forms. As the *-ing* form with genitive subject or after negative determiners like *no* or *any* really displays mixed properties, a more complex analysis was needed for those forms. For these cases, Bresnan and Mugane's (2006) analysis of mixed categories has been applied. This means that actually two different lexical entries are needed for the different subclasses of the *-ing* form. This then can also explain why some verbs can only be matrix verbs to the *-ing* form with accusative or null subject, but not with the genitive subject.

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PARTITIVE MORPHOSEMANTICS ACROSS ESTONIAN GRAMMATICAL CATEGORIES, AND CASE VARIATION WITH EQUI AND RAISING

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Proceedings of the LFG08 Conference

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Abstract

This article discusses two related case marking phenomena in Estonian. The first issue is representing partitive morphosemantics as it is expressed in the language specific aspectual, epistemic modal and evidential grammatical categories. A DRT based sketch of propositional attitudes and speaker-hearer relationships explicates several semantic links between the categories. The second case marking issue concerns the nature of empty categories and the distinction of raising and equi with perception verbs. Raising but not equi is the syntactic environment for variation and non-partitive case marking on the subject argument of the predicate that is embedded under mental epistemic verbs. The non-partitive case is an instance of a default accusative on the embedded subject under atelic matrix verbs in raising constructions.

1 Introduction

1.1 The problem

The Estonian case marking phenomena and, specifically, the partitive marking and its relationships with the aspectual, epistemic modal and evidential semantics are a challenge in many areas of linguistic subdisciplines and language modules. The Estonian partitive case marking appears on arguments and predicates, for instance, on the objects *Toomas-**t*** 'Thomas' and *raamatu-**t*** 'book' and the non-finite form *kirjuta-**va-t*** 'writing' respectively in examples (1.1) and (1.2).[1] The object case on the subject of the embedded predicate, *Toomas*, is either partitive, or it varies between partitive and non-partitive (glossed as accusative).

(1.1) *Mari* *arvas* *Tooma /Toomas**t*** .
M[NOM] think-3S.PST T.ACC/ T.PART

*raamatu**t*** *kirjuta-**va-t.***
book.PART write-PERS.PRES.PTCP.PART
'Mary thought that Thomas was writing a book.'
'Mary thought of/about Thomas that he was writing a book.'

[1] The glosses follow the Leipzig glossing rules, available at <http://www.eva.mpg.de/lingua/files/morpheme.html>. Additional abbreviations: ADE adessive, ALL allative, DA_INF t-stem non-finite form (the 'da-infinitive'), ELA elative, ILL illative, IMPERS impersonal, INDIR indirect, INE inessive, JUSS jussive, ACT_PTCP active/personal past participle, PERS.PRES.PTCP.PART/PART_EV – personal present participle partitive (morphological gloss)/partitive evidential (gloss for the functional category), PART partitive, PERS personal, PRT particle, TOT total (semantic accusative), TRANSL translative (transformative), PASS_PTCP passive/impersonal past participle.

(1.2) *Mari* *kuulis* *Toomas**t**/#Tooma*
M[NOM] heard-3S.PST T.PART/T.ACC

*raamatu**t*** *kirjuta-**va-t.***
book.PART write-PERS.PRES.PTCP.PART
'Mary heard Thomas writing a book.'

This article discusses only the perception readings of the verb 'hear'. The translation of example (1.2) can be 'Mary heard Thomas was writing a book' in its literal meaning. For instance, Mary can hear the pen scratching on the paper or the keys of the typewriter being hit. Although the partitive agreement or spreading pattern (Thomas-part – writing-part) may seem to be a plausible synchronic analysis of the two instances of partitive, I argue that in Modern Standard Estonian there is no agreement relationship between the object and the participle. Object case generally encodes aspect in simple sentences. The aspectually telic counterparts of the atelic base predicates with partitive objects in (1.1) and (1.2) have a total object in the embedded predicates as in (1.3) and (1.4).

(1.3) *Mari* *arvas* *Tooma /Toomast* .
M[NOM] think-3S.PST T.ACC/ T.PART

raamatu *kirjutavat.*
book.TOT write-PERS.PRES.PTCP.PART
'Mary thought that Thomas would write a book.'
'Mary thought of/about Thomas that he would write a book.'

(1.4) *Mari* *kuulis* *Toomast/#Tooma*
M[NOM] heard-3S.PST T.PART/T.ACC

raamatu *kirjutavat**.***
book.TOT write-PERS.PRES.PTCP.PART
'Mary heard that Thomas would write a book.'

There is, therefore, no agreement pattern in Modern Estonian (Thomas-part – writing-part). The partitive on the embedded predicate *kirjutavat* 'write' is synchronically part of a complex morpheme that can be decomposed into a partitive and a personal present participle parts, shown in the glossing. There are two related but distinct instances of partitive – aspectual (on the object) and evidential-epistemic modal (of the predicate). One of the goals of this article is to find a consequent way to represent the similarities and differences between the two instances of the partitive. The other goal relates to the issue of empty categories, which is central to generative grammar and shapes its various frameworks. In LFG, the accusative-partitive case variation on the embedded subject *Tooma/Toomas**t*** can be related to a syntactic structural difference, parallel with distinct semantics.

1.2 Case and non-finite forms

The naming of the Estonian object cases is not a trivial matter. Morphologically, there are three object cases: partitive, genitive and nominative. Which of these three morphological cases is the closest equivalent of the 'normal' accusative is an exciting topic across the Finnic languages (Lees 2005). The structural or inherent status of the Finnish partitive is another disputed issue (Vainikka & Maling 1996). Several accounts of Finnish treat the partitive case as the 'default' object case (Kratzer 2004); others regard it as a combination of structural and semantic case (Kiparsky 2005); yet others define clear formal semantics for partitive (de Hoop 1996). Estonian partitive as an object case is an aspectual semantic case (Tamm 2004a, 2007); in some instances that are reminiscent of Hungarian semantic pseudo-incorporation, non-referential and optionally referential NPs, partitive is the default case (Tamm 2008). Genitive and nominative, referred to as the total case, are also aspectual semantic object cases in simple transitive sentences (Tamm 2004a, 2007); genitive appears on singular nominals and nominative on plurals, most numerals, certain quantifiers and nominals denoting quantities (Erelt et al. 1993).

This paper discusses another set of data that contributes to the analysis of partitive as a semantic case. Case-marked nominalizations frequently give rise to non-finite forms, which were complements originally but develop further into subordinate clauses. The subordinate clause type may be reinterpreted as main clause, while the case marker is reinterpreted as a mood marker. Estonian has several originally case-marked non-finite forms, illustrated in Table 1 (cf. Erelt et al. 1993), and it has a rich morphological case system of 14 cases.

Name	Form	Stem	Suffix	Case
Illative of the m-stem infinitive	-ma	-m-	-	illative
Inessive of the m-stem infinitive	-mas	-m-	-s	inessive
Elative of the m-stem infinitive	-mast	-m-	-st	elative
Translative of the m-stem infinitive	-maks	-m-	-ks	translative
Abessive of the m-stem infinitive	-mata	-m-	-ta	abessive
Gerundive	-des	-t-	-s	inessive
-da-infinitive	-da	-t-	-	(disputed)
-vat-infinitive	-vat	ptcp	(-t)	partitive

Table 1. The non-finite, originally case marked forms in Estonian.

In particular, the changes concerning the Estonian partitive case and the partitive evidential (*vat*-infinitive, indirect speech, Erelt et al. 1993) illustrate the development from an object case into mood marking, where non-finite, as in (1.1) – (1.4), and even finite verbs (1.5) are originally partitive marked.

(1.5) *Mari kirjutavat raamatut.*
M[nom] be-PERS.RES.PTCP.**PART** book.**PART**
'Allegedly, Mary is writing a book.'

The partitive case does not only mark dependent NPs according to their syntactic position, grammatical or discourse function, thematic role or inherent NP-properties. There is no case spreading either. The partitive participle form will be referred to as the partitive evidential and glossed as PART_EV in the remainder of this paper if demonstrating that the composition of the constituent morphemes is not relevant. On embedded predicates, its semantic content corresponds to epistemic modality (Tamm forthcoming, b).

2 Aspect and the partitive object case

The aspectual partitive encodes incomplete events, in other words, the lack of maximal boundedness, or more precisely, the lack of the maximal degree of realization of the event. Non-partitive expresses complete events, which are maximally realized and have a clear result. Examples (2.1) and (2.2) illustrate the aspectual case marking.

(2.1) *Toomas kirjutas raamatu.*
T[NOM] write-3S.PAST book. **TOT**
'Thomas wrote a book.'

(2.2) *Toomas kirjutas raamatut.*
T[NOM] write-3S.PAST book. **PART**
'Thomas was writing a book.'

In sentence (2.1) with the object that is marked with an aspectual semantic case referred to as total (comparable to the Finnish accusative), the book-writing event is described as being realized according to the speaker's idea of a complete, finished event of writing a book. In case of example (2.1) with a total object, the knowledge state about the event of writing a completed book defines the measuring scale of completion. Compared to the scale, the actual completion of the book-writing event does not fall short. As described in example (2.1) with a total object, the book-writing event is realized, in other words, bounded, completely or maximally. Atelic verbs, such as *kuulma* 'hear' or *arvama* 'believe, think', which cannot be associated with a mental state of completion, are not compatible with the total objects and only appear with partitive objects in simple sentences. In sentence (2.2) with a partitive object, the event is described as not being realized completely. The aspectual partitive expresses the incomplete degree of realization of the actual event as compared to the inferential state about the completed event; for details see Tamm (2007, forthcoming, a).

3 Incomplete evidence, indirect evidentiality, and the partitive evidential

The evidential partitive expresses an insufficient degree of strength of evidence for the event described by the predicate, which is compared to an expectation of sufficient evidence. The strength of evidence is insufficient for the speaker because of the type of perception or report of the direct experiencer of the event. The Estonian partitive evidential encodes the blended semantics of indirect evidentiality (Aikhenvald 2004) with some characteristics of epistemic modality (Tamm forthcoming, a, b, cf. Rätsep 1971, an analysis in terms of 'indirect mode of communication', summarized in Erelt, Metslang and Pajusalu 2006). The originally partitive marked personal and impersonal present participles (3.1) form a minimal pair with unmarked forms (3.2) in the Estonian category of evidentiality and epistemic modality.

(3.1) *Ma tulevat koju.*
I[NOM] come-PERS.PRES.PTCP.**PART** home.ILL
'Allegedly, I am coming home.'
*Mind too-**da-vat** koju.*
I.part bring-IMPERS.PRES.PTCP.**PART** home.ILL
'Allegedly, I am being brought home.'

(3.2) *Väidetavasti Mari tuleb /tuuakse koju.*
allegedly M[NOM] come-3.SG/bring-IMPERS.PRES home.ILL
'Allegedly, Mary is coming home/Mary is being brought home.'

In (3.2), the evidence available to the Speaker corresponds to the expectation, and the source of the message is not necessarily another speaker. Grammatically, it is an indicative sentence, with no overt morphological mood marking. The semantic context of indirect evidential meaning (the adverb *allegedly*) does not trigger the use of the partitive evidential, which indicates that the meanings of epistemic modality and evidentiality are simultaneously present in the partitive evidential.

The prototypical examples of the partitive evidential that are discussed in previous sources belong to the quotative (reportative) category as in (3.3); this data seems to support the indirect evidentiality based hypothesis. However, again, report is not a sufficient criterion. The partitive evidential may be missing with report as in (3.4). Simply, the degree of completeness of evidence for the proposition is insufficient in (3.3) as opposed to (3.4).

(3.3) *Mari ütles, et Toomas ole**vat** koju tulnud.*
M[NOM]say-3S.PSTthatT[NOM]be-PART_EVhome.ILLcome-ACT_PTCP
'Mary said that Thomas had come home.'

(3.4) *Mari ütles, et Toomas tuli koju.*
M[NOM] say-3S.PST that T[NOM]come-3S.PST home.ILL
'Mary said that Thomas had come home.'

In addition to *verba dicendi*, the matrix perception (3.6) and mental epistemic verbs appear with a partitive evidential on a base verb (3.5). A modal meaning is more prominent in sentence (3.5) and the quotative analysis is implausible; on the other hand, the indirect speech analysis does not extend smoothly to perception verbs (3.6) either.

(3.5) *Mari arvas Tooma/Toomast tulnud olevat.*
M[NOM] believe-3S.PST T.ACC/PART come-ACT.PTCP be-PART_EV
'Mary believed (thought) that Thomas had arrived.'

(3.6) *Mari kuulis Tooma/ Toomast tulnud olevat.*
M[NOM] hear-3S.PST T.ACC/PART come-ACT.PTCP be-PART_EV
'Mary heard how/that Thomas arrived/Thomas had arrived.'

In these examples, the speaker conveys to the hearer that the evidence for Thomas having come home is insufficient, compared to the necessary and expected sufficient evidence. The information is gathered from another speaker or by the type of perception that is not considered reliable for obtaining the required evidence (for details see Tamm forthcoming, a, b). The evidence about the arriving event is compared to another, inferential knowledge state about the evidence for the event, which defines the scale and the sufficient degree of strength of evidence for the event described by the predicate. The partitive encodes insufficient degree of strength of evidence.

4. Summary of aspect and evidentiality and their representation in LFG

The data shows that partitive case-marking pervades the Estonian TAM system and is a cross-categorial phenomenon. Partitive marking corresponds to an incomplete (atelic, non-bounded) event or incomplete evidence. The lack of partitive marking corresponds to complete evidence or event. Partitive is a semantic case as defined in Butt (2006), or Butt and King (2005), with parallel meanings across grammatical categories. Partitive encodes that, compared to the expectation about sufficient evidence or a completely realized event, the available evidence or the realization of the event falls short (Table 2). Partitive encodes incompleteness.

	Partitive marking	No partitive marking
Epistemic modality	Incomplete evidence	Complete evidence
Aspect	Incomplete event	Complete event

Table 2. Events and the object case; evidence and the partitive evidential.

Since the partitive evidential requires the presence of both epistemic modality and evidentiality, the entry of the morpheme in Lexical Functional Grammar

should combine the features of incomplete evidence (the grammatical domain of evidentiality and epistemic modality) and indirect evidentiality. The lexical entries for the partitive evidential morpheme are presented in (4.7) and (4.8). The lexical entry for the aspectual partitive is modeled as semantic, constructive case (Butt & King 2005, Nordlinger & Sadler 2004) in (4.3).

The aspectual partitive is a semantic case that constrains the clause semantics so that it cannot denote complete events. Put informally, the aspectual partitive either confirms or completes the aspectual semantics of the verb or a complex predicate. The division of labor between case and verbs is rather fuzzy at this synchronic stage of language development. In this article I include the semantics as grammaticalized semantics, which I take to be reflected in the feature structures at the f-structure. The reason for including the feature in the functional structure, which is in principle a syntactic level of representation, is that the functional structure combines purely syntactic relations with semi-semantic relations. On the one hand, f-structure can be regarded as a syntactic level of description that should contain only the types of semantic information that are relevant for (morpho)syntax (e.g., in agreement, the gender feature of the noun is relevant for the adjective, etc.). On the other hand, f-structure can contain features that reflect typological categories of more or less predefined semantics, such as indirect evidence. There is also a third option, and this the approach chosen in this paper. The level of f-structure can be seen as the level of description that encodes the language internally relevant distinctions. The pros and cons and subtypes of three main approaches to the inclusion of information at the f-structure are discussed in further detail elsewhere. This paper provides examples of entries that reflect the three approaches to the inclusion of grammatical categories:
1) no morphosemantic categories that have bearing on other parts of morphosyntax and prosody (4.1), 2) cross-linguistically identical features (4.2), 3) language-specific categories (4.3).

(4.1) **[aspectual partitive]** (↑ CASE) = PARTITIVE
(OBJ↑)
(reflects no morphosyntactic categories that have bearing on other parts of morphosyntax)

(4.2) **[aspectual partitive]** (↑ CASE) = PARTITIVE
((OBJ↑) PERFECTIVITY) = --
((OBJ↑) TELICITY) = --
(reflects cross-linguistically identical features)

(4.3) **[aspectual partitive]** (↑ CASE) = PARTITIVE
((OBJ↑) EVENT) ≠ COMPLETE
(reflects language-specific categories)

The corollary of the last approach is the divergence of the f-structure features across languages. I consider morphosemantic categories to have language internal psycholinguistic reality, and I represent them as features at the f-structure if they are the intuitive categories for native speakers and form paradigms or systems of minimal pairs in their interactions with other meanings that have grammaticalized.

The aspectual partitive contributes the meaning of no complete event. I proposed to represent it in the form of a feature, as one of the specifications in the lexical entry of the partitive morpheme. This feature is motivated, because it represents a language internally relevant category. Namely, it interacts with the morphosemantics and morphosyntax in the grammar. The aspectual partitive appears in sentences that form a minimal pair with sentences with the aspectual total case. The total case contributes the semantics of complete event in a sentence. The semantics of the partitive object case interacts with the aspectual features of verbs and of the aspectual particles, either completing the aspect or not (Tamm 2007, 2004a, b). The aspectual partitive is also semantically related to the partitive evidential meanings in the evidential and epistemic modal domain of the grammar as described above. In sum, it has a place in the language system. However, as opposed to morphosyntactically more conspicuous features such as agreement features, it is difficult to establish the place of partitive without summoning semantics and the study of related categories.

How about the evidential partitive? Does it have a distinct place in the Estonian morphosyntactic and morphosemantic system? Before proposing an entry for this morpheme, I search for motivation for including the features in the entry according to the criterion of language internal relevance (approach 3 above). In the previous discussion about the aspectual partitive I established that the aspectual and evidential partitive semantics runs parallel (see Table 2). I propose that the two relevant features of the partitive evidential are the indirect evidentiality, referred to as the indirect mode of communication (in the terminology adopted from Rätsep 1971) and incomplete evidence. The relatedness of the categories of aspect and epistemic modality (strength of evidence) has been demonstrated already. In the following I briefly discuss the Estonian jussive (Erelt 2002b) that language internally justifies the feature of indirect mode of communication in the entry of the partitive evidential. The Estonian jussive is an indirect imperative, encoding a mediated command. Also, the jussive has personal (*-gu*) (4.4) and impersonal forms (*ta/da-gu*) (4.5).

(4.4) *Ma tulgu koju.*
I[NOM] come-JUSS home.ILL
'I should come home (according to a third person).'

(4.5) *Tuldagu* *koju.*
come-IMPRS-JUSS home.ILL
'One should come home.'

The English translations are not adequate. The speaker using a jussive form communicates that the command is indirect. The speaker is the mediator of the command of another speaker, and not the direct source of it. As a test, one can try to add a continuation *Nobody told/thinks/commands that except me* to those utterances, which contradicts sentences (4.4) and (4.5). The same speaker relationship is present in the partitive evidential: the speaker communicates with the use of the morpheme that the proposition is not their own assertion, but mediated by them. The mood of the partitive evidential, as opposed to the jussive that is its counterpart in the imperative mood, is argued to be indicative (Rätsep 1971). I assume that the entries for the morphemes of the jussive and the partitive evidential contain a common feature about the indirect mode of communication. However, the entry of the jussive morpheme (4.6) lacks the feature that connects the partitive evidential to the domain of epistemic modality ((↑EVIDENCE) ≠ COMPLETE), since the modal meaning is not part of the jussive meaning.

(4.6) [-gu] FORM = JUSSIVE
(↑MODE OF COMMUNICATION) = INDIRECT
(↑MOOD) = IMPERATIVE
(↑TENSE) = PRESENT
(↑VOICE) = PERSONAL

The category of mode of communication has distinctions in the tense and voice category as well. Example (3.1) presented the data of the impersonal form of the partitive evidential. It shows that there is a category that interacts with other categories within the grammar. The entry for the impersonal form in the partitive evidential is illustrated by example (4.7). Having shown that the distinctions are relevant, I propose the entry for the partitive evidential in (4.8). The exact details about linking the form to semantics will be left for further refinement; the following section deals with the semantics of the features of the indirect mode of communication and incomplete evidence (which has an aspectual parallel in incomplete events).

(4.7) [-ta-vat] FORM = PARTITIVE EVIDENTIAL
(↑MODE OF COMMUNICATION) = INDIRECT
(↑EVIDENCE) ≠ COMPLETE
(↑VOICE) = IMPERSONAL

(4.8) [-va-t] FORM = PARTITIVE EVIDENTIAL
(↑MODE OF COMMUNICATION) = INDIRECT
(↑EVIDENCE) ≠ COMPLETE
(↑VOICE) = PERSONAL

5 A DRT-based account of propositional attitudes

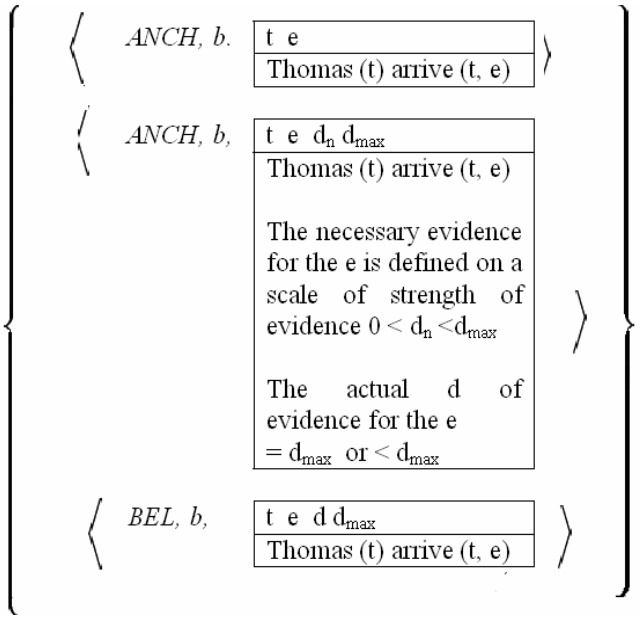
The exact relationship between evidentiality and modality, as well as the relationship between aspect and modality, is still an unresolved issue in linguistics. The relationship between the morphosyntax and semantics of case is also in need of clarification. The similarities between aspectual (event structural) and evidential categories are attested cross-linguistically and occasionally formalized (e.g., Izvorski 1997, Nikolaeva 1999). In formal approaches to the meaning of the evidentials, pragmatic and semantic approaches have gained momentum (Faller 2002, Garrett 2001). Despite the fact that descriptions of the evidential systems across languages frequently refer to scales of evidence in capturing the semantics of the evidential category, there are few attempts to combine the pragmatic or indirect semantic accounts with scale-based ones in the generative and formal approaches. However, there are several analyses of aspect (event structure) in terms of degrees (Hay et al 1999, Kennedy & McNally 2005, Piñon 2008, scalarity based verb classes in Tamm 2004a). In several formal and functional descriptions of languages, evidentiality is seen as a subtype of epistemic modality or at least having substantial overlap with it (van der Auwera & Plungian 1998), which is formalized in terms of possible world semantics (e.g., Izvorski 1997). The Estonian data show that the interdependencies between three domains of grammar are tighter than previously assumed. Diverging from the well-attested perfect-indirect pattern of relatedness, the interdependencies build on the part-whole, atelicity and imperfective based semantics in Estonian.

In the following I give the preliminaries of the account of sentence (3.5), in terms of an account of Kamp and Bende-Farkas (2006) of epistemic specificity in a DRT-based account of propositional attitudes. The analysis is based on a situation of communication, where speaker A (the 1st person, "me", the utterer) mediates an experience or knowledge of speaker B (Mary) to the hearer. At each point of communication, the hearer evaluates the content of the communication. The partitive evidential as in (1.1) or (1.2) encodes the information about incomplete evidence (a non-maximal degree of strength of evidence), which is due to the lack of reliable perception of the described event. The information about the participants' attitudes is represented in the attitude DRS and the knowledge states in the anchor DRS. The discussion presents the representations separately and excludes the less relevant details for the core data discussed in this paper (e.g., temporality).

In combination with non-maximal evidence, the historically partitive marked personal and impersonal present participles are markers of the category

referred to as the Mode of Communication according to Rätsep (1971).[2] The partial DRS in (5.1) pertains to the speaker B, Mary, who is the original experiencer of the event of Thomas coming home (sentence (3.5)). For B, the evidence for the event is maximal and, therefore, it is part of their beliefs. Mary's beliefs are represented thus in (5.1). Except for the epistemic modal part, the analysis should be applicable to the jussive as well, with some additions that are necessary for representing imperatives.

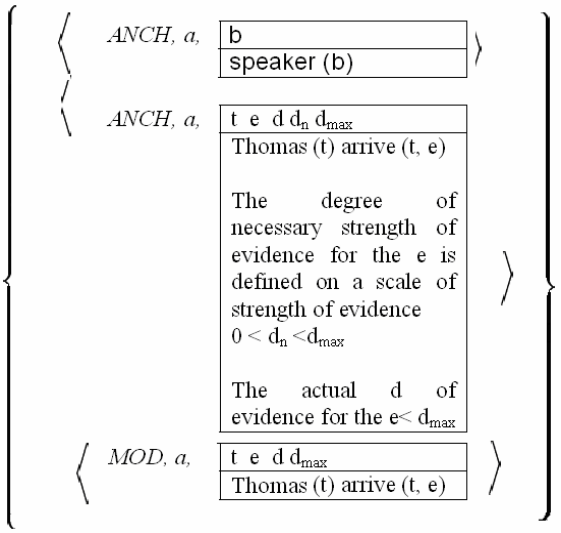
(5.1)



The DRS in (5.2) pertains to the Speaker A, who acquires the knowledge from speaker B – for whom he is a hearer – and interprets it in his own modality.

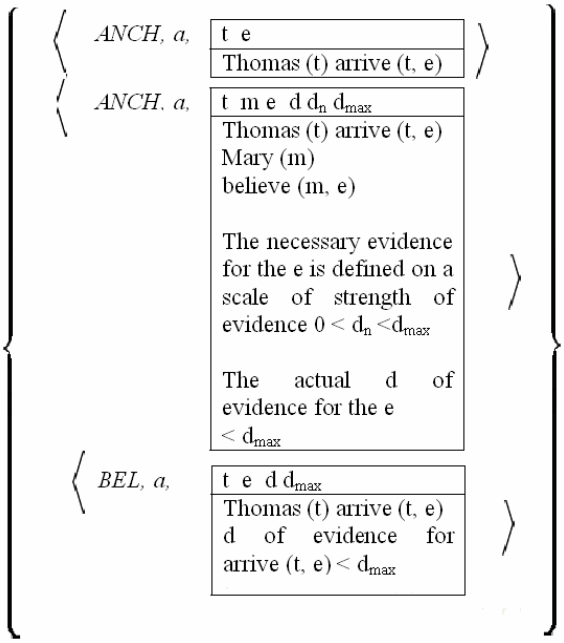
[2] See also Aikhenvald (2004), Erelt et al. (2006), Kehayov (2008), Tamm (2004a), Sepper (2006), Klaas (1997), (2002), and Erelt (1984), (2002a), (2002b).

(5.2)



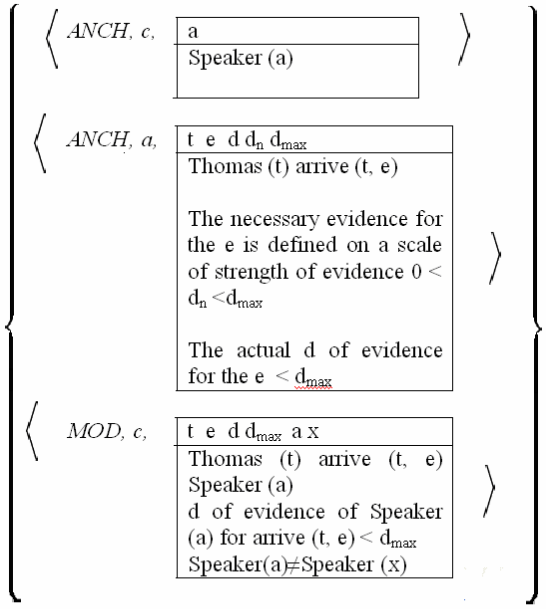
The speaker A is the utterer of sentence (3.5), the one who tells the message (Thomas has come home) to the hearer of the sentence. The partitive evidential expresses, on the one hand, that the message is not firsthand knowledge and that the evidence is not complete (not maximal compared to the scale that defines the sufficient degree of evidence).

(5.3)



The hearer has his knowledge from speaker A, but he evaluates it in his own way (5.4). For the hearer, there has been another speaker whose message is not considered as providing maximal evidence for speaker A. However, as in the case of the non-specific indefinites, for the hearer, the other speaker can have any referent except the speaker A.

(5.4)



6 Case variation of the subject of the embedded non-finite predicate

This section shows that the genitive and nominative objects are not aspectual semantic cases in raising environments with atelic matrix verbs. I propose that genitive and nominative (at least if they appear as the case of the embedded subject in the raising contexts) are an instance of an 'elsewhere' case – a default accusative. The morphological change replacing the genitive on aspectual objects with partitive has not affected all objects at this stage of language development, as shown in the diverging examples (6.1) and (6.2). Tests show that for this meaning, the sentence does not represent a completed event – the verbs *arvama* 'think' and *kuulma* 'hear' would co-occur with a partitive object (6.3).

(6.1) *Mari arvas Tooma/Toomast tulevat.*
M[NOM] believe-3S.PST T.ACC/PART come-PART_EV
'Mary believed (thought) that Thomas arrived/would arrive.'

(6.2) *Mari kuulis Toomast/#Tooma tulevat.*
M[NOM] hear-3S.PST T.PART/T.ACC come-PART_EV
'Mary heard how /that Thomas arrived.'

(6.3) *Mari arvas/kuulis seda/*selle (pikka aega).*
M[NOM] think/hear-3S.PST this.PART/TOT for a long time
'Mary thought/heard this (for a long time).'

The difference in the variation of case on the embedded subject, where the verb *arvama* 'think' allows for variation as in (6.1) and the verb *kuulma* 'hear' does not as in (6.2), leads to the question of how to account for the variation, if there is no aspectual difference.

LFG distinguishes between two control relationships for these constructions that are similar in their surface form, raising and equi (Bresnan 1982, Dalrymple 2001, Komlósy 2001). This section cannot do justice to the vast literature on control but relates new data about the impact of the TAM categories to control phenomena. In an equi sentence, the subject of the non-finite clause is not expressed and is identical with an argument of the finite verb; the identity relation links the subject of the non-finite clause with the finite verb's object. In raising, the subject of the non-finite clause is not a thematic argument of the matrix verb, but shows object-like properties and appears in the object position of the finite clause. Hiietam (2003:149) discusses two object control (equi) verbs in Estonian (*veenma* 'persuade' and *käskima* 'order') and some subject-to-object raising constructions, *teadma* 'know' and *uskuma* 'believe' (Hiietam 2003:151-152). Equi can be regarded as obligatory anaphoric control and not functional control. It can be hypothesized that raising to object versus equi can be related to the case alternation on objects. Two hypotheses about the alternating case will be checked against the data: 1) the varying arguments appear with raising while the invariant ones appear with equi structures, and 2) with equi, the object is an aspectual object.

A comparison between the verbs in (1.1) and (1.2) shows that hypothesis 1 is verified. Many well-known tests used to detect the distinction are not applicable; however, the test of idioms is ('the cat is out of the bag'). For the idiomatic reading to be available, the phrasal constituent cannot be an argument of another predicate (6.5).

(6.4) *I convinced the cat to be out of the bag. (equi)
(6.5) I believed the cat to be out of the bag. (raising)

Testing shows that variation appears with raising, and it does not appear with equi. The idiomatic reading is not available with *kuulma* 'hear' (6.6) and it is available with *arvama* 'believe, think' (6.7). The verb *kuulma* 'hear' can be classified as an equi verb and the verb *arvama* 'believe' can be classified as a

raising verb. The idiom for testing is *Sinna ongi koer maetud* 'that's where the problem is' (literally, 'that's where the dog has been buried'). The vowel length of the partitive form differs from that of the genitive one and is indicated by underlining.

(6.6) *Ma kuulsin koera sinna maetud olevat.*
I[NOM] hear-3S.PST dog.**PART** there bury-PASS.PTCP be- PART_EV
'I heard that the dog had been buried there.' (Non-idiomatic.)

(6.7) *Ma arvasin koera sinna maetud olevat.*
I[NOM] believe-3S.PST dog.**ACC** there bury-PASS.PTCP be- PART_EV
'I believed that that was the origin of the problem.' (both)

It is important to note that the case encoding of the base predicate's subject matters for the interpretation and well-formedness of the test sentence. The idiomatic meaning that is present with an accusative object and the mental epistemic matrix verb disappears with the partitive embedded subject encoding as in (6.8).

(6.8) *Ma arvasin koera sinna maetud olevat.*
I[NOM] believe-3S.PST dog.**PART** there bury-PASS.PTCP be-PART_EV
'I believed that that the dog was buried there.' (Non-idiomatic.)

Does partitive signal an equi construction, and does the morphological genitive appear only in raising constructions? The answers are yes, and no respectively, if the test indeed tests for the distinction of equi and raising. With partitive, the idiomatic meaning is lost. However, the morphological genitive is perhaps not obligatorily an instance of a default accusative. In order to solve the dilemma, a telic matrix verb should be selected, which has predominantly total object case encoding, and submitted to the same idiom test. Example (6.9) indicates a non-idiomatic interpretation of the idiom. In this environment, genitive can appear as a total case as well, which I analyze as the aspectual semantic case.

(6.9) *Ma leidsin koera sinna maetud olevat.*
I[NOM] find-3S.PST dog. **TOT** there bury-PASS.PTCP be-PART_EV
'I found that that the dog was buried there.' (Non-idiomatic.)

This combination of a non-partitive object and a telic matrix verb patterns with atelic matrix verbs in allowing only the non-idiomatic reading. With the atelic matrix verbs, the embedded subject is partitive marked, as in (6.6) and (6.8). In the test, example (6.9) does not pattern with example (6.7), which has the accusative object and the matrix verb *arvama* 'believe', since it does not allow the idiomatic reading. Therefore, case does not directly reflect whether we have equi or raising in those environments. While partitive patterns with equi, there is a distinction between the non-partitive objects. The morphological genitive appears as the default accusative (not as the semantic total) only if the matrix verb is atelic; otherwise, the non-partitive (genitive) is an instance of total, an aspectual object case. The aspectual object must be thematic.

Since partitive never gives idiomatic readings in these tests, it is possible that raising verbs are in the process of developing into equi verbs. The variation and the clear increase in partitive in the variation may alternatively point to the diachronic fact that the original 'default' case of objects was accusative. The structural change targets the default case, which is now being taken over by partitive. The gradual change may be affecting distinct structures at different speeds. The change can be understood as follows: from the status of the embedded subject argument as a semantic argument of the base verb to the semantic argument of both verbs; from a raising structure to an equi structure; from a purely structural object case to aspectual object case; possibly, from accusative (genitive) as the default object case to partitive as the default object case. The lexical entries, reflecting the optional case restriction on the raising verbs are in (6.10), (6.13), and (6.14).

(6.10) **arvama**, V 'believe <(↑SUBJ), (↑XCOMP)> (↑OBJ)'
(↑XCOMP SUBJ) = (↑OBJ)
((↑XCOMP SUBJ CASE) = ACC)
(↑EVENT) ≠ COMPLETE

However, before presenting an entry for the auditory matrix verb, some more data must be examined about equi, raising, and case. Namely, the choice of tense influences the acceptability of the accusative on the embedded subject. As opposed to clauses with present tense and incomplete (progressive) events (book-writing), which do not appear with accusative embedded subjects as in (6.11), accusative embedded subjects are unexpectedly allowed with past tense clauses describing a result, Thomas having arrived as in (6.12).

(6.11) *Mari kuulis Toomast /#Tooma raamatut kirjutavat*
M[NOM] heard-3S.PST T.PART/T.ACC book.PART write-PART_EV
'Mary heard Thomas writing a book.'

(6.12) *Mari kuulis Toomast/ Tooma tulnud olevat.*
M[NOM] hear-3S.PST T.PART/ACC come-ACT.PTCP be-PART_EV
'Mary heard that Thomas had arrived.'

Since a tense and aspect distinction can be identified as a factor behind case variation, the lexical entry must be more specific, even if it is at present not clear what the exact phenomenon behind the choice of case might be. It seems reasonable to assume that the agent is more prominent or saliently perceived in progressive activities (Thomas writing a book) than in the descriptions of result states of the activities of the agents (the result state of Thomas being at home). This intuitive distinction between whether the secondary agent or the result state is more prominent seems to map to the morphosyntactic and morphosemantic pattern, but there are no further valid tests. Therefore, the implications of this observation for equi, raising and case

marking will be left for further study; I propose that prominence in perception influences whether there is a thematic relationship between the matrix predicate and the agent of the embedded predicate. Tense and aspect can condition what is prominent. The two lexical entries reflect the observed difference, in (6.13) allowing for partitive and in (6.14) allowing for accusative in case of completed past events.

(6.13)	**kuulma**[1] , V	'hear	<(↑SUBJ), (↑OBJ) (↑XCOMP)>' (↑XCOMP SUBJ) = (↑OBJ) (↑EVENT) ≠ COMPLETE
(6.14)	**kuulma**[2], V	'hear	<(↑SUBJ), (↑XCOMP)> (↑OBJ)' (↑EVENT) ≠ COMPLETE (↑XCOMP SUBJ) = (↑OBJ) (↑XCOMP SUBJ CASE) = ACC (↑XCOMP TNS) = PAST (↑XCOMP EVENT) = COMPLETE

7 Summary

The article discusses two related partitive and non-partitive case marking phenomena in Estonian. The first issue concerns representing partitive semantics as it is expressed in the aspectual, epistemic modal and evidential domains. Analogously with an account of epistemic specificity, a DRT sketch of propositional attitudes and multiple speaker-hearer relationships explicates some semantic links between these grammar domains. The semantics of the partitive evidential, an evidentiality and epistemic modality marker in Estonian, is parallel with that of the aspectual partitive, from which it originally developed. The aspectual partitive encodes the lack of the complete event realization or maximal boundedness; the evidential partitive encodes the lack of the complete (maximal) evidence. In addition, three different approaches to functional specifications at the lexical entries of the partitive morphemes are presented. The second case marking issue concerns the nature of empty categories and the distinction of raising and equi. Raising but not equi is the syntactic environment for variation and the accusative case marking on the subject argument of the embedded predicate verb under Estonian mental epistemic matrix verbs. The morphological genitive and nominative, at least as the cases of the embedded subject in the raising contexts, are an instance of an 'elsewhere' case, a default accusative. Data from morphologically rich languages will potentially continue to clarify some disputed issues about case, and the nature of the relation between cognitive prominence, linguisitic encoding and interfaces in general.

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