# Proceedings of LFG14

Miriam Butt and Tracy Holloway King (Editors)

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## 1 Editors' Note

The program committee for LFG14 were Anna Kibort and Ida Toivonen. We would like to thank them for coordinating the review process and liasing with the local and workshop organizers in order to put together the final program that gave rise to this collection of papers. Thanks also go to the executive committee and the abstract and final paper reviewers, without whom the conference and the proceedings would not have been possible in this form. With respect to the local organizing committee, we thank Damir Ćavar for proposing to host the LFG conference in Michigan in the first place and for ensuring that the local conditions were wonderful. Many thanks are especially due to Gosia Ćavar, who put together a superbly organized conference. The social program was divided between Ann Arbor and Detroit. Who knew the surprising delights Detroit could offer!

Finally, as always, we would like to thank Dikran Karagueuzian for his and CSLI's unfailing support.

The on-line 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.

# COPULAR INVERSION AND NON-SUBJECT AGREEMENT

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**Abstract**

In this paper we analyze the phenomenon of copular inversion (CI) in Catalan, which consists in the copula not agreeing with its subject but with its complement. We claim this is due to the idea that in CI-languages verbs agree with one of their cosubjects, i.e. the GFs that are coreferential with the subject, including the subject itself. In the case of copular sentences, there are two cosubjects the verb may agree with, namely the subject and the predicate; which one the verb agrees with is determined by a set of OT constraints that implement a Person-Number Hierarchy so that the copula agrees with the most marked cosubject. This theory does not affect the analysis of subject-verb agreement in non-copular sentences, as in such cases there is only one cosubject available, the subject itself. In order to integrate these ideas within an LFG framework, we propose a change in how verbal agreement is formalized: we claim that verbs do not specify the person and number features of the subject, but have a special structure, AGR, specifying their own features. An f-structure constraint requires this AGR to be unified with a GF in the sentence, the choice being licensed through an OT ranking of constraints.

# 1 Introduction

Copular sentences show a puzzling situation with respect to subjecthood properties when the predicative complement is a DP in Catalan and closely related languages such as Spanish and Italian. In some cases, the preverbal DP agrees with the copula, as in (1). All linguistic data in this paper are from Catalan, unless otherwise noted.[1]

(1) a. Els impostos són el problema
*the*.pl *tax*.pl *be*.pres.3.pl *the*.sg *problem*.sg
'The taxes are the problem.'

b. * Els impostos és el problema
*the*.pl *tax*.pl *be*.pres.3.sg *the*.sg *problem*.sg

This is an unsurprising situation, given that, as will be argued later, the preverbal DP is assumed to be the subject in the absence of an agreeing clitic or marked intonation. However, we also find situations in which it is the postverbal DP that agrees with the copula, as in (2):

(2) a. El problema són els impostos
*the*.sg *problem*.sg *be*.pres.3.pl *the*.pl *tax*.pl
'The problem is taxes.'

[†]We gratefully acknowledge the observations made by the reviewers and the audience of the 19th LFG Conference. The research presented in this paper is supported by research project FF2011-23046.

[1]Gender information is not glossed in the examples in order to keep the glosses as compact and simple as possible. Only the features relevant for our discussion are annotated.

b. * El problema és els impostos
*the*.sg *problem*.sg *be*.pres.3.sg *the*.pl *tax*.pl

In examples like (2) not only can the copula agree with the postverbal DP, but it cannot agree with the preverbal DP, as in (2b). We refer to the construction illustrated in (2a) as *copular inversion*, or CI.

In this paper we build on the claim in Alsina (2007) that the agreeing postverbal DP in CI is not the subject, but the complement of the copula. But we depart from Alsina (2007) in claiming that in CI the verb really agrees with the complement and that CI is not an instance of covert subject agreement. This conclusion forces us to abandon the standard LFG idea that, in their lexical entries, finite verb forms specify the grammatical function (GF) that the verb agrees with. We propose that verb forms lexically specify a set of agreement features, without tying them down to any specific GF. It is through the interaction of OT-like constraints that this set of features is required to belong to a particular GF. In languages like Catalan, these constraints allow a non-subject as agreement trigger only in copular sentences. In other languages, such as English, the same constraints, in a different ranking, prohibit non-subject agreement completely, whereas in yet other languages different rankings of the same constraints account for a much more general distribution of non-subject agreement.

In what follows, we first review the evidence from Alsina (2007) for the claim that, in CI, the agreeing postverbal DP is not the subject. We then briefly discuss the analysis of CI proposed in Alsina (2007), which makes the claim that CI is only possible if the construction has a null subject. We provide evidence that this claim is incorrect. We propose an analysis of CI in which the verb agrees with its complement: it is, in fact, a new approach to highest argument agreement that derives subject-verb agreement as a particular case and the most frequent one, but by no means the only one. To conclude, we show that this approach can be straightforwardly applied to other instances of non-subject agreement.

## 2 The properties of the postverbal DP

The fact that the postverbal DP in CI agrees with the verb, as shown in (2), is strong prima facie evidence in favor of the subject status of the postverbal DP. Typical examples of copular sentences where the verb agrees with the postverbal DP, when both DPs are 3rd person and the postverbal DP is plural, are found when the preverbal DP denotes an abstract entity, such as ‘the problem’, as in (2), ‘the solution’, ‘the reason’, ‘the best thing’, etc. But it is also found when the preverbal DP denotes a concrete entity, as in (3):

(3) a. El meu joc preferit són/*és els escacs
*the*.sg *my*.sg *game*.sg *favorite*.sg *be*.pres.3.pl/*sg *the*.pl *chess*.pl
‘My favorite game is chess.’

b. El sopar d'avui són/*és verdures a la planxa
*the*.sg *dinner*.sg *of=today* *be*.pres.3.pl/*sg *vegetable*.pl *on the* *grill*
'Today's dinner is grilled vegetables.'

c. Aquesta cadira són/*és quatre fustes mal clavades
*this*.sg *chair*.sg *be*.pres.3.pl/*sg *four* *wood*.pl *badly nailed*.pl
'This chair is a bunch of pieces of wood poorly nailed together.'

Examples (3b) and (3c) show that the postverbal DP does not have to be more specific (or more restrictive in its reference) than the preverbal DP in order for it to agree with the verb. The copula never agrees in the 3rd person singular with the postverbal DP when the preverbal DP is 3rd person plural, as in (1b). When one of the DPs involved in a copular sentence is a first or second person pronoun, whereas the other one is a DP unmarked for person, the former attracts agreement, regardless of its position with respect to the verb:

(4) a. L'autor sóc/*és jo
*the=author*.sg *be*.pres.1.sg/*3.sg *I*
'I am the author.'

b. Jo sóc/*és l'autor
*I* *be*.pres.1.sg/*3.sg *the=author*.sg
'I am the author.'

(5) a. Els candidats més ben valorats éreu/*eren vosaltres
*the*.pl *candidate*.pl *more well valued*.pl *be*.impf.2.pl/*3.pl *you*.pl
'You were the most highly valued candidates.'

b. Vosaltres éreu/*eren els candidats més ben valorats
*you*.pl *be*.impf.2.pl/*3.pl *the*.pl *candidate*.pl *more well* *valued*.pl
'You were the most highly valued candidates.'

Despite what the phenomenon of agreement seems to indicate, all of the other subjecthood properties examined by Alsina (2007) argue for analyzing the postverbal agreeing DP in the CI construction as a complement, not the subject of the verb. The relevant properties are: the evidence from the position of the DP, the impossibility of omitting it, and its behavior with respect to the partitive clitic. (Alsina, 2007 also examines the facts of raising, which point to the same conclusion, although we will not review them here for space reasons.)

In Catalan, as in the other Romance languages that allow null subjects, there is a positional asymmetry between subject and complements: the apparent subject[2] can appear either preverbally or postverbally, whereas complements (by which we mean direct and indirect objects and obliques) are restricted to appearing postverbally. (6) illustrates the alternative position of the apparent subject, while the contrast between (6) and (7) shows the fixed postverbal position of complements. All orders in (7) are ungrammatical with a neutral intonation: a marked intonation of the preverbal elements would render the orders in (7) grammatical, but that would imply a different syntactic structure in which neither of the preverbal DPs occupies this position by virtue of being a complement of the verb, but as a focused phrase.

(6) a. Els ruixats seguiran la tempesta
*the*.pl *shower*.pl *follow*.fut.3.pl *the*.sg *storm*.sg
'The showers will follow the storm.'

b. Seguiran la tempesta els ruixats
*follow*.fut.3.pl *the*.sg *storm*.sg *the*.pl *shower*.pl
'The showers will follow the storm.'

(7) a. * La tempesta seguiran els ruixats
*the*.sg *storm*.sg *follow*.fut.3.pl *the*.pl *shower*.pl

b. * Els ruixats la tempesta seguiran
*the*.pl *shower*.pl *the*.sg *storm*.sg *follow*.fut.3.pl

c. * La tempesta els ruixats seguiran
*the*.sg *storm*.sg *the*.pl *shower*.pl *follow*.fut.3.pl

Given this subject/non-subject asymmetry, it follows that, in a sentence like (2a), the preverbal DP can be nothing but the apparent subject and, consequently, the postverbal DP has to be the complement, even though it agrees with the verb.

An additional argument having to do with position is that, in some cases, the agreeing DP cannot be placed in the preverbal position, which is an expected position for a subject. In many cases, the order of the two DPs in a copular sentence can be reversed, without affecting the agreement of the verb, as shown in (1)–(2) and in the pairs of sentences of (4) and (5), or the truth-conditional meaning of the sentences, though the information-structure is different. But, in some cases, the order of the two DPs cannot be reversed. This is what we see if we try to reverse the order of the DPs in (3b)–(3c):

(8) a. * Verdures a la planxa són/és el sopar
*vegetable*.pl *on the grill* *be*.pres.3.pl/sg *the*.sg *dinner*.sg
d'avui
*of=today*

[2] We use the term *apparent subject* to be neutral with respect to whether the preverbal DP in sentences like (1) is a true subject or a topic that anaphorically binds a null pronominal subject. The latter analysis is supported by a lot of evidence and has been argued for in Bonet (1990), Solà (1992), and Vallduví (1992), among others, but it is by no means unanimously accepted, cf. Forcadell (2013).

b. * Quatre fustes mal clavades són/és aquesta cadira
*four* *wood*.pl *badly* *nailed*.pl *be*.pres.3.pl/sg *this*.sg *chair*.sg

If the agreeing DP were the subject, it should have no difficulty in appearing in preverbal position. The fact that, in some cases, it cannot strongly suggests that it is not the subject.

Another property that reveals the non-subject status of the postverbal agreeing DP in CI is the impossibility of omitting it. Catalan, as a null subject language, freely allows the subject to be omitted in any sentence (subject to pragmatic constraints). So, if we take a sentence like (1a), we can leave out the preverbal DP and the sentence is interpreted as if it had a pronominal subject coreferential with a discourse topic, possibly *els impostos* 'taxes', as in (9a). In contrast, we cannot leave out the agreeing postverbal DP of a CI sentence: (2a) becomes ungrammatical if we leave out the agreeing DP, as in (9b), although it is fine without the non-agreeing DP, as in (9c).

(9) a. Són el problema
*be*.pres.3.pl *the*.sg *problem*.sg
'They are the problem.'

b. * El problema són
*the*.sg *problem*.sg *be*.pres.3.pl

c. Són els impostos
*be*.pres.3.pl *the*.pl *tax*.pl
'It is taxes.'

The same occurs when the agreeing postverbal DP is a first or second person pronoun, as in (4)–(5). Corresponding to (4a), we cannot omit the agreeing DP, although we can omit the non-agreeing DP:

(10) a. * L'autor sóc
*the=author*.sg *be*.pres.1.sg

b. Sóc jo
*be*.pres.1.sg *I*
'It is me.'

If the agreeing DP in CI were to be analyzed as the subject, the fact that it cannot be elided would be unexplained. If we analyze it as an obligatory complement of the verb, the fact that it cannot be left out follows from this.

Finally, the partitive clitic *en* may correspond to a nounless DP only when this DP is a complement, never when it is only a subject.[3] The clitic *en* is required in

[3] As is well-known, the single nominative GF of many verbs —unaccusatives— behaves like an object in many respects, and that includes the possibility of having a partitive clitic related to it. Thus, an expression that looks like a subject because it agrees with the verb may have a partitive clitic, as in *N'arriben molts* (EN *arrive*.3.pl *many*) 'Many of them are arriving', but it is reasonable to analyze this expression both as a subject and an object (Alsina, 1995). This is not the situation in copular sentences, where there are two nominative GFs.

(11b) because the direct object lacks the head noun, but it cannot be used in (12), where it corresponds to the missing noun of the subject:[4]

(11) a. Els estudiants llegeixen molts llibres
*the*.pl *student*.pl *read*.pres.3.pl *many*.pl *book*.pl
'The students read many books.'

b. Els estudiants *(en) llegeixen molts
*the*.pl *student*.pl *(EN) *read*.pres.3.pl *many*.pl
'The students read many (books, magazines, . . . ).'

(12) Molts (*n')aprovaran
*many*.pl (*EN)=*pass*.fut.3.pl
'Many will pass.'

In copular constructions, it is the postverbal DP that triggers the presence of the partitive *en* when it lacks a head noun, even if it is the agreeing DP.

(13) a. El problema són molts estudiants
*the*.sg *problem*.sg *be*.pres.3.pl *many*.pl *student*.pl
'The problem is many students.'

b. El problema *(en) són molts
*the*.sg *problem*.sg *(EN) *be*.pres.3.pl *many*.pl
'The problem is many of them.'

Even though the postverbal DP agrees with the verb in (13b), it triggers the presence of the partitive clitic, which indicates it is a complement.

To summarize, the evidence from position, omissibility, and *en*-cliticization indicates that the postverbal DP in CI is a complement. This leaves the agreement facts as a problem that needs to be solved.

## 3 Previous analyses

Previous analyses of CI have assumed that the general process of subject-verb agreement applies in this construction. Many authors, such as Hernanz and Brucart (1987), Fernández Leborans (1999), and Ramos (2002), have assumed that the agreeing DP is the subject, without providing an adequate explanation for the facts presented in Section 2 that argue for the complement status of the agreeing DP in CI. Alsina (2007), however, breaks with this tradition and assumes that this DP is a complement and explains the agreement facts by positing a covert (or null) subject in CI which shares its features with the postverbal DP, thus preserving the idea that

[4]Clitic *en* has a second function (in addition to supplying the restrictor of an OBJ): to supply the complement of the OBJ. For this reason, *Molts en llegeixen els llibres* is grammatical with *en* corresponding to the complement of the OBJ *els llibres* (hence, the meaning of the sentence: 'Many read his/her books'). It does not correspond in any case to the missing noun of the SUBJ.

the verb agrees with its subject even in constructions that appear to contradict this idea. Some aspects of this analysis are shared with Moro (1997), but, for ease of exposition, the rest of this section will discuss the analysis in Alsina (2007).

Alsina (2007) assumes, as in Vallduví (1992) and others, that finite clauses have an optional iterative position at the front of the clause that can be occupied by an XP that is a topic anaphorically connected to a pronoun inside the clause, possibly in a long-distance relation. This pronoun can be a clitic, in which case we get what is known as clitic left dislocation, or a null subject, the claim being that null subjects are pronominal, so that what appears to be a sentence with a clause-initial subject should be analyzed as a sentence with an initial topic DP that binds a null pronominal subject either in the same clause or at a deeper level of embedding. The f-structure conditions and the c-to-f-structure mapping principles in Alsina (2007) are set up so that a subject can only be overtly expressed as a VP-internal phrase (an XP inside the VP). If the subject is not realized in this position, there is no phrase corresponding to the subject, but a PRED 'PRO' feature is provided for the subject, allowing it to satisfy the Completeness condition. In this case, there may be a topic DP in clause-initial position that anaphorically binds the pro subject, giving the impression that it is the subject.

This analysis, according to which subjects are either postverbal DPs or null pronominals, applies in all clauses in Catalan, including copular clauses. In this type of clause, a special situation arises. As a lexical property of the copula, the subject and the complement are coindexed.[5] From a syntactic point of view, two coindexed expressions are required to have the same agreement features, i.e. person, number, and gender. Two expressions in an anaphoric binding or control relation are also coindexed, which implies that the pronoun and its antecedent have the same agreement features. Thus, in a copular construction in which there is a null subject bound by a topic, the subject is coindexed with both the topic and the predicative complement and, so, needs to have the same agreement features as both of these expressions.

A null subject has no lexically specified features and therefore is free to "copy" whatever features are present in both coindexed expressions. No conflict arises if both the coindexed topic and the predicative complement happen to have the same agreement features. But a conflict does arise when the two expressions have different features—suppose the topic that binds the null subject is first person singular and the predicative complement is third person singular. Assuming that Consistency, or Uniqueness, cannot be violated, the subject cannot be both first person and third person. In such cases, a set of OT constraints has the effect of requiring the subject to choose, out of the two sets of features of the coindexed expressions, the one that is highest in the following Person-Number Hierarchy:

(14) 1/2 SG > 3 PL > 3 SG

[5]The subject is referentially a subset of the complement in a copular construction, either a proper subset or the same set. We use the term *coindexed* in this paper to refer to both situations.

Given this, it does not matter whether it is the topic anaphorically linked to the subject or the predicative complement that has the features that are higher in the hierarchy in (14): these are the features that the subject will pick and that will have a morphosyntactic effect on the form of the copula. This explains why, when one of the two GFs involved is first or second person and the other one is not, the copula shows agreement with the first or second person GF, regardless of which one is the topic and which one the complement, as shown in (4)–(5), or, when one is third person plural and the other one is third person singular, the copula shows agreement with the former, as shown in (1)–(2) and (3).

This analysis correctly explains the agreement facts in copular sentences with a preverbal and a postverbal DP, while preserving the observation made in Section 2 of this paper that the postverbal DP in CI is a complement even though it agrees with the verb. But the analysis makes the claim that CI is only possible in languages and in constructions with null subjects. As we shall see now, this claim is not correct.

## 4 Problems with Alsina (2007)

The main problem with the approach defended by Alsina (2007), as well as Moro (1997), is that it claims that CI is possible only in *pro*-drop languages and, within languages of this kind, in constructions that have a null subject. However, we will show this is not true, as there is CI in Catalan copular constructions in which no null subject is possible and there is data that shows the existence of CI in a non-*pro*-drop language like German.

Consider the following examples in Catalan, where a VP-internal subject is found:[6]

| | | | | | | |
|---|---|---|---|---|---|---|
| (15) | a. | Són/*és | els | impostos | un | problema |
| | | *be*.pres.3.pl/*sg | *the*.pl | *tax*.pl | *a*.sg | *problem*.sg |
| | | 'Taxes are the problem.' | | | | |
| | b. | Són/*és | un | problema | els | impostos |
| | | *be*.pres.3.pl/*sg | *the*.sg | *problem*.sg | *a*.pl | *tax*.pl |
| | | 'The problem is taxes.' | | | | |

These sentences do not have a null subject. According to the sentence structure defended by Alsina (2007) and Vallduví (1992), a null pronominal subject is required to comply with the Subject Condition if there is no postverbal DP corresponding to the subject and there is no displaced constituent (such as an interrogative DP) that fills the subject through structure-sharing. In such cases, a null pronominal subject

[6]In these examples, we have decided to give data that use the indefinite article for *problema* instead of the definite article which we have been using throughout this paper, as we have noticed that the latter produces some unwanted effects that seem to be due to the information structure of the sentence, as in example ??*Són el problema els impostos* 'The problem is taxes.' This seems to be constant regardless of which nouns are involved.

is assumed to be present at f-structure: this null pronoun can be anaphorically dependent on a discourse topic not present in the sentence, as in (9a) and (9c), or on a discourse topic expressed as a preverbal DP, as in examples (1) through (5). In the latter class of examples, the preverbal DP is assumed not to be the subject, but a topic that is the antecedent of the null subject, hence the name "apparent subject" used for this DP.

It seems to be irrelevant to know which of the two DPs is the subject. The data in (15) show that regardless of word order, the copula must agree in the plural, thus yielding exactly the same paradigm we have shown for CI: the plural wins over the singular.

In fact, Alsina (2007) predicts that in cases like (15) the verb should agree with its subject. Leaving aside the problem that it is quite difficult to determine which DP is actually the subject, the data presented above show that this prediction is wrong. If the verb agreed with its subject, there are two possible situations: if we assume a flat structure where either DP may be assigned the SUBJ function, the verb should be able to agree with either DP, or if we assume a strict interpretation of Vallduví's (1992) theory, which proposes a VOS canonical word order for Catalan, then the final DP should be regarded as the subject, thus leaving (15a) unexplained.

As has been already mentioned above, there is further data showing that approaches that explain CI by means of null subjects are incorrect. Consider these data from German, for instance:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (16) | a. | Die | Steuern | sind/*ist | das | Problem | |
| | | *the*.pl | *tax*.pl | *be*.pres.3.pl/*sg | *the*.sg | *problem*.sg | |
| | | 'Taxes are the problem.' | | | | | |
| | b. | Das | Problem | sind/*ist | die | Steuern | |
| | | *the*.sg | *problem*.sg | *be*.pres.3.pl/*sg | *the*.pl | *tax*.pl | |
| | | 'The problem is taxes.' | | | | | |

In (16) we see exactly the same paradigm that is shown by Catalan: the copula agrees with the element that is higher in the Person-Number Hierarchy, regardless of its position.

If we follow Berman (2003), one could argue that German is a language that allows for a certain freedom of word order, such that any DP may be placed in Spec-CP (the so-called *Vorfeld*) in order to be focalized. This could lead to the false impression that in (16b) *das Problem* is a focalized predicate, such that the subject, *die Steuern*, remains internal to the VP. The main issue with this hypothesis is that it does not explain why singular agreement is barred in (16a) which should be the consequence if we consider *die Steuern* a focalized predicate, or why singular agreement is ungrammatical in (16b), which should be the consequence if *das Problem* was a focalized subject.

We conclude, therefore, that German does indeed have CI phenomena. Since German is not a *pro*-drop language, it is clear that the analysis of CI cannot depend on the presence of a null subject. The paradigm shown by (15) and (16) is explained in a unified way if we assume a CI analysis, where the Person-Number Hierarchy is the key factor determining the agreement features, such that only plural agreement is possible because it ranks higher than singular agreement.

In summary, the data presented in this section imply that any approach using null subjects as some kind of "proxy" that "copies" agreement features from a non-subject to the subject, like Moro (1997) and Alsina (2007), is incorrect.[7] CI, as we will show below, is about two GFs competing for agreement with a verb whose arguments are in a very particular relationship. Whereas in transitive sentences the object does not share its reference with the subject, in copular sentences the predicate (the "object") is indeed coreferential with the subject of the sentence. The proposal we defend here is that the copula is not different from any other verb with respect to agreement; this special relationship between the subject and complement of the copula unravels the nature of verbal agreement, namely, that all verbs seek to agree with a GF that is coreferential with the subject. Of course, copular sentences are the only case where two GFs share their reference, thus allowing the copula to agree with the predicate.[8]

## 5 Proposed analysis

Our claim is that in some languages, the verb does not actually agree with its subject, but with some GF that is coreferential with the subject, which may, of course, be the subject itself. We call the GFs that comply with these conditions cosubjects (COSUBJs), more formally:

(17) A GF $f$ is a COSUBJ iff $ref(f) = ref(g)$, where $g$ is SUBJ and $ref(x)$ is a function that returns the reference of some GF $x$.

If $f$ is the subject, then $f = g$, thus $ref(f) = ref(g)$ by definition. Therefore, the subject is always considered a cosubject and, in fact, in non-copular sentences it is the only one available.

In a copular sentence, of course, there are at least two cosubjects, the subject and the predicate of the sentence. This means that the verb must somehow choose which GF it agrees with, a choice that is determined by the Person-Number Hierarchy proposed earlier. The problem is that the aforementioned hierarchy is not a principle by itself, but needs to be integrated in a theory of syntax that predicts in which situation the verb will agree with a non-subject and in which it will agree with a subject. The statement that the verb must agree with the cosubject ranking higher in the hierarchy is just an informal description. In order for this statement

[7]This kind of analysis resembles the approach defended by Perlmutter (1983) for unaccusative constructions, in which the verb agrees with a non-subject postverbal DP triggered by the presence of a dummy null subject.

[8]There is one exception to this claim, namely reflexive objects. Such cases, though, pose no problem for our theory, as will be shown later.

to be incorporated in a formal LFG theory of agreement, we need to change some aspects of the LFG framework in a substantive way, as we shall see next.

In the first place, we assume that verb forms specify agreement features in a feature structure called AGR as shown in Figure 1 (see next page).

$$\begin{bmatrix} \text{PRED} & \text{`}\textit{be}\left\langle \text{arg(ument)} \right\rangle\text{'} \\ \text{TENSE} & \text{PRES} \\ \text{MOOD} & \text{INDIC} \\ \text{AGR} & \begin{bmatrix} \text{PERS} & 3 \\ \text{NUM} & \text{PL} \end{bmatrix} \end{bmatrix}$$

Figure 1: Lexical entry for Catalan *són* ‘(they) are’

The AGR of the verb must be unified with the AGR of some other GF according to the well-formedness condition GF-VERB AGREEMENT shown below:[9]

(18) GF-VERB AGREEMENT: $\begin{bmatrix} \text{AGR} & \boxed{1} \\ \text{GF}_j & \boxed{1} \end{bmatrix}$

The condition in (18) must be fulfilled by the f-structure of the sentence. In a language with CI, GF$j$ is a cosubject, whereas in languages without this phenomenon, it is just the subject.

It is easy to understand how this is a radical departure of what may be called “standard” LFG (Bresnan, 2001, Dalrymple, 2001, among others). In previous theories, verbal agreement is formalized by means of a functional annotation of the verbal lexical entry that specifies the agreement features of the SUBJ. These features have to unify with those of the DP in subject position. However, the data we have presented are not compatible with this approach, as the GF the verb agrees with cannot be determined at a lexical level. For instance, a form like *són* ‘they are’ agrees with the subject in (1a) and with the complement in (2a).

For a sentence like (2a), the c-structure and f-structure are those shown in Figures 2 and 3 (next page), respectively.[10] These assume that the preverbal DP is effectively a topic, following Alsina (2007) and Vallduví (1992), but it is perfectly possible to represent both structures by assuming that the preverbal DP is mapped to a SUBJ, for example, if one follows theories that reject VOS as the “neutral”

[9]In languages where a single verb form simultaneously agrees with SUBJ as well as with other arguments (e.g. Basque, Swahili, etc.), the verb specifies information about OBJ (and possibly other non-subject arguments) as well as AGR.

[10]The correspondence between arguments at a-structure and GFs at f-structure is not governed by the standard Completeness and Coherence conditions, but by principles such as those proposed by Alsina (2007, pp. 32–33), including the Subject Condition, which licenses a subject in the f-structure, even without a corresponding argument at a-structure.

word order in Catalan, e.g. Forcadell (2013). The only difference, besides the obvious ones at the level of c-structure (the preverbal DP would be Spec-IP, not an adjunct of IP), would be that there is no instance of a null subject at the f-structure.

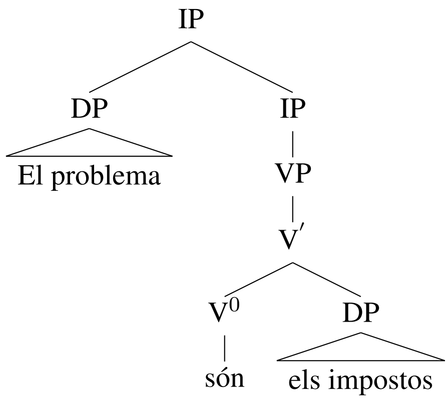


Figure 2: c-structure of (2a)

$$
\left[\begin{array}{ll}
\textsc{pred} & \text{`}\textit{be}\left\langle \text{arg}_1 \right\rangle\text{'} \\
\textsc{agr} & \boxed{1} \\
\textsc{topic} & \left[\begin{array}{ll} \textsc{pred} & \text{`}\textit{problem}\text{'} \\ \textsc{pers} & 3 \\ \textsc{num} & \textsc{sg} \\ \textsc{index} & \text{i} \end{array}\right] \\
\textsc{subj} & \left[\begin{array}{ll} \textsc{pred} & \text{`PRO'} \\ \textsc{pers} & 3 \\ \textsc{num} & \textsc{sg} \\ \textsc{index} & \text{i} \end{array}\right] \\
\textsc{comp} & \boxed{1}\left[\begin{array}{ll} \textsc{pred} & \text{`}\textit{tax}\text{'} \\ \textsc{pers} & 3 \\ \textsc{num} & \textsc{pl} \\ \textsc{index} & \text{i} \end{array}\right]_1
\end{array}\right]
$$

Figure 3: f-structure of (2a)

As stated so far, we still do not have any mechanism that determines which GF the copula must agree with. We have the Person-Number Hierarchy, but, as noted before, in its current fashion it is nothing but a useful descriptive device, yet devoid of any explanatory power as it is not integrated into a theoretical framework that answers the questions of why and how CI arises.

To do so, we propose an implementation of the Person-Number Hierarchy in an OT-LFG framework (Bresnan, 2000; Kuhn, 2003). OT-LFG operates under the standard assumptions of LFG that syntax is the product of interactions between different levels of grammatical information that are independent of each other, but it adds the OT hypothesis that grammaticality is actually the product of a competition between different possible candidates, such that the grammatical one is the one that violates the least important constraint the least amount of times (Prince and Smolensky, 2004). From a philosophical stand, using OT-LFG embodies a vision of language that states that the forms that are deemed part of the language (i.e. grammatical) are actually those that are the "less defective" ones with respect to different criteria represented in the structures of the LFG architecture as a result of the complex interaction of potentially clashing tendencies that are found within a language, across languages and in human language in general.

The OT constraints we propose are the following ones, ranked as in (22) and in (23) for CI and non-CI languages, respectively:

(19) CosubjAgr: $\textsc{gf}_j = \textsc{cosubj}$

(20) SubjAgr: $\textsc{gf}_j = \textsc{subj}$

(21) MarkedAgr:

a. AgrPers: $\begin{bmatrix}\textsc{agr} & \begin{bmatrix}\textsc{pers} & 1 \vee 2\end{bmatrix}\end{bmatrix}$

b. AgrNum: $\begin{bmatrix}\textsc{agr} & \begin{bmatrix}\textsc{num} & \textsc{pl}\end{bmatrix}\end{bmatrix}$

c. AgrPers $\gg$ AgrNum

(22) For CI languages:
CosubjAgr $\gg$ MarkedAgr $\gg$ SubjAgr

(23) For non-CI languages:
SubjAgr $\gg$ MarkedAgr
SubjAgr $\gg$ CosubjAgr

The way to implement the Person-Number Hierarchy is the constraint "bundle" MarkedAgr with its two internal constraints: agreement in the 1st or 2nd person plural means no violation of MarkedAgr; agreement in the 1st or 2nd person singular, one violation against AgrNum; agreement in the 3rd person plural, one against AgrPers; and agreement in the 3rd person singular, two against both constraints that make up MarkedAgr.[11]

Given that MarkedAgr favors verb forms in the 1st and 2nd person, why don't we always get verb forms with these features? The reason is that the verb's AGR must unify with a GF in the clause, as required by (18) and it must do so preserving Consistency, which we consider to be an inviolable principle. In addition, the sentence must satisfy either CosubjAgr or SubjAgr, in CI or non-CI languages, respectively.

The ranking in (23) for non-CI languages may require further explanation. This device, formalized by Anttila and Cho (1998) and used in OT-LFG by Belyaev (2013), expresses an underspecified ranking where the relative order between the MarkedAgr and CosubjAgr constraints is irrelevant and is, therefore, left undetermined, as it does not affect the predictions about verb agreement in non-CI languages. The only relevant ranking in this case is that SubjAgr must be higher than MarkedAgr and CosubjAgr.

Let us now explain the basic facts of CI making use of this theory. For cases like those in (2), repeated here for convenience, the optimization is the one shown in Table 1:

[11] Instead of MarkedAgr one could have a disjunction of four constraints as suggested by a reviewer, but not only would it be extremely inelegant; it would not be able to explain the facts in (26) and (27).

(24) a. El problema són els impostos
*the*.sg *problem*.sg *be*.pres.3.pl *the*.pl *tax*.pl
'The problem is taxes.'

b. * El problema és els impostos
*the*.sg *problem*.sg *be*.pres.3.pl *the*.pl *tax*.pl

| | | MARKEDAGR | | |
|---|---|---|---|---|
| | COSUBJAGR | AGRPERS | AGRNUM | SUBJAGR |
| ☞(24a) | | * | | * |
| (24b) | | * | *! | |

Table 1: Optimization for (24)

The explanation is quite straightforward in this case. Neither candidate violates COSUBJAGR, as in both cases the verb agrees with a cosubject: the complement in (24a) and the subject in (24b). Both violate AGRPERS once, as in both cases agreement is in the 3rd person, not in the 1st or the 2nd. The constraint that rules out (24b) is AGRNUM: this constraint is violated in (24b) because the verb is in the singular (i.e. its AGR would have the NUM feature singular), whereas it is not violated in (24a), where the verb is in the plural form.

The COSUBJAGR constraint is the key for rejecting any possible instance of a transitive verb agreeing with its object in Catalan just because the object ranks higher than the subject in the Person-Number Hierarchy. As the object is not a cosubject, a verb agreeing with its object violates COSUBJAGR, which is the highest ranking constraint, thus it follows that the verb must agree with the subject (the only cosubject available in a transitive sentence) in order to comply with the COSUBJAGR constraint. An interesting situation is presented by transitive sentences with a reflexive object that is coreferential with the subject: here the reflexive object is a cosubject. Per definition, the reflexive shares its agreement features with its antecedent, in this case, the subject. Therefore, the reflexive will always have the same ranking as the subject in the Person-Number Hierarchy, so MARKEDAGR does not choose which candidate is grammatical as it is violated exactly the same amount of times in both cases. SUBJAGR is the constraint which rejects the candidate where GF$_j$ is the object, thus licensing the candidate where the verb is stated to agree with the subject as the only grammatical form.

In a non-CI language, the optimization forces the verb to agree with the subject. The ranking of constraints shown below is licensed by (23), but it is just one of the two possible rankings due to the underspecification of the relative order between MARKEDAGR and COSUBJAGR in non-CI languages. Therefore, for a minimal pair in English like the one presented below, the OT tableau is the one shown in Table 2:

(25) a. The problem is taxes

b. * The problem are taxes

| | | MARKEDAGR | | |
|---|---|---|---|---|
| | SUBJAGR | AGRPERS | AGRNUM | COSUBJAGR |
| ☞ (25a) | | * | * | |
| (25b) | *! | * | | |

Table 2: Optimization for (25)

Let us now consider the case in which one cosubject is in the 1st person and the other one in the 2nd person. As the reader will recall, the Person-Number Hierarchy states that the 1st and 2nd person both rank the highest. Consider the following set of data, where the four mathematically possible combinations of 1st and 2nd person singular in the subject and complement function of the copula are shown:

(26) a. Jo sóc tu
*I* *be*.pres.1.sg *you*
'I am you.'

b. * Jo ets tu
*I* *be*.pres.2.sg *you*

(27) a. Tu ets jo
*you* *be*.pres.2.sg *I*
'You are me.'

b. * Tu sóc jo
*you* *be*.pres.1.sg *I*

The description of the data above can be captured by the simple statement that, if both cosubjects rank equally, then the verb must agree with its subject. This is predicted by our theory as is, as shown by the tableau below for (26):[12]

| | | MARKEDAGR | | |
|---|---|---|---|---|
| | COSUBJAGR | AGRPERS | AGRNUM | SUBJAGR |
| ☞ (26a) | | | * | |
| (26b) | | | * | *! |

Table 3: Optimization for (26)

As shown above, in such cases, SUBJAGR is the deciding factor that rules out the ungrammatical structure (26b) in favor of (26a). This shows that, even in CI languages, where agreement with a cosubject is the strongest of the constraints being considered here, SUBJAGR becomes relevant when the higher ranking constraints do not provide a way to distinguish between the available candidates.

In summary, the claim we defend here is that all verbs are subject to cosubject-verb agreement in CI languages, but non-subject agreement only arises in copular

[12]We only provide the tableau for (26) as the optimization is identical to the one for (27).

sentences because the copula has the unique function of requiring its complement to be coreferential with its subject and therefore only copular sentences have more than one cosubject that the verb can agree with. When two cosubjects are available, we claim that the grammatical structure is the one in which the copula violates MARKEDAGR the least amount of times, i.e. by agreeing with the DP that is higher in the Person-Number Hierarchy.

## 6 The Norman Bates Problem: when there is no coreference

The analysis provided above presents an apparent problem that we have called "The Norman Bates Problem," in which CI does not arise:[13]

(28) a. Norman Bates és moltes persones a *Psicosi*
*Norman Bates be*.pres.3.sg *many*.pl *person*.pl *in Psycho*
'Norman Bates is many people in *Psycho*.'

b. * Norman Bates són moltes persones a *Psicosi*
*Norman Bates be*.pres.3.pl *many*.pl *person*.pl *in Psycho*

If we blindly applied our theory, we would predict exactly the opposite of what the data show: we would predict that the copula should be in the 3rd person plural, as such a candidate violates just AGRPERS, whereas (28a) violates both the higher ranking AGRNUM constraint as well as AGRPERS.

This is not restricted to Catalan and closely related languages. German, which we already have claimed to be a CI-language, also shows the exact same issue as in the sentences above:

(29) a. Norman Bates ist mehrere Personen in *Psycho*
*Norman Bates be*.pres.3.sg/*pl *many*.pl *person*.pl *in Psycho*
'Norman Bates is many people in *Psycho*.'

b. * Norman Bates sind mehrere Personen in *Psycho*
*Norman Bates be*.pres.3.sg/*pl *many*.pl *person*.pl *in Psycho*

The key to this is the lack of coreference between the subject and the predicate in a case like (28a). The meaning of the sentence above is not that Norman Bates really is many people, but that he plays *the roles* of many people. This introduces a layer of fiction whereby the copula is linking an entity with the representation of another entity, i.e. the role of that entity, which is in no case that entity. This implies that the subject and the predicate are not coreferential and thus, that the predicate is not a cosubject. Therefore, the only cosubject available in (28a) is the subject, which explains why the singular is the only possible form in this case; this

[13] We thank a reviewer for bringing up this potential problem.

leaves a situation that is exactly the one in transitive sentences, where the object is not a cosubject. The optimization for (28) follows in Table 4:

| | | MARKEDAGR | | |
|---|---|---|---|---|
| | COSUBJAGR | AGRPERS | AGRNUM | SUBJAGR |
| ☞ (28a) | | * | * | |
| (28b) | *! | * | | * |

Table 4: Optimization for (28)

In the case of (28) the CI version of the structure is impossible, as there cannot be coreference betwen the subject and the complement because it is contradictory to believe that one person is many people.

However, a distinction must be made between people acting as, or playing the role of, other people as in (28) and inanimate objects that represent people such as statues and pictures. In the former case, coreference between the two expressions denoting the people involved is disallowed, whereas in the latter case coreference between the image and the person represented by it is required. For example, in the context in which a person is pointing at a picture of herself, she can utter (30a) but not (30b):

(30) a. Aquesta noia sóc jo
*this* *girl* *be*.pres.1.sg *I*
'I am this girl.'

b. * Aquesta noia és jo
*this* *girl* *be*.pres.3.sg *I*

In some cases, a given object can be taken to be either the representation of a specific person or not. In such cases, the DP corresponding to the object, if used as the subject of the copula, may either be coreferential with the complement or not, so that the two agreement forms shown below are possible:

(31) a. Aquest és jo
*this* *be*.pres.3.sg *I*
'This is me.'

b. Aquest sóc jo
*this* *be*.pres.1.sg *I*
'This is me.'

The case in (31) is data taken from a TV program in the Catalan public broadcasting service. At a certain point, the speaker is holding a puppet that looks like him and utters (31a) while holding, and pointing at, the puppet. The context makes it quite clear that the intended meaning is 'This (puppet) represents me.' In the same context, example (31b) can be used meaning 'I am this (puppet).' In our interpretation, there is no coreference between subject and complement in example (31a), whereas there is in (31b). Without coreference the verb has to agree with its subject, as in (28a); with coreference, it agrees with the complement, since the complement is a cosubject that is higher than the subject in the Person-Number Hierarchy.

The conclusion we draw from these data is that they actually support our claim that it is coreference that drives the existence of CI in copular sentences. In some copular sentences, coreference between the subject and the complement is not possible for semantic reasons and, therefore, CI does not arise.

## 7 Conclusions and possible extensions

As has been shown in the previous pages, our proposal radically modifies our way of thinking about verb agreement. We have claimed that the best approach towards explaining CI is to abandon the hypothesis that verbs specify the person and number features of the subject; our claim implies that verbs and GFs have their features specified in a special f-structure named AGR so that the verb's AGR must unify with one of the GFs in the verb's clause, according to the GF-VERB AGREEMENT well-formedness constraint.

The GF which the verb agrees with is determined in a language-specific way. In the case of non-CI languages, it will always be SUBJ, due to SUBJAGR being the highest-ranking constraint. On the other hand, in CI languages the GF is a cosubject and, in case there is more than one, the set of constraints MARKEDAGR determines which one the verb agrees with, namely the one that ranks higher in the Person-Number Hierarchy.

There is, of course, room for extending this research further. There are non-subject agreement phenomena that we propose may be analyzed by means of the theory that we have defended in this paper.

One of the phenomena that may be of greatest interest to explore is the case of non-subject agreement in Dargwa, as described by Belyaev (2013). Belyaev (2013) claims that in certain Dargwa dialects transitive verbs agree with the GF that is more prominent in terms of person,[14] regardless of which GF this is. This situation is exactly the one that is predicted if we ranked our constraints like this:

(32) MARKEDAGR $\gg$ SUBJAGR, COSUBJAGR

The only obstacle that must be faced if our analysis is to be extended to the data presented by Belyaev (2013) is the fact that in these dialects the 2nd person takes precedence over the 1st, which would require a more fine-grained AGRPERS constraint than the one that we have proposed so far.

Finally, there are phenomena of "oblique SUBJs" that also allow for an analysis like ours, namely Icelandic quirky case and English locative inversion. Both consist

[14] Number seems to be an underspecified feature in this language, so Belyaev (2013) does not take it into account.

in having a non-nominative element (an oblique case DP in Icelandic, a locative PP in English) taking the SUBJ function, such that the verb must agree with a non-SUBJ nominative DP. This situation can be perfectly analyzed within our framework by stating an AGRCASE principle that requires the case of the GF which the verb unifies its AGR with to be nominative. This constraint must be the highest-ranking constraint in these languages in order to predict the desired results:

(33) AGRCASE: $\left[\text{AGR} \quad \left[\text{CASE} \quad \text{NOM}\right]\right]$

(34) AGRCASE $\gg$ SUBJAGR $\gg$ MARKEDAGR, COSUBJAGR

As has been shown in the previous pages, even though the theory presented implies a significant departure from common assumptions on agreement in LFG, it allows for an explanation of CI that integrates seamlessly with cases of subject-verb agreement. The only difference with respect to standard treatments of subject-verb agreement is that our theory treats this phenomenon as a particular instance of a more general verb agreement mechanism available in all languages with agreement, the differences between CI and non-CI languages being explained as a result of different rankings of the constraints involved in agreement.

# References


Alsina, A. (1995). The fall of function-argument biuniqueness. In G. V. Morill and R. T. Oehrle (Eds.), *Formal grammar: Proceedings of the Conference of the European Summer School in Logic, Language and information*, pp. 1–16. Barcelona: Universitat Politècnica de Catalunya.

Alsina, A. (2007). Apparent copular inversion and the theory of null subjects. In A. Zaenen, J. Simpson, T. Holloway King, J. Grimshaw, J. Maling, and C. Manning (Eds.), *Architectures, rules, and preferences*, pp. 21–47. Chicago: The University of Chicago.

Anttila, A. and Y.-m. Y. Cho (1998). Variation and change in Optimality Theory. *Lingua 104*, 31–56.

Belyaev, O. (2013). Optimal agreement at m-structure: person in Dargwa. In M. Butt and T. H. King (Eds.), *Proceedings of the LFG13 Conference*, pp. 90–110. Stanford: CSLI Publications.

Berman, J. (2003). *Clausal syntax of German*. Stanford: CSLI Publications.

Bonet, E. (1990). Subjects in Catalan. In L. L. S. Cheng and H. Demirdash (Eds.), *Papers on wh-movement*, pp. 1–26. Cambridge, Mass.: Massachusetts Institute for Technology. Department of Linguistics and Philosophy.

Bresnan, J. (2000). Optimal syntax. In J. Dekkers, F. van der Leeuw, and J. van der Weijer (Eds.), *Optimality theory: phonology, syntax and acquisition*, pp. 334–385. Oxford: Oxford University Press.

Bresnan, J. (2001). *Lexical-functional syntax*. Malden, Mass.: Blackwell Publishing.

Dalrymple, M. (2001). *Lexical functional grammar*. San Diego: Academic Press.

Fernández Leborans, M. J. (1999). La predicación: las oraciones copulativas. In I. Bosque and V. Demonte (Eds.), *Gramática descriptiva de la lengua española*, Volume 2, pp. 2357–2460. Madrid: Espasa Calpe.

Forcadell, M. (2013). Subject informational status and word order: Catalan as an SVO language. *Journal of Pragmatics 53*, 39–63.

Hernanz, M. L. and J. M. Brucart (1987). *La sintaxis*. Barcelona: Crítica.

Kuhn, J. (2003). *Optimality-Theoretic syntax: a declarative approach*. Stanford: CSLI Publications.

Moro, A. (1997). *The raising of predicates*. Cambridge: Cambridge University Press.

Perlmutter, D. M. (1983). Personal vs. impersonal constructions. *Natural language and linguistic theory 1*(1), 141–200.

Prince, A. and P. Smolensky (2004). *Optimality Theory: constraint interaction in generative grammar*. Malden, Mass.: Blackwell Publishing.

Ramos, J.-R. (2002). El SV, II: la predicació verbal no obligatòria. In J. Solà, M. R. Lloret, J. Mascaró, and M. Pérez Saldanya (Eds.), *Gramàtica del català contemporani*, Volume 2, pp. 1951–2044. Barcelona: Editorial Empúries.

Solà, J. (1992). *Agreement and subjects*. Ph. D. thesis, Universitat Autònoma de Barcelona.

Vallduví, E. (1992). A preverbal landing site for quantificational operators. *Catalan working papers in Linguistics 2*, 319–343.

# DOUBLE AND BACKWARD CONTROL IN INDONESIAN: AN LFG ANALYSIS

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Abstract

This paper discusses syntactic, semantic and pragmatic properties of an Indonesian control construction allowing forward/backward double control alternations. While having a tight VP structure, the backward control structure is not monoclausal. An argument-structure based LFG analysis is proposed, accounting for the complex properties of double control structures, including ambiguity between ordinary forward and unusual backward readings.

## 1 Introduction

Control phenomena have been of great interest in linguistics for typological and theoretical reasons (see Davies and Dubinsky 2004, 2006, 2007, inter alia).[*] Recent research in control phenomena focuses on backward control (Polinksy and Potsdam 2002, Potsdam 2009, Sells 2006, Haug 2011).

Indonesian also shows backward control, but only in the presence of forward control: i.e. in a double control structure. Consider (1), showing two gaps; left-headed and right-headed arrows indicate backward and forward control types respectively:[1]

| (1) | <u>*Mobil*</u> | <u>*mana*</u> | *yang* | __ | *coba* | [ __ | *kau=jual*]. |
|---|---|---|---|---|---|---|---|
| | car | which | FOC | (A) | UV.try | (P) | 2SG=UV.sell |

‘Which car did you try to sell?’

In the backward control type, the controller (*kau* ‘2SG’) is realised in the downstairs verb (*jual* ‘sell’) and the gap is in the matrix verb. (As the lines representing the control cross one other, the term ‘crossed control’ is also used.)

The double control structure in (1) can have parallel forward control, in which the A argument *kau* ‘2SG’ shows up in the matrix verb:

| (2) | <u>*Mobil*</u> | <u>*mana*</u> | *yang* | *kau=coba* | [ | __ | __ | *jual*]. |
|---|---|---|---|---|---|---|---|---|
| | car | which | FOC | 2SG=UV.try | | (P) | (A) | UV.sell |

‘Which car did you try to sell?’

Two properties of double control exemplified in (1)-(2) are central to the discussion throughout. Firstly, unlike its English translation, (1) in Indonesian is not an object-extraction structure. The NP *mobil mana* ‘which car’ is the grammatical SUBJECT (SUBJ) of the verb *coba* ‘try’ and also the SUBJ of the

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[1] Abbreviations used in this paper: 1,2,3 (First, Second, Third person), A (Actor), AV (Actor Voice), FOC (Focus), P (Patient), PASS (passive), Q (Question word), REL (relativiser), UV (Undergoer Voice).

UV verb *jual* 'sell'. Secondly, as mentioned, backward control only appears in the presence of forward control associated with a highly prominent Patient NP. Backward control is highly constrained, requiring a tight structure with voice harmony involved (discussed in 4.4).

While the backward control phenomenon has recently attracted attention due to Polinksy and Potsdam (2002), the double control shown in (1–2) needs further exploration. Indonesian research on this has been specifically in relation to the verb *ingin/mau* 'want', triggered by a puzzling ambiguity, as in (3). This is further discussed in 3.4.

(3) *Anak itu* *mau/ingin* [ – *di-cium* *oleh* *Ibu* ]
child that want PASS-kiss by Mother
i. 'The child wanted to be kissed by Mother.' (ORDINARY CONTROL)
ii. 'Mother wanted to kiss the child.' (CROSSED CONTROL READING)

The aim of the paper is to provide more empirical basis for the analysis of double control structures in Indonesian. I show that, despite recent attention in Indonesian linguistics (Polinsky and Potsdam 2008, Nomoto 2011), certain issues are not properly addressed, such as the interplay between forwards and backwards control, the nature of their differences and the constraints licensing backward control.

By contrast, the parallel-based model of LFG provides a unified account of the properties and key empirical points of different types of control. While much LFG work exists on single forward/backward control, none discusses double control alternations of the type found in Indonesian.

There are two competing options to handle backward control. The first is the classic LFG analysis with a symmetrical equation, e.g. ($\uparrow$SUBJ)=($\uparrow$XCOMP SUBJ), which actually allows control in both directions. Haug (2011) argues that this is the right analysis for Ancient Greek. The second option is to extend Zaenen and Kaplan's (2002) idea of subsumption (i.e. ($\uparrow$SUBJ)$\sqsubseteq$($\uparrow$XCOMP SUBJ)) as proposed by Sells (2006). Since subsumption allows control in one direction only, and since double control in Indonesian allows control in both directions (i.e. backwards and forwards), it follows that the classic LFG analysis is the right one for double control in Indonesian.

The paper is organised as follows. A brief overview of the Indonesian voice system and ordinary syntactic control is given in section 2. Different types of control structures are outlined in section 3, showing alternations of single-/double control structures (3.1), their syntactic, semantic and pragmatic properties (3.2), and the puzzling ambiguity (3.3–3.4). An LFG argument-structure based analysis is given in section 4, followed by the conclusion in 5.

## 2 An overview of Indonesian morphosyntax: voice and syntactic control

### *2.1 Voice system: verbal morphology and argument flagging*

Indonesian has AV (actor voice), UV (Undergoer Voice), and PASS (passive voice), each marked by different verbal morphology: *meN*-, $\varnothing$-, and *di*-

respectively (Arka and Manning 2008, Cole et al. 2008, Musgrave 2001, among others). Key to grammatical function identification, in addition to voice morphology, are structural positions of arguments, in particular core arguments (SUBJ and OBJ), and argument flagging. The structural positions of arguments and their flagging in simple monotransitive clauses in Indonesian can be informally represented as in (4a). As shown, core arguments are NPs while obliques are PPs.[2] (4b) shows singular pronominal forms in these core and oblique functions.

| | | | | | | |
|---|---|---|---|---|---|---|
| (4) a. | NP | [CL=V=CL/NP | | NP | $PP]_{VP}$ | |
| | $SUBJ_{:A/P}$ | $OBJ_{:A}$ | $OBJ_{:P/R}$ | $OBJ_{:T}$ | OBL | |
| b. | *aku* | *ku=* | *=ku* | *aku* | *=ku* | '1SG' |
| | *(eng)kau* | *kau=* | *=kau* | *(eng)kau* | *=kau* | '2SG' |
| | *(d)ia* | *(d)ia=* | *=nya* | *dia/*ia* | *=nya/dia/*ia* | '3SG' |

In addition, when the arguments are pronominals, the distribution of their forms (clitics or free pronouns) is constrained by, and therefore reflects, their syntactic status. This is clear from the clitics for the singular forms, especially the first and the third person clitics, as in (4b).[3] Firstly, pronominal clitics cannot be surface (A) SUBJECT;[4] clitics are non-SUBJ arguments. Secondly, the immediately preverbal position is the A position (precisely, the [Spec, VP] position). Any pronominal clitic can appear here except =*nya*, which is reserved for the postverbal position, either directly hosted by the verb (in which case it is a core argument), or by a P (in which case it is an oblique). Third, the free pronoun *(d)ia* is subject to distributional functional constraints, i.e. either *dia* or *ia* is used for the core argument in the preverbal position, but only *dia* is used postverbally (either as core or oblique).

The following examples illustrate these points, using the AV-UV alternation:

| | | | | | |
|---|---|---|---|---|---|
| (5) a. | *Aku* | *mencium* | *=nya/dia/*ia* | b. *Dia/ia/*nya* | *ku=cium* |
| | 1SG | AV.kiss | 3SG | 3SG | 1SG=UV.kiss |
| | 'I kissed her/him.' | | | 'Him/her, I kissed.' | |

*2.2 Syntactic control in Indonesian*

Control structures involve a referential identity dependency relation between a controller (an overt NP) and controllee (a gap, typically but not necessarily in the dependent clause). In (6), the pronominal form =*nya* '3SG' is

[2] The non-SUBJ agent clitic of the UV, which remains a core argument, is classified as OBJ; see Arka and Manning (2008).
[3] The plural forms *kita/kami/mereka* lack clitic counterparts and are not shown here.
[4] This is strictly so for the A subject, but there may be variation in acceptability for an intransitive (S) subject:

i) *aku/ku=datang* 'I came.' vs. ii) *aku/*ku mendatangi dia* 'I came to him.'

the controller of the identity of the controllee (indicated by a dash). This is a forward single control structure: there is a single gapped position, and the controller is structurally higher than, and linearly precedes, the controllee.

(6) *Aku* *menyuruh* =*nya* [ – *menjual* *mobil* *itu*].
1SG AV.ask 3SG AV.sell car that
CONTROLLER CONTROLLEE
'I asked him/her to sell the car.'

As shown, the pronominal form =*nya* suggests the askee is the P/object of the matrix verb, even though it is also the subject of the embedded clause.

The matrix P in (6) can alternate and become subject of the matrix verb, and the verb must be in the UV form, as in (7). The voice alternation does not affect the logical meaning and acceptability of the control relation. The control remains a forward type of single control:

(7) *Dia/ia/*nya* *ku=suruh* [ – *menjual* *mobil* *itu*].
3SG 1SG=UV.ask AV.sell car that
CONTROLLER CONTROLLEE
'I asked him/her to sell the car.'

The voice alternation of (6)-(7) suggests that the controller is semantically determined. *Suruh* 'ask' belongs to the INFLUENCE type of verbs, in which the matrix P participant is the controller (Sag and Pollard 1991). P can then be realised as an object in the AV verb or subject in the UV verb.

In both cases, the controlee must be subject. Controlling non-subject arguments is unacceptable, as in (8). Here, in contrast to (6), the attempted controllee (i.e. A) argument is not subject, because the verb is in the UV form:

(8) * *Aku* *menyuruh* =*nya* [*mobil* *itu* – *jual* ]. (cf. (7))
1SG AV.ask=3SG car that UV.sell
FOR: 'I asked him/her to sell the car.'

Gapping of non-subject A is, however, possible under a certain strict condition. This is discussed and exemplified in the following sections.

## 3 Alternations in control constructions

### *3.1 Alternations of control types*

Indonesian allows alternative control constructions, with the same logical meaning (though different information structure): single-double control alternations as in (9a-b) (both are forward control) and forward-backward alternations as in (9b-c) (both are double control). The verb *coba* 'try' represents the A-type control verbs (i.e. the matrix Actor is the semantic controller), which also include verbs such as *mau* 'want', *suka* 'like', and *perlu* 'need' (cf. Foley and Van Valin 1984, Sag and Pollard 1991).

(9) a. *Aku* *mencoba* [ __ *menjual* *mobil* *itu*].
1SG AV.try AV.sell car that
'I tried to sell the car.'

b. *Mobil itu* *(yang)* *ku=coba* [ __ __ *jual*].
car that FOC 1SG=UV.try (P) (A) UV.sell

'That car (is the one that) I tried to sell.'

c *Mobil itu* *(yang)* __ *coba* [ __ *ku=jual*].
car that FOC (A) UV.try (P) 1SG=UV.sell

'That car (is the one that) I tried to sell.'

In the single control (9a) both the matrix and embedded verbs are in AV, and the complement SUBJ is controlled by the matrix SUBJ. In the double control structures (9b-c), both matrix and complement verbs are in UV, with the embedded P SUBJ appearing as the matrix SUBJ. That is, in both cases, the forward control is associated with the embedded P. The difference between (9b) and (9c) is the position of the overt expression of the shared A argument *ku=* in the matrix structure, giving rise to forward control (9b); or in the embedded structure (9c), giving rise to backward control.

The same forward-backward alternation also applies to the P-control verbs *suruh/minta* 'ask'. The following are the double control counterparts of (7) with the verb *suruh*. Note that the same string can be analysed as having different gap positions, as shown in (10).

(10) a. *Mobil* *itu* *yang* *ku=suruh* *dia* [ __ __ *jual* ].
car that 3SG 1SG=UV.ask 3SG (P) (A) UV.sell

'I asked him/her to sell the car.'

b. *Mobil* *itu* *yang* *ku=suruh* __ [ __ *dia=jual* ].
car that 3SG 1SG=UV.ask (P) 3SG=UV.sell

'I asked him/her to sell the car.'

Backward control is also possible in passive voice, such that the oblique is only realised in the downstairs verb, as seen below with A- and P-control verbs:

(11) a. *Mobil* *mana* *yang* *di-coba* *di-curi* *(oleh)* *orang?*
car which REL PASS-try PASS-steal (by) person
'Which car was tried to be stolen by somebody?'

b. *Apa yang di-mohon di-kabulkan oleh President?*
what REL PASS-beg PASS-accept by president
'What is it that is asked to be accepted/approved by the president?'

Unlike the UV verb, where the A argument is still core and required to be present (a clear case of forward/backward control), in the passive, it is less clear that we have a gap, as passive agent is syntactically oblique/adjunct-like. When it shows up, it appears in the embedded structure. Thus, *orang* 'person' is the underlying A of *coba* 'try' in (11a), and *President* is the underlying matrix P of *mohon* 'beg/ask', also understood as the underlying A of the embedded verb *kabulkan* 'accept' in (11b).

An important property of the P-control verb in the passive, as in (11b), is that the P cannot show up overtly in between the first verb and the second verb as object (12a), or oblique PP (12b). Note that the P can show up in the matrix verb when it is in the UV; see (10) above. This is evidence that the matrix and embedded verbs form a tight unit; this is further discussed in section 4.2.1.

(12) a. * *Apa yang di-mohon <u>President</u> di-kabulkan ?*
what REL PASS-beg president PASS-accept
'What is it that is asked to be accepted/approved by the president?'

b.* *Apa yang di-mohon <u>oleh President</u> di-kabulkan ?*
what REL PASS-beg by president PASS-accept
'What is it that is asked to be accepted/approved by the president?'

In sum, Indonesian exhibits double control structures showing morphosyntactic constraints. In such structures, forward-backward control alternation is possible, with matrix UV and PASS (but not AV).

*3.2 On the syntactic, semantic and pragmatic status of fronted P NP*

The fronted sentence-initial NP in double control structures is grammatical subject; it is also a highly prominent NP in terms of its pragmatics. For these reasons, it is labelled as SUBJ-D̂F, where D̂F is typically FOC. I present evidence that the fronted NP is SUBJ-D̂F in 3.2.1, and evidence that it is a non-thematic (or raised) argument in 3.2.2.

3.2.1 Evidence for SUBJ-D̂F

As evidence that SUBJ is D̂F, a double control structure involving the sentence-initial P is common in questions asking the P; i.e. where P is in focus (marked by =*kah*), or if in declarative mood, the P is given contrastive focus (marked by =*lah*). This is why the examples throughout mostly resemble (13).

(13) *Mobil mana=kah yang dia=coba* [ __ __ *curi*]?
car which=FOC REL 3SG=UV.try UV.steal
'Which car did s/he try to steal?'

Relativisation by *yang* is exclusively restricted to subject (Chung 1976, Arka and Manning 2008, Cole et al. 2008, Aldridge 2008, among others). For example, in the double control structure in (9), repeated as (14a), the relativised/focussed argument with *yang* is P (*mobil itu* 'that car'), and it is the embedded SUBJ (because the embedded verb is in UV). An attempt to relativise it when it is an object as in (14b) is not acceptable.

(14) a. <u>*Mobil itu*</u> *yang* *ku=coba* [ __ __ *jual*].
car that FOC 1SG=UV.try (P) (A) UV.sell
'That car (is the one that) I tried to sell.'

b. * <u>*Mobil itu*</u> *yang* *ku=coba* [ __ *menjual* __ ].
car that FOC 1SG=UV.try (A) AV.sell P:OBJ
FOR: 'That car (is the one that) I tried to sell.'

Even when there is no *yang*, double control cannot involve the fronting of P from the embedded object position:

(15) a. <u>*Mobil itu*</u> *ku=coba* [ __ __ *jual*].
car that 1SG=UV.try (P) (A) UV.sell
'That car (is the one that) I tried to sell.'

b. * <u>*Mobil itu*</u> *ku=coba* [ __ *menjual* __ ].
car that 1SG=UV.try (A) AV.sell P:OBJ
FOR: 'That car (is the one that) I tried to sell.'

As such, the sentence-initial P NP *mobil itu* cannot be a topicalised (object) NP. Rather it is raised to (or more precisely, shared with) the matrix verb *coba* under certain strict conditions. Neither can its acceptability in (14a) and (15a) constitute evidence that it is a topicalised embedded subject NP. As (16) shows, in contrast to (15a), voice harmony constraints preclude the matrix A from being SUBJ in the presence of the fronted P in the double control structure:

(16) * <u>*Mobil itu*</u> *aku* *mencoba* [ __ __ *jual*].
car that 1SG AV.try (P) (A) UV.sell
'That car I tried to sell (it).'

That is, the AV voice morphology *meN-* of *mencoba* fixes the linking of the A *aku* to SUBJ. This does not allow, at the same time, the linking the same SUBJ NP to a different role, namely the embedded P. This causes a clash in linking, and the structure is unacceptable, as expected.

Furthermore, in a normal structure without double control, it is acceptable to have a topicalised/left-dislocated object:

(17) <u>*Mobil itu*</u>, *aku* *yang* *mencoba* [ __ *menjual(=nya)*].
car that 1SG REL AV.try (A) AV.sell(=3SG)
'That car, I tried to sell (it).'

The pronominal form test with *dia/ia* also provides further support that the sentence-initial argument is SUBJ. Recall that the third person pronoun *dia* or *ia* can be SUBJ, whereas for OBJ it is restricted to *dia*. That the sentence-initial NP allows *dia/ia* as in (18) suggests that the NP is SUBJ, not OBJ.

(18) *Dia/ia* *yang* *ku=coba* [ __ __ *pecat*].
3SG REL 1SG=try (P) (A) sack
'It is him that I tried to sack.'

3.2.2 Non-thematic 'raised' ARG2

The fronted embedded P NP is non-thematic with respect to the matrix verb: it bears the patient role only in relation to the embedded verb. This is evident in the case of the P-control (INFLUENCE type) verbs such as *suruh* 'ask'. The verb *suruh* 'ask' is semantically a three-place predicate by default: 'ask(1:asker, 2:askee, 3:action.asked)'. The third propositional argument, e.g. 'selling a car' in (19a), has its P argument (*mobil itu* 'the car') realised as the matrix subject. *Mobil itu* is not the A 'asker' argument, nor the P 'askee' argument. Note that the 'askee' is typically a human. The fronted P *mobil itu* is morphosyntactically treated as a second argument in the syntactic a-str (19b) as evident from the UV voice of the matrix verb. Hence, it is represented as $ARG_2$ outside the angle brackets.

(19) a. [*Mobil itu* ] *yang* *ku=suruh* *dia* [ __ __ *jual* ].
car that REL 1SG=UV.ask 3SG (P) (A) UV.sell
'I asked him/her to sell the car.'

b. SUBJ-D̂F
*suruh* 'UV.ask< $ARG_1$ , $ARG_3$, 'UV.sell<A, P:'car'>'> $ARG_2$'
1:asker , 2:askee, 3:action

Reflexive binding provides evidence that the fronted P is thematically associated with the embedded predicate and raised as the matrix (SUBJ) argument. In Indonesian (Arka and Manning 2008), the reflexive pronoun must be bound within its predicate nucleus. In (20), the reflexive pronoun *dirinya*, while appearing sentence-initially as the syntactic argument of the matrix verb *suruh* 'ask', takes the A (*dia* '3SG') of the embedded verb *perhatikan* 'care' as its antecedent/binder. The embedded verb *perhatikan* is the predicate nucleus of the reflexive *dirinya*. More discussion on reflexivisation as a diagnostic test for monoclausality is given in section 4.2.2.

(20) *Dirinya* *ku=suruh* [ __ *dia=perhatikan*].
self.3 1SG=ask 3SG=UV.care
'Himself, I asked him to care __.'

*3.3 Intransitive control verbs*

Strictly intransitive verbs (i.e. those with overt intransitive morphology) do not allow backwards control. Bare intransitive verbs, in contrast, do allow it, confirming the validity of the constraint that backward control requires the raising of P with the matrix verb obligatorily in UV-like form.

Consider the verb *berjanji* 'MID-promise', overtly marked with middle (intransitive) morphology. (21a) is an ordinary control structure (acceptable), whereas (21b) is an attempt to have backward control with a verb in the middle (*ber-*) form (unacceptable). If *ber-* (21c) is removed, the acceptability of backward control improves significantly (even though native speakers may vary in their judgment in this case).

(21) a. *Mereka* *berjanji* [ _ *(akan) memilih* *Jokowi sebagai predisen*].
3PL MID-promise _ (will) AV.elect Jokowi as president
'They promise to elect Jokowi as the president.'

b. * *Jokowi=lah* *yang* *mereka* *ber-janji* [ __ *(akan)* __ *pilih*].
Jokowi=LAH REL 3PL MID-promise _ (will)UV.elect
FOR: 'It is Jokowi that they promise to elect.'

c. *Jokowi=lah* *yang* *mereka* *janji* [ __ *(akan)* __ *pilih*].
Jokowi=LAH REL 3PL promise _ (will) UV.elect
'It is Jokowi that they promise to elect as the president.'

*3.4 Puzzling ambiguity and previous analyses*

Backward control in Indonesian gives rise to puzzling ambiguity, as mentioned in (3) in relation to the verb *mau/ingin* 'want'. The same ambiguity appears with other verbs of the same type, e.g. *suka* 'like', as in (22), with UV instead of PASS on the embedded verb.

(22) *Binatang* *itu* *suka* [ __ *kau=kasi makanan*] *ya*?
animal that like UV=give food yes
i. 'The animal likes to be fed by you, right?'(ORDINARY CONTROL)
ii. 'You like to feed the animal, right?' (BACKWARD CONTROL)

Polinsky & Potsdam (2008) propose a raising analysis for the crossed control reading in (3) (essentially along the lines described in this paper, albeit in the Chomskyan framework). In their analysis, however, this is attributed to the special lexical semantics of *mau* 'want'. As above (also pointed out by Nomoto (2011)), backward/crossed control phenomena are not restricted to *ingin/mau*, as ordinary control verbs (A- and P-types), e.g. *coba* 'try' and *suruh/minta* 'ask', and bare experiencer verbs e.g. *suka* 'like' can have backward control.

Furthermore, a point not made explicit in earlier studies, is that the ambiguity shows up when the raised P is a sentient being (typically human, but depending on the verb, possibly animals as in (22)). This allows an actor-like conception of a participant involved in the event expressed by the matrix/first verb. Indeed, this sentient participant is necessary for the ordinary default control reading. We can test it by using different kinds of SUBJ NPs with the verb *coba* 'try', as shown in (23): (a) *ayah* 'father' (human), (b) *anjing* 'dog' (non-human animate) and (c) *pohon* 'tree':

(23) *Ayah /* *anjing itu/* *pohon* *itu* *coba* [ __ *ku=obati*]
father / dog that/ tree that try 1SG=treat.medically
(a) (b) (c)

a. i. 'Father had a try/tried to be medically treated by me.' (ORD. CTRL.)
ii. 'I tried to medically treat Father.' (BACKWARD CTRL.)

b. i.#? 'The dog tried to be medically treated by me.' (ORD. CTRL.)
ii. 'I tried to medically treat the dog.' (BACKWARD CTRL.)

c. i. * 'The tree tried to be medically treated by me.' (ORD. CTRL.)
ii. 'I tried to medically treat the dog.' (BACKWARD CTRL.)

Clear ambiguity is only obtained in (23a), where both the ordinary and backward control readings are possible. (23c), with an inanimate subject, is not ambiguous, disallowing the backward control reading. (23b), with a non-human inanimate (or artificial intelligent robot) subject, could be ambiguous, but only in an unusual reading where the dog is human-like, actively cooperating with me for the medical treatment.

It is not clear how Polinsky & Potsdam's (2008) analysis can be extended to account for the (dis)ambiguity in (23), because the first verb is *coba* 'try', whose lexical semantics is quite different from that of *ingin/mau*. It is also not clear in their analysis, even in the simple case, whether the ordinary (default) control structure (i.e. reading (22.i)) involves raising. In the analysis advocated in this paper, the ordinary default control reading, as in (3.i) and (23a.i) involves no raising. This is further elaborated in the next section below.

No raising is involved in Nomoto's (2011) analysis. In his analysis, *mau* and *ingin* are treated the same: they are not auxiliary verbs, nor raising verbs. However, this is not entirely accurate: while *mau* and *ingin* are semantically synonymous, they do not behave exactly the same. There is evidence, at least for *mau*, that it can indeed be a modal auxiliary. In this function *mau* expresses the speaker's evaluation about an event that would imminently happen, translatable as 'be about to' in English. The subject in this meaning is not necessarily an animate/human participant. Consider the (dis)ambiguity and associated structures below:

(24) *John* / *buah* *itu* *mau* *jatuh*
John / fruit that MAU fall
(a) (b)

a. i) 'John was about to fall off.' (modal aux., raising)
ii) 'John wanted/was willing to fall off.; (control, no raising)

b. i) 'The fruit was about to fall off.' (modal aux., raising)
ii)# 'The fruit wanted/was willing to fall off.; (control, no raising)

The point is that *mau* is a modal verb in its readings in (24a.i) (with human subject) and (24b.i) (with inanimate subject). It is not constrained by the animacy/humaness of the subject NP. In its modal function, it does involve raising because the SUBJ NP has its semantic (P) role determined by the verb *jatuh* 'fall', not by the first verb *mau*.

In its lexical meaning 'want, be willing (to)', the verb *mau* involves control without raising. It assigns an actor-like role to its SUBJ argument. It is therefore expected that in this control meaning *mau* is sensitive to animacy/humanness of the subject as confirmed by the contrast between reading (24a.ii) (human, acceptable) and (24b.ii) (non-human, unacceptable).

It should be highlighted here that even in its lexical meaning (i.e. non-auxiliary function) *mau* 'want' can show raising, as demonstrated in earlier examples. This is the case when the embedded P is required to be fronted/linked to the matrix SUBJ giving rise to backward control and ambiguity as in (3).

Unlike *mau*, *ingin* can never be an auxiliary verb, and always assigns an actor-like/experiencer role to its SUBJ. It is sensitive to animacy requiring sentient properties. Thus, in contrast to (24a), (25a) is fine (though contextually unusual) but (25b) does not make sense:

(25) *John* / *buah* *itu* *ingin* *jatuh*
John / fruit that want fall
(a) (b)
(a) 'John wanted to fall off.'
(b) # 'The fruit wanted to fall.'

Furthermore, it is unclear in Namoto's analysis how the different realisations of the controller are accounted for. In his analysis, the A-type verbs that allow backward control (*mau/ingin/coba*) have special properties in that the theta-role of the matrix verb is ambiguously assigned to the internal and external argument of the embedded verb. Namoto's analysis is framed within Chomskyan Phase Theory and it has theory-internal and empirical problems in relation to the expected reflexive binding; see as Sato (2010) for the details.

In Sato's (2010) analysis, the backward control reading arises because the embedded verb undergoes syntactic incorporation into the matrix control predicate, forming one complex predicate. The complex predicate allows the argument of the lower verb to receive the thematic role from the matrix/first verb. In Sato and Kitada (2012), downward successive θ-feature inheritance allows the lower verb to inherit the matrix theta role, such that the lower argument can receive it. In both such analyses, the matrix and embedded verbs must be structurally tight–a key point in this paper, also. There is an empirical issue with the incorporation analysis, though; see 4.2.2.

In the ensuing sections, I propose a unified account within LFG, building on previous studies and addressing the issues with better empirical basis.[5] The key idea of the proposal is as follows. There are two kinds of control structures associated with the same control verbs. One is ordinary default syntactic control, and the second one 'derived', pragmatically driven control. The latter correlates with and therefore requires a tight structure akin to, though not the same as, a serial verb construction (SVC). This tight structure licenses argument sharing, enabling an argument to be realised only once in the surface syntax. The ambiguity of the type exemplified in (3) and similar structures with UV verbs as in (22) is accounted in terms of the interplay of semantics, syntax and pragmatics of control verbs. At the heart of this argument-structure analysis is the availability of two syntactic subcategorisation frames (default/ordinary vs. derived/marked), with the latter allowing backward control.

## 4 An argument-structure based analysis in LFG

The proposed analysis of double/backward control makes use of the syntacticised argument structure as described in Manning (1996), Arka (2003) and Arka and Manning (2008). In this view syntactic argument structure is an ordered list of arguments whose prominence is syntactically and thematically determined: core arguments outrank non-core arguments, and within the core list, arguments are ordered thematically. Thus, the agent when it is a core argument becomes the most prominent argument in the a-str.

This syntactic a-str is distinct from semantic structure (sem-str). Sem-str contains configurations of semantic elements/primitives by which thematic/semantic roles can be identified, and other information which is not always syntactically relevant. It can be quite complex, and I assume a semantic conceptual structure of the type described in Jackendoff (1990).[6]

Syntactic a-str and sem-str are related by mapping (see Arka (2003) and Arka and Manning (2008) for the principles). An aspect of syntactic a-str that distinguishes it from sem-str is that it can have a purely syntactic (i.e. non-thematic) argument slot/position. Its realisation can be specific and lexically determined, e.g. the dummy *it* in weather predicates in English such as *it rained*; or else, it can be shared with or 'raised from' the embedded predicate, a case that is relevant for the discussion of backward control in this paper. As we shall see in the ensuing subsection, the non-thematic ARG involved in the syntactic a-str

[5] The proposed analysis has been implemented and tested in the XLE-based Indonesian computational grammar; this is not discussed here, but see Arka (2014).

[6] Sem-str assumed in this paper is equivalent to Logical Structure in RRG (Foley and Van Valin 1984, Van Valin and LaPolla 1997).

in the backward control structure is syntactically treated as the second ARG; hence it is labelled as $ARG_2$.

*4.1 Default and pragmatically marked a-strs*

It has been demonstrated in the preceding section that double control relations must contain a syntactic forward control with P being raised to SUBJ-D̂F. Without this pragmatic licensing, no alternative a-str with raising is permitted. The key point of analysis is that there are two a-strs, and the two can be conceptualised as being related via a 'lexical rule' as in classic LFG (Bresnan 1982). The first type of a-str is the one with the default control structure (lexically determined), listed in, or shared by, lexical items. The second type is the corresponding alternative a-str which is pragmatically marked with 'raising'. This is not listed in the lexicon, but derived from the first default a-str on certain conditions primarily the need to have the embedded P as matrix SUBJ-D̂F.

For simplicity, this is illustrated by the A-type control with the verb *coba* 'try' in (26a). Its pragmatically derived structure is given in (26b). The down arrow (⇓) indicates (output) derivation.

The crucial differences between the default and derived a-strs are as follows. Firstly, the default A-type control verb has the A as the controller, identified as the embedded SUBJ indicated by the index *i*. Different types of control verbs would have different default semantic relations, though. However, if the embedded verb is in the UV or PASS, the trier A is identified as the P of the embedded action, as in (23a). In this case, the trier is understood to have an active participant with respect to the matrix verb but is also patientive with respect to the embedded action, giving rise to a meaning where s/he is being a cooperative patient in a medical examination process by a doctor.

(26) a. Lexically licensed (default) a-str:
Type A verb: *coba*$_1$ 'try'
(A is Controller; embedded A/P can be controlled SUBJ_i)

```
              XCOMP SUBJ_i
'pred<__ ,  'pred< __ , __>'>'      coba1
     A_i           A   P
```

⇓

b. Pragmatically-induced alternative a-str: derived *coba*$_2$
(Matrix athematic ARG2 is introduced, shared with lower P)

```
                              SUBJ-D̂F    coba2
              XCOMP SUBJ        |
'pred<__ ,  'pred< __ , _|_>'> ARG2'
     A_i          A_i  P
```

Secondly, the derived a-str in (26b) has $ARG_2$, a non-thematic matrix argument. The non-thematicity of $ARG_2$ is indicated by placing it outside the angle brackets. This is the position or argument shared with the embedded P (traditionally often called the raised argument). As discussed earlier, there is good evidence that this position is treated not as ARG1 as far as the matrix verb is concerned, e.g. evidence from the voice marking of the matrix verb; see 3.2.2.

*4.2 Between complex predicates and complement clauses*

I now provide evidence to show that the alternative a-str in (26b) (which allows double/crossed control relations) requires an internally tight VP structure.

4.2.1 Structurally tight VP

In the VP, material can intervene between matrix and embedded verbs: e.g., a conjunctive-like particle such as *agar*, *untuk*, and possibly an adverbial. However, when such material is allowed in the VP, only the default syntactic control is possible. (27) shows the use of *agar* with the control verb *ingin* 'want'; this precludes the backwards control reading (reading ii):

| (27) | *Anak* | *itu* | *ingin* | [ *agar* __ | *di-cium* | *oleh* | *Ibu* ] (cf. (3a)) |
|---|---|---|---|---|---|---|---|
| | child | that | want | AGAR | PASS-kiss | by | Mother |

i. a) 'The child wanted to be kissed by Mother.' (FORWARD CTRL ONLY)
or, b) 'The child wanted that s/he would be kissed by Mother.'
ii. * 'Mother wanted to kiss the child.' (BACKWARD CONTROL)

*Agar* is typically used to encode purposive adjuncts. Its presence with the control verb makes the complement clause less tight, giving rise to an implied meaning that the matrix actor has little direct control over the realisation of the event expressed by the complement, as in the meaning given in (27.i.b). *Untuk*, not shown for space reasons, similarly 'loosens' the complement clause.

To sum up, a control verb can enter two possible control structures within the VP:

| (28) | VP → | a. | V | (XP/PART) | VP | (VP1: loose) |
|---|---|---|---|---|---|---|
| | | | $\uparrow=\downarrow$ | | $(\uparrow\text{XCOMP})=\downarrow$ | |
| | | b. | V | | VP | (VP2: tight) |
| | | | $\uparrow=\downarrow$ | | $(\uparrow\text{XCOMP})=\downarrow$ | |

The first loose VP allows a PART item (where PART is a particle/conjunctive-like marker signalling clear subordination such as *untuk/agar*), whereas the second tight VP does not. It is the latter that allows fronted raised P and double control relations with backward/forward alternation.[7] The tight structure resembles a complex predicate or a complex VP in SVC in which two verbs share one or more arguments, which then get expressed only once in the surface syntax (Foley and Olson 1985, Butt 1995, Durie 1997, among others). However, evidence suggests the tight VP structure in (28b) is not a true complex predicate (contra Sato (2010)), nor a real SVC. This is discussed in the next subsection.

[7] We can capture the constraint that only VP2 is associated with the backward control by specifying the VP2 node with a set of linking equations. For example, in addition to the general control constraint of $(\uparrow\text{XCOMP SUBJ})=(\uparrow\text{SUBJ})$, we should also have $(\uparrow\text{XCOMP SUBJ})=(\uparrow\sigma\ \text{P})$ where P is the Patient-like core argument. That is, the tight structure is motivated by the need to have the P argument in the semantic argument structure linked to (matrix) SUBJ (assumed to be pragmatically prominent).

4.2.2 Not a complex predicate nor a real SVC

Unlike an SVC, the second VP still maintains its independent clausal status in a complement-like bi-clausal structure; hence it is associated with XCOMP (cf. argument structure mapping in (26) and the VP structure in (28)). Evidence for this comes from the bare possessive construction, which requires a minimal predicate nucleus as its domain. Certain nouns, especially inalienable, kin, or typically possessed nouns, such as *rumah* 'house' and *pakaian* 'clothes,' can appear bare in the object position and the understood possessor is the SUBJ NP of the same predicate nucleus. For example, the possessor of *pakaian* in (29a) is Ani as shown by the index *i*. It cannot be somebody else (index *j). Likewise in a true complex predicate e.g. *tembak mati* 'shoot dead' as shown in (29b) the bare noun *istri* 'wife' must have its possessor understood as the subject of the same clause, *penjahat* 'the criminal'.

(29) a.

| | | |
|---|---|---|
| *Ani* | *membuka* | *pakaian*. |
| 3SG | AV.take.off | cloth |

'Ani_i took off her_i/*j dress.'

b.

| | | | | | | |
|---|---|---|---|---|---|---|
| *Penjahat* | *itu* | [*menembak* | *mati*] | *istri* | *dengan* | *sadis*. |
| criminal | that | AV.shoot | dead | wife | with | cold.blood |

'The criminal_i shot his_i/*j wife dead in cold blood.'

The same pattern of bare possessed NP is observed in a true SVC as exemplified in (30): the shared SUBJ (*Ibu*) is the understood possessor of the bare *anak* 'child'.

(30)

| | | | | | | |
|---|---|---|---|---|---|---|
| *Apa* | *Ibu* | [*membeli* | *baju* | *banyak*] | [*kasi* | *anak*]? |
| Q | mother | AV.buy | shirt | many | give | child |

'Did you (mother) buy a lot of shirts for your/*somebody's child?'

In the backward control structure (31), the bare noun *tangan* 'hand' cannot take the matrix SUBJ as the antecedent possessor. This means that the second VP retains its minimal nucleus function, and we have a case of biclausal structure.

(31)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Hanya* | *tangan* | *kiri* | *yang* | *dia* | *suruh* | [ __ | *kita* | *angkat*] | *tinggi-tinggi*. |
| only | hand | left | REL | 3SG | UV.ask | | 1PL.Inc | raise | high-REDUP |

'It was only our_*i/j left hands that he_i wanted us_j to raise up high."

Emphatic reflexive possessives with [bare noun + *sendiri*], as in (32), also indicate that backward control structure is neither an SVC nor a complex predicate. The possessor antecedents of the possessive reflexive NPs in the complex predicate and SVC (32a,b) are the clausal subject NPs ('soldier' and '3SG'). However, as seen from the translation, in the complement clauses with forward (32c) or backward control (32d), the antecedent can only be the co-argument within the second/embedded clauses.

(32) a.

| | | | | | |
|---|---|---|---|---|---|
| *Tentara* | *itu* | [*menembak* | *jatuh*] | *pesawat* | *sendiri*. |
| soldier | that | AV.shoot | fall | plan | self |

‘The soldier shot down his own plane.’ (complex predicate)

b.

| | | | | | |
|---|---|---|---|---|---|
| *Dia* | [*menjemput* | *aku*] | [*pakai* | *mobil* | *sendiri*]. |
| 3SG | AV.pick.up | 1SG | use | car | self |

‘He picked me up using his/*my own car.’ (SVC)

c.

| | | | | | |
|---|---|---|---|---|---|
| *Dia* | *menyuruh* | *aku* | *pakai* | *mobil* | *sendiri* |
| 3SG | AV.ask | 1SG | use | car | self |

‘He asked me to use my/*his own car.’ (forward control)

d.

| | | | | | |
|---|---|---|---|---|---|
| *Mobil* | *sendiri* | *yang* | *dia* | *suruh* | *ku=pakai.* |
| car | self | REL | 3SG | ask | 1SG=use |

‘It is my/*his own car that he asked me to use.’ (backward control)

### 4.3 *Accounting for the (dis)ambiguity*

Having outlined the syntactic, semantic and pragmatic properties of double control relations, we are now ready to account for the double control structures and the associated forward/backward alternation with possible ambiguity. Let us start with why, with respect to the verb *ingin* ‘want’, the backward/forward alternation has an impact on (dis)ambiguity. Consider (33a) where the forward control of A *ku*= does not allow ambiguity. By contrast, the backward control in (33b) gives rise to ambiguity (i.e., reading (ii) is also acceptable).

(33) a.

| | | | | | |
|---|---|---|---|---|---|
| *Anak* | *itu* | *yang* | *ku=ingin* | [ __ __ | *cium*] |
| child | that | REL | 1SG=want | | UV.kiss |

i) ‘The child (is the one that) I want to kiss.’
ii) * ‘The child wants to be kissed by me.’

b.

| | | | | | | |
|---|---|---|---|---|---|---|
| *Anak* | *itu* | *yang* | *(__)* | *ingin* | [ __ | ku=*cium*] |
| child | that | REL | | want | | 1SG=UV.kiss |

i) ‘The child (is the one that) I want to kiss.’
ii) ‘The child wants to be kissed by me.’

In our a-str based analysis, this follows from the possibility of the two a-strs as captured in (26) and its interaction with the voice system. The appearance of *ku=* in the first verb *ku=ingin* ‘1SG=want’ forces the UV linking in the matrix verb, as in (34). This is the verb *ingin* with a derived a-str, showing the UV form (i.e. UV.*ingin*$_2$). The raised P *anak itu* ‘the child’ is therefore not the ‘wanter’; the A *ku=* is, as indicated by the index *i*. Hence, reading (ii) where the raised P is identified as the wanter is not acceptable.

Reading (33b.i) has the same a-str as reading (i) of (33a). The only difference is the surface realisation of the A argument. The argument (index *i*) now surfaces as the A of the embedded UV.kiss (i.e. backward control). The indexation of both As is semantically determined: the A-type verb is by default controlled by the matrix A, and also by default identified as the lower A.

Reading (33b.ii), however, has a different a-structure. It is in fact the default control structure of *ingin* ‘want’, where there is no raising (i.e. no non-thematic ARG2); i.e., *ingin*$_1$. This is shown in (35).

(34) Double control: **UV.*ingin*$_2$** (reading 33a.i & 33b.i) (with raising)

SUBJ SUBJ-$\hat{\text{D}}$F

*ingin*$_2$ ‘UV.want< ‘1SG’ , ‘ UV.kiss < __ , ‘child’ >’> ARG$_2$’

(A_i) (A_i) (P_j)

‘wanter_i’ (‘kisser_i’ ‘kissee_j’)

(35) Ordinary default single control: ***ingin*$_1$** (no raising)

SUBJ SUBJ-$\hat{\text{D}}$F

*ingin*$_1$‘want< ‘child’ ‘UV.kiss < ‘1SG’ , ___>’>’

(A_i) (A_j) (P_i)

‘wanter_i’ (‘kisser_j’ ‘kissee_i’)

As seen, the ‘wanter’/A argument of *ingin*$_1$ is the controller, and is identified as the subject because this is the only core argument. The bare verb *ingin*$_1$ is therefore not a transitive UV verb. Unlike UV.*ingin*$_2$ in (34), there is no ARG2 in *ingin*$_1$ (35). In *ingin*$_1$ (35), *ku=* (the kisser, the A of the embedded verb, index j) has no sharing with any matrix argument.

The morphological form of UV.*ingin*$_2$ and *ingin*$_1$ is the same, despite having quite different a-strs. We have captured the difference via a lexical-rule derivation.

In short, *ingin* ‘want’ in (33a) is unambiguously UV.*ingin*$_2$ (a three-place transitive UV verb, derived) whereas *ingin* in (33b) is ambiguous between the default *ingin*$_1$ and the derived UV.*ingin*$_2$. The ambiguity of the two structures, indicated by a dash within brackets in (33b), produces the two readings.

The same explanation applies when the embedded verb is passive, as seen in the ambiguity of (3). The only special property about the second backward control reading here is that the matrix bare verb *ingin* ‘want’ is also interpreted as passive (despite bearing no passive morphology); i.e, the otherwise ARG1 of *ingin*$_2$, which by the principle of linking would be mapped onto the matrix A (cf. *ingin* in the UV form in (34)), is removed from the syntactic a-str, but it remains in the semantic structure as the wanter A, and indexed with the embedded A, because there is no other choice, and also because *ingin* ‘want’ is an A-type control verb. In short, *ingin* in (3) is ambiguous between the default *ingin* (reading (i), and the derived passive (reading (ii)), which is the passivisation of *ingin*$_2$. The a-str of the derived passive *ingin*$_2$ that allows backward control is shown in (36).

*4.4 Voice harmony*

Bare verbs like *ingin* 'want' can be interpreted as having different subcategorisation frames, as shown above. For double/backward control to be possible, both matrix and second verbs must have the same voice type (i.e. voice harmony). Note that the first verb may show no specific voice morphology, e.g.

(36) Passive: ARG1 removed from the core argument list (cf. (34)):

OBL SUBJ-D̂F

*ingin* 'PASS.want< 'PASS.kiss < 'child' | 'mother'>'>ARG$_2$'

(P) (A)

'wanter_i' ('kisser_i' 'kissee')

The bare verb *ingin* in (3) has a passive interpretation due only to the *di*-passive marking in the embedded verb. Of course, overt passive voice morphology also shows the voice harmony constraint, e.g. with *coba* 'try' as in (37).

(37) *Apa* *yang* *di-coba* *di-curi* *oleh* *dia*?
what REL PASS-try PASS-steal by 3SG
'What did he try to steal?

Morphologically overt voice disharmony is not allowed, e.g. UV with PASS or PASS with UV as seem in (38):

(38) * <u>*Mobil itu*</u> *(yang)* *di-coba* [ __ *ku=jual*]. (cf. 14)
car that FOC PASS-try (P)1SG=UV.sell
FOR: 'The car is the one I tried to sell.'

As a corollary, voice disharmony is always associated with a default or ordinary control reading only. For example, the A-type control verb *janji* 'promise' can have *ber-* (*berjanji*), making it strictly intransitive. This verb does not allow backward control, as seen in (21). Likewise, the bare verb *coba* 'try' allows ambiguity in (39a) but its overt AV form *mencoba* in (39b) does not.

(39) a. *Siapa* *yang* *coba* [ __ *di-obati* *dokter* *itu*]?
who REL try PASS-treat doctor that
i) 'Who tried to be treated by the doctor?'
ii) 'Who did the doctor try to treat?'

b. *Siapa* *yang* *men-coba* [ __ *di-obati* *dokter* *itu*]?
who REL AV-try PASS-treat doctor that
i) 'Who tried to be treated by the doctor?'
ii) * 'Who did the doctor try to treat?'

The voice harmony constraint constitutes further evidence that the two verbs in the backward control structure are part of a tight structure. In our a-str based analysis, the constraint is expected, as it is essentially a linking constraint regulated by the voice system that allows alternative argument realisations. [8]

## 5 Conclusion

This paper has discussed the forward/backward double control constructions in Indonesian, providing more evidence of their syntactic, semantic and pragmatic properties. Syntactically the backward control construction involves raising of the embedded P to the matrix second argument, pragmatically motivated by the need to be mapped onto SUBJ-$\hat{\text{D}}$F (where $\hat{\text{D}}$F is typically FOC). This is possible only in a tight verbal structure akin to a complex predicate or SVC, with their hallmark of argument sharing. Close examination, however, reveals that this structure is neither of these; it is a special kind of control structure whose properties result from an interplay among subcomponents in the grammar: the voice system that regulates argument linking, morpho-semantic-lexical properties of the control verbs, animacy of the matrix argument, and information structure of argument focussing.

The analysis recognises two kinds of control structures: the default control structure projected by the control verb (i.e. without raising of embedded P), and the special control structure, with raising of P. The analysis accounts for the complex properties of double control structures, including an ambiguity where the same structure allows both ordinary forward and unusual backward readings.

## 6 References


Arka, I W. 2003. *Balinese morphosyntax: a lexical-functional approach*. Canberra: Pacific Linguistics.

Arka, I W. 2014. Computational implementation of crossed control structures in Indonesian. In *Cahaya Bahasa: a festschrift in honour of Prof. Sutjaja*, edited by I N. Sudipa and G. Primahadi-Wijaya-R, 21-27. Denpasar: Swasta Nulus.

Arka, I W., and C. Manning. 2008. Voice and grammatical relations in Indonesian: a new perspective. In *Voice and grammatical relations in Austronesian Languages*, edited by P.K. Austin and S. Musgrave, 45-69. Stanford: CSLI Publications.

Bresnan, J. 1982. The passive in lexical theory. In *The Mental Representation of Grammatical Relations* edited by Joan Bresnan, 3–86. Cambridge, MA: The MIT Press.

Butt, M. 1995. *The Structure of Complex Predicates in Urdu.* Stanford: CSLI Publications.


[8] In Chomskyan syntax, the blocking of fronting of an embedded P NP by overt voice AV morphology in the matrix verb relies upon a theory-internal mechanism that regulates movement, e.g. *meN-* constitutes a strong phase; see Sato and Kitada (2012).

Chung, S. 1976. An Object-Creating Rule in Bahasa Indonesia. *Linguistic Inquiry* 7:41-87.
Cole, P., G. Hermon, and Yanti. 2008. Voice in Malay/Indonesian. *Lingua* 118:1500-1553.
Davies, W. D., and S. Dubinsky. 2004. *The grammar of raising and control: a course in syntactic argumentation*. Oxford: Blackwell.
Davies, W. D., and S. Dubinsky. 2006. The place, range, and taxonomy of control and raising. *Syntax* 9:111–17.
Durie, M. 1997. Grammatical structures in verb serialisation. In *Complex predicates*, edited by A. Alsina, J. Bresnan and P. Sells, 289-354. Stanford: CSLI Publications.
Foley, W.A. , and M. Olson. 1985. Clausehood and verb serialization. In *Grammar inside and outside the clause*, edited by Johanna Nichols and Anthony Woodbury, 17-60. Cambridge: Cambridge University Press.
Foley, W. A., and R. D. Van Valin. 1984. *Functional syntax and universal grammar*. Cambridge: Cambridge University Press.
Haug, D. T. T. 2011. Backward control in Ancient Greek–subsumption or linearisation? In *Proceedings of LFG2011*, edited by Miriam Butt and Tracy Holloway King. Stanford: CSLI Publications.
Jackendoff, R. 1990. *Semantic Structures*. Cambridge, MA: The MIT Press.
Manning, C. D. 1996. *Ergativity: argument structure and grammatical relations*. Stanford: CSLI Publications.
Musgrave, S. 2001. *Non-subject arguments in Indonesian*. PhD thesis, Melbourne University.
Nomoto, H. 2011. Analisis Seragam bagi Kawalan Lucu. In *Tinta kenangan esei bahasa dan linguistik*, edited by H. Nomoto, Anwar R. and Zaharani A. Kuala Lumpur: Dewan Bahasa dan Pustaka.
Polinksy, M, and E. Potsdam. 2002. Backward control. *Linguistic Inquiry* 33:245–282.
Polinsky, M., and E  Potsdam. 2008. The syntax and semantics of wanting in In donesian. *Lingua* 118:1617–1639.
Potsdam, E. 2009. Malagasy Backward Object Control. *Language* 85:754-784.
Sag, I, and C. Pollard. 1991. An integrated theory of complement control. *Language* 67:63-113.
Sato, Y. 2010. The crossed-control construction and the syntactic role of passive morphology in Standard Indonesian. *lingbuzz/001177*.
Sato, Y., and S-I.  Kitada. 2012. Successive feature inheritance, Ɵ-features and the crossed-control construction in Standard Indonesian. http://ling.auf.net/lingbuzz/001523.
Sells, P. 2006. Using subsumption rather than equality in functional control. In *Proceedings of LFG06*, edited by Miriam Butt and Tracy Holloway King. Stanford: CSLI Publications

# THE BIG MESS CONSTRUCTION

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**Abstract**

An LFG treatment is proposed for the ‘Big Mess’ construction in English, in which under certain circumstances adjectival expressions appear before the determiner (as in ‘that big a mess’), rather than in the normal position between the determiner and noun (‘a very big mess’, compare ‘*a that big mess’). Empirically, the analysis is superior in coverage to existing treatments.

# 1 Introduction

The starting point of this paper is the belief that questions of explanation can only be properly addressed in the context of properly formalised and empirically adequate descriptions of phenomena. The goal of this paper is to provide such a description of the so-called ‘Complex Pre-determiner Construction’ or ‘Big Mess’ construction (BMC), exemplified in (1), formalised using the theoretical apparatus of LFG.[1]

(1) This is too big a mess (for anyone to clear up).

The construction involves an adjectival expression (*too big*) appearing before the determiner, rather than in the normal position for adjectives (between the determiner and noun, as in *an excessively big mess*), and seems to be a genuinely bizarre aberration in the syntax of English. Despite a considerable amount of work in a variety of frameworks other than LFG (see references in Section 3), it remains problematic.

The paper is structured as follows: Section 2 introduces the basic phenomenon; Section 3 reviews existing analyses; Section 4 presents the LFG analysis; Section 5 contains some supplementary discussion.

# 2 Outline of Phenomena

In the ‘Big Mess’ construction, an adjectival expression containing one of a limited number of Degree (‘Deg’) words, including *too*, *so*, *as*, *this*, *that*, *how*, and *however*, appears before the determiner (in what we will call the ‘pre-determiner’ or ‘BM’ position). See the examples in (2).[2]

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[1]The term ‘Big Mess’ is originally from Berman (1974); the term ‘Complex Pre-determiner Construction’ is from Kay and Sag (2012). The phenomenon is sometimes called ‘degree fronting’.

[2]The term Degree word, Deg, used for these items comes from Bresnan (1973), where these items are distinguished from the ’Q’ (for ’Quantity’) words *more*, *less*, and *enough*, which are compatible with what we will call ‘canonical’ position. The items *such* and *what* (as in *such a mess*, *what a mess*) are often included in the list of Degree words; we omit them here mainly for reasons of space, but also because they differ from the others in not being adjectival modifiers.

(2) a. She made *too rude* a remark (for me to repeat).
b. She made *so rude* a remark (that we were shocked).
c. I've never heard *as rude* a remark (as that).
d. He doesn't look the type to make *this rude* a remark.
e. He doesn't look the type to make *that rude* a remark.
f. I wonder *how rude* a remark she could have made.
g. Don't be offended, *however rude* a remark she makes.

In general, adjectival expressions which do not contain one of these words are excluded from this position:

(3) *She made (very) rude a remark.

Instead, such 'normal' adjectivals appear in what we will call the 'canonical' position between the determiner and the noun:

(4) She made a (very) rude remark.

In general, adjectivals containing one of these Degree words are excluded from canonical position:

(5) *She made a *too rude* remark.

Descriptively, there seem to be two challenges: (i) to characterise the circumstances under which the BMC is triggered, and (ii) to characterise the restrictions on the determiner that follows the BM adjectival. Neither is very difficult to describe informally and approximately, but both have proved remarkably resistant to formal treatment. In this section we will keep things simple and informal.

The words in (2) that trigger the BMC do not seem to form any very natural class. Though they are all in some sense degree modifiers, they are not a homogenous group: for example, while *how* and *however* are *wh*-words, the others are not. Moreover there are many degree modifiers that are not in the group. For example the equative comparative *as* is a trigger, but normal comparatives are not – they are perfectly compatible with canonical position, as in (6a), and normally excluded from the BMC, see (6b) (but see below for a qualification). Similarly, while *too* is a trigger, its near synonym *excessively* is not, see (7a) and (7b). Following Bolinger (1972), a number of analyses have sought to exploit the fact that BM triggers are mostly monosyllabic (so the problem with **a too rude remark* is something to do with the prosody or stress pattern required), but this will not explain why *however* is a trigger, or why *too* and *as* are triggers, but *more* and *less* can occur in canonical position – or indeed why there is nothing wrong with a string of monosyllabic adjectives in canonical position (*a nice new hat*). At this point, it seems a list, as above, is the best that can be done.

(6) a. a ruder remark, a more/less insulting remark, an insulting enough remark
b. *ruder a remark, ?more/less insulting a remark, ?insulting enough a remark

(7) a. an excessively rude remark

b. *excessively rude a remark

In the examples in (2) the Degree word is a direct modifier of the pre-determiner adjective. This is not necessary: a more deeply embedded Degree word has the same effect. For example, in the following, *as* is a modifier of *incredibly*, which in turn modifies the adjective *rude*; the BMC is allowed (in fact, required), just as in the examples above:

(8) *as* incredibly rude a remark
(9) *an *as* incredibly rude remark

To summarise so far: an adjectival in pre-determiner/BM position must contain a Degree word, and an adjectival containing a Degree word must appear in BM position. In fact, things are slightly more complicated than this, as we will describe below. But this is still a good starting point.

Turning now to the restrictions on the determiner that follows the BM position: this can be stated very simply – the only determiner that is permitted is the indefinite article *a*, and its phonological variant *an* (we will write this as *a/an*).

The following show that the definite article *the* is not permitted, nor are possessive NPs, or quantificational determiners such as *every*.

(10) *She made too rude the remark (for me to repeat).
(11) *She made too rude Sam's remark (for me to repeat).
(12) *She made too rude every remark (for me to repeat).

Plurals are excluded, whether with a determiner, or bare:

(13) *She made too rude remarks (for me to repeat).
(14) *She made too rude many remarks (for me to repeat).
(15) *She made too rude several remarks (for me to repeat).

Notice that what is involved here is not an indefiniteness restriction. As the examples in (16) show, indefinites whose determiner is not *a/an* are excluded:

(16) a. *too good (some) solutions (cf. There are (*some*) good solutions.)
b. *too good several solutions (cf. There are *several* good solutions.)
c. *too big one problem (cf. There's *one* big problem left to deal with.)
d. *too big no problem (cf. There's *no* big problem for them to fix.)
e. *too hot coffee (cf. There's hot coffee in the pot.)
f. *too tall this chap (cf. There's *this* tall chap in the corner. . . )
g. *too stupid some idiot (cf. There's *some* stupid idiot at the door.)
h. *too hard any problem (cf. I can solve *any* hard problem you like.)

Notice also that this restriction is absent with post-nominal modifiers, where any Degree word is compatible with any determiner:

(17) She made a remark too rude (for me to repeat).
(18) She made no/the/every remark too rude (for me to repeat).
(19) She made remarks too rude (for me to repeat).

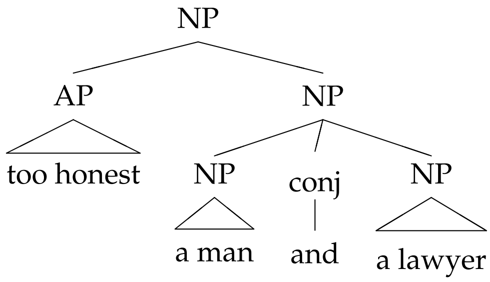
(20) She made several remarks too rude (for me to repeat).
(21) She serves coffee too expensive (for us to afford).

A initially appealing way of dealing with this restriction might seem to involve associating *a/an* with the BMC itself, so that the structure would be along the lines of *[too rude a] remark*, which would make what follows 'too rude a' a perfectly normal nominal phrase. Unfortunately, coordination facts make this untenable: *a/an* seems to form a constituent with the following nominal. Consider the following example from the British National Corpus (it is from Robert Louis Stevenson *The Strange Case of Dr. Jekyll and Mr. Hyde*, 1886). The interpretation makes it clear that *a lawyer* is coordinated with *a man*, both being modified by *too honest*:[3]

(22) But Mr Utterson was too honest a man and a lawyer to do that.
(23) too honest [[a man] and [a lawyer]]

That is, the surface constituent structure should be something like (24), disregarding the precise position of the conjunction *and*:

(24)




It is worth emphasising that apart from the position of the adjectival, and the *a/an* requirement, BMC NPs are strikingly normal. In particular, an NP with a BM adjectival seems to have exactly the distribution one would expect of an NP with *a/an* as its determiner.[4] So, for example, an NP like *as large a group as possible* can be used predicatively as in (25); as an apposition as in (26); as subject, direct object, or indirect object, as in (27) to (29); or as object of a normal preposition as in (30).

(25) This seems to be *as large a group as possible* under the circumstances.
(26) The group, *as large a group as possible*, will be selected next week.
(27) So that *as large a group as possible* will benefit...
(28) We must give *as large a group as possible* a chance.
(29) We must give a chance to *as large a group as possible*.
(30) Having searched among *as large a group as possible*...

[3]The only alternative structure would involve *too honest* modifying just *a man*, but this would require that *to do that* being associated with *a lawyer* – as in 'Mr Utterson was a lawyer to do that' (compare 'He was a fool to do that'). This is clearly not the intended meaning.

[4]This has not always been appreciated, e.g. Bresnan (1973) and Berman (1974) thought the BMC was only possible in predicative NPs; Matushansky (2002) claims that what she calls degree fronting is only possible in non-specific (i.e. non-referential) indefinites.

Moreover, we seem to get the full range of interpretations that one would expect. For example, (31) includes a normal indefinite use after presentational *there*; (32) shows what is plausibly interpreted as a *de dicto* reading, while (33) involves a *de re* reading; (34) and (35) are generic; (36) and (37) show object NPs which are interpreted with respectively narrow and wide scope with respect to the subject:

(31) There is *as rude a piece of graffiti* on this wall as on that wall.
(32) I need *this wide a piece of wood* to finish this job – but we unfortunately haven't one – we haven't got any more wood at all.
(33) I saw *that wide a piece of wood* behind the shed – I'll go and get it.
(34) A potato is a good source of starch, but a green potato can make you ill, and *too green a potato* can poison you.
(35) *As skilled a hunter* as the pike has no problems with these conditions.
(36) Most well-run organisations have *too large an investment* in their stock.
(37) No doubt everyone will welcome *so detailed a proposal*.

Similarly, what follows *a/an* is a normal nominal, e.g. it can contain normal pre-nominal and post-nominal modifiers: (38a) contains a post-nominal modifier *about his work*, in (38b) *remark* is pre-modified by a normal adjective *casual*:[5]

(38) a. That was too rude a remark about his work for him to forgive.
b. That was too rude a casual remark for him to forgive.

And there is the normal *a/an* alternation:

(39) a. That was too rude a remark . . . (**an*)
b. That was too rude an assertion . . . (**a*)

In short, apart from the oddness inherent in the BMC itself, the associated NP seems to be both internally and externally normal.

The same is true of the BM adjectival, i.e. apart from having to contain a Degree word, the BM adjectival is a normal adjectival expression. First, notice that the modification relations are perfectly normal. For example, in *as incredibly rude a remark*, *incredibly* is a modifier of *rude*, and *as* is a modifier of *incredibly*, just as in a predicative use (40a), or postnominal use (40b), and just as in a paraphrase with *equally* in (40c) (though of course *equally* is not a Degree word, so not a BMC licensor, see (40d)):

(40) a. That was as incredibly rude as anything I have ever heard.
b. A remark as incredibly rude as any I have ever heard.
c. She made an equally incredibly rude remark.
d. *equally incredibly rude a remark

In each case, what is being equated is something like 'degree of extreme rudeness'.

[5]Interestingly, the way a BM adjective composes with the head noun and other pre-head modifiers is also normal, in the sense that it reflects linear order. The BM adjective 'takes scope over' following pre-head adjectives (i.e. semantically, it composes last). For example, the scope relations in *as false an empirical claim as we have seen* are the same as those in *a false empirical claim*.

Second, and more significantly, the BM adjectival is a normal *pre-nominal* (i.e. attributive) adjectival. In particular:

- *all* gradable adjectives are allowed (presumably the gradability requirement follows from the presence of the Degree word, which will only be able to modify gradable adjectives);
- the adjectives have precisely the range of meanings one would get if they appeared directly after the determiner; and
- *only* pre-nominal adjectives are allowed.

Rather than attempt an exhaustive discussion of these points, we will focus on some cases that are of theoretical significance.

The first concerns 'adverbial' interpretations of adjectives. Pre-nominally, when modifying an action nominal, an adjective like *hard* can be interpreted adverbially (*hard worker* can be interpreted as 'one who works hard'). This adverbial interpretation is not possible when *hard* is used predicatively, or post-nominally. Thus, in the examples in (41) *hard* can only be interpreted as 'tough', 'not soft': (41a) is predicative; (41b) and (41c) are post-nominal (they involve coordinate structures and an adjective with a complement because without these post-nominal position would be strange; the difference between them is just the order of the conjuncts).

(41) a. As a worker she is hard.
b. She is a worker dedicated to the company and hard.
c. She is a worker hard and dedicated to the company.

Crucially, adverbial use of *hard* is perfectly compatible with the BMC, so (42) can be paraphrased as 'she works too hard to be accused of shirking':

(42) She is too hard a worker to be accused of shirking.

Similarly, adverbial use of *occasional*, as exemplified in (43) (which is interpreted as 'from time to time Sam is a philosopher'), is possible in the BMC, cf. (44):

(43) Sam is an occasional philosopher.

(44) Thus we see even so occasional a philosophical scholar as Ralegh quoting Aquinas . . .
(Richard Harp, *The consolation of Romance: providence in Shakespeare's late plays* in *Shakespeare's Last Plays: Essays in Literature and Politics*, edited by Dr. Stephen W. Smith, Travis Curtright, Lexington Books).

This use is impossible predicatively, witness (45). In short: the BMC involves *attributive* adjectives, interpreted normally.

(45) *As a philosopher Sam is occasional.

Moreover the *only* adjectives that are allowed are ones which can appear pre-nominally (e.g. adjectives with complements are excluded from the BMC, just as they are excluded from 'canonical' position):

(46) a. *too fond of children a person (cf. a person too fond of children)

b. *a (very) fond of children person    (cf. a person very fond of children)

In short, apart from the inherent oddness, in an example like *that rude a casual remark about her work* we seem to have an expression which is externally a normal NP, which contains a normal attributive adjectival expression (*that rude*), and a normal nominal (*casual remark about her work*). What is odd is that the adjectival must contain a Degree word, and the determiner must be *a/an*.

To be completely accurate, this simple picture must be supplemented by two complications.

The first is that as well as the 'obligatory' BMC triggers (*too*, *so*, *as*, etc.) that we noted at the outset, there are a number of 'optional' triggers – that is, items which are compatible with both the BM and canonical position. The most obvious of these are *more*, *less*, *enough*, and *quite* (in general, canonical position is preferred, but BM position is possible, as can be seen from the following):[6]

(47) a. England look a *far more potent* force going forward now...
  b. ...apathy was *far more potent* a force among the British working class than action.
  c. ...the organization had become a *far less* potent force.
  d. ...white racism would have been *far less potent* a force
  e. You're *good enough* an actress to be invited to our Fenice theatre.
  f. Forlani is hot but not a *good enough* actress.
  g. For I feel that there is here a *quite basic* issue.
  h. The syntactic correctness of dereferenced RDF seems *quite basic* an issue to me.

The second complication is that even obligatory BM triggers are not absolutely excluded from canonical position. We think we can distinguish two phenomena. The first, and less interesting here, include examples of Degree words like *too* in canonical position as in (48a) and (48b) from Huddleston and Pullum (2002, p552). Huddleston and Pullum point out that these examples are 'somewhat marginal', and punctuated as compound adjectives:

(48) a. the too-warm sheets
  b. the too-perfect living room

Though it is easy enough to find examples that are not punctuated in this way, as in (49), it seems to plausible that what is going on involves some kind of compounding process, perhaps analogous to what can be seen in (50), and we will say no more about this matter here.

(49) a. Possibly the learned author has taken *a too extreme view* of the matter,...

[6]The examples in (47) are all attested, (47b) and (47e) are from the BNC, the rest are from Google. It is perhaps worth observing that these examples with adjectivals in the pre-determiner position are genuine instances of the BMC – in particular, there is the same restriction on the determiner: while *a/an* can be replaced by another determiner in the 'canonical' examples, *a/an* is the only possibility when the adjectival is in pre-determiner position, thus while *several far more potent ideas* is acceptable, one cannot have **far more potent several ideas*.

b. Musicians normally are not madly keen on having an expensive car, but *a too expensive instrument* or *a too expensive bow* gives them much joy.

(50) one of those I'm-so-sick-of-this-bloody-job-that-I-could-scream days

The second phenomenon seems to us more systematic: adjectival expressions containing Degree words are freely allowed in canonical position, *providing they are pre-modified* (cf. Matushansky, 2002; Kim and Sells, 2011). Compare (51-53)a with (51-53)b; as (51-53)c indicate, such adjectivals are also able to appear in the BMC:[7]

(51) a. *a too rude remark
b. a far too rude remark
c. far too rude a remark

(52) a. *an as rude remark
b. a just as rude remark
c. just as rude a remark

(53) a. *a that rude remark, *an all that rude remark
b. a not (all) that rude remark
c. not (all) that rude a remark

Intuitively, it seems one can have an adjectival expression containing a Degree in canonical position, so long as the Degree word is "hidden", or "protected" by being pre-modified.

It is worth pointing out that when adjectival expressions containing a Degree expression are allowed in canonical position, restrictions on the determiner are relaxed, and one can find such expressions in (for example) definite plural NPs like (54) and (55), and indefinite plurals like (56). [8]

(54) As I pulled the knot tight, Jan twitched, raised his *far too blue* eyes above his left sleeve and turned an incredibly blue and watery gaze upon me.
(55) In addition to Urban Hund's leather collars and leashes, Barkley Paws Pet Boutique also carries their *just as stylish* nylon webbing collars!
(56) I recently started a new character due to several *not that good* decisions in the character creation.

To summarise: there is group of Degree words, including *too*, *so*, *as*, *this*, *that*, *how*, and *however*, which cause adjectival expressions containing them to appear before the determiner, in the BM position. When this happens, the only determiner that is allowed is *a/an*. Such expressions are permitted in canonical position only under very restricted circumstances (if they are in a kind of compound, or if they are pre-modified). There is a second group of words, including *more*, *less*, *enough*,

[7]There is some variation here, which we have not investigated. Not all Degree words are open to this process. Notably, *how*, *however*, and *this* seem less susceptible to it. In the case of *however* it may simply be a general resistance to modification. We leave this issue open.

[8]Example (54) is from Günter Grass, *The Tin Drum*, trans. Breon Mitchell, Vintage Books, 2009; the others are from Google. These examples all involve pre-modified expressions, but it is of course possible that they are actually examples of the 'compounding' process noted above.

and *quite*, which normally appear in adjectival expressions in canonial position, but which can also appear the in the BM position. Apart from the positioning of the adjectival expression, NPs in which this phenomena occurs appear perfectly normal, in terms of distribution, interpretation, and internal make-up.

## 3 Previous Analyses

The BMC has been a feature of English since at least early modern times,[9] and although it is mentioned in traditional grammars (e.g. Jespersen, 1987, p136) the first serious analyses are Bresnan (1973) and Berman (1974).[10] While descriptively useful, the analyses are not very appealing starting points for analyses with current formal apparatus. The broadly Generativist/Minimalist literature contains a number of analyses or suggestions for analyses (for example, Corver (1997); Kennedy and Merchant (2000); Matushansky (2002); Haumann (2004); Troseth (2009) Wood and Vikner (2011)), but all are to some degree problematic.[11]

Several have straightforward empirically flaws – e.g. assuming a post-nominal, predicative source for the construction (e.g. Haumann, 2004; Wood and Vikner, 2011), which is incompatible with the facts about adverbial interpretations of adjectives discussed above.

Several adopt the view that degree modified adjectivals are actually headed by Degree words (as in Corver (1997)), and so constitute DegPs, rather than APs, which makes it surprising that the distribution of adjective phrases seems to be unaffected by whether they are accompanied by a degree word (indeed unaffected by whether they are open to degree modification at all).[12] Some assume that preposing involves movement to a functional projection outside DP (Kennedy and Merchant, 2000, e.g.), but such a projection is necessarily distinct from DP, so one would expect DPs containing the BMC to have a different distribution from ones that do not, which does not appear to be the case (cf. above, a DP is what we have been calling an NP).

[9]Shakespeare *Two Gentlemen of Verona* has someone described as '. . . too low a Mistress for so high a servant', and Rissanen (1999, p209) notes that deviations from what we are calling the BMC are so rare that they cannot be regarded as a regular syntactic pattern. But there has clearly been some development, for example the OED cites an example of an adjectival containing *so* modifying a plural as late as 1797: *Men were no longer shut up in so narrow boundaries* (a modern speaker would use *such* here), and one in a definite NP from 1865: *The one weakness of his so mighty love* (a modern speaker would probably omit *so* here).

[10]Jespersen talks about *how* and *however* being like other interrogative words in 'coming first', and 'attracting the adjective'. One should also mention de Moennink (1996) as a more recent, corpus based study.

[11]See Kim and Sells (2011) for further discussion of problems.

[12]For example, coercing a nationality adjective like *British* to be scalar, so that it accepts degree modification, does not seriously affect its distribution. Similarly, the kind of modification (e.g. modification by an ordinary adverb, by a comparative, or a degree word) makes little distributional difference (apart from the BMC of course). There are for example no items that subcategorise for adjectives modified in one way rather than another. Analysing modified and unmodified adjectival expressions such as *British*, *very British*, *more British*, *too British* etc. as APs captures distributional facts which cannot be captured if they are treated as being projections of different functional categories.

Most are formally incomplete, making crucial reliance on unspecified principles. All involve complex structures, a rich array of empty categories, a variety of covert and overt movement operations (which are in many cases without theoretical motivation).[13]

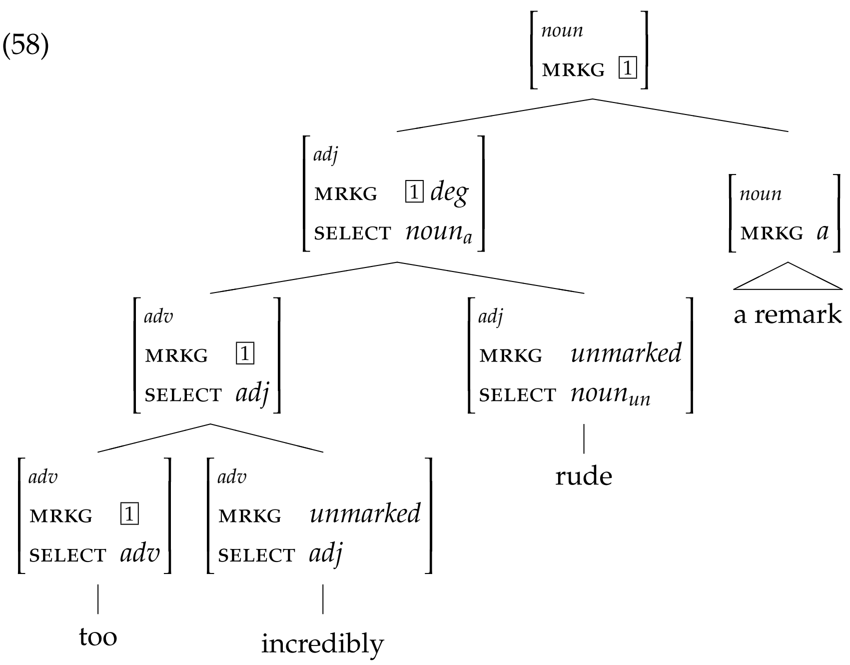
More impressive, both formally and descriptively, are a number of analyses formulated in the framework of HPSG (Ginzburg and Sag (2001); Van Eynde (2007); Kim and Kim (2009); Kim and Sells (2011); Kay and Sag (2012)). We will focus our discussion on Kay and Sag (2012).

In the version of HPSG assumed in Kay and Sag (2012) ('Sign-Based Construction Grammar', see e.g. Sag (2012)), phrases are licensed by *constructions*, which stand in inheritance relations, and determine the syntactic and semantic properties of the phrases they license. For example in a *head-functor-construction*, which is the construction which licenses the combination of adjectival and adverbial modifiers and the heads they modify, there are two daughters, a functor daughter and a head. The functor daughter determines the sort of head it can modify via a SELECT feature, which mothers inherit from their head daughter, by default. The other attribute that is important for this discussion is MARKING (abbreviated to MRKG), which a mother inherits from the functor daughter.

The key ideas of Kay and Sag's analysis of the BMC can be seen in (58), the analysis of (57).

(57) too incredibly rude a remark

(58)




Here, the functor daughter dominating *too incredibly rude* is of type *adj*, and is

[13]For example, while preposing of expressions including a *wh* item like *how* and *however* might be motivated by the need for some kind of feature checking, this account cannot plausibly be extended to other BMC triggers, which are not *wh* items.

an instance of what Kay and Sag call the 'Complex Pre-determiner' (CPD) construction. This is a type of head-functor construction which has three distinctive properties.

The first is that it is specified as SELECTing a nominal head with the MRKG value *a* (which we have abbreviated as $noun_a$). Having this SELECT value means it can only combine with a nominal which has this MRKG value. The only way a phrase can acquire this value of MRKG is by containing an instance of the indefinite article (*a/an*) as determiner, as in (58). It is this MRKG value that puts an instance of the CPD construction like *too incredibly rude* in the pre-determiner position, and guarantees that the only determiner allowed is *a/an*.

The second important property of the CPD construction is that its MRKG value is specified as *deg*. The only way a constituent can be marked DEG is by (i) being a degree word (like *too*), or (ii) having a functor daughter which has this marking. Thus, *too rude* could have this marking, and in (58) *too incredibly* and *too incredibly rude* have this marking. It is this property that guarantees the presence of a Degree word in the pre-determiner position.

Recall that by default mothers inherit the SELECT feature from their head daughter. The third important property of the CPD construction is that this default must be over-ridden: in (58) *too incredibly rude* must be specified as selecting a noun with MRKG value *a*; but its head is *rude*, which will be specified as selecting a noun with MRKG value *unmarked* (so that it can modify bare nouns, as in *(a) rude remark*).

Thus, the key idea of Kay and Sag's analysis is that it involves a special adjectival construction – the CPD construction – which is marked *deg* (and so contains a Degree word), and *select*s a noun which is marked *a* (and so has to modify an NP with the determiner *a/an*). And since the head of this construction is a normal adjective (which selects an unmarked noun), this requires the normal default inheritance of the SELECT value to be over-ridden. Everything else in (58) is normal (all the other sub-trees involve normal head-functor constructions, with mothers inheriting SELECT values from their head daughters).

Adjectives which are modified by Degree words are specified as MRKG *deg*, so they can occur in this construction, but unmodified adjectives are not: unmodified adjectives are specified as MRKG *unmarked*, as *rude* is in (58), and so are excluded from this construction. Likewise, assuming intensifying adverbs like *very* are MRKG *none*, phrases where they are the functor will be excluded from this construction. Thus, while (57) is licensed, the following are not:

(59) *That was rude a remark.
(60) *That was very rude a remark.

Unmodified adjectives select unmarked nouns, and so appear in canonical position; and so do adjectives modified by normal intensifying adverbs. So examples like (61) are licensed:

(61) a (very) rude remark

Kay and Sag do not discuss the possibility of Degree modified adjectives in canonical position, but one can imagine extending it to allow Degree words in canonical position only when 'protected'. For example, the construction that combines normal adjectives and unmarked nouns might require the adjective to have some MRKG value other than *deg*, which would exclude (62) and allow (63).

(62) *a too rude remark
(63) a far too rude remark

(62) would be excluded because *too rude* is specified as MRKG *deg*, but (63) would be allowed, because *far too rude* inherits the MRKG value of *far too*, which in turn has the MRKG value of *far*, which is not *deg*.[14]

This is an attractive analysis: it is carefully formalised, and covers most of the data we have presented. It embodies a very simple intuition about the construction (there has to be a degree word, and the determiner has to be *a/an*) in a very direct and descriptively appealing manner. The structure it assigns captures the modification relations (*too* modifies *incredibly*, *too incredibly* modifies *rude*, etc) directly, and seems to involve the right kind of constituent structure (e.g. *a remark* is a constituent).

In the following section, we will attempt to improve on the empirical coverage of this analysis, using the standard formal apparatus of LFG. On the formal side, this means we will not use features like SELECT or MRKG, default inheritance, or SBCG style constructions. On the empirical side, we will improve on Kay and Sag's account by addressing two particular problems.

The first is that since MRKG values are inherited from functor daughters, the MRKG value on a BMC NP like *too rude a remark* (which will be *deg*, as in (58)) will be different from that of a normal NP like *a rude remark* or *a remark* (which will be *a*). This will be a problem if the MRKG value plays a role in determining the distribution of NPs elsewhere in the grammar, because as we saw above, there is no real distributional difference – from the outside, they all look the same.[15]

A more serious empirical problem is this. The analysis allows the Degree word that licenses the BMC to percolate from any depth inside the BM adjectival, but since the MRKG value is inherited from the functor daughter, and in these cases the functor daughter is the first daughter, it predicts that an adjectival where the Degree word is pre-modified should not license the BMC. This is incorrect, as the following demonstrate, and as we noted above (compare (51c)-(53c)):

(64) a. nearly *as* incredibly rude a remark
b. [[[nearly *as*] incredibly] rude] a remark

[14]It might also be possible to provide an account of 'optional' BMC triggers (like *more*, *less*, etc.) by assigning these a MRKG value which is a super-type of *deg* and *unmarked*, hence compatible with both.

[15]It is not clear if this will be a problem for Kay and Sag in practice, because it is not clear what role MRKG values generally play in determining the distribution of phrases. The main purpose of MRKG values is to register the presence of grammatical elements in a phrase so to avoid it being duplicated – for example the restriction that a noun can have only one determiner can be enforced by having determiners select nouns that are unmarked.

(65) a. very nearly exactly *as* rude a remark

b. [[[[very nearly] exactly] *as*] rude] a remark

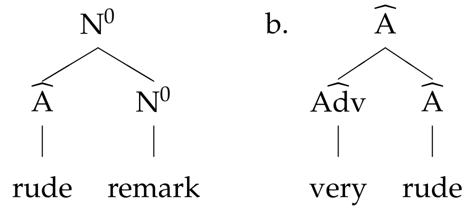
For example, in (64), the marking on *nearly as incredibly rude* will be inherited from *nearly*, which is not a Degree word, not from *as*, predicting (wrongly) that such a phrase cannot appear in the BMC. Contrary to what Kay and Sag predict, the BMC licensor can be *anywhere* in the pre-determiner expression.

## 4 LFG Analysis

The goal of this section is to develop an analysis of the BMC which improves on the empirical coverage of existing analyses, using only the standard apparatus of LFG.

We begin with some background on the analysis of attributive adjectives. Following Arnold and Sadler (2013), we assume that pre-nominal adjectives, and their modifiers, are instances of 'non-projecting' categories $\widehat{\mathrm{A}}$, $\widehat{\mathrm{Adv}}$, etc. (cf. Toivonen (2003)). The difference between a 'hat' $\widehat{\mathrm{X}}$ category and a conventional $\mathrm{X}^0$ category is that the latter is typically dominated by X' and XP, and can thus be accompanied by complements and phrasal modifiers, whereas the former is only permitted in two circumstances: as a sister to $\mathrm{Y}^0$ under $\mathrm{Y}^0$, or $\widehat{\mathrm{Y}}$ under $\widehat{\mathrm{Y}}$, for example:

(66) a. b.




Most adjectives have both $\widehat{\mathrm{A}}$ and $\mathrm{A}^0$ lexical entries, and so can appear both pre- and post-nominally (e.g. *grateful*: as in *a grateful public* and *a public grateful for his leadership*), some have only $\widehat{\mathrm{A}}$ entries (e.g. *mere*), and can only appear pre-nominally, some have only $\mathrm{A}^0$ entries (e.g. *asleep*) and can only appear post-nominally. The adverbs we are concerned with here (intensifiers like *very*, Degree words, and *more*, *less* etc) are $\widehat{\mathrm{Adv}}$.[16]

We thus assume the following basic rules for NP (leaving aside now the possibility of post-nominal modifiers):

(67) $\mathrm{NP} \rightarrow \underset{\uparrow=\downarrow}{\mathrm{DET}} \quad \underset{\uparrow=\downarrow}{\mathrm{N}}$

(68) $\mathrm{N} \rightarrow \underset{\downarrow\in(\uparrow\textsc{adj})}{\widehat{\mathrm{A}}} \quad \underset{\uparrow=\downarrow}{\mathrm{N}}$

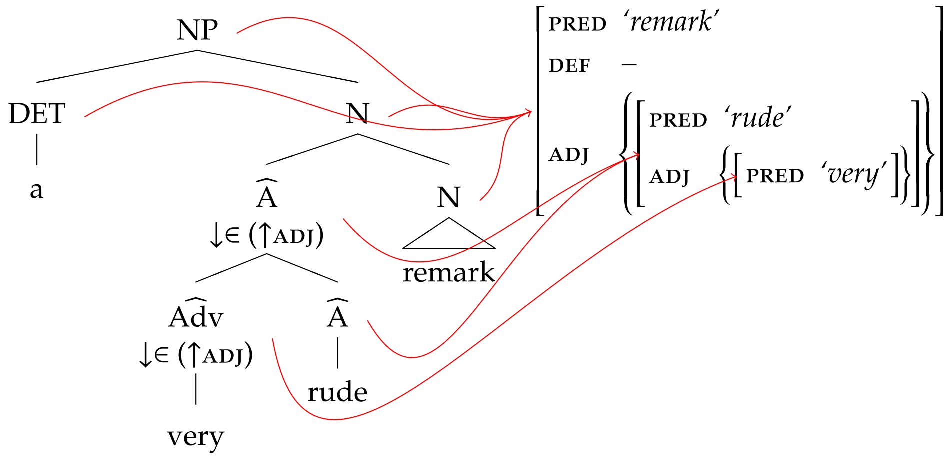
(69) $\widehat{\mathrm{A}} \rightarrow \underset{\downarrow\in(\uparrow\textsc{adj})}{\widehat{\mathrm{Adv}}} \quad \underset{\uparrow=\downarrow}{\widehat{\mathrm{A}}}$

[16] As a consequence Degree words, as well as *more* and *less*, which take complements, cannot realise their complements 'locally' (local realisation would require them to be $\mathrm{Adv}^0$, heading AdvPs), so their complements are obligatorily extraposed as in '*as* rude *as that*', '*as* rude a remark *as that*'. See Arnold and Sadler (2013).

(67) makes DET and N co-heads of NP; (68) allows a noun to have an adjectival ($\widehat{\text{A}}$) pre-head adjunct (i.e. an element of its ADJUNCT set); (69) similarly allows an $\widehat{\text{A}}$'s ADJUNCT set to contain an adverb. Assuming appropriate lexical entries, we will get c- and f-structures like (71) for (70). We assume the DEF:– value is a reflex of the indefinite article (we ignore other features).

(70) a very rude remark

(71)




With this in place, we can provide an analysis of examples like (72), which is very straightforward and conservative in its theoretical assumptions.

(72) too rude a remark

As regards f-structure, we noted in Section 2 that the modification relations involved here are straightforward: *too* is a modifier of *rude*, which is a modifier of *(a) remark*. This is parallel to the modification relations one sees in (70) and (71), consequently *too* should be an ADJUNCT of *rude*, and *rude* should be an ADJUNCT of *remark*.

As regards c-structure, the discussion in Section 2 established that (72) is an NP; the data about coordination indicated that the determiner and noun form a constituent (see example (22)), which gives every appearance of being an NP. The evidence that the BM adjectival is a normal attribute adjectival leads us to assume it is an $\widehat{\text{A}}$ adjunct of the NP, as expressed in the rule in (73). [17]

Now we need to ensure that this $\widehat{\text{A}}$ contains somewhere within it a Degree word, which we can assume can be identified by the presence of a feature ADVTYPE *deg*,[18]

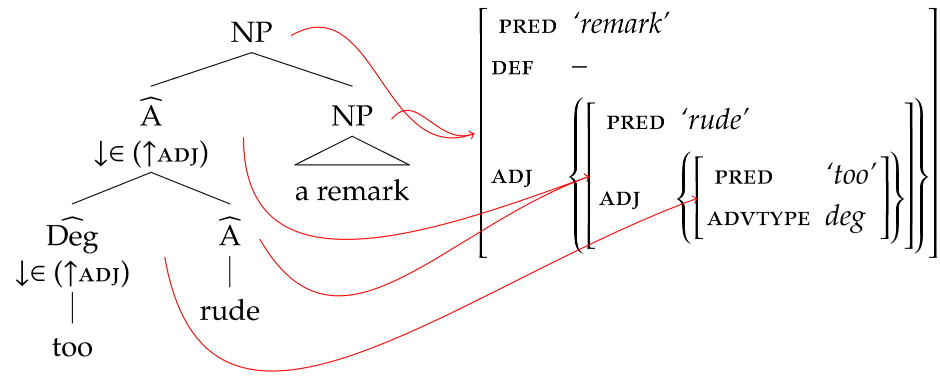
[17] Allowing $\widehat{\text{A}}$ to adjoin to NP as in this rule involves an extension of Toivonen's proposals about 'hat' categories, which assumed they adjoined only to $\text{X}^0$, and to Arnold and Sadler (2013), where it was proposed that they can also adjoin to $\widehat{\text{X}}$. (We are grateful to Tracy Holloway King for bringing this issue to our attention). But allowing the possibility of phrasal adjunction for 'hat' categories is not novel – it seems to have first been proposed in Spencer (2005). We take this opportunity to note that the possibility of adjunction to $\widehat{\text{X}}$ was first suggested in Duncan (2007), a fact which our earlier discussion unfortunately failed to acknowledge.

[18] One could equally well assume that Degree words are a distinct category $\widehat{\text{Deg}}$, though this would require optional BMC triggers to be listed as both $\widehat{\text{Adv}}$ and $\widehat{\text{Deg}}$.

and that the lower NP contains the indefinite article *a/an*. If we assume that in English the feature specification DEF – is uniquely associated with the indefinite article, we can achieve this very simply with the rule and annotations in (73), which will produce the c- and f-structure in (74).[19] Notice that the f-structure in (74) differs from that in (71) only in the presence of PRED *'too'* and the ADVTYPE feature in the former.

(73) $$\text{NP} \;\rightarrow\; \underset{\substack{\downarrow\in(\uparrow\textsc{adj})\\ (\,\downarrow(\textsc{adj}\in)^{+}\ \textsc{advtype}\,) =_c \textit{deg}}}{\widehat{\text{A}}} \qquad \underset{(\uparrow\textsc{def}) =_c -}{\text{NP}}$$

(74)




The '↓∈ (↑ADJ)' constraint on $\widehat{\text{A}}$ simply makes the adjective an adjunct of the noun (as in (68)). The functional uncertainty constraint '$\downarrow(\textsc{adj}\ \in)^{+}$ ADVTYPE $=_c$ *deg*' requires the presence of a Degree word in the $\widehat{\text{A}}$. The 'Kleene plus' operator '+' ensures that this constraint can be satisfied in many ways, *inter alia*:

(75) a. $(\downarrow\textsc{adj} \in \textsc{advtype}) =_c \textit{deg}$
b. $(\downarrow\textsc{adj} \in \textsc{adj} \in \textsc{advtype}) =_c \textit{deg}$
c. $(\downarrow\textsc{adj} \in \textsc{adj} \in \textsc{adj} \in \textsc{advtype}) =_c \textit{deg}$

(76) a. the adjunct set of the $\widehat{\text{A}}$ contains a degree word: *too rude (a remark)*
b. the adjunct set of the $\widehat{\text{A}}$ contains an item whose adjunct set contains a degree word: *too incredibly rude (a remark)*
c. the adjunct set of the $\widehat{\text{A}}$ contains an item whose adjunct set contains an item whose adjunct set contains a degree word: *too incredibly surprisingly rude (a remark)*

Notice that nothing is said about the linear position of the degree word here. Thus, we improve on Kay and Sag (2012) by allowing examples like the following:

(77) a. nearly *as* incredibly rude a remark [cf. (16a)]
b. very nearly exactly *as* rude a remark [cf. (88a)]

The fact that this constraint involves '$=_c$' means it cannot be satisfied by an

[19] This assumption about the feature DEF – is of course crucial, and means, for example, that this feature cannot be used as the morpho-syntactic reflex of semantic indefiniteness, because as the examples in (16) showed, semantic indefinites are not generally allowed in the BMC.

element that is unspecified for ADVTYPE (so we correctly exclude **very rude a remark*). We can allow examples involving *more*, *less*, and *quite* in BM position, as well as canonical position, as in (78), if we optionally associate them with an ADVTYPE=*deg* constraint in the lexicon.

(78) a. *more/less/quite potent* a force [cf. (47)]
b. a *more/less/quite potent* force

The 'DEF $=_c$ – on the daughter NP will have the effect of correctly excluding examples involving determiners other than *a/an*; it will also exclude mass nouns (which lack any determiner, and so presumably have no DEF specification at all). This is correct: compare **too expensive wine* (vs. *too expensive a wine*).

Notice that in other ways the lower NP is expected to have normal NP internal structure, as seems correct, and from the outside the upper NP will be indistinguishable from any other indefinite singular NP (unlike under Kay and Sag's analysis), and will be predicted to have the normal distribution noted above in Section 2.[20]

If we assume DEF to be a distributive feature, we derive an interesting, and apparently correct, prediction about co-ordinate structures involving nouns inside the BMC, namely that all conjuncts will have to satisfy the DEF $=_c$ – constraint. Coordination within the NP can arise in two ways. If two Ns are co-ordinated in the scope of *a/an* as in (79), the defining equation '↑DEF = –' associated with the indefinite determiner will distribute to both conjuncts, and the constraining equation will be satisfied by both conjuncts.

(79) (as nice) [ a [ cup and saucer ] ]

Alternatively, coordination may be at the level of the NP, in which case each conjunct obtains this feature independently, from its own determiner, as in (80). Again the constraining equation is satisfied in both conjuncts.

(80) (too honest) [ [a man] and [a lawyer] ]

What is excluded is a case like (80), where the conjuncts contain different determiners. This prediction seems to be correct:[21]

(81) *too honest [[a man] and [no lawyer]]

Turning now to the phenomenon of degree-modified adjectivals in canonical position, as in (51)–(53). Recall that the generalisation was that degree words are allowed in this position providing they are pre-modified. This generalisation can be stated directly using a 'local name' (Dalrymple, 2001, p146), if the existing

[20] An anonymous reviewer correctly points out our rule (73) will license recursion, with the lower NP expanding into another BMC. We note, first, that it is in general not easy to combine multiple Degree modifiers, including *more*, *less*, etc. quite apart from the BMC. For example a phrase like *several more interesting more plausible analyses* requires a considerable amount of context to be acceptable. Given sufficient context, we think examples like the following would be acceptable:
(i) I expected her to wear too short a skirt, but had not expected quite *so colourful too short* a skirt.

[21] Of course, there is nothing wrong with a *string* like *too honest a man and no lawyer* – but here the conjuncts would be *too honest a man*, and *no lawyer*.

rule expanding N, (68) above, is replaced by the following:

(82)
$$\mathrm{N} \;\rightarrow\; \begin{array}{c} \widehat{\mathrm{A}} \\ \downarrow\in(\uparrow\mathrm{ADJ}) \\ \neg\left(\begin{array}{c} (\downarrow(\mathrm{ADJ}\in)^{+}) = \%\mathrm{x} \\ (\%\mathrm{x}\ \mathrm{ADVTYPE}) =_c deg \\ \neg(\%\mathrm{x}\ \mathrm{ADJ}\in) \end{array}\right)\end{array} \qquad \begin{array}{c}\mathrm{N}\\ \uparrow=\downarrow\\ \\ \\ \\ \end{array}$$

The first constraint on $\widehat{\mathrm{A}}$ here says that it is an adjunct (this is just as in the existing rule), the second more complex constraint is negative, that is, it forbids something. What it forbids is the following. Suppose there is an adjunct, or an adjunct's adjunct, . . . inside the $\widehat{\mathrm{A}}$. Suppose we call this adjunct '%x', and suppose %x's ADVTYPE is *deg*, and suppose %x does not itself have an adjunct. This is forbidden. See (83) for a line by line paraphrase:

(83) a. $(\downarrow(\mathrm{ADJ}\in)^{+}) = \%\mathrm{x}$ — Let %x be an adjunct (or adjunct's adjunct, etc). . .
b. $(\%\mathrm{x}\ \mathrm{ADVTYPE}) =_c deg$ — which is specified as ADVTYPE *deg* . . .
c. $\neg(\%\mathrm{x}\ \mathrm{ADJ}\in)$ — . . . and which does not have an adjunct

In other words: any Degree word in the $\widehat{\mathrm{A}}$ must have an adjunct. But recall that 'hat' categories are only permitted to dominate other 'hat' categories, and that 'hat' categories are always head final. It follows that any Degree word which has an adjunct will be *pre*-modified, and we correctly account for the contrast in, for example, (84):

(84) a. *a too rude remark [cf. (51)]
b. a far too rude remark

The goal of this section was to develop an analysis which improves on the empirical coverage of previous analyses, using only the standard apparatus of LFG. We believe this goal has been achieved.

## 5 Discussion

The two crucial ingredients of the analysis in Section 4 are the use of a functional uncertainty equation to ensure the presence of a Degree word in the BMC, and the use of the constraining equation '$\mathrm{DEF} =_c -$' to ensure the presence of the indefinite article. In this section we will consider some alternatives to the second.

In informal discussions in LFG, it is often assumed that determiners are just a kind of syntactic marker, and thus do not have PRED values. This cannot be true in general. Many determiners play a much fuller role: some can be the target of modification (*absolutely no ideas*, *almost every suggestion*, . . . ), can contribute to the construction of complex determiners (*some but not all*), or clearly introduce some particular semantic content.[22] Even the definite determiner *the* introduces some kind of familiarity or uniqueness requirement. Significantly, perhaps, *a/an*

[22]So, for example, *some* often contributes a derogatory flavour (compare *Some student wants to see you.* with *A student wants to see you.*), or conveys that the precise identity of the individual picked out is somehow important, which accounts for the contrast in *Oh look! There's a/#some fly in my soup!* (cf. Farkas, 2002).

has none of these properties: it cannot be modified or conjoined – arguably it is unique in contributing no constraints on the variable it introduces (e.g. Farkas, 2002), which is why it is so open to unselective binding by adverbs like *usually*, and can take on generic interpretations, as in *a lion is a carnivore*. If all other determiners have PRED values, then the following would be an alternative to (73) (the difference is just in the constraints on NP):

(85)
$$\begin{array}{lccc} \text{NP} & \rightarrow & \widehat{\text{A}} & \text{NP} \\ & & \downarrow\in(\uparrow\textsc{adj}) & \uparrow=\downarrow \\ & & \downarrow(\textsc{adj}\in)^{+}\ \textsc{type} =_c \textit{deg} & \downarrow\textsc{spec} \\ & & & \neg\,(\downarrow\textsc{spec pred}) \end{array}$$

Here the existential constraint (↓SPEC) is required to exclude bare noun phrases like **too hot coffee*, **too rude remarks* (which lack a SPEC); *a/an* would have to be lexically specified as contributing a SPEC value, but no PRED value.

Of course, a further possibility is that *a/an does* have a PRED value, then the constraint is simple and we can write (86):[23]

(86)
$$\begin{array}{lccc} \text{NP} & \rightarrow & \widehat{\text{A}} & \text{NP} \\ & & \downarrow\in(\uparrow\textsc{adj}) & \uparrow=\downarrow \\ & & \downarrow(\textsc{adj}\in)^{+}\ \textsc{type} =_c \textit{deg} & (\downarrow\textsc{spec pred fn}) =_c \text{'a'} \end{array}$$

It is not obvious that either of these approaches is superior to that described in Section 4.

One further possibility is that instead of trying to express the constraint in terms of features, we should simply require that the string contain the lexical item *a/an* after the BM adjective.[24] This would be equivalent to what we have for simple cases, but it would require some kind of matching constraint on the conjuncts in order to ensure we do not produce examples like *too honest [a man and a lawyer]*, and do not produce examples like *too honest [a man and no lawyer]* (cf (80) and (81) above). It also makes a different prediction about the grammatical role of *a/an*. According to the account in Section 4, the lower NP must be DEF –, that is, it must have the indefinite article as its determiner. This constraint is satisfied in the NP in (87a), but not that in (87b). Both contain *a/an* in the right string position, but in (87b) the indefinite article is not the determiner of the NP, but of the *specifier* of the NP, cf the structure in (87c).

(87) a. a famous wine
b. a famous vineyard's wine
c. [a famous vineyard]'s wine

A string-based account would predict each would be equally able to participate in the BMC, the account in Section 4 predicts that while (87a) should, (87b) should not.

The kind of data one would need to decide this would be as in (88): on the

[23] One often sees this sort of constraint written more briefly as SPEC $=_c$ 'a'. We assume this is an abbreviation, and that the values of SPEC are not semantic forms, as this would suggest.

[24] We are grateful to Ron Kaplan for suggesting that we consider this approach.

string-based account (88b) would allowed, on our account above it would not.

(88) a. as delicately flavoured a famous wine
b. ?as delicately flavoured [a famous vineyard]'s wine

While we are content that (88b) is less than wonderful, this might be for other reasons – it would be nice to have more decisive data.[25]

In Section 4 we have provided what we believe to be the most descriptively complete account of the BMC and related pre-nominal constructions involving Degree words that is currently available. We have done this using standard LFG apparatus. Of course, we have provided nothing whatsoever in the way of *explanation* – no account of *why* these particular words appear in this construction under these circumstances. However, we believe precise and complete description such as this is a necessary pre-requisite of explanation.

## References

Arnold, Doug and Sadler, Louisa. 2013. Displaced Dependent Constructions. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG '13 Conference*, pages 48–68, Stanford, Ca.: CSLI Publications.

Berman, Arlene. 1974. *Adjectives and Adjective Complement Constructions in English*. PhD thesis, Dept of Linguistics, Harvard University, also published as Report NSF-29.

Bolinger, Dwight. 1972. *Degree words*. The Hague: Mouton.

Bresnan, Joan. 1973. Syntax of the comparative clause construction in English. *Linguistic Inquiry* 4(2), 275–343.

Corver, Norbert. 1997. Much-Support as a Last Resort. *Linguistic Inquiry* 28(1), 119–164.

Dalrymple, Mary. 2001. *Lexical Functional Grammar*, volume 34 of *Syntax and Semantics*. New York: Academic Press.

de Moennink, Inge. 1996. A first approach to the mobility of noun phrase constituents. In Carol E Percy, Charles F Meyer and Ian Lancashire (eds.), *Synchronous Corpus Linguistics: Papers from the Sixteenth International Conference on English Language Research on Computerized Corpora (ICAME 16)*, pages 143–158, Rodopi.

Duncan, Lachlan. 2007. Analytic Noun Incorporation in Chuj and K'Ichee' Mayan. In Miriam Butt and Tracy Holloway King (eds.), *The Proceedings of the LFG '07 Conference*, pages 163–183, Stanford, Ca.: CSLI Publications.

Farkas, Donka. 2002. Varieties of Indefinites. In Brendan Jackson (ed.), *Proceedings of SALT 12*, Ithaca, NY: Cornell University.

Ginzburg, Jonathan and Sag, Ivan A. 2001. *Interrogative Investigations: the form, meaning, and use of English Interrogatives*. Stanford, Ca.: CSLI Publications.

[25]There is a potential source of confounds here: there are examples which are superficially like (88b) which are perfectly fine, e.g. *as expensive a children's coat*, however this does not have the structure that is relevant here: the specifier here is not **a children*, rather the structure involves the compound noun *children's coat* (a kind of coat), and the determiner is *a/an*. The fact that an example like this can appear in the BMC does not provide evidence either way.

Haumann, Dagmar. 2004. Degree Phrases versus Quantifier Phrases in prenominal and preverbal positions. In Jennifer R. Austin, Stefan Engelberg and Gisa Rauh (eds.), *Adverbials : the Interplay Between Meaning, Context, and Syntactic Structure*, volume 70 of *Linguistik aktuell*, pages 167–203, Amsterdam: John Benjamins.

Huddleston, Rodney and Pullum, Geoffrey K (eds.). 2002. *The Cambridge grammar of the English language*. Cambridge: Cambridge University Press.

Jespersen, Otto. 1987. *Essentials of English Grammar: 25th impression*. Routledge.

Kay, Paul and Sag, Ivan A. 2012. Cleaning Up the Big Mess: Discontinuous Dependencies and Complex Determiners. In Hans C. Boas and Ivan A. Sag (eds.), *Sign-based Construction Grammar*, CSLI Lecture Notes, No. 193, pages 229–256, CSLI Publications.

Kennedy, Christopher and Merchant, Jason. 2000. Attributive Comparative Deletion. *Natural Language and Linguistic Theory* 18, 89–146.

Kim, Jong-Bok and Kim, Kyeongmin. 2009. A functor treatment of *such*: A corpus-based approach. *Korean Journal of Linguistics* 33(4), 853–70.

Kim, Jong-Bok and Sells, Peter. 2011. The Big Mess Construction: Interactions between the Lexicon and Constructions. *English Language and Linguistics* 15, 335–362.

Matushansky, Ora. 2002. *Movement of Degree/Degree of Movement*. PhD thesis, MIT, Cambridge, Mass., MIT Disserations in Linguistics, MATU01.

Rissanen, Matti. 1999. Syntax. In Roger Lass (ed.), *The Cambridge History of the English language*, volume 3, 1476-1776, pages 187–331, Cambridge: Cambridge University Press.

Sag, Ivan A. 2012. Sign-Based Construction Grammar: An Informal Synopsis. In Hans C. Boas and Ivan A. Sag (eds.), *Sign-based Construction Grammar*, CSLI Lecture Notes, No. 193, pages 69–202, CSLI Publications.

Spencer, Andrew. 2005. Case in Hindi. In Miriam Butt and Tracy Holloway King (eds.), *The Proceedings of LFG '05 Conference*, pages 429–446, Stanford, Ca.: CSLI Publications.

Toivonen, Ida. 2003. *Non-Projecting Words. A Case Study of Swedish Particles*. Dordrecht: Kluwer.

Troseth, Erika. 2009. Degree inversion and negative intensifier inversion in the English DP. *The Linguistic Review* 26(1), 37–65.

Van Eynde, Frank. 2007. The Big Mess Construction. In Stefan Müller (ed.), *Proceedings of the 14th International Conference on Head-Driven Phrase Structure Grammar*, pages 415–433, Stanford, Ca.: CSLI Publications.

Wood, Johanna and Vikner, Sten. 2011. Noun phrase structure and movement: A cross-linguistic comparison of *such/sådan/solch* and *so/så/so*. In Petra Sleeman and Harry Perridon (eds.), *The noun phrase in Romance and Germanic: Structure, variation, and change*, pages 89–110, Amsterdam: John Benjamins.

# MEANING AND VALENCY

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**Abstract**

We draw together ideas from a number of certain recent proposals in the LFG literature for the encoding of lexical information and the sharing of this information across valencies in a generalized fashion. This forms the beginnings of a theory of the representation and specification of information that sits at the lexicon–syntax–semantics interface. Our formal ingredients are: 1. Templates; 2. Aspects of the regular language of f-descriptions, particularly optionality; 3. Resource-sensitive semantic composition, as captured by Glue Semantics. We provide analyses of passives, cognate objects and benefactives, and demonstrate that the analyses of these phenomena interact properly. We derive a system in which composition is flexible and meaning emerges from the properly constrained interaction of a variety of contributors.

# 1 Introduction

There have been certain recent proposals in the LFG literature (Dalrymple et al. 2004, Asudeh et al. 2008, 2013, Asudeh and Giorgolo 2012) for the encoding of lexical information and the sharing of this information across valencies in a generalized fashion — including, in some cases, 'constructions'.[1] The first main aim of this paper is to make an initial attempt at drawing these proposals together in a consistent way. The second main aim is programmatic: we put this approach forward as the beginning of a theory of the representation and specification of information that sits at the lexicon–syntax–semantics interface. The main intuition behind our approach is similar to the intuition that the lexicon is a "web of meaning", which is in the spirit of some independent proposals (Asher 2011). More particularly, we take a perspective that meaning *emerges* from the interaction of lexically and configurationally triggered components: all and only the possible meanings are selected, depending on the grammatical context.

We focus particularly on the following issues:[2]

1. **The representation of core semantic information, such that the same lexical entry can be involved in a number of valency realizations:** For example, the verb *eat* can be used transitively, intransitively and in the "*way*-construction", but it has a stable meaning across these uses.

   (1) The hamster ate a sheet of newspaper this morning.

   (2) The hamster ate this morning.

   (3) The hamster ate its way through a sheet of newspaper this morning.

   These examples involve different surface realizations and have distinct overall interpretations, but they all involve an eating event, with the hamster as the agent/eater.

2. **The representation of missing/understood arguments:** For example, the patient of intransitive *eat* in (2) is unrealized, but still understood: The hamster ate *something* this morning. Moreover, there are implicit limits on *what* the hamster is understood to have eaten (hamster food, not newspapers). Another example of this is the understood argument in a short passive.

3. **The representation of additional/derived arguments:** For example, the verb *laugh* does not normally take an object, but it can take a *cognate object*:

   (4) *The performer laughed the children.

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[1] We intend this term only pretheoretically and do not commit to Construction Grammar.

[2] The editors point out that some of these ideas are similar in spirit to Rappaport Hovav and Levin's (1998) notion of *Template Augmentation*. We have not had the opportunity to explore this connection carefully.

(5) The performer laughed a funny laugh.

4. **The possibility of associating meanings with syntactic configurations:** For example, certain verbs that do not inherently have a benefactive reading can receive one if they occur in a double object structure:

   (6) The performer sang the children a song.

   Similarly, Asudeh et al. (2013) argue that the Swedish "Directed Motion Construction" (Toivonen 2002) involves association of a meaning similar to that of the English *way*-construction with a specific phrase structure configuration.

5. **Templates as generalizations over lexically encoded meaning:** Commonalities across lexical entries can be factored out and stated once only. For example, *eat* and *kick* are both AGENT-PATIENT verbs, but differ in other aspects of their semantics; this is reflected by some shared template calls and some distinct calls. The same technique can capture similarities between verb types like *eat* and *devour* that share core meaning but display distinct valency options.

6. **Templates as the locus of specification of meanings which can be associated with lexical entries or c-structure rules:** A single abstract meaning can be stated for, e.g. *benefactive*, which could be associated with a lexical entry, e.g. *give*, or with a syntactic configuration, such as the double object structure. It then becomes an empirical question which approach gives the more parsimonious description or explanation, but it is not necessary to dispense with the distinction between lexicon and syntax.[3]

Our formal ingredients are the following:

1. Templates (Dalrymple et al. 2004, Asudeh et al. 2008, 2013, Asudeh and Toivonen 2014)
2. Aspects of the regular language of f-descriptions, particularly optionality (Kaplan and Bresnan 1982, Kaplan 1989)
3. Resource-sensitive semantic composition, as captured by Glue Semantics (Dalrymple 1999, 2001, Asudeh 2012)

The following schematic lexical entry for *ate* illustrates the above:

(7) *ate* V $(\uparrow \text{PRED}) = \text{‘eat’}$
$(\ @\text{AGENT-PATIENT}\ )$
$(\ @\text{UNDERSTOODOBJECT}\ )$
$\lambda e.eat(e) : (\uparrow_\sigma \text{EVENT}) \multimap \uparrow_\sigma$

The only obligatory meaning constructor is the constructor that specifies the core meaning. The meaning templates AGENT-PATIENT and UNDERSTOODOBJECT, which contribute further meaning constructors, are optional. Our use of optional semantic resources is different from an approach that simply lists alternative lexical entries for each use of the verb. The resource sensitivity of Glue Semantics provides further constraints on well-formedness and ensures that the options are selected appropriately (Asudeh and Giorgolo 2012). Resource sensitivity ensures that: 1. neither optional meaning template can be selected for a *way*-construction example like (3); 2. only the AGENT-PATIENT template is additionally possible for a transitive example like (1); 3. both optional templates are required for a syntactically intransitive example like (2).

In general, templates for optional semantic resources will be functions that work on the core semantic resource by adding to its valency appropriately. For example, fundamental valency templates such as

[3] We envisage that this would vitiate the need for lexical rules as an added mechanism, but we have not explored this systematically. Some relevant discussion can be found in Asudeh and Toivonen (2014).

AGENT-PATIENT add the basic argument structure. In the case of missing arguments, the template will modify the basic argument structure from a binary relation to a unary predicate, existentially binding the object argument. In contrast, in a case like (5), the optional resource specified for *laughed* should change the type of the core semantic resource by adding an argument, possibly a dummy one, but also checking for specific semantic properties of the cognate object (e.g. the added argument must be something that is a kind of laugh).

Our main proposals/claims are as follows:

1. Lexical entries for predicates generally contain no specific information except:
   (a) A stripped down PRED value, which now serves only as a label and ensures f-structural uniqueness (Dalrymple 2001, Asudeh 2012).[4]
   (b) A predicate over events that provides the fundamental meaning, which is optionally augmented by a-structure templates, and possibly other optional templates, and which interacts with templates triggered by c-structure configurations ('constructions').
   (c) At least in some cases, information about selectional restrictions.
2. Composition is *flexible*: the relation between syntax and semantics is not total and one-to-one, but rather partial and one-to-many. A single terminal node (i.e., lexical entry) can contribute multiple meaning constructors or possibly none (e.g., expletives).
3. Meaning is *emergent*: the possible interpretations for an expression are fully determined by the information in the terminal nodes and the syntactic structure, thus maintaining compositionality and ensuring that all syntactic structures produced by the grammar are interpreted, but the meanings arise from an interaction of a set of meaning constructors whose cardinality is possibly larger than that of the set of terminal nodes.

The overall system brings a constraint-based ethos to semantic composition and the lexicon–syntax–semantics interface, as in Minimal Recursion Semantics (Copestake et al. 2005) and certain other approaches, but without giving up the type-logical approach to composition as founded on functional application.

## 2 Data/Phenomena

We restrict ourselves to three empirical phenomena and their interactions, all exemplified by data from English:

1. Passives
   (a) Short passive
      (8) Kim was crushed last night.
   (b) Passive with *by*-phrase
      (9) Kim was crushed by Godzilla last night.
2. Cognate objects
   (10) Kim laughed a crazy laugh.
3. Benefactives
   (a) Double object benefactive

[4] Even the latter function would seem to be covered by resource sensitivity in Glue Semantics, but we will not comment further here, as the nature of PRED values is not our primary focus. See Asudeh (2012) for some initial discussion.

(11) Kim drew Sandy Godzilla.

(b) *For*-benefactive

(12) Kim drew Godzilla for Sandy.

4. Interactions

(a) Double object benefactive with cognate object

(13) The performer sang the children a song.

(14) *The clown laughed the children a crazy laugh.

(b) Double object benefactive with cognate object and short passive

(15) The children were sung a song.

(16) *The children were laughed a laugh.

The analysis of the passive is essentially that of Asudeh and Giorgolo (2012), but updated in light of the mapping theory of Findlay (2014). The analysis of benefactives is based on Toivonen (2013) and Findlay (2014), which in turn builds on unpublished work by Asudeh (2013).

# 3 Theoretical and Formal Ingredients

## 3.1 Derived Arguments

The distinction between arguments and adjuncts is vital in linguistic theory, but sometimes a phrase displays mixed argument/adjunct characteristics, behaving in some ways as an argument and in other ways as an adjunct. Examples from the literature include: the passive *by*-phrase (Cook 2006, Grimshaw 1990), possessive phrases in event nominals (Grimshaw 1990), benefactives (*for*-PPs), displaced themes (*with*-PPs; Lewis 2004), instruments (Donohue and Donohue 2004, Koenig et al. 2003, Van Valin and LaPolla 1997, Schütze 1995), experiencer PPs (Asudeh and Toivonen 2007, 2012, Bosse et al. 2012), directionals (Needham and Toivonen 2011, van Luven 2014), result XPs (Christie 2013). Needham and Toivonen (2011) treat such 'in-between cases' as *derived* arguments; that is, arguments added to the basic argument frame of a verb. We will find it useful to appeal to the notion of derived arguments below.

## 3.2 Templates

A template in LFG is just a named lexical description: templates contain all and only the sort of information that is encoded in LFG f-descriptions. Templates were introduced as part of the XLE (Crouch et al. 2011) for implementation of LFG grammars, but have since made their way into the theoretical LFG literature (Dalrymple et al. 2004, Asudeh et al. 2008, 2013, Asudeh 2012, Asudeh and Toivonen 2014). The rest of this section introduces templates, following the exposition of Asudeh and Toivonen (2014).

The following is an agreement template for third singular subject agreement, 3SG:

(17) 3SG =
$(\uparrow \text{SUBJ NUM}) = 3$
$(\uparrow \text{SUBJ PERS}) = \text{SG}$

The template 3SG is simply equal to the f-description on the right side of the equality in (17). The semantics of template invocation (written @TEMPLATE) is thus just substitution. It follows, then, templates do not increase the expressive power of LFG grammars. However, they do allow certain generalizations about common uses of linguistic information to be captured in ways that the extensionally equivalent non-templatic grammar would not.

The use of the agreement template 3SG is illustrated in the following partial lexical entries for the intransitive verbs *laughs* and *laugh*:

(18) a. *laughs* V $(\uparrow \text{PRED}) = \text{`laugh}\langle\text{SUBJ}\rangle\text{'}$
$(\uparrow \text{TENSE}) = \text{PRESENT}$
@3SG

b. *laugh* V $(\uparrow \text{PRED}) = \text{`laugh}\langle\text{SUBJ}\rangle\text{'}$
$\{ (\uparrow \text{TENSE}) = \text{PRESENT}$
$\neg$@3SG |
$\neg(\uparrow \text{TENSE}) \}$

The disjunction in the lexical entry for *laugh* states that it is either a present tense verb, but not in the third person singular, or else not a tensed verb (as in, e.g., *It is fun to laugh.*)

It is possible to further generalize these lexical entries, using more templates. The following lexical entries have abstracted all non-idiosyncratic information away into templates:[5]

(19) a. *laughs* V @INTRANSITIVE(laugh)
@TENSE(PRESENT)
@3SG

b. *laugh* V @INTRANSITIVE(laugh)
@BAREV

The templates INTRANSITIVE and BAREV can be defined as follows:

(20) INTRANSITIVE(X) =
$(\uparrow \text{PRED}) = \text{`X}\langle\text{SUBJ}\rangle\text{'}$

(21) BAREV =
{ @TENSE(PRESENT)
$\neg$@3SG |
$\neg(\uparrow \text{TENSE}) \}$

The INTRANSITIVE template illustrates that templates can take arguments. In this case, it is the PRED function that is the argument of the template, e.g. laugh in (19). These templates — TENSE, INTRANSITIVE, BAREV, 3SG — thus capture cross-cutting generalizations about *laugh*, *laughs*, and other elements of the lexicon, as follows (Asudeh and Toivonen 2014):

1. The argument to the template TENSE, which is also invoked by BAREV, captures that *laughs* is necessarily present tense and that *laugh* can be present tense (unless it is a bare verb).

2. The argument to INTRANSITIVE captures the fact that *laugh* and *laughs* are instances of the same lemma, while the template itself relates these verbs to other intransitive verbs, which would also invoke this template.

3. Similarly, the template BAREV captures the relationship between *laugh* and other uninflected regular verbs. Lastly, the negated invocation of 3SG within BAREV captures the fact that no uninflected regular verbs in English are third person singular.

Asudeh et al. (2008, 2013) discuss how templates can generalize not just across lexical items, but also across lexical items and phrase-structural configurations, thus capturing constructional effects, but without admitting into the theory constructions as specific theoretical constructs, in contrast to Construction Grammar (e.g., Goldberg 1995). Asudeh and Toivonen (2014) illustrate the point with English restrictive relatives, which have elsewhere indeed been analyzed as constructions (Sag 1997). Consider the reduced relative (22a) and its counterpart with a relative pronoun (22b).

[5] We have not taken morphology into account here, but we assume that templates for morphologically complex words like *laughs* are in fact contributed appropriately by their parts. This could be formally captured and implemented in a framework like that of Beesley and Karttunen (2003).

(22) a. *the book Kim read*

b. *the book which Kim read*

The relevant point here is that English relative clauses can contain a relative pronoun, but do not necessarily have to.

Asudeh and Toivonen (2014) propose the template REL in (23), building on work by Dalrymple (2001).

(23) REL = $\lambda Q.\lambda P.\lambda x.P(x) \wedge Q(x) : clause \multimap nominal \multimap nominal$

This template expresses the compositional semantics of restrictive relativization, using Glue Semantics. This demonstrates that templates can also capture semantic information, which we will put to use below. The Glue logic term has been abbreviated to $clause \multimap nominal \multimap nominal$, which captures the fact that relativization is a modification of a nominal by an open clause; see Dalrymple (2001: 417) for the full term. In the meaning language side, this is intersective modification of the nominal predicate by the relative clause predicate.

The template REL can be associated with a relative pronoun, as in (24), or with a node in a c-structure rule, as in (25), since c-structure rules in LFG are annotated with the same sorts of descriptions that occur in LFG lexical entries.

(24) *which* D @REL

(25) $\text{CP} \rightarrow \begin{pmatrix} \text{RelP} \\ \ldots \end{pmatrix} \quad \begin{matrix} \text{C}' \\ (\ @\text{REL}\ ) \end{matrix}$

In the c-structure rule above, RelP is the relative pronoun (or, more accurately, the phrase containing the relative pronoun, to allow for pied-piping), which is optional, as exemplified in (22a) above. If the RelP is present, it contributes the @REL meaning constructor. Otherwise, the very same information is directly contributed by the C′ node in the c-structure rule. The @REL template thus generalizes the same information across relative pronouns and bare relatives.

### 3.3 Flexible Composition

Asudeh and Giorgolo (2012) assume a version of LFG's Correspondence Architecture (Kaplan 1987, 1989) in which argument structure (a-structure) is captured in a new connected level of semantic structure (s-structure). Some of the benefits of this approach are as follows:

1. A simplified architecture is achieved, which eliminates a separate a-structure projection, without losing information
2. Linking relations can be preserved and they are still post-constituent structure, as required for empirical reasons (Butt 1995, Butt et al. 1997).
3. Many of the meaning constructors for semantic composition are more elegant and simplified.
4. The simple, traditional $\phi$ mapping from c-structure to f-structure is regained.
5. Semantic structure is a true, connected structure, in contrast to the unconnected s-structures which serve only to enable proofs in Glue Semantics (Dalrymple 1999, 2001, Asudeh 2012, among others).

Figure 1 shows relevant structures and correspondences from Asudeh and Giorgolo (2012). They assume an event semantics for the meaning language, such that thematic roles are functions from events to individuals (Parsons 1990), so avoid redundancy in the argument structure by using attributes like $\text{ARG}_1$ instead of AGENT, etc.

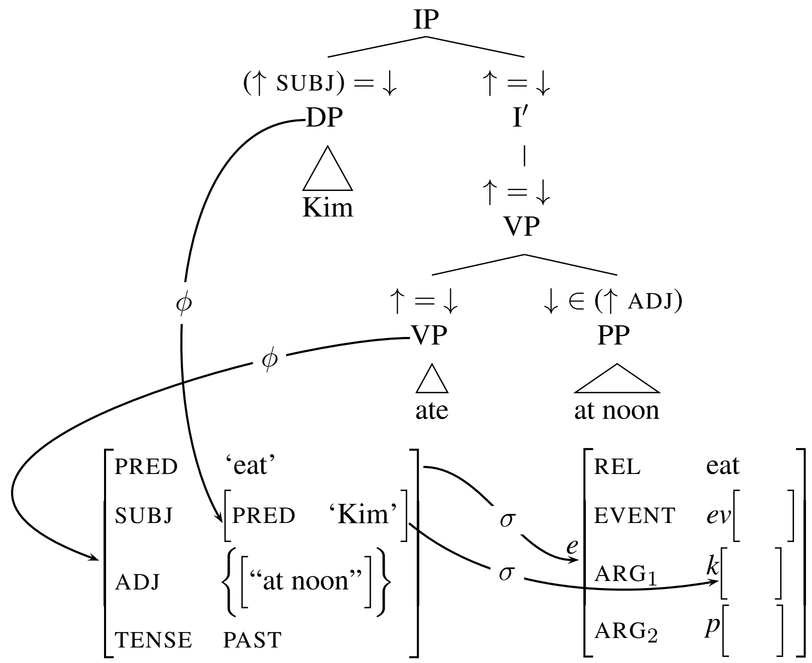


Figure 1: *Kim ate at noon.*

### 3.4 Kibort-Findlay Lexical Mapping Theory

The lexical entries and templates in Asudeh and Giorgolo (2012) stipulated equations for *argument realization* (Levin and Rappaport-Hovav 2005), also known as *linking* or *mapping*. For example, the last line in the following lexical entry specifies that $(\uparrow \text{OBJ})_\sigma = (\uparrow_\sigma \text{ARG}_2)$, i.e. the object maps to $\text{ARG}_2$ at semantic structure.

(26) *devoured* V $(\uparrow \text{PRED}) = \text{‘devour’}$
$(\uparrow \text{TENSE}) = \text{PAST}$
$\vdots$ $(\uparrow \text{OBJ})_\sigma = (\uparrow_\sigma \text{ARG}_2)$

Ideally, we would like such equations to be derived from some version of Lexical Mapping Theory (Bresnan and Kanerva 1989, Alsina 1996, among others).

This has been addressed in recent unpublished work by Jamie Findlay (Findlay 2014), which presents a formalization of Anna Kibort's version of LMT (Kibort 2001, 2007, 2008, 2013a,b) in the context of the formalization of argument structure in Asudeh and Giorgolo. In Kibort's mapping theory ($\text{LMT}_\text{K}$), the grammatical function hierarchy in (27) is assumed to map to argument position in the universally available subcategorization frame in (28) (Kibort 2001, 2007, 2008).

(27) $\text{SUBJ} > \text{OBJ}, \text{OBL}_\theta > \text{OBJ}_\theta$

(28) $$\begin{array}{lcccccl} \langle & \text{arg}_1 & \text{arg}_2 & \text{arg}_3 & \text{arg}_4 & \ldots\ \text{arg}_n & \rangle \\ & [-o] & [-r] & [+o] & [-o] & [-o] & \end{array}$$

The positions in the universal phrase are intrinsically associated with LMT feature specifications, where we have the standard LMT features $r$ for *restrictive* and $o$ for *objective*.

Predicates do not have to select a contiguous series of arguments (Kibort 2001, 2007, 2008), as exemplified by the following frame for *put*:

(29) $$\begin{array}{lcccl} \textit{put}\ \langle & \text{arg}_1 & \text{arg}_2 & \text{arg}_4 & \rangle \\ & [-o] & [-r] & [-o] & \end{array}$$

It should thus be stressed that Kibort uses these underspecified argument labels in a different way than Asudeh and Giorgolo: for Kibort, the argument labels correspond to underspecified LMT features, $r$ and $o$.

In Findlay's version of LMT, which builds on Kibort's theory and which we'll designate as $\text{LMT}_{\text{KF}}$, the [±r] and [±o] feature specifications are defined as features (Findlay 2014):

(30) $\quad \text{MINUSR} \equiv \{\text{SUBJ}|\text{OBJ}\}$ $\quad [-r]$

(31) $\quad \text{MINUSO} \equiv \{\text{SUBJ}|\text{OBL}_\theta\}$ $\quad [-o]$

(32) $\quad \text{PLUSR} \equiv \{\text{OBL}_\theta|\text{OBJ}_\theta\}$ $\quad [+r]$

(33) $\quad \text{PLUSO} \equiv \{\text{OBJ}|\text{OBJ}_\theta\}$ $\quad [+o]$

The universally available subcategorization frame is accordingly revised as follows (Findlay 2014):

(34)
$$\left\langle \begin{array}{cccc} \text{ARG}_1 & \text{ARG}_2 & \text{ARG}_3 & \text{ARG}_4 \\ \text{MINUSO} & \text{MINUSR} & \text{PLUSO} & \text{MINUSO} \end{array} \right\rangle$$

Findlay (2014: 25) assumes that only $\text{ARG}_{1...4}$ are core arguments and that all other arguments are *derived arguments* (Needham and Toivonen 2011), in the sense sketched in section 3.1.

Findlay (2014) recasts (34) in terms of the approach to a-structure of Asudeh and Giorgolo (2012):

(35) $\quad (\uparrow \text{MINUSO})_\sigma = (\uparrow_\sigma \text{ARG}_1)$

(36) $\quad (\uparrow \text{MINUSR})_\sigma = (\uparrow_\sigma \text{ARG}_2)$

(37) $\quad (\uparrow \text{PLUSO})_\sigma = (\uparrow_\sigma \text{ARG}_3)$

(38) $\quad (\uparrow \text{MINUSO})_\sigma = (\uparrow_\sigma \text{ARG}_4)$

These mapping equations need to be optional, in order to capture the fact that certain arguments may actually be unrealized; for example, optional objects of verbs like *eat* or the logical subject in short passives.

However, pure optionality is insufficient, as we need the relevant argument to map appropriately if it actually is realized. We therefore need disjunctions that state that an argument is mapped appropriately *unless* it is unrealized, e.g.:[6]

(39) $\quad \{\ (\uparrow \text{MINUSO})_\sigma = (\uparrow_\sigma \text{ARG}_1) \mid (\uparrow_\sigma \text{ARG}_1)_{\sigma^{-1}} = \varnothing\ \}$

We can define templates to capture the disjuncts in (39) (Findlay 2014).

(40) $\quad \text{MAP(F,A)} =$
$\quad (\uparrow \text{F})_\sigma = (\uparrow_\sigma \text{A})$

(41) $\quad \text{NOMAP(A)} =$
$\quad (\uparrow_\sigma \text{A})_{\sigma^{-1}} = \varnothing$

The template MAP maps a grammatical function to a-structure, as in the left disjunct of (39). The template NOMAP states that a given argument in argument structure is not mapped from anything in f-structure, as in the right disjunct of (39).

The $\text{LMT}_{\text{KF}}$ templates for universal mapping principles are then as follows (Findlay 2014):

(42) $\quad \text{ARG1} =$
$\quad \{\ @\text{MAP}(\text{MINUSO},\text{ARG}_1) \mid @\text{NOMAP}(\text{ARG}_1)\ \}$

[6]Our presentation of some details at this point diverges a little from the presentation in Findlay (2014), but essentially only notationally — the ideas are Findlay's.

(43) $\textsc{Arg2} =$
$\{\ @\textsc{Map}(\textsc{minusr},\textsc{arg}_2) \mid @\textsc{NoMap}(\textsc{arg}_2)\ \}$

(44) $\textsc{Arg3} =$
$\{\ @\textsc{Map}(\textsc{pluso},\textsc{arg}_3) \mid @\textsc{NoMap}(\textsc{arg}_3)\ \}$

(45) $\textsc{Arg4} =$
$\{\ @\textsc{Map}(\textsc{minuso},\textsc{arg}_4) \mid @\textsc{NoMap}(\textsc{arg}_4)\ \}$

The lexical entry for *devour* can now be rewritten in terms of $\text{LMT}_{\text{KF}}$ as follows:

(46) *devoured* V $(\uparrow \textsc{pred}) = \textsc{devour}$
$@\textsc{past}$
$@\textsc{Arg1}$
$@\textsc{Arg2}$
$\vdots$

Lastly, we add a template ADDMAP for monotonic addition of further mapping constraints, e.g. in passive.

(47) $\textsc{AddMap}(\text{F,A}) =$
$\{\ @\textsc{Map}(\text{F,A}) \mid @\textsc{NoMap}(\text{A})\ \}$

This template simply calls the MAP and NOMAP templates to add another mapping constraint.

# 4 Analysis

We now demonstrate how the theory works by providing analyses for the phenomena in section 2. We first specify the templates, which constitute the heart of the flexible composition approach (section 4.1). We then use these templates along with lexical and c-structure specifications to analyses passives (section 4.2), cognate objects (section 4.3), benefactives (section 4.4) and some interactions of these phenomena (section 4.5).

## 4.1 Templates

We first define templates for agent arguments and patient arguments:

(48) $\textsc{Agent} =$
$@\textsc{Arg1}$
$\lambda P \lambda x \lambda e. P(e) \wedge agent(e) = x :$
$[(\uparrow_\sigma \textsc{event}) \multimap \uparrow_\sigma] \multimap (\uparrow_\sigma \textsc{arg}_1) \multimap (\uparrow_\sigma \textsc{event}) \multimap \uparrow_\sigma$

(49) $\textsc{Patient} =$
$@\textsc{Arg2}$
$\lambda P \lambda x \lambda e. P(e) \wedge patient(e) = x :$
$[(\uparrow_\sigma \textsc{event}) \multimap \uparrow_\sigma] \multimap (\uparrow_\sigma \textsc{arg}_2) \multimap (\uparrow_\sigma \textsc{event}) \multimap \uparrow_\sigma$

Each of these templates has two parts. The first part is a call to the appropriate $\text{LMT}_{\text{KF}}$ mapping template. These ensure the correct correspondence between grammatical functions and arguments, as discussed in section 3.4. The second part of each template is a meaning constructor that modifies an event, adding an $agent$ or $patient$ argument.

The following template is defined in terms of these templates:

(50) $\textsc{Agent-Patient} =$
$@\textsc{Agent}$
$@\textsc{Patient}$

This template thus provides both the appropriate linking and interpretation for agent-patient verbs.

The template for passives is as follows:[7]

(51) $\textsc{Passive} =$
$(\uparrow \textsc{voice}) = \textsc{passive}$
$@\textsc{AddMap}(\textsc{plusr},\textsc{arg}_1)$
$(\ \lambda P \exists x.[P(x)] : [(\uparrow_\sigma \textsc{arg}_1) \multimap \uparrow_\sigma] \multimap \uparrow_\sigma\ )$

This template does two things. First, it uses the ADDMAP template from section 3.4 to add a further linking constraint, such that $\textsc{arg}_1$ is either a restricted grammatical function or else absent. The linking theory will ensure that if it is present it corresponds to the restricted function OBL. Second, the template provides an optional meaning constructor that must be selected for the short passive but cannot be selected if there is a *by*-phrase, due to the resource sensitivity of the Glue logic, as discussed by Asudeh and Giorgolo (2012).

The following template is used in cognate object cases:

(52) $\textsc{CognateObject}$
$\lambda x \lambda P \lambda e.P(e) \ \wedge \ x = \varepsilon(e) :$
$(\uparrow \textsc{obj})_\sigma \multimap [(\uparrow_\sigma \textsc{event}) \multimap \uparrow_\sigma] \multimap (\uparrow_\sigma \textsc{event}) \multimap \uparrow_\sigma$

The template provides the capacity to deal with an OBJ in the verb's f-structure, even if it would not normally be licensed by the verb. The fact that it must be a *cognate* object is captured by the meaning term. The function $\varepsilon$ embeds the type of events into the types of individuals, i.e. it maps each event to an individual that represents that event. Being an embedding, it is injective and can be made surjective (and therefore a bijection) by restricting its codomain to the image of the set of events under $\varepsilon$. Since $\varepsilon$ is a bijection, it means we also have an inverse mapping $\varepsilon^{-1}$ from individuals to events.

The following template handles double-object benefactives:[8]

(53) $\textsc{Benefactive} =$
$@\textsc{Arg3}$
$\lambda x \lambda y \lambda P \lambda e.P(y)(e) \ \wedge \ \mathit{beneficiary}(e) = x :$
$(\uparrow_\sigma \textsc{arg}_2) \multimap (\uparrow_\sigma \textsc{arg}_3) \multimap [(\uparrow_\sigma \textsc{arg}_2) \multimap (\uparrow_\sigma \textsc{event}) \multimap \uparrow_\sigma] \multimap (\uparrow_\sigma \textsc{event}) \multimap \uparrow_\sigma$

Independent linking constraints will ensure that there is a correspondence between the OBJ of the verb and its $\textsc{arg}_2$. The template also encodes a kind of formal trick: the dependency that the verb would have otherwise discharged in terms of $\textsc{arg}_2$ is now discharged instead in terms of the $\textsc{obj}_\theta$, which corresponds to $\textsc{arg}_3$

Lastly, the following template is used to provide tense and to existentially close the event variable:

(54) $\textsc{Past} =$
$(\uparrow \textsc{tense}) = \textsc{past}$
$\lambda P \exists e.[P(e) \ \wedge \ \mathit{past}(e)] :$
$[(\uparrow_\sigma \textsc{event}) \multimap \uparrow_\sigma] \multimap \uparrow_\sigma$

## 4.2 Passives

Let us consider the following two examples, respectively a short-passive and a *by*-passive:

(55) Kim was crushed last night.

(56) Kim was crushed by Godzilla last night.

The following lexical entry for *crushed* suffices for both examples:

[7] This template is adapted from Findlay (2014: 33).

[8] This template is from Findlay (2014: 37).

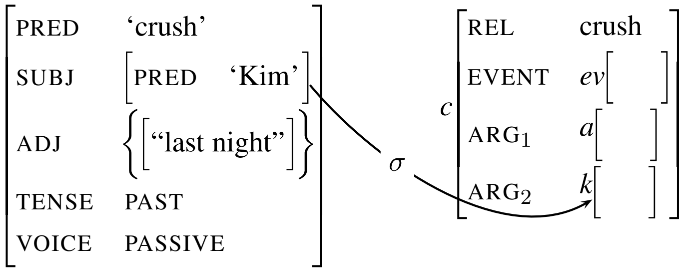


Figure 2: Relevant structures and correspondences for *Kim was eaten last night.*

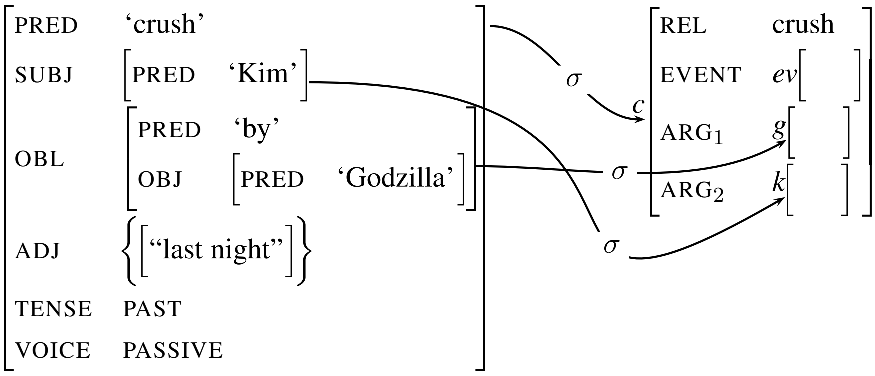


Figure 3: Relevant structures and correspondences for *Kim was crushed by Godzilla last night.*

(57) *crushed* V $(\uparrow \text{PRED}) = \text{'crush'}$
@AGENT-PATIENT
{ @PAST | @PASSIVE }
$\lambda e.crush(e) : (\uparrow_\sigma \text{ EVENT}) \multimap \uparrow_\sigma$

The verb calls the AGENT-PATIENT which provides its function-argument linking. The lexical entry also states that this morphological form of the verb is either a past tense verb or a passive participle, hence the disjunction on calls to the @PAST template and the PASSIVE template; it is the latter that is relevant here. Lastly, the verb provides its root meaning, a predicate on events. The relevant structures for this example are in Figure 2 and the Glue proof is in Figure 7 in the appendix.

The following lexical entry for *by* covers its use in the passive:

(58) *by* P $(\uparrow \text{PRED}) = \text{'by'}$
$((\text{OBL} \uparrow) \text{ VOICE}) =_c \text{PASSIVE}$
$(\uparrow \text{OBJ})_\sigma = ((\text{OBL} \uparrow)_\sigma \text{ ARG}_1)$
$\lambda x \lambda P.[P(x)] : (\uparrow_\sigma \text{ ARG}_1) \multimap [\uparrow_\sigma \multimap (\text{OBL} \uparrow)_\sigma] \multimap (\text{OBL} \uparrow)_\sigma$

The constraining equation for VOICE ensures that this *by* must occur with a passive participle. The third line maps the object of *by* to be the $\text{ARG}_1$ of the passive predicate. Lastly, the meaning constructor feeds the $\text{ARG}_1$ to the passive predicate as an argument. The relevant structures for this example are in Figure 3 and the Glue proof is in Figure 8 in the appendix.

## 4.3 Cognate Objects

We now turn to a cognate object example:

(59) Kim laughed a crazy laugh.

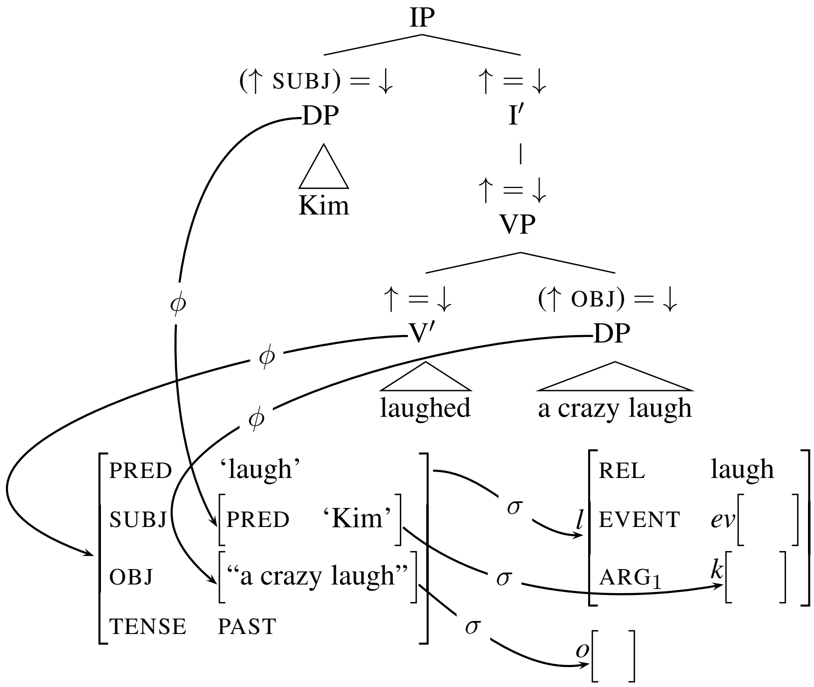


Figure 4: C-structure, f-structure, and semantic structure for *Kim laughed a crazy laugh*

The lexical entry for *laughed* is shown in (60).[9]

(60) *laughed* V
(↑ PRED) = ‘laugh’
@PAST
@AGENT
( @COGNATEOBJECT )
$\lambda e.laugh(e) : (\uparrow_\sigma \text{ EVENT}) \multimap \uparrow_\sigma$

The cognate object is not obligatory, so the call to the COGNATEOBJECT template is optional. This lexical entry is thus general and covers both intransitive and cognate object uses of *laughed*.

The structures for example (59) are in Figure 4. The cognate object is treated compositionally like an adjunct (Sailer 2010), since it does not map to an argument in semantic structure and composes as a modifier, but note that it is in fact an OBJ in f-structure. This accounts for the object-like syntactic behaviour of the cognate object (Jones 1988), without forcing us to treat it as an underlying argument or postulating a transitive version of *laugh*. The Glue proof for example (59) is shown in Figure 9 in the appendix, assuming other standard premises as appropriate and with premises instantiated as per Figure 4.

### 4.4 Benefactives

Next we consider the following two benefactive examples:

(61) Kim drew Godzilla for Sandy.

[9]Recall that wee assume that the predicate $laugh$, defined for events, is mirrored by a corresponding $laugh^\varepsilon$ predicate defined for individuals. In general we assume that there are lexical axioms linking intransitive verbs extensions and the extensions of their cognate objects. In the case of $laugh$ we assume the following axiom:

(i) $\forall e.laugh(e) \leftrightarrow laugh^\varepsilon(\varepsilon(e))$

Notice that this accounts for the redundancy of an expression such as *Kim laughed a laugh*, as the cognate object does not add anything to the truth conditions of the sentence.

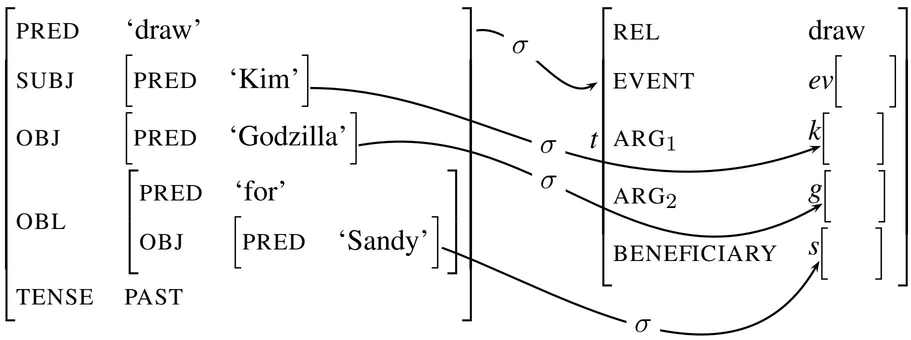

Figure 5: Relevant structures and correspondences for *Kim drew Godzilla for Sandy.*

(62) Kim drew Sandy Godzilla.

We assume the following lexical entry for *drew*:

(63) *drew* V
$(\uparrow \text{PRED}) = \text{`draw'}$
$@\textsc{Past}$
$@\textsc{Agent-Patient}$
$\lambda e.draw(e) : (\uparrow_\sigma \text{ EVENT}) \multimap \uparrow_\sigma$

The verb is just treated like a normal transitive and does not encode the benefactive in any way.

In the *for*-benefactive, (61), it is the preposition *for* that adds the benefactive meaning.

(64) *for* P
$(\uparrow \text{PRED}) = \text{`for'}$
$(\uparrow \text{OBJ})_\sigma = ((\text{OBL} \uparrow)_\sigma \text{ BENEFICIARY})$
$\lambda y \lambda P \lambda e.[P(e) \wedge beneficiary(e) = y] :$
$(\uparrow_\sigma \text{ BENEFICIARY}) \multimap$
$[((\text{OBL} \uparrow)_\sigma \text{ EVENT}) \multimap (\text{OBL} \uparrow)_\sigma] \multimap$
$((\text{OBL} \uparrow)_\sigma \text{ EVENT}) \multimap (\text{OBL} \uparrow)_\sigma$

The preposition *for*, in this use, maps the OBJ of the predicate it modifies to a designated role BENEFICIARY in semantic structure (see the treatment of instrumental *with*-phrases in Asudeh and Giorgolo 2012). The relevant structures for example (61) are in Figure 5 and the Glue proof is in Figure 10 in the appendix.

For the double-object benefactive, (62), it is the configuration itself that encodes the benefactive meaning, so we associate the c-structure rule for double-objects with the BENEFACTIVE template.

(65)
$$\text{V}' \rightarrow \begin{array}{c} \text{V} \\ \uparrow = \downarrow \\ (\ @\textsc{Benefactive}\ ) \end{array} \quad \begin{array}{c} \text{DP} \\ (\uparrow \text{OBJ}) = \downarrow \\ \ \end{array} \quad \begin{array}{c} \text{DP} \\ (\uparrow \text{OBJ}_\theta) = \downarrow \\ \ \end{array}$$

The call to BENEFACTIVE is optional, such that the double-object rule is general and can also apply to non-benefactive cases. However, if a non-ditransitive verb occurs in the c-structures described by this rule, BENEFACTIVE must be selected in order for the meanings of both objects to be properly integrated, given the resource sensitivity of the Glue logic. The relevant structures for example (62) are in Figure 6 and the Glue proof is in Figure 11 in the appendix.

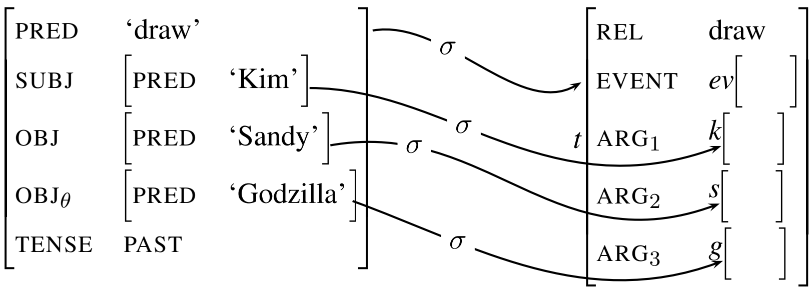


Figure 6: Relevant structures and correspondences for *Kim drew Sandy Godzilla.*

### 4.5 Interactions

We lastly consider interactions between the passive, cognate objects and the double-object benefactive, as demonstrated by the contrast between the grammatical *sing* examples in (66) and the ungrammatical *laugh* examples in (67):

(66) a. The performer sang the children a song.
b. The children were sung a song.

(67) a. *The clown laughed the children a laugh.
b. *The children were laughed a laugh.

These contrasts seem initially surprising, but fall into line if we assume that *laugh* is a true cognate object verb, whereas *sing* is just a transitive verb that allows its object to be dropped, much like *eat* (Asudeh and Giorgolo 2012).

There is independent evidence for this assumption. The verb *sing* allows its object to be an existential quantifier, but the verb *laugh* does not:

(68) Kim sang something.

(69) *Kim laughed something.

The well-formedness of (68) is explained if *sing* is an optional transitive. In that case, (68) in fact conveys exactly the same information as *Kim sang*, since the understood object of an optional transitive is existentially closed (Asudeh and Giorgolo 2012).

Further evidence comes from extraction, which can target the object of *sing* but not that of *laugh*:

(70) What did Kim claim Sandy sang?

(71) *What did Kim claim Sandy laughed?

This is again explained if *sang* is a transitive verb.

The lexical entries for *laughed* and *sang* are contrasted in (72), where the entry for *laughed* is the very same entry in (60) above.

(72)

| *laughed* V | *sang* V |
|---|---|
| ($\uparrow$ PRED) = 'laugh' | ($\uparrow$ PRED) = 'sing' |
| @PAST | @PAST |
| @AGENT | @AGENT |
| ( @COGNATEOBJECT ) | @PATIENT |
| $\lambda e.laugh(e) : (\uparrow_\sigma \text{EVENT}) \multimap \uparrow_\sigma$ | ( @UNDERSTOODOBJECT ) |
| | $\lambda e.sing(e) : (\uparrow_\sigma \text{EVENT}) \multimap \uparrow_\sigma$ |

Since *laugh* is a true cognate object verb, the templates COGNATEOBJECT and BENEFACTIVE both place a requirement on the cognate object, but there is only a single object (*a laugh*), so resource sensitivity blocks the derivation.

In contrast, since *sing* is a transitive verb it does not call the COGNATEOBJECT template and there is no conflict with the BENEFACTIVE template. The optionality of *sing*'s object argument is instead handled by the UNDERSTOODOBJECT template, which is the same template used for, e.g., the intransitive use of *eat* (Asudeh and Giorgolo 2012):

(73) UNDERSTOODOBJECT =
$\lambda P \exists x.[P(x)] : [(\uparrow_\sigma \text{ ARG}_2) \multimap \uparrow_\sigma] \multimap \uparrow_\sigma$

Thus the theory correctly predicts that an optional transitive like *sing* can occur in a double-object benefactive, as in (66a), and in the passivized version of the double-object benefactive, as in (66b), whereas a true cognate object verb like *laugh* cannot occur in either case, as shown in (67a) and (67b).

# 5 Conclusion

We have drawn together ideas from a number of recent proposals in the LFG literature for the encoding of lexical information and the sharing of this information across valencies in a generalized fashion. This can form the beginning of a theory of the representation and specification of information that sits at the lexicon–syntax–semantics interface. Our formal ingredients were the following: 1. Templates; 2. Aspects of the regular language of f-descriptions, particularly optionality; 3. Resource-sensitive semantic composition, as captured by Glue Semantics. We provided analyses of passives, cognate objects and benefactives, and demonstrated that the analyses of the various phenomena interact properly. We thus derive a system in which composition is flexible and meaning emerges from the properly constrained interaction of a variety of contributors.

# References


Alsina, Alex. 1996. *The Role of Argument Structure in Grammar*. Stanford, CA: CSLI Publications.

Asher, Nicholas. 2011. *Lexical Meaning in Context: A Web of Words*. Cambridge: Cambridge University Press.

Asudeh, Ash. 2012. *The Logic of Pronominal Resumption*. Oxford: Oxford University Press.

Asudeh, Ash. 2013. Flexible Compositon and the Argument/Adjunct Distinction in LFG+Glue, Part II, talk presented at the LLI Lab, Institute of Cognitive Science, Carleton University.

Asudeh, Ash, Dalrymple, Mary and Toivonen, Ida. 2008. Constructions with Lexical Integrity: Templates as the Lexicon-Syntax Interface. In Butt and King (2008), pages 68–88.

Asudeh, Ash, Dalrymple, Mary and Toivonen, Ida. 2013. Constructions with Lexical Integrity. *Journal of Language Modelling* 1(1), 1–54.

Asudeh, Ash and Giorgolo, Gianluca. 2012. Flexible Composition for Optional and Derived Arguments. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG12 Conference*, pages 64–84, Stanford, CA: CSLI Publications.

Asudeh, Ash and Toivonen, Ida. 2007. Copy Raising and Its Consequences for Perception Reports. In Annie Zaenen, Jane Simpson, Tracy Holloway King, Jane Grimshaw, Joan Maling and Christopher Manning (eds.), *Architectures, Rules, and Preferences: Variations on Themes by Joan Bresnan*, Stanford, CA: CSLI Publications.

Asudeh, Ash and Toivonen, Ida. 2012. Copy Raising and Perception. *Natural Language and Linguistic Theory* 30(2), 321–380.

Asudeh, Ash and Toivonen, Ida. 2014. With *Lexical Integrity*. *Theoretical Linguistics* 40(1–2), 175–186.

Beesley, Kenneth R. and Karttunen, Lauri. 2003. *Finite State Morphology*. Stanford, CA: CSLI Publications.

Bosse, Solveig, Bruening, Benjamin and (to appear), Masahiro Yamada. 2012. Affected experiencers. *Natural Language and Linguistic Theory* pages 1–35.

Bresnan, Joan and Kanerva, Jonni M. 1989. Locative Inversion in Chicheŵa: A Case Study of Factorization in Grammar. *Linguistic Inquiry* 20(1), 1–50.

Butt, Miriam. 1995. *The Structure of Complex Predicates in Urdu*. Stanford, CA: CSLI Publications.

Butt, Miriam, Dalrymple, Mary and Frank, Anette. 1997. An Architecture for Linking Theory in LFG. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG97 Conference*, Stanford, CA: CSLI Publications.

Butt, Miriam and King, Tracy Holloway (eds.). 2008. *Proceedings of the LFG08 Conference*. Stanford, CA: CSLI Publications.

Christie, Liz. 2013. Result XPs and the Argument-Adjunct Distinction. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG10 Conference*, pages 212–231, Stanford, CA: CSLI Publications.

Cook, Philippa. 2006. The German Infinitival Passive: a Case for Oblique Functional Controllers? In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG06 Conference*, pages On–line proceedings, Stanford, CA: CSLI Publications.

Copestake, Ann, Flickinger, Dan, Pollard, Carl and Sag, Ivan A. 2005. Minimal Recursion Semantics: An Introduction. *Research on Language and Computation* 3(4), 281–332.

Crouch, Richard, Dalrymple, Mary, Kaplan, Ronald M., King, Tracy, Maxwell, III, John T. and Newman, Paula. 2011. *XLE Documentation*. Palo Alto Research Center (PARC), Palo Alto, CA.

Dalrymple, Mary (ed.). 1999. *Semantics and Syntax in Lexical Functional Grammar: The Resource Logic Approach*. Cambridge, MA: MIT Press.

Dalrymple, Mary. 2001. *Lexical Functional Grammar*. San Diego, CA: Academic Press.

Dalrymple, Mary, Kaplan, Ronald M. and King, Tracy Holloway. 2004. Linguistic Generalizations over Descriptions. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG04 Conference*, pages 199–208, Stanford, CA: CSLI Publications.

Dalrymple, Mary, Kaplan, Ronald M., Maxwell III, John T. and Zaenen, Annie (eds.). 1995. *Formal Issues in Lexical-Functional Grammar*. Stanford, CA: CSLI Publications.

Donohue, Catherine and Donohue, Mark. 2004. On the Special Status of Instrumentals. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG04 Conference*, pages 209–225, Stanford, CA: CSLI Publications.

Findlay, Jamie. 2014. Mapping Theory without Argument Structure, ms., University of Oxford.

Goldberg, Adele E. 1995. *Constructions: A Construction Grammar Approach to Argument Structure*. Chicago: University of Chicago Press.

Grimshaw, Jane. 1990. *Argument Structure*. Cambridge, MA: MIT Press.

Jones, Michael Allan. 1988. Cognate Objects and the Case-Filter. *Journal of Linguistics* 24(1), 89–110.

Kaplan, Ronald M. 1987. Three Seductions of Computational Psycholinguistics. In Peter Whitelock, Mary McGee Wood, Harold L. Somers, Rod Johnson and Paul Bennett (eds.), *Linguistic Theory and Computer Applications*, pages 149–181, London: Academic Press, reprinted in Dalrymple et al. (1995: 339–367).

Kaplan, Ronald M. 1989. The Formal Architecture of Lexical-Functional Grammar. In Chu-Ren Huang and Keh-Jiann Chen (eds.), *Proceedings of ROCLING II*, pages 3–18, reprinted in Dalrymple et al. (1995: 7–27).

Kaplan, Ronald M. and Bresnan, Joan. 1982. Lexical-Functional Grammar: A Formal System for Grammatical Representation. In Joan Bresnan (ed.), *The Mental Representation of Grammatical Relations*, pages 173–281, Cambridge, MA: MIT Press, reprinted in Dalrymple et al. (1995: 29–135).

Kibort, Anna. 2001. The Polish Passive and Impersonal in Lexical Mapping Theory. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG01 Conference*, pages 163–183, Stanford, CA: CSLI Publications.

Kibort, Anna. 2007. Extending the Applicability of Lexical Mapping Theory. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG07 Conference*, pages 250–270, Stanford, CA: CSLI Publications.

Kibort, Anna. 2008. On the Syntax of Ditransitive Constructions. In Butt and King (2008), pages 312–332.

Kibort, Anna. 2013a. Argument Structure and Lexical Mapping Theory. Lectures, Faculty of Linguistics, Philology & Phonetics. University of Oxford.

Kibort, Anna. 2013b. Objects and Lexical Mapping Theory. Paper presented at the LFG13 Conference, University of Debrecen.

Koenig, Jean-Pierre, Mauner, Gail and Bienvenue, Breton. 2003. Arguments for Adjuncts. *Cognition* 89, 67–103.

Levin, Beth and Rappaport-Hovav, Malka. 2005. *Argument Realization*. Cambridge: Cambridge University Press.

Lewis, Heather. 2004. *The with-phrase theme in English: Argument or adjunct?*. Masters Thesis, University of Canterbury.

Needham, Stephanie and Toivonen, Ida. 2011. Derived Arguments. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG11 Conference*, pages 401–421, Stanford, CA: CSLI Publications.

Parsons, Terence. 1990. *Events in the Semantics of English: A Study in Subatomic Semantics*. Cambridge, MA: MIT Press.

Rappaport Hovav, Malka and Levin, Beth. 1998. Bulding Verb Meaning. In Miriam Butt and Wilhelm Geuder (eds.), *The Projection of Arguments: Lexical and Compositional Factors*, pages 97–134, Stanford, CA: CSLI Publications.

Sag, Ivan A. 1997. English Relative Clause Constructions. *Journal of Linguistics* 33, 431 – 483.

Sailer, Manfred. 2010. The Family of English Cognate Object Constructions. In Stefan Müller (ed.), *Proceedings of the HPSG10 Conference*, pages 191–211, Stanford, CA: CSLI Publications.

Schütze, Carson. 1995. PP Attachment and Argumenthood. In Carson T. Schütze, Jennifer B. Ganger and Kevin Broihier (eds.), *Papers on language processing and acquisition*, volume 267 of *MIT Working Papers in Linguistics*, pages 95–151, Cambridge MA: MIT.

Toivonen, Ida. 2002. The Directed Motion Construction in Swedish. *Journal of Linguistics* 38(2), 313–345.

Toivonen, Ida. 2013. English Benefactive NPs. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG13 Conference*, pages 502–523, Stanford, CA: CSLI Publications.

van Luven, Katie. 2014. The Argument Status of Directional PPs. Bachelor's thesis, Carleton University, lli lab.

Van Valin, Robert and LaPolla, Randy J. 1997. *Syntax: Form, Meaning, and Function*. Cambridge, UK: Cambridge University Press.

# A Appendix: Proofs

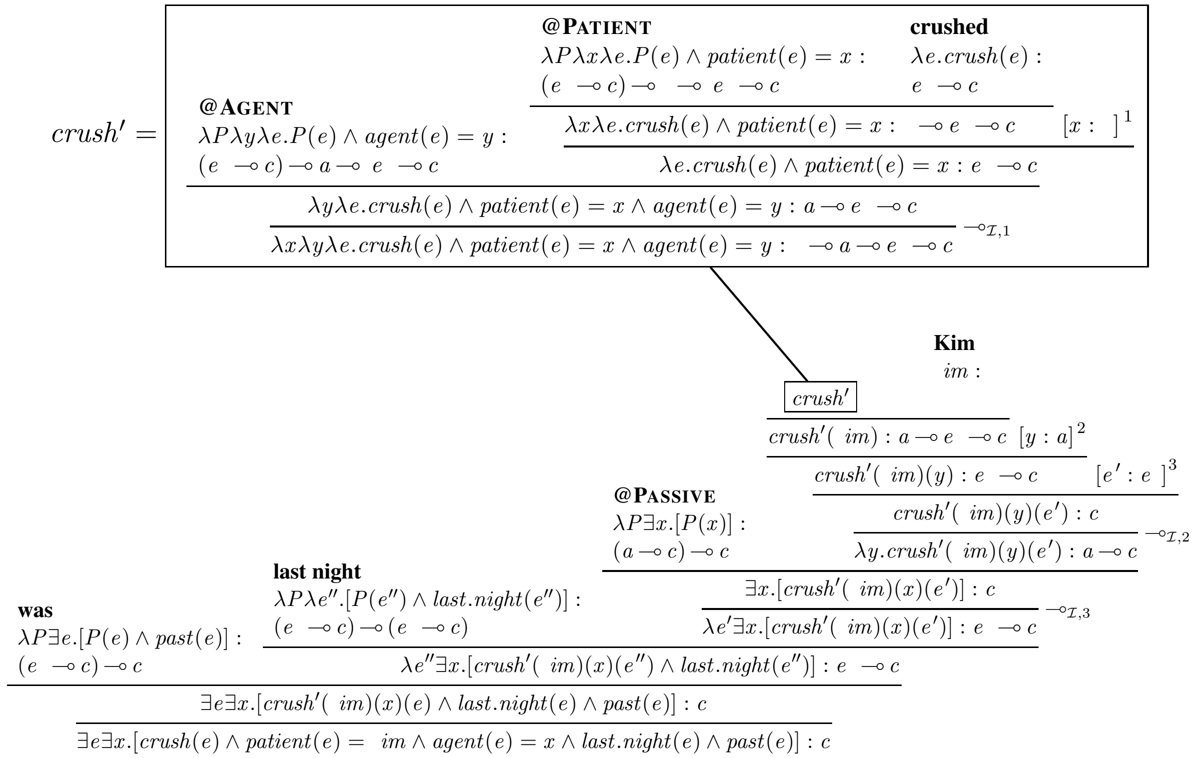


Figure 7: Proof for *Kim was crushed last night.*

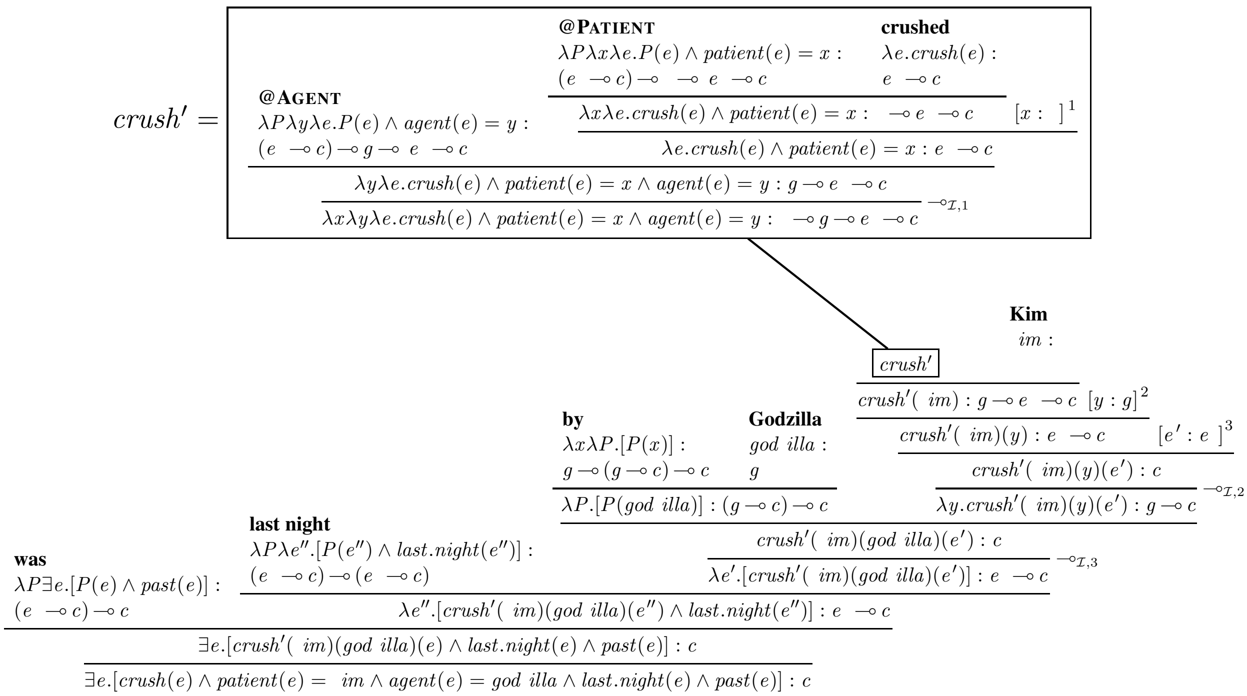


Figure 8: Proof for *Kim was crushed by Godzilla last night.*

**@CognateObject**

$$\lambda P \lambda e \lambda x.[P(e) \wedge \varepsilon(e) = x] : (e \multimap l) \multimap e \multimap o \multimap l \qquad [Q : (e \multimap l)]^1$$

$$\lambda e \lambda x.[Q(e) \wedge \varepsilon(e) = x] : e \multimap o \multimap l \qquad [e' : e\ ]^2$$

**a crazy laugh**

$$\lambda P \exists x.[laugh(x) \wedge cra\ y(x) \wedge P(x)] : \ .[(o \multimap \ ) \multimap$$

$$\lambda x.[Q(e') \wedge \varepsilon(e') = x] : o \multimap l$$

$$\exists x.[laugh(x) \wedge cra\ y(x) \wedge Q(e') \wedge \varepsilon(e') = x] : l$$

$$\lambda e' \exists x.[laugh(x) \wedge cra\ y(x) \wedge Q(e') \wedge \varepsilon(e') = x] : e \multimap l \quad \multimap_{\mathcal{I},2}$$

$$\lambda Q \lambda e' \exists x.[laugh(x) \wedge cra\ y(x) \wedge Q(e') \wedge \varepsilon(e') = x] : (e \multimap l) \multimap e \multimap l \quad \multimap_{\mathcal{I},1}$$

**laughed**

$$\lambda e.laugh(e) : e \multimap l$$

**@Agent**

$$\lambda P \lambda y \lambda e.P(e) \wedge agent(e) = y : (e \multimap l) \multimap \ \multimap e \multimap l$$

$$\lambda e' \exists x.[laugh(x) \wedge cra\ y(x) \wedge laugh(e') \wedge \varepsilon(e') = x] : e \multimap l$$

**kim**

$$im :$$

**@Past**

$$\lambda P \exists e.[P(e) \wedge past(e)] : (e \multimap l) \multimap l$$

$$\lambda y \lambda e \exists x.[laugh(x) \wedge cra\ y(x) \wedge laugh(e) \wedge \varepsilon(e) = x] \wedge agent(e) = y : \ \multimap e \multimap l$$

$$\lambda e \exists x.[laugh(x) \wedge cra\ y(x) \wedge laugh(e) \wedge \varepsilon(e) = x] \wedge agent(e) = \ im : e \multimap l$$

$$\exists e \exists x.[laugh(x) \wedge cra\ y(x) \wedge laugh(e) \wedge \varepsilon(e) = x] \wedge agent(e) = \ im \wedge past(e) : l$$

Figure 9: Proof for *Kim laughed a crazy laugh.*

$draw' =$

$\boxed{\begin{array}{l} \textbf{@AGENT} \quad \lambda P\lambda y\lambda e.P(e) \wedge agent(e) = y : (e \multimap d) \multimap \ \multimap e \multimap d \\ \textbf{@PATIENT} \quad \lambda P\lambda x\lambda e.P(e) \wedge patient(e) = x : (e \multimap d) \multimap g \multimap e \multimap d \\ \textbf{drew} \quad \lambda e.draw(e) : e \multimap d \\ \hline \lambda x\lambda e.draw(e) \wedge patient(e) = x : g \multimap e \multimap d \qquad [x : g]^1 \\ \hline \lambda e.draw(e) \wedge patient(e) = x : e \multimap d \\ \hline \lambda y\lambda e.draw(e) \wedge patient(e) = x \wedge agent(e) = y : \ \multimap e \multimap d \\ \hline \lambda x\lambda y\lambda e.draw(e) \wedge patient(e) = x \wedge agent(e) = y : g \multimap \ \multimap e \multimap d \quad \multimap_{\mathcal{I},1} \end{array}}$

**for** $\lambda y\lambda P\lambda e.[P(e) \wedge beneficiary(e) = y] : s \multimap (e \multimap d) \multimap e \multimap d$ **Sandy** $sandy : s$

$\lambda P\lambda e.[P(e) \wedge beneficiary(e) = sandy] : (e \multimap d) \multimap e \multimap d$

$\boxed{draw'}$ **Godzilla** $god\ illa : g$

$draw'(god\ illa) : \ \multimap e \multimap d$ **Kim** $im :$

$draw'(god\ illa)(\ im) : e \multimap d$

**@PAST** $\lambda P\exists e.[P(e) \wedge past(e)] : (e \multimap d) \multimap d$

$\lambda e.[draw'(god\ illa)(\ im)(e) \wedge beneficiary(e) = sandy] : e \multimap d$

$\exists e.[draw'(god\ illa)(\ im)(e) \wedge beneficiary(e) = sandy \wedge past(e)] : d$

$\exists e.[draw(e) \wedge patient(e) = god\ illa \wedge agent(e) = \ im \wedge beneficiary(e) = sandy \wedge past(e)] : d$

Figure 10: Proof for *Kim drew Godzilla for Sandy.*

$draw' =$

$\boxed{\begin{array}{l} \textbf{@AGENT} \quad \lambda P\lambda y\lambda e.P(e) \wedge agent(e) = y : (e \multimap d) \multimap \ \multimap e \multimap d \\ \textbf{@PATIENT} \quad \lambda P\lambda x\lambda e.P(e) \wedge patient(e) = x : (e \multimap d) \multimap s \multimap e \multimap d \\ \textbf{drew} \quad \lambda e.draw(e) : e \multimap d \\ \hline \lambda x\lambda e.draw(e) \wedge patient(e) = x : s \multimap e \multimap d \qquad [x : s]^1 \\ \hline \lambda e.draw(e) \wedge patient(e) = x : e \multimap d \\ \hline \lambda y\lambda e.draw(e) \wedge patient(e) = x \wedge agent(e) = y : \ \multimap e \multimap d \\ \hline \lambda x\lambda y\lambda e.draw(e) \wedge patient(e) = x \wedge agent(e) = y : s \multimap \ \multimap e \multimap d \quad \multimap_{\mathcal{I},1} \end{array}}$

**@BENEFACTIVE** $\lambda x\lambda y\lambda P\lambda e.P(y)(e) \wedge beneficiary(e) = x : s \multimap g \multimap (s \multimap e \multimap d) \multimap e \multimap d$ **Sandy** $sandy : s$

$\lambda y\lambda P\lambda e.P(y)(e) \wedge beneficiary(e) = sandy : g \multimap (s \multimap e \multimap d) \multimap e \multimap d$ **Godzilla** $god\ illa : g$

$\boxed{draw'}$ $[\ : s]^2$

$draw'(\ ) : \ \multimap e \multimap d$ **Kim** $im :$

$draw'(\ )(\ im) : e \multimap d$

$\lambda\ .draw'(\ )(\ im) : s \multimap e \multimap d \quad \multimap_{\mathcal{I},2}$

$\lambda P\lambda e.P(god\ illa)(e) \wedge beneficiary(e) = sandy : (s \multimap e \multimap d) \multimap e \multimap d$

**@PAST** $\lambda P\exists e.[P(e) \wedge past(e)] : (e \multimap d) \multimap d$

$\lambda e.draw'(god\ illa)(\ im)(e) \wedge beneficiary(e) = sandy : e \multimap d$

$\exists e.[draw'(god\ illa)(\ im)(e) \wedge beneficiary(e) = sandy \wedge past(e)] : d$

$\exists e.[draw(e) \wedge patient(e) = god\ illa \wedge agent(e) = \ im \wedge beneficiary(e) = sandy \wedge past(e)] : d$

Figure 11: Proof for *Kim drew Sandy Godzilla.*

# PRONOMINAL COREFERENCE IN OSSETIC CORRELATIVES AND THE SYNTAX-SEMANTICS INTERFACE

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**Abstract**

Correlatives are a subtype of relative constructions where the subordinate clause precedes the main clause, contains a relative pronoun or DP, and is resumed in the main clause by a full DP containing a personal or demonstrative pronoun (the correlate). Crucially, the subordinate clause does not usually form a constituent with the correlate. Most explicit treatments of the semantics of correlatives adopt, with some variations, the standard set-intersective analysis of relative clauses. In this paper, we demonstrate that the data of Ossetic shows that the relative DP and the correlate are instead linked through pronominal anaphora, such that the relative DP acts as the antecedent and the correlate, as the bound pronominal or definite description. This explains certain effects that are unexpected under the standard analysis of relative clauses, such as the possibility of bridging. The analysis is given a full formalization in terms of LFG, Glue semantics and PCDRT as the semantic metalanguage.

# 1 Introduction

The correlative construction is generally understood as a relative clause where "a left-peripheral relative clause is linked to a (possibly phonetically unrealized) nominal correlate in the clause that follows the relative clause" (Lipták 2009, 1). A classic example of a language with correlatives is Hindi:

(1) [ [ **jo** **laṛkii** ]$_{\text{DP}_{\text{rel}}}$ khaṛii hai ] [ **vo** ]$_{\text{DP}_{\text{mat}}}$ lambii hai
REL girl standing is she tall is
'The girl who is standing is tall'

(Srivastav 1991)

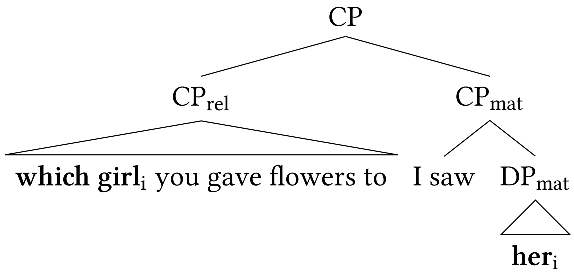
Here, the subordinate clause precedes the main clause, contains a left-dislocated relativized DP with an internal head ($\text{DP}_{\text{rel}}$), which is linked to a demonstrative pronoun ($\text{DP}_{\text{mat}}$) in the main clause.[1]

Broadly speaking, there are two syntactic analyses of correlatives that dominate the contemporary literature. In one of them, originally proposed in Srivastav (1991), the subordinate clause is said to be base-generated in the left peripheral

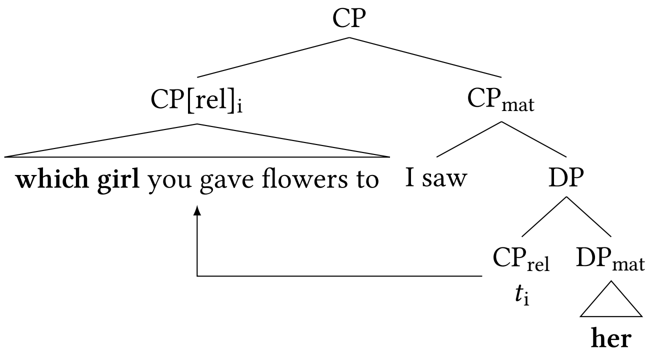
†This research was supported by grants from the Russian Foundation for the Humanities No. 13-04-00342 and 12-34-01345 to the first author, and a sabbatical leave from the University of Oslo to the second author. List of glosses: ABL: ablative; ACC: accusative; ADD: additive particle; ALL: allative; ASC: associative plural; ATTR: attributive; COM: comitative; CONJ: conjunction; DAT: dative; DEM: demonstrative; DOWN: marker indicating downwards movement; ESS: essive orientation; GEN: genitive; HAB: habitual; IMP: imperative; IN: inessive-illative; INDEF: indefinite pronoun; INS: instrumental; IPFV: particle; IQ: indirect question; M: masculine; NEG: negation; OBL: oblique; PFV: perfective; PL: plural; PRS: present; PST: past tense; PTCL: particle; PTCP: participle; PV: preverb; REL: relativization marker; RESTR: restrictive; SBJV: subjunctive; SG: singular; SUPER: superessive-superlative.

[1]The abbreviations $\text{DP}_{\text{rel}}$ and $\text{DP}_{\text{mat}}$ are adopted from Andrews (2007).

position, and non-locally linked with $\mathrm{DP_{mat}}$:




The second analysis has been most explicitly articulated in Bhatt (2003). In this analysis, the subordinate clause is base-generated adjoined to $\mathrm{DP_{mat}}$ and afterwards (optionally) undergoes movement to the left periphery:




Even though these analyses differ considerably in terms of syntax, the semantics they assume is always some variant of the standard semantics of relative clauses. This is true even of the former analysis: although the binding is non-local, it does not involve any special anaphoric mechanisms. Thus, in Srivastav's original version, the relative clause is assigned the following meaning:

(2) $\lambda P.P(\iota x(\text{girl}'(x) \wedge \text{stand}'(x)))$

The correlate is interpreted as a "phonetically realized trace" (and so is treated in a very different way from the external head in a canonical relative clause). This means the main clause is an open proposition, in this case $\lambda x.\,\text{tall}'(x)$. When substituted into (2), this gives:

(3) $\lambda P.P(\iota x.\,\text{girl}'(x) \wedge \text{stand}'(x))(\lambda x.\,\text{tall}'(x)) \Rightarrow$
$\text{tall}(\iota x.\,\text{girl}'(x) \wedge \text{stand}'(x))$

The standard semantics for relative clauses, i.e. set intersection (Quine 1960; Partee 1975, 229; Larson and Segal 1995, 256), gives, if combined with a definite article, exactly the same result:

(4) $[\![\text{girl who is standing}]\!] = \lambda x.\,\text{girl}(x) \wedge \text{stand}(x)$

(5) a. $[\![\text{the}]\!] = \lambda P.\iota x.P(x)$
b. $[\![\text{the girl who is standing}]\!] = \iota x.\,\text{girl}(x) \wedge \text{stand}(x)$
c. $[\![\text{the girl who is standing is tall}]\!] = \text{tall}(\iota x.\,\text{girl}'(x) \wedge \text{stand}'(x))$

Therefore, Srivastav's analysis essentially treats correlatives as definite relative clauses.[2] The approaches provided in Dayal (1995) and Grosu and Landman (1998) involve an additional maximalization operation applied to (2), but do not otherwise differ from the conventional approach to relative clauses. In Brasoveanu (2008), the matrix correlate is taken to refer anaphorically to DP$_{\text{rel}}$, with maximalization following from anaphora. But again, the anaphora is assumed to always involve full coreference.

In what follows we will demonstrate that for Ossetic and a few other languages an analysis that appeals to the conventional semantics of relative clauses meets with considerable difficulties, and we must rather analyze the linking between DP$_{\text{rel}}$ and DP$_{\text{mat}}$ as an anaphoric relation between two separate referents which does *not* necessary involve full coreference.

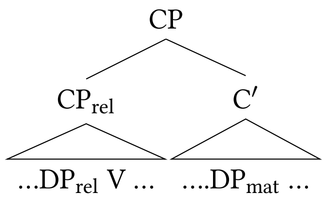
## 2 The syntax of simple correlatives in Ossetic

Ossetic[3] is an Iranian language spoken by around 700 000 people worldwide, with about 450 000 living in the Republic of North Ossetia in the Caucasus, part of the Russian Federation, where the language enjoys official status. Other areas with considerable numbers of Ossetic speakers include the disputed region of South Ossetia, certain areas of Georgia and some settlements in Turkey. Ossetic consists of two dialects, Iron and Digor, both of which have standard varieties, but Iron is by far the dominant idiom. This study is based on the standard variety of the Iron dialect.

The basic structure of the correlative clause in Ossetic is illustrated in (6), with the very schematic structural representation in (7).

(6) [ didinǯ-ətɜ **sə** **čəžg-ɜn** ba-lɜvar kot:-aj ], fet:-on
flower-PL what girl-DAT PV-present do-PST.2SG see.PFV-PST.1SG
**wəj** fəd-ə
that[GEN] father-GEN
'I saw the father[4] of **the girl that** you gave flowers to.'

(7)




That is, CP$_{\text{rel}}$ is left-peripheral and contains DP$_{\text{rel}}$ (obligatorily preceding the verb of its clause), which is "resumed" in the main clause by DP$_{\text{mat}}$ which must contain

[2]Correlatives also tend to have a universal interpretation, which we mostly ignore for the purposes of this article; but see the end of section 4 for a brief discussion.

[3]All sourced examples marked as "ONC" are from the Ossetic National Corpus (`http://corpus.ossetic-studies.org/en`). Unsourced examples are elicited from native speakers. There is a list of glosses at the end of the paper.

[4]Direct objects in Ossetic are marked by either nominative or genitive. The rules determining this are complex, mostly involving animacy, cf. Kulaev (1961).

a distal demonstrative. We assume that $CP_{rel}$ is attached in the specifier position of $CP_{mat}$; the motivation for the adoption of this structure instead of adjunction will be provided below.

From the syntactic point of view, both $DP_{rel}$ and $DP_{mat}$ are full-fledged DPs, that can have their own modifiers such as numerals, adjectives, and even certain quantifiers:

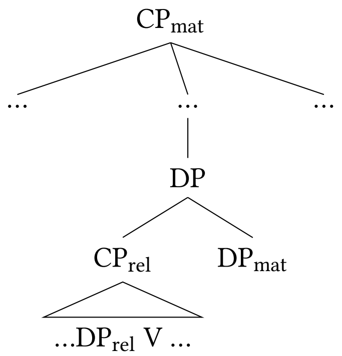
(8) … [ **sə birз čingʷə-tз** ba-kašt aχзšton-ə ], **wədon-ə**
what many book-PL PV-look[PST.3SG] prison-IN those-GEN
midiš =dзr =zə nз roχ kot:-a.
content ADD it.IN NEG oblivion do-PST.3SG
'He didn't forget the content of **the many books that** he read in prison.'
(ONC: Gusalty Baris, *Tugdar æmæ tugagur*, 2003)

(9) [ jekup-ə kзrt-ə **sə зrtз fзtkʼʷə-jə** žaj-ə ], **wədon-ə**
Ekup-GEN courtyard-IN what three apple-GEN grow-PRS.3SG those-GEN
dərʁ-tз raǯə зfšnajd зr-səd-əštə…
fruit-PL long_ago gather.PTCP PV-go-PST.3PL
'The fruits **from the three apple trees that** grow in Ekup's courtyard have been gathered long ago.'
(ONC: *Max dug* 4, 2008)

As an alternative, the subordinate clause may be located immediately preceding the correlate as in (10), a variant of (6) with the simplified structure in (11).

(10) fet:on, [ didinǯətз **sə čəžgзn** balзvar kodtaj ], **wəj** fədə

(11)




In the latter case, the relative clause and $DP_{mat}$ form a constituent, since the relative clause must immediately precede $DP_{mat}$, and two groups of relative clause + $DP_{mat}$ can be coordinated:

(12) alan kзš-ə, [ [ [ **sə činəg$_i$** =ən ba-lзvar kot:-a
Alan read-PRS.3SG what book he.DAT PV-present do-PST.3SG
aslan ], **wəj$_i$** $]_{DP}$, **зmз** [ [ **sə statʲja$_j$** nə-ffəšt-a žawər ],
Aslan that.DEM and what article PV-write-PST.3SG Zaur
**wəj$_j$** $]_{DP}$ $]_{CoP}$
that.DEM
'Alan is reading **the book that** Aslan gave him **and the article that** Zaur wrote.'

Furthermore, the $\mathrm{CP}_{\mathrm{rel}}$+$\mathrm{DP}_{\mathrm{mat}}$ combination can be modified by the adverb *ʒrmʒšt* 'only' (which generally precedes the focused element, and which can associate with DPs but not CPs):

(13) χʒzar-ə =ma ba-žžad-iš **ʒrmʒšt**, [ ʒnʒmʒng **či** qʒw-ə ],
house-IN more PV-remain-PST.3SG only certainly who need-PRS.3SG
**aχʒm zawma-tʒ**
such thing-PL
'In the house there were left **only the things which** were certainly needed.'
(ONC: Mamsyraty Dæbe, *Cardy k'æpxæntyl*, 1937)

We will see that correlative clauses have exactly the same semantics irrespective of whether they are in SpecCP or adjoined to DP. This gives some motivation for adopting an analysis of the kind proposed in Bhatt (2003), formulated in terms of LFG by Butt, King, and Roth (2007). On this analysis, the fronted correlative clause is an f-structure TOPIC structure-shared with the ADJ feature of the correlate's f-structure.

A demonstrative $\mathrm{DP}_{\mathrm{mat}}$ is obligatory; it is generally impossible not to have a correlate (14), or for the correlate to be expressed by a null pronoun (15), an enclitic pronoun (16b) or a possessive proclitic (for exceptions see Belyaev 2014a).

(14) * [ **či** rba-sʒw-a ], dwar ba-jgom kʒn
who PV-go-SBJV.3SG door PV-open do[IMP.2SG]
('(If) **who** comes, open the door.')

(15) [ **sə** **lʒpːu**$_i$ ʒrba-səd-i ], **wəj**$_i$ / *∅$_i$ me= fšəmʒr u
what boy PV-go-PST.3SG that.DEM my brother be.PRS.3SG
'**The boy who** came is my brother.'

(16) a. [ **sə** **lʒpːu**$_i$ ʒrba-səd-i ], **wəm-ʒn**$_i$ činəg ratː-on
what boy PV-go-PST.3SG that-DAT book give.PFV-PST.1SG
b. * [ **sə** **lʒpːu**$_i$ ʒrba-səd-i ], činəg **=ən**$_i$ ratː-on
what boy PV-go-PST.3SG book he.DAT give.PFV-PST.1SG
'I gave the book **to the boy who** came.'

The treatment of correlatives crucially depends on the phrase structure that one assumes at the clause level. Ossetic word order is free in the sense that the linear position of constituents does not depend on their grammatical function. However, specific linear positions, especially in the preverbal area (on which see Erschler 2012), are rigidly associated with particular discourse functions or word classes, such that the language can be characterized as discourse-configurational. Informally and schematically, the purely linear structure of the clause can be presented as follows:

(17) $$\text{LPeriph} - \underbrace{\text{PreC} - \text{C} - \text{PostC} - \overbrace{\text{Foc} - \text{Wh} - \text{Neg} - \text{V}}^{\text{verb complex}} - \text{PostV}}_{\text{enclitic placement area}} - \text{RPeriph}$$

A detailed discussion of each of these positions is beyond the scope of this paper, but the most important ones can be briefly described as follows:

**LPeriph** The position for left-dislocated elements, whose defining feature is the inability to host second-position enclitics.

**C** The position for the five non-preverbal subordinators (*sɜmɜj* ‘in order to’, *kɜd* ‘if’, *salənmɜ* ‘while’, *səma* ‘as if’, *jugɜr* ‘if’) which may be optionally preceded by one, rarely two or more, left-peripheral but clause-internal elements.

**Foc** The position for focused constituents.

**Wh** The position for interrogatives and $\mathbf{DP_{rel}}$[5].

**Neg** The position for negative particles or negative pronouns.

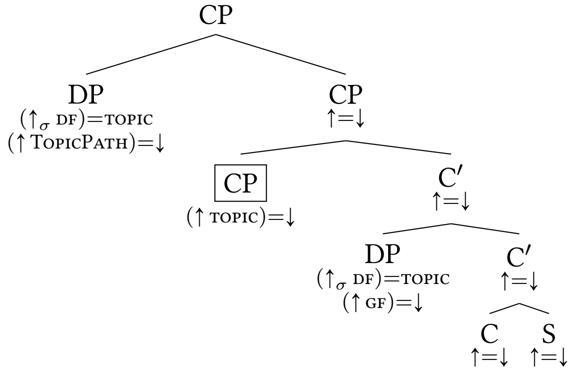
**V** The finite verb or complex predicate.

**PostV** The postverbal area, which may contain both topical and focal DPs.

**RPeriph** The position for right-dislocated clitic-doubled DPs.[6]

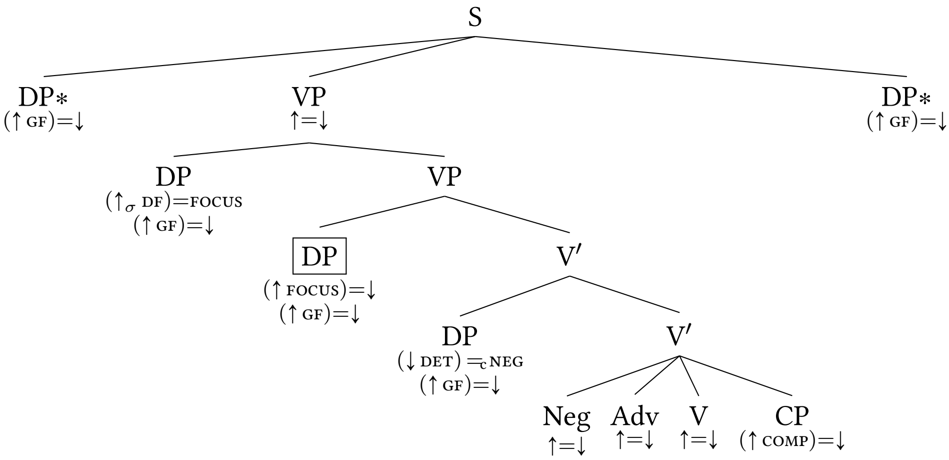
The clause structure thus revolves around the verbal complex, which is tightly integrated both syntactically and prosodically, and can be regarded as a VP constituent. We also assume that non-preverbal subordinators go into $C^0$, and the peripheral elements are either specifiers or adjuncts of CP. Between the CP and the VP level we situate the S level, which contains elements not explicitly designated as topical or focal. This can be summed up in the following scheme:

(18)




[5]An anonymous reviewer observes that there can also be multiple subordinators here, as shown in Erschler (2012, 680). The example that this refers to concerns multiple correlatives, which, as argued in Belyaev (2014a), must be treated as a separate construction. In particular, multiple correlatives use “true” interrogatives instead of relative markers or subordinators. Furthermore, as argued in Belyaev (2014c), only the last of the interrogatives occupies the Wh position and is required to have a correlate; the rest are ordinary focal items.

[6]An anonymous reviewer observes that these can be treated as separate fragments rather than genuine clitic-doubled items. This is indeed a possiblity; in fact, such an analysis of clitic right dislocation has been proposed in Ott and Vries (2013). If this is the correct analysis, RPeriph should not be treated as a special structural position within the clause. Note, however, that there are certain locality constraints on right dislocation (Belyaev 2014b).




It must be stressed that this structure is preliminary and should be elaborated and motivated in more detail. For the purposes of this article, it merely serves as a basis for the full syntactic formalization of correlatives. The crucial point is that we distinguish between f-structure and i-structure DFs; only the former are relevant for establishing long-distance dependencies and are involved in the correlative construction. They are boxed in the tree above. $\text{DP}_{\text{rel}}$ is, just like wh-words occupying the same position, a FOCUS structure shared with some GF in the relative clause:

(19) VP → $\left\{ \underset{(\uparrow\ \text{FOC})=\downarrow}{\text{DP}} \right\}$ $\underset{\uparrow=\downarrow}{\text{V}'}$

The fronted correlative clause is in SpecCP and occupies the TOPIC position, structure shared with some ADJ function in the matrix clause:

(20) CP → $\underset{\substack{(\uparrow\ \text{TOPIC})=\downarrow \\ \downarrow \in (\uparrow\ \text{GF POSS}^{*}\ \text{ADJ}) \\ (\downarrow\ \text{STYPE}) =_c \text{CORREL}}}{\text{CP}}$ $\underset{\uparrow=\downarrow}{\text{C}'}$

For (21), this yields the f-structure in (22):

(21) [ didinǯ-ətɜ **sə** **čəžg-ɜn** ba-lɜvar kot:-aj ], **wəj** fet:-on
flower-PL what girl-DAT PV-present do-PST.2SG that[GEN] see.PFV-PST.1SG
'I saw **the girl which** you gave flowers to.'

(22) $$\left[\begin{array}{ll} \textsc{pred} & \text{‘see}\langle\textsc{subj obj}\rangle\text{’} \\ \textsc{topic} & \left[\begin{array}{ll} \textsc{pred} & \text{‘give}\langle\textsc{subj obj obj}_{\textsc{goal}}\rangle\text{’} \\ \textsc{stype} & \textsc{correl} \\ \textsc{focus} & \left[\begin{array}{ll} \textsc{pred} & \text{‘girl’} \\ \textsc{det} & \textsc{rel} \end{array}\right] \\ \textsc{obj}_{\textsc{goal}} & \left[\ \right] \\ \textsc{subj} & \left[\begin{array}{ll} \textsc{pred} & \text{‘you’} \end{array}\right] \\ \textsc{obj} & \left[\begin{array}{ll} \textsc{pred} & \text{‘flowers’} \end{array}\right] \end{array}\right] \\ \textsc{subj} & \left[\begin{array}{ll} \textsc{pred} & \text{‘I’} \end{array}\right] \\ \textsc{obj} & \left[\begin{array}{ll} \textsc{pred} & \text{‘}\textsc{pro}\text{’} \\ \textsc{det} & \textsc{dist} \\ \textsc{adj} & \left\{\left[\ \right]\right\} \end{array}\right] \end{array}\right]$$

Alternatively, the correlative clause attaches to $\text{DP}_{\text{mat}}$ and thus only occupies the ADJ function of the correlate:

(23) $$\text{DP} \rightarrow \underset{\substack{\downarrow\in(\uparrow\ \textsc{adj}) \\ (\downarrow\ \textsc{stype}) =_c \textsc{correl}}}{\text{CP}} \quad \underset{\uparrow=\downarrow}{\text{DP}}$$

(24) $$\left[\begin{array}{ll} \textsc{pred} & \text{‘see}\langle\textsc{subj obj}\rangle\text{’} \\ \textsc{subj} & \left[\begin{array}{ll} \textsc{pred} & \text{‘I’} \end{array}\right] \\ \textsc{obj} & \left[\begin{array}{ll} \textsc{pred} & \text{‘}\textsc{pro}\text{’} \\ \textsc{det} & \textsc{dist} \\ \textsc{adj} & \left\{\left[\begin{array}{ll} \textsc{pred} & \text{‘give}\langle\textsc{subj obj obj}_{\textsc{goal}}\rangle\text{’} \\ \textsc{stype} & \textsc{correl} \\ \textsc{focus} & \left[\begin{array}{ll} \textsc{pred} & \text{‘girl’} \\ \textsc{det} & \textsc{rel} \end{array}\right] \\ \textsc{obj}_{\textsc{goal}} & \left[\ \right] \\ \textsc{subj} & \left[\begin{array}{ll} \textsc{pred} & \text{‘you’} \end{array}\right] \\ \textsc{obj} & \left[\begin{array}{ll} \textsc{pred} & \text{‘flowers’} \end{array}\right] \end{array}\right]\right\} \end{array}\right] \end{array}\right]$$

That said, it must be stressed that the syntactic approach one adopts does not in any way influence the semantic part of our analysis, which is logically independent from the issue of movement/structure sharing.

## 3 Semantics

### 3.1 Why the linking is anaphoric

Intuitively, relative clauses link two positions, one in the matrix clause and one in the relative clause. Some analyses, e.g. Falk (2010), assume that these two positions are structure shared in the syntax. For correlatives, however, that would yield a clash of PRED-values. In any case, most analyses link the two positions semantically instead. Typically this is done by binding the two positions to the same variable as in (25).

(25) $\lambda P.\lambda Q.\lambda x.P(x) \wedge Q(x)$

The formula in (25) may be the meaning of a relative pronoun, or be associated with the relative clause construction itself (if there is no pronoun). Essentially, the combination of a head with a relative clause denotes the intersection of the individuals in their denotations. The matrix determiner applies to this meaning. There are several reasons why this does not work for Ossetic correlatives.

**Bridging** Correlatives can have both an internal and an external "head". In most cases the subordinator and the correlate are fully coreferent, but indirect coreferentiality ('bridging') is also possible.

(26) [ afɜz-ɜj afɜz-mɜ =šɜ **sə** **kɜnd-tɜ**$_{\mathrm{i}}$ qɜw-ə ],
year-ABL year-ALL those.GEN what commemoration-PL need-PRS.3SG
**wə-sə** **χɜrz-tɜ**$_{\mathrm{j\sim i}}$ mɜ= χi-mɜ iš-ən.
that-ATTR expense-PL my self-ALL take-PRS.1SG
'I take **the expenses** needed for **the commemorations** that they need every year on myself.'
(lit. '**What remembrances**$_{\mathrm{i}}$ they need every year, I take **these expenses**$_{\mathrm{j\sim i}}$ on myself.')
(ONC: Gaglojty Vladimir, *Ġe, marʒæ, isči!..*, 2009)

(27) [ adɜjmag χʷəždɜr **sə** **vžag-əl**$_{\mathrm{i}}$ zur-a ], **wə-sə**
person better what language-SUPER speak-SBJV.3SG that-ATTR
**adɜməχatː-ɜj**$_{\mathrm{j\sim i}}$ u.
nation-ABL be.PRS.3SG
'A person belongs **to the nation** whose **language** s/he speaks better.'
(lit. '**What language**$_{\mathrm{i}}$ a person speaks better, from **that nation**$_{\mathrm{j\sim i}}$ he is.')
(ONC: Ajlarty Izmail, Gæʒy̌naty Rimæ, Kcojty Rimæ, *Iron dissægtæ æmæ æmbisændtæ* [Ossetic proverbs], 2006)

Interestingly, we find such indirect linking even when the relative clause is DP-adjoined:

(28) ɜž χorž žət:-on, [ de= št’ol-əl **sə** **k’am** iš ], **wə-sə**
I well know-PST.1SG your table-SUPER what photo is that-ATTR
**lɜp:u-jə**
boy-GEN
‘I knew well **the boy whose** photo is on your table.’
(lit. ‘I knew well, **what photo** is on your table, **that boy**.’)
(ONC: *Max dug* 5, 1998)

This could perhaps be explained by some implicit variable acting as the correlate (boy [in it], language [of the nation], etc.), see e.g. Higginbotham (1997). But this explanation is implausible, as Ossetic generally imposes a very strict requirement that the correlate must contain a distal demonstrative. Furthermore, this analysis does not capture the semantics of the Ossetic construction, which can involve relations that do not imply any direct link between the two referents that may be expressed by a null variable, e.g.:

(29) [ wədon **sə** **šɜrd** ɜr-ləʁd-əštə ], **wə-sə** **fɜžžɜʒ-ə** sə-dɜr
those what summer PV-run-PST.3PL that-ATTR autumn-IN what-INDEF
raʒə ɜr-səd-əštə wərəš-ɜj ibəri-i-tɜ
early PV-go-PST.3PL Russia-ABL Ibiri-ASC-PL
‘**In the autumn** after **the summer** when they moved, Ibiri’s family came to Russia somewhat early.’
(lit. ‘**Which summer** they moved, in **that autumn** …’)
(ONC: *Max dug* 12, 1999)

Clearly, no direct link can be postulated between ‘summer’ and ‘autumn’, and, to our knowledge, there is no language which marks such a relation by genitive, i.e. **summer of autumn.* The connection here is rather through both summer and autumn being associated with the same year; an implicit variable approach would require postulating, in essence, a covert noun ‘year’, which is obviously an *ad hoc* solution.

**Split antecedents** Unlike in Hindi etc., Ossetic correlatives may stack, i.e. there may be several subordinate clauses at the left periphery corresponding to a single correlate.[7] In this case we may have split antecedents, i.e. one correlate corresponding to a *sum* of all the DP$_{rel}$s:

(30) [ sard-ɜj **sə** **konflikt-tɜ**$_{i}$ išt-a ], [ **sə** **χarakter-tɜ**$_{j}$
life-ABL what conflict-PL take-PST.3SG what character-PL
ɜvdəšt-a ], **wədon**$_{i+j}$ wəd-əštə kadɜʒ-ə ɜrmɜg.
demonstrate-PST.3SG those be-PST.3PL legend-GEN material
‘**What conflicts**$_{i}$ he took from life, **what characters**$_{j}$ he demonstrated, **they**$_{i+j}$ were legendary material.’
(ONC: Gædiaty Sek’a, *Wacmystæ*, 1991)

[7]While stacking is allowed, there may be only one correlate in the main clause, regardless of the number of stacked relatives. This suggests analyzing such cases as asyndetic coordination.

(31) [ kalač-ə **sə** **sɜl**$_i$, **sə** **bon**$_j$ wəd-i ], [ **sə** **χɜžna**$_k$ wəd-i ],
city-IN what goods what force be-PST.3SG what richness be-PST.3SG
**wədon**$_{i+j+k}$ ra-χašt-oj ɜfšɜd-tɜ.
them PV-carry-PST.3PL army-PL
'**What goods**$_i$, **what force**$_j$, **what riches**$_k$ there were in the city, the armies took **them**$_{i+j+k}$ away.'
(ONC: *Max dug* 8, 1996)

Once again, split antecedence is not predicted for "normal" relative clauses: **the boys*$_{i+j}$ *who*$_i$ *was standing (and) who*$_j$ *was sitting* is clearly bad. But under some circumstances, split antecedence seems possible, e.g. ?*people who he knew (and) who he didn't know*. In any case, the possibility of such split antecedence cannot in itself serve as a valid argument in favour of anaphora, because similar phenomena are found with adjectives, elements that are not usually assumed to be anaphorically linked. E.g., the English NP *red and white flags* has two interpretations: a purely intersective one, where the meaning is a set of flags each of which is of two colours, red and white, and a second, non-intersective interpretation, where some of the flags are red and some are white. The latter interpretation is similar to the split antecedence effects observed above for Ossetic. The data of Russian is even more relevant in this regard, cf. *krasnyj i belyj flagi* (red.SG and white.SG flag.PL), where singular morphology on each of the adjectives leads to the unambiguous interpretation of there being exactly one red flag and exactly one white flag.

Such examples demonstrate that there must be an explanation of such effects that does not appeal to anaphoric mechanisms. Still, an anaphoric treatment of Ossetic correlatives predicts this behaviour without any additional elaboration, and therefore, the possibility of split antecedence indirectly confirms our analysis.

**"Intermediate" anaphoric indexation** When two subordinate clauses are attached, the second of them may reference the DP$_{rel}$ of the first one, while the DP$_{rel}$'s of both clauses are split antecedents of the correlate in the main clause:

(32) [ **sə** **lɜg**$_i$ =mɜm χəl kot:-a ] ɜmɜ [ **jemɜ**$_i$ **sə** **lɜp:u**$_j$
what man me.ALL scold do-PST.3SG and he.COM what boy
fɜ-bəsɜw ], **wədon**$_{i+j}$ šɜ= dəwwɜ =dɜr rašt štə
PV-argument those their two ADD right be.PRS.3PL
'**The man who**$_i$ scolded me and **the lad who**$_j$ argued with **him**$_i$, both of **them**$_{i+j}$ are right.'

In other words, each DP$_{rel}$ has independent reference, otherwise it would be impossible to refer to the DP$_{rel}$ of the first clause without using a correlate first.

## 3.2 Anecdotal evidence from other languages

The possibility of bridging in correlatives has apparently never been explicitly discussed, but there is anecdotal evidence that it was allowed in old Indo-European languages, specifically Hittite:

(33) **PÍŠ ga-pár-ta=na=kán ku-in** *A-NA* DÙ EME ši-pa-an-ta-aš nu
animal:ACC=CONJ=PTCL REL.ACC to made tongue sacrifice CONJ
$^{UZU}$**NÍG.GUG** $^{UZU}$**ZAG.UDU** ḫa-ap-pí-ni-it za-nu-zi
intestines.ACC shoulder.ACC flame.INS burn.PRS.3SG
'He roasts the intestines and the shoulders of **the animal**[8] **which** he had sacrified to the artificial tongue.' (lit. '**What animal** he had sacrificed to the artificial tongue, he roasts **intestines** and **shoulder** with the flame.') (Probert 2006, 63)

Bridging is also observed in Ashti Dargwa, where correlatives exist as a marginal strategy:[9]

(34) [ **si luʁat-li-ži-w** ʁaj
what language-OBL-SUPER-M[ESS] speech
ka:k'-ul=il ], **te: ummat-la** w-i:χʷ-a:
DOWN:M:speak.IPFV-PRS[3]=IQ that nation-GEN M-be.IPFV-HAB.3
har-il insan
every-RESTR person
'Every person belongs to **that nation** whose **language** they speak.'
(lit. '**Which language** (they) speak, **of that nation** every person is')
(field data, 2014)

Finally, Creissels and Sambou (2013, 470) provide examples of non-coreferentiality in Mandinka (Mande > Niger-Congo) correlatives.

By contrast, in Hindi, it is only possible to use synonyms and hyponyms in $\mathrm{DP_{rel}}$ and $\mathrm{DP_{mat}}$ (McCawley 2004). According to some authors, even more radically, one can only repeat the same noun or use an epithet in $\mathrm{DP_{mat}}$ (Potts 2005). If so, the variable binding analysis works for Hindi, and consequently, this language has a different type of correlatives than Ossetic, Hittite or Ashti.

## 4 Analyzing correlatives in LFG + Glue + PCDRT

### 4.1 Guiding intuitions

We observed above that Ossetic correlatives can involve bridging and split antecedents. In this they are closely parallel to ordinary discourse anaphora involving pronouns and definite DPs, as illustrated in (35) and (36).

(35) When I go to a bar$_i$, the bartender$_{j\sim i}$ always throws me out.

(36) Peter$_i$ met Harold$_j$ in Utrecht. They$_{i+j}$ loved the town.

Moreover, cross-linguistically correlates are always demonstratives, personal pronouns, or definite descriptions, or, at least, historically derived from these elements — the same kind of items that are used in pronominal / discourse anaphora.

[8] *PÍŠ ga-pár-t* is really the name of an unknown animal rather than a generic term for animals.

[9] Interestingly, Ashti also allows postposing the correlative clause with an internal head, which seems to contradict the idea that correlatives are always left-adjoined, and that right-adjoined relative clauses are actually displaced adnominal clauses.

There seems to be no language where there is a special set of correlative pronouns. It is therefore tempting to analyze correlatives as truth-conditionally more or less equivalent to a juxtaposition of two clauses with an anaphoric link between them.

(37) a. Which girl$_{\mathrm{i}}$ came, I saw her$_{\mathrm{i}}$.

b. A girl$_{\mathrm{i}}$ came. I saw her$_{\mathrm{i}}$.

There are some differences relating to the fact that the subordinate clause is used to identify a referent, rather than making an assertion. For simplicity, we ignore this aspect and use simple juxtaposition of the meanings, just like the traditional analysis of relative clauses use predicate conjunction to achieve set intersection. In DRT terms we get (38).

(38)
$$\begin{array}{|c|}\hline x\;y \\ \hline \text{came}(x) \\ \text{girl}(x) \\ \text{saw}(\text{speaker}, y) \\ y = x \\ \hline \end{array}$$

Crucially, we have **two separate discourse referents**, and not two occurences of the same variable. This means that instead of equality as in (38), we can use some other, more general relation, compatible with bridging, split antecedence, etc. In the next section we will see how this can be made formally explicit.

## 4.2 Coreference in PCDRT

Partial CDRT (Haug 2013) aims at providing a clear separation of monotonic (semantic) and non-monotonic (pragmatic) content. It provides a model-theoretic semantics for unresolved anaphors (including accessibility constraints) but treats coreference resolution post-semantically in the pragmatics. Consider the mini-discourse in (39).

(39) John$_1$ hid Bill's$_2$ key$_3$. He$_4$ was drunk.

After processing (39) we may entertain the resolution that $x_4 = x_1$. In PCDRT this is modelled through a function $\mathcal{A}$ taking anaphoric discourse referents to their antecedents.

(40)
$$\begin{array}{|c|}\hline x_1\;x_2\;x_3\;x_4 \\ \hline \text{john}(x_1) \\ \text{bill}(x_2) \\ \text{key}(x_3) \\ \text{poss}(x_2, x_3) \\ \text{hide}(x_1, x_3) \\ \text{drunk}(x_4) \\ \hline \end{array}\;, \mathcal{A} = \{x_4 \mapsto x_1\}$$

Notice that the interpretation of the discourse is split: the DRS on the left side of the comma tracks the monotonic content of the discourse, whereas the right-hand part of the representation tracks pragmatic enrichments of the discourse – in (40) we only show the anaphoric resolution, but this is also where e.g. Gricean inferences and other non-monotonic content would be represented. When the discourse is updated, the set of pragmatic inferences can be recomputed and destructively updated. For example, if we update (39) with (41), the resolution of $x_4$ may be non-monotonically changed to $x_2$.

(41) So he$_5$ shouldn't drive.

(42)
$$\begin{array}{|c|} \hline x_1\ x_2\ x_3\ x_4\ x_5 \\ \hline \text{john}(x_1) \\ \text{bill}(x_2) \\ \text{key}(x_3) \\ \text{poss}(x_2, x_3) \\ \text{hide}(x_1, x_3) \\ \text{drunk}(x_4) \\ \text{shouldn't. drive}(x_5) \\ \hline \end{array}, \mathcal{A} = \{x_5 \mapsto x_4, x_4 \mapsto x_2\}$$

As presented in Haug (2013), PCDRT assumes that antecedence implies equality. But this is a simplification that must be given up when dealing with bridging. Haug (2014) proposes to enrich the framework by assuming that the non-monotonic content not only supplies a function $\mathcal{A}$ taking anaphoric discourse referents to their antecedents, but also a function $\mathcal{B}$ taking anaphoric discourse referents to a relation between individuals, namely their coreference relation. $\mathcal{B}$ defaults to identity but other relations are possible, similarly to the analysis of bridging in Asher and Lascarides (1998):[10]

(43) John entered the room. The chandelier sparked brightly.

$$\begin{array}{|c|} \hline x_1\ \bar{x}_2\ \bar{x}_3 \\ \hline \text{john}(x_1) \\ \partial(\text{room}(x_2)) \\ \text{enter}(x_1, x_2) \\ \text{spark. brightly}(x_3) \\ \partial(\text{chandelier}(x_3)) \\ \hline \end{array}, \mathcal{A} = \{x_3 \mapsto x_2\}, \mathcal{B} = \{x_3 \mapsto \lambda x.\lambda y.\, \text{in}(x, y)\}$$

A truly predictive theory of bridging will have to constrain $\mathcal{B}$ in a principled way. We make no attempt to do that here, but we do assume that such a theory can be developed, and that the constraints on bridging in Ossetic correlatives are not different from bridging in ordinary discourse anaphora. We also abstract from split antecedence: these could be captured by taking $\mathcal{A}$ to be a function to a set of antecedents and allowing $\mathcal{B}$ to be a sum operation on this set, but the details would depend on the particular theory of plurals one adopts.

### 4.3 Attaching the subordinate clause

We augment the rules given in (20) and (23) above with the template @CORREL. Beyond requiring the adjoined clause to be marked as a correlative (by having an

[10] In the DRS we use $\partial$, the presupposition operator of Beaver 1992.

appropriate subordinator, see below), the template turns it into a modifier of the main clause.

(44) $$\mathrm{CP} \rightarrow \begin{array}{c} \mathrm{CP} \\ (\uparrow \textsc{topic}){=}\downarrow \\ \downarrow{\in}(\uparrow \textsc{gf poss}{*}\ \textsc{adj}) \\ @\ \textsc{correl} \end{array} \quad \begin{array}{c} \mathrm{C}' \\ \uparrow{=}\downarrow \\ \\ \\ \end{array}$$

(45) $$\mathrm{DP} \rightarrow \begin{array}{c} \mathrm{CP} \\ \downarrow \in(\uparrow \textsc{adj}) \\ @\ \textsc{correl} \end{array} \quad \begin{array}{c} \mathrm{DP} \\ \uparrow{=}\downarrow \\ \\ \end{array}$$

(46) $$@\ \textsc{correl} = \begin{array}{l} (\downarrow \textsc{stype}) =_c \textsc{correl} \\ \%M = ((\textsc{gf} - \textsc{poss})\ \textsc{poss}{*}\ \textsc{adj} \in \downarrow) \\ \lambda P.\lambda Q.P;Q : \downarrow_\sigma \multimap \%M_\sigma \multimap \%M_\sigma \end{array}$$

In the CP-adjunction case we could easily identify the matrix clause as ↑, the f-structure of the CP node dominating the correlative CP. But this will not work for DP-adjoined correlatives. For uniformity we therefore use an inside-out functional uncertainty to identify the matrix clause. The idea is that we start from the f-structure where the correlative clause has an ADJ function and move up any number of nominal embeddings (POSS) until we reach a function which is not adnominal (GF − POSS).[11] We use a local name, $\%M$, to make sure the functional uncertainty is instantiated to the same f-structure in both occurrences, but in practice, there is no room for ambiguity here: we are basically just reversing the outside-in functional uncertainty that is used to attach the correlative CP in (44) and there is only one way to do this, by moving along a (possibly empty) path of POSS-functions until we find a non-POSS-function.[12]

## 4.4 The subordinators

In (47) and (48) we give lexical entries for *sə*, which has a generalized quantifier type and must combine with a noun to form a $\mathrm{DP}_{\mathrm{rel}}$, and *či* 'who',[13] which forms a $\mathrm{DP}_{\mathrm{rel}}$ alone.

(47) *sə* relativizer $\mathrm{D}^0$ $(\uparrow \textsc{det}) = \textsc{rel}$
@INDEF
@RELPRO

(48) *či* 'who' $\mathrm{D}^0$ $(\uparrow \textsc{pred}) = \text{‘}\textsc{pro}\text{’}$
$(\uparrow \textsc{det}) = \textsc{rel}$
$\lambda x.\, \mathrm{person}(x) : (\uparrow_\sigma \textsc{var}) \multimap (\uparrow_\sigma \textsc{restr})$
@INDEF
@RELPRO

[11] For simplicity we assume that POSS is the only adnominal function; another candidate would be SPEC.

[12] Notice that it is not necessary to say explicitly in (44) that GF must be instantiated to something other than POSS since (we assume) POSS is not licensed outside adnominal contexts.

[13] The meaning provided below assumes that *či* can only refer to humans. This is not entirely correct: as an anonymous reviewer observes, this pronoun can also refer to inanimate entities (in relative clauses, but not in questions), as in (13). Since the distribution of 'who' vs. 'what' in relative clauses is not yet completely clear and bears nothing on the problems discussed in this paper, we assume an animate vs. inanimate distinction for simplicity.

Both subordinators introduce a new discourse referent. This is taken care of by the @INDEF template in (49), which produces a semantic resource with a generalized quantifier type.

(49) @INDEF = $\lambda R.\lambda P.[x_1|\,]\,;R(x_1)\,;P(x_1):$
$((\uparrow_\sigma \text{VAR}) \multimap (\uparrow_\sigma \text{RESTR})) \multimap \forall\alpha.(\uparrow_\sigma \multimap \alpha) \multimap \alpha$

For *sə* the restrictor of the generalized quantifier is supplied by the noun phrase it attaches to; we assume that *sə* and the NP are co-heads of the DP. *či*, on the other hand, does not need an NP co-head, since it provides its own restriction (to persons).

The more interesting part of the semantics of the subordinator is provided by the @RELPRO-template in (50).

(50) @RELPRO = $((\text{FOCUS}\downarrow)\ \text{STYPE}) = \text{CORREL}$
$\%\text{C} = (\text{ADJ FOCUS}\downarrow)$
$(\%\text{C DET}) =_c \text{DIST}$
$\lambda P.\lambda x.\lambda y.P(x)(y);[\,|\mathcal{A}(y) = x]:$
$\forall\alpha.(\%\text{C}_\sigma \multimap\ \downarrow_\sigma \multimap \alpha) \multimap (\%\text{C}_\sigma \multimap\ \downarrow_\sigma \multimap \alpha)$

The first line of @RELPRO marks the clause in whose FOCUS function the $\text{DP}_{\text{rel}}$ appears as a correlative clause. This is what licenses the adjuctions in (44)–(45). The next line identifies the matrix correlate and binds it to a local name, %C. Since we know that $\text{DP}_{\text{rel}}$ has a FOCUS function in the correlative clause, which again is the ADJUNCT of the correlate, we can identify the correlate with a functional uncertainty. Next, we require the correlate to have a distal demonstrative. And finally, @RELPRO offers a semantic resource that requires the correlate to take $\text{DP}_{\text{rel}}$ as its antecedent.

The lexical entries above ignore the possibility of pied-piping, which is allowed in Ossetic. However, we could capture that by using the standard solution of having a separate f-structure function OPER which is structure-shared with some constituent of FOCUS.

## 4.5 A worked example

We are now ready to see how we can analyze (21), whose f-structure is repeated here as (51).

(51) $$f{:}\left[\begin{array}{ll} \textsc{pred} & \text{‘see}\langle\textsc{subj obj}\rangle\text{’} \\ \textsc{topic} & r{:}\left[\begin{array}{ll} \textsc{pred} & \text{‘give}\langle\textsc{subj obj obj}_{\textsc{goal}}\rangle\text{’} \\ \textsc{stype} & \textsc{correl} \\ \textsc{focus} & \left[\begin{array}{ll} \textsc{pred} & \text{‘girl’} \\ \textsc{det} & \textsc{rel} \end{array}\right] \\ \textsc{obj}_{\textsc{goal}} & \left[\ \right] \\ \textsc{subj} & \left[\begin{array}{ll} \textsc{pred} & \text{‘you’} \end{array}\right] \\ \textsc{obj} & \left[\begin{array}{ll} \textsc{pred} & \text{‘flowers’} \end{array}\right] \end{array}\right] \\ \textsc{subj} & \left[\begin{array}{ll} \textsc{pred} & \text{‘I’} \end{array}\right] \\ \textsc{obj} & \left[\begin{array}{ll} \textsc{pred} & \text{‘}\textsc{pro}\text{’} \\ \textsc{det} & \textsc{dist} \\ \textsc{adj} & \left\{\left[\ \right]\right\} \end{array}\right] \end{array}\right]$$

In the semantic composition, we must first construct the meanings of the matrix clause without $\mathrm{DP}_{\mathrm{mat}}$ and the correlative clause without $\mathrm{DP}_{\mathrm{rel}}$ in the normal fashion. This gives us

(52) $\lambda x.[\,|\,\text{saw}(\text{speaker}, x)] : (f\ \textsc{obj})_\sigma \multimap f_\sigma$

(53) $\lambda y.[x_1\,|\,\text{flowers}(x_1), \text{gave}(\text{hearer}, x_1, y)] : (r\ \textsc{obj}_{\textsc{goal}})_\sigma \multimap r_\sigma$

We now combine these two meanings using the meaning constructor provided by @CORREL-template, which turns the correlative clause into a modifier of the matrix. @CORREL requires clausal meanings, so we provide hypothetical fillers $(\mathbf{x}, \mathbf{y})$ for the missing slots in the two clauses. The result is as in (54).

(54) $\lambda P.\lambda Q.P; Q([\,|\,\text{saw}(\text{speaker}), \mathbf{x})])([x_1\,|\,\text{flowers}(x_1), \text{gave}(\text{hearer}, x_1, \mathbf{y})])$

When we reduce this and discard the hypothetical fillers, we get (55):

(55) $\lambda x.\lambda y.[x_1\,|\,\text{saw}(\text{speaker}, x), \text{flowers}(x_1), \text{gave}(\text{hearer}, x_1, y)] :$
$(f\ \textsc{obj})_\sigma \multimap (r\ \textsc{obl}_{\textsc{goal}})_\sigma \multimap f_\sigma$

Now we have a dependency on the meanings of both $\mathrm{DP}_{\mathrm{rel}}$ and $\mathrm{DP}_{\mathrm{mat}}$. The binder resource provided by @RELPRO can apply to this as in (56), which reduces to (57).

(56) $\lambda P.\lambda x.\lambda y.P(x)(y); [\,|\mathcal{A}(y) = x]$
$(\lambda x.\lambda y.[x_1\,|\,\text{saw}(\text{speaker}, x), \text{flowers}(x_1), \text{gave}(\text{hearer}, x_1, y)])$

(57) $\lambda x.\lambda y.[x_1\,|\,\text{saw}(\text{speaker}, x), \text{flowers}(x_1), \text{gave}(\text{hearer}, x_1, y), \mathcal{A}(y) = x] :$
$(f\ \textsc{obj})_\sigma \multimap (r\ \textsc{obl}_{\textsc{goal}})_\sigma \multimap f_\sigma$

And finally, when we saturate the slots of $\mathrm{DP}_{\mathrm{rel}}$ and $\mathrm{DP}_{\mathrm{mat}}$, we get (58)

(58) $[x_1\ x_2\ x_3|\,\text{girl}(x_3), \text{saw}(\text{speaker}, x_1), \text{flowers}(x_2), \text{gave}(\text{hearer}, x_2, x_3),$
$\mathcal{A}(x_1) = x_3] : f_\sigma$

This is the desired result. We see that the grammar imposes an anaphoric relation between $DP_{rel}$ and $DP_{mat}$. In the case of examples such as (6) above, there is no reason to assume anything else than identity between the two discourse referents: this is the default in an anaphoric relation. But the semantics is compatible with other referential relationships, and the analysis therefore extends to cases of bridging such as (26)–(28).

The semantics we have developed here only deals with definite readings of correlative clauses. Ossetic correlatives also have universal readings. One possibility is to treat these as simply generic uses of the definite reading. Another option, which is seen more often in the literature on correlatives, is to treat universal correlatives as genuinely quantifying structures. This would entail a very different semantic analysis of such correlatives. We can leave the issue open here, as we focus on the manner in which the connection between $DP_{rel}$ and $DP_{mat}$ is established: and this connection must be anaphoric both in definite readings and in universal ones, because the same phenomena (bridging, split antecedence) occur in both types, as seen in (27) above.

## 5 Conclusions

From the syntactic point of view, Ossetic correlatives are not significantly different from other similar constructions that have been analyzed in the literature. They can be readily accounted for on an LFG-version of Bhatt's approach to correlatives (Bhatt 2003), following Butt, King, and Roth (2007) who recast Bhatt's movement analysis in terms of functional control. It is not unlikely that the analysis of Srivastav (1991), which would translate into LFG as anaphoric control, would also work. However, since Ossetic correlatives can appear both adjoined both to the matrix CP and to the correlate DP with no distinction in meaning, the functional control analysis offers a convenient way of unifying the two constructions.

However, regardless of the syntactic analysis chosen, the semantic behaviour of Ossetic correlatives does not conform to any of the treatments proposed in the literature. Specifically, $DP_{rel}$ and $DP_{mat}$ need not be fully coreferent: they can be in a part-whole relation, or there may even be no coreference in the strict sense, the relation between the referents being only associative (similar to bridging in anaphora). We have seen that this means that the standard property denotation of relative clauses, leading to set intersection with the head noun, does not work. Instead, a proper solution must take the anaphoric connection between $DP_{rel}$ and $DP_{mat}$ seriously. Our analysis captures this by representing the two DPs as two different discourse referents, unlike all previous analyses of correlative clauses, which assume that the two positions are represented by the same variable (just like in canonical headed relative clauses). In other words, the relation between $DP_{rel}$ and $DP_{mat}$ is akin to pronominal anaphora rather than variable binding. Informally, Ossetic correlatives may thus be characterized as juxtaposition of two clauses with obligatory coreference between their elements imposed by the grammar.

The distinction between separate discourse referents and a single bound variable could not be modelled in standard versions of DRT, where anaphors and antecedents are represented by the same variable. But it is easily incorporated into PCDRT if we allow relations other than full coreference to hold between anaphoric expressions and their antecedents.

## References


Andrews, A. 2007. Relative clauses. In *Complex constructions,* vol. 2 of *Language typology and syntactic description,* ed. by T. Shopen, 206–236. Cambridge: Cambridge University Press.

Asher, N., and A. Lascarides. 1998. Bridging. *Journal of Semantics* 15 (1): 83–113.

Beaver, D. 1992. The kinematics of presupposition. In *Proceedings of the eighth amsterdam colloquium,* ed. by P. Dekker and M. Stokhof, 17–36. Amsterdam: ILLC.

Belyaev, O. 2014a. Anaphora in ossetic correlatives and the typology of clause combining. In *On diversity and complexity of languages spoken in europe and north and central asia,* ed. by P. Suihkonen and L. Whaley, 275–310. Amsterdam and Philadelphia: John Benjamins.

———. 2014b. Systematic mismatches: Coordination and subordination at three levels of grammar. *Journal of Linguistics* FirstView (December): 1–60. In press.

Belyaev, O. I. 2014c. Korreljativnaja konstrukcija v osetinskom jazyke v tipologičeskom osveščenii [Ossetic correlatives in typological perspective]. Cand. thesis, Lomonosov Moscow State University.

Bhatt, R. 2003. Locality in correlatives. *Natural Language & Linguistic Theory* 210:485–541.

Brasoveanu, A. 2008. Uniqueness effects in correlatives. In *Proceedings of sinn und bedeutung 12,* ed. by A. Grønn, 47–65. Oslo: Department of Literature, Area Studies / Oriental Languages.

Butt, M., T. H. King, and S. Roth. 2007. Urdu correlatives: theoretical and implementational issues. In *Proceedings of the lfg07 conference,* ed. by M. Butt and T. H. King. Stanford: CSLI Publications. Accessed December 10, 2013.

Cinque, G. 2012. Five notes on correlatives. In *Typological studies: Word order and relative clauses.* London: Routledge.

Creissels, D., and P. Sambou. 2013. *Le mandinka: Phonologie, grammaire, textes.* Paris: Karthala.

Dayal, V. 1995. Quantification in correlatives. In *Quantification in natural languages,* ed. by E. W. Bach, E. Jelinek, A. Kratzer, and B. H. Partee, 2:179–205. Dordrecht, Boston, and London: Kluwer.

Erschler, D. 2012. From preverbal focus to preverbal "left periphery": the ossetic clause architecture in areal and diachronic perspective. *Lingua* 122 (6): 673–699.

Falk, Y. N. 2010. An unmediated analysis of relative clauses. In *Proceedings of the lfg10 conference,* ed. by M. Butt and T. H. King, 207–227. Stanford, CA: CSLI Publications. Accessed June 21, 2014.

Grosu, A., and F. Landman. 1998. Strange relatives of the third kind. *Natural Language Semantics* 6 (2): 125–170.

Haug, D. T. T. 2013. Partial dynamic semantics for anaphora: Compositionality without syntactic coindexation. *Journal of Semantics.* Pre-published. Accessed January 25, 2014.

———. 2014. The anaphoric semantics of partial control. In *Proceedings of salt 24,* ed. by T. S. et al. Linguistic Society of America.

Higginbotham, J. 1997. A plea for implicit anaphora. In *Atomism and binding,* ed. by H. Bennis, P. Pica, and J. Rooryck, 183–203. Dordrecht: Foris.

Kulaev, N. X. 1961. K voprosu o probleme padežej v osetinskom [Concerning the problem of case in Ossetic]. In *Voprosy sostavlenija opisatel'nyx grammatik,* [Issues in the creation of descriptive grammars], ed. by S. G. Barxudarov, N. A. Baskakov, and A. A. Reformatskij, 245–252. Moscow: Izdatel'stvo AN SSSR.

Larson, R. K., and G. M. Segal. 1995. *Knowledge of meaning.* Cambridge, MA: MIT Press.

Lipták, A. 2009. The landscape of correlatives. In *Correlatives cross-linguistically,* ed. by A. Lipták, 1–48. Amsterdam and Philadelphia: John Benjamins.

McCawley, J. D. 2004. Remarks on adnominal, adsentential and extraposed relative clauses in hindi. In *Clause structure in south asian languages,* ed. by V. Dayal and A. Mahajan, 291–313. Dordrecht: Kluwer.

Ott, D., and M. de Vries. 2013. Right-dislocation as deletion. May. In preparation. Accessed January 2, 2014.

Partee, B. H. 1975. Montague grammar and transformational grammar. *Linguistic Inquiry* 6:203–300.

Potts, C. 2005. *The logic of conventional implicatures.* Oxford: Oxford University Press.

Probert, P. 2006. Clause boundaries in old hittite relative sentences. *Transactions of the Philological Society* 104 (1): 17–83.

Quine, W. V. O. 1960. *Word and object.* Cambridge, MA: MIT Press.

Srivastav, V. 1991. The syntax and semantics of correlatives. *Natural Language and Linguistic Theory,* no. 9:637–686.

# DEGEMA AND THE STRING INTERFACE

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**Abstract**

This paper reports on some of the phonological properties of Degema, a language spoken in the south of Nigeria, and focusses on the occurence of endoclitics, which allow for interesting insights into the interplay of syntax, lexicon, postlexical phonological rules and prosody. This phenomenon presents a problem for current linguistic analysis, specifically to the concepts of modularity and lexical integrity, and requires a clear positioning of the different modules and the respective 'strings'. On the basis of the Degema data, this paper proposes an architecture that allows for the analysis of endoclisis, respects modularity and keeps the principle of lexical integrity intact.

# 1 Introduction

Recent years have seen several papers on the nature of the syntax-prosody interface within LFG (Bögel et al. 2009, Dalrymple and Mycock 2011, Bögel 2012, a.o.). The current general assumption is that the string is at the heart of the interface, incorporating (at least) two representations: the p-string which represents the phonological form of the string, and the s-string, which represents the syntactic side of the string. Both representations are interfaced by a multi-layered lexicon, which includes information on the phonological and syntactic properties of a lexical entry. However, the exact nature and position of the p-string is part of an ongoing debate, probably also owed to the fact that only little has been written about the (s-)string as such in the past. This paper aims to contribute to the discussion.

In general, the syntactically unparsed, but tokenized string is simply taken to be mapped to c-structure via the relation $\pi$ (Kaplan 1987, Asudeh 2006), where c-structure represents the 'linear order and hierarchical structure' of that string (Dalrymple 2001, Asudeh et al. 2013). A slightly different view is taken by Asudeh (2009) who defines the (s-)string as a 'representation of linear phonology', thus assuming phonological and syntactic linear order to be parallely represented within the string. Another recent analysis has adjusted the notion of linear order in that second position clitics were allowed to be moved in order to correctly analyse the associated syntactic information (Bögel et al. (2009), following Halpern (1995)), which implies a non-parallelity between the two sides of the string.

With reference to Degema, a language spoken in the South of Nigeria, this paper aims to look at these string concepts by analysing a notoriously difficult linguistic phenomenon: endoclisis. Endoclisis presents a challenge on several levels: First, the occurrence of a clitic element within the stem of another syntactic element is an obvious violation of the *Principle of Lexical Integrity*. Second, the analysis of endoclitics involves several aspects of the grammar: syntax, prosodic structure, postlexical phonological rules and the lexicon. It is thus also a discussion

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about how these components interact and how, in spite of this complex interaction, the concept of a modular grammar can be preserved.

For reasons of space, the data and the resulting analysis have been reduced to the facts vital for the discussion in this paper. For an extended version, see Bögel (forthcoming).

## 2 Architectural assumptions

It is very important to understand that this paper is not written from the perspective of a grammar where all modules "are present in parallel" (Asudeh and Toivonen 2010). Instead, the underlying assumption is that any act of language necessarily takes a certain directon, i.e., from meaning to form or vice versa. The analysis proposed here is conducted from the perspective of language production (human or machine) and thus from a specific *direction*: From c-structure *to* p-structure, i.e., from the viewpoint of generation/production. The 'order' of the modules follows findings on the arrangement of grammatical modules from the field of psycholinguistics.[1] As this notion of a *pipeline* architecture seems to contrast with the notion of the *parallel* architecture, the position taken in this paper is explained in the following.

In the approach presented here, the notion of "parallel modules" refers to the level of *competence* in that each module and the constraints and principles related with it are stored in parallel. Furthermore, the connections between these modules, the correspondence functions, are stored along as well. Together, they form the individual's (static) knowledge of a language, its grammar. Note, however, that projection functions always imply a direction; they are part of the interface between two modules A and B and can be understood as the output, e.g., module A feeds into module B (or as the reference to a constraint stored in the static knowledge of module B). While the *knowledge* about these modules is present in parallel, the projections between them have to be triggered by a specific process of module A before they can project their information to module B. Projection functions are thus necessarily directional, an assumption also supported by the fact that they are not reversible and are thus difficult to grasp in the context of 'parallelity'.

As stated above, any act of language is directional. This means that as soon as a specific linguistic phenomenon is analysed, the analysis necessarily takes a direction — this is especially true if several modules are involved. Such an analysis does *not* fall under the notion of *performance* as defined by Chomsky (although it can be interfaced with it): The analysis presented in this paper is not concerned with individual speaker circumstances or memory constraints, but with the abstract rules

[1]Note that researchers in the field of psycholinguistics largely agree on the order of the modules; the discussions are mainly concerned with if and how the modules overlap (see Levelt (1999) for an overview and important references). Furthermore, speech production and perception are not viewed as identical processes, i.e., speech perception is *not* the reverse of speech production. This assumption is, in fact, nicely accounted for by the non-bidirectionality of correspondence functions in LFG and stresses the need for a directional analysis.

and constraints stored in each language module that are necessary for the analysis or production of a specific phenomena. The application *tests* the constraints stored in each module and the processes at the interface on an abstract level and from a specific direction. If the application fails, then the *competence* level, i.e., the constraints and rules stored in each module, needs correction.

It is, of course, possible to avoid such a pipeline view and analyse a linguistic phenomenon in a continued parallel view of the modules. However, it is unclear how such an analysis contributes to the overall goal of linguistic analysis which is to add knowledge to the level of competence on the basis of a concrete application in a specific direction, and to test the resulting competence level by further applications. The 'static' (parallel) analysis of a phenomenon, especially of one involving separate modules, does not contribute to this process as it will necessarily fail in a concrete case of linguistic application (machine *and* human language processing).

## 3 Degema – some background

Degema is a Delta-Edoid language, spoken in the Rivers State region of Southern Nigeria. So far, no standard version of Degema has emerged, but there are two dialects: Usokun and Atala, spoken by an estimated 11.000 speakers each. The main focus of this paper lies on the Usokun dialect. From the phonological viewpoint, Degema has several interesting aspects related to the topic of this paper.

1. **Syllable structure:**
   Degema has four basic syllable types: V, VC, CV and CVC. Consonant clusters are the result of deleting an intervening vowel, thus CCV is derived from CVCV. In connected speech, consonants will resyllabify to a following word starting with a vowel. Thus, the prevalent syllable structure is CV or CVC (cf. Kari 2004, 378ff.).

2. **Vowel harmony:**
   The ten Degema vowels can be divided into two sets: One set with an advanced tongue root (phonetic feature +ATR) and one set with a retracted tongue root (-ATR) (Fulop et al. 1998). Vowels in simple words are exclusively drawn from one of the sets. Vowel harmony also spreads to clitics, possessives, some object pronouns and the negative adverb (Kari 2007).

3. **Lexical tone:**
   Degema is a tone language, which can distinguish between segmentally and categorically identical lexical entries via lexical tone and thus requires an elaborate analysis of all linguistic aspects of a lexical entry. Degema has two basic tones, H(igh) (x́), L(ow) (x̀, or unmarked) and a downstepped high tone (indicated by $^{\downarrow}$x), which applies if a High tone directly follows another High tone. Tones are marked on the syllables of a string. As reported by Kari (2004), there is no evidence of contour tones, i.e., two tones do not share one

syllabic host. Sequences of tones occur only in a handful of words. These consist of identical vowels and have a high - downstepped high tone pattern.[2]

# 4 The factative clitic

Degema has several clitics; of these, the factative clitic is of special interest, as it can appear as an enclitic in some contexts, but as an endoclitic in other contexts. The factative clitic attaches to verbs and object pronouns. The factative aspect

> *is used to denote a fact, which may be a dynamic situation that has already been completed or a state that once existed or still exists at the present time.* (cf. Rose 2014)[3]

The factative clitic has an underspecified vowel, which copies the features of the vowel in the host's last syllable as part of a process of vowel harmony, followed by an *n*: *Vn*. The clitic's realisation depends on

a. the phonological environment (consonant vs. vowel) of the host's last segment and (if present) the following word's first segment.

b. its medial vs. final position in an intonational phrase (IntP).

In the following sections, the different realisations of the clitic will be demonstrated with a number of (non-IPA) examples from Kari (2004).[4]

## 4.1 Enclisis in the intonational phrase (IntP) medial position

In the medial IntP position, the underspecified vowel is never realised. The realisation of the *n* is determined by its phonological environment (FE $\widehat{=}$ factative).

1. Phonological environment: **Vowel–Factative–Consonant (xxV=n Cxx)**

(1) Breno o=síré tạ́=**n** mụ́ éki
Breno 3Sg=run go=FE to market
'Breno ran to the market.' (Kari 2004, 114)

2. Phonological environment: **Vowel–Factative–Vowel (xxV=n Vxx)**

(2) Ení ḅól-ám ójzí yọ i=ḍíyómósé=**n** ávom ḅáaw
we hold-GER thief DEF 3Sg=sweeten=FE inside their
'It pleased them that we caught the thief.' (Kari 2004, 50)

[2] There are no long vowels in Degema (the word for 'yes' being an exception).

[3] Kari prefers the notion *factative*, because it "marks past in dynamic verbs but past/non-past in stative verbs. Given this situation, one can really not describe factative as perfective, since in stative verbs factative could have a non-past or timeless meaning/interpretation." (Rose 2014, fn 4).

[4] Note also that while the occurence of the factative clitic is quite common, it never occurs in (sub)clauses with a negative meaning. This aspect and its implementation is 'ignored' as it involves the semantic component as well – an analysis would thus go far beyond the scope of this paper.

3. Phonological environment: **Consonant–Factative–Vowel (xxC=n Vxx)**

(3) Ub̩uwan i=kél=**n** ú̩sóm yo̩<br>
salt 3Sg=be more than=FE soup DEF<br>
‘Salt is more than the soup.’ (Kari 2004, 153)

4. Phonological environment: **Consonant–Factative–Consonant (xxC ∅ Cxx)**

(4) E̩=yáw mú̩ ínw̩íny ú̩tany<br>
3Pl=take.FE from body tree<br>
‘They got it from a tree.’ (Kari 2004, 200)

In this specific environment, the factative enclitic is not realised which is consistent with the general rejection of complex consonant clusters mentioned in Section 3. Thus, the generalisation can be established that the factative clitic is realised as *n* in medial IntP position, except when preceded and followed by a consonant.

## 4.2 En(do)clisis at the IntP final position

In the case of the factative clitic *Vn* following a vowel at the final IntP position, the underspecified vowel copies the features of the host's last vowel.

1. Phonological environment: **Vowel–Factative (xxV=Vn)**

(5) O=síré=↓**en**<br>
3Sg=run=FE<br>
‘(S)he ran.’ (Kari 2004, 72)

Note that there is no simple vowel lengthening, as Degema does not feature long vowels and does not allow for contour tones (see Section 3). Instead, the presence of the factative vowel is indicated via a downstepped High tone.

2. Phonological environment: **Consonant–Factative (xxVVC) → endoclisis**

(6) O=b̩ó↓**o**l<br>
3Sg=hold.FE<br>
‘(S)he held (a cloth).’ (Kari 2004, 72)

As in (5), the underspecified vowel copies all the features of the host's last vowel; it is then moved into the last syllable via *metathesis* (by switching position with the last consonant of the host) (Kari 2002). However, in order to avoid illegal consonant clustering, the *n* is deleted (which is consistent with the deletion in the context xxC ∅ Cxx, see (4)). The result is a changed tone pattern H↓H as found in (5), which contrasts with the factative clitic in IntP-medial position as shown in the parallel construction in (7).

(7) O=ḅól=**n** ítónw
3Sg=hold=FE cloth
'(S)he held a cloth.' (Kari 2004, 72)

A possible alternative explanation would be that the factative clitic in IntP-final position causes the vowel of its host to be lengthened and to adapt two different tones. However, this is not conform with the general phonological findings of Degema, which do not allow for vowel lengthening or contour tones.

The following figure shows a Praat (Boersma and Weenink 2013) analysis of a sentence containing endo- and enclisis.

(8) [ɔ́mɔ́ßítám jɔ ɔ=sɔ́=ꜜ**ɔ**=l ] [ɔ=kírí ɓέnέ=**n** ʊ́kpá]
girl DEF 3Sg=jump.FE 3Sg=also play=FE dance
'The girl jumped and danced.' (Kari, p.c.)

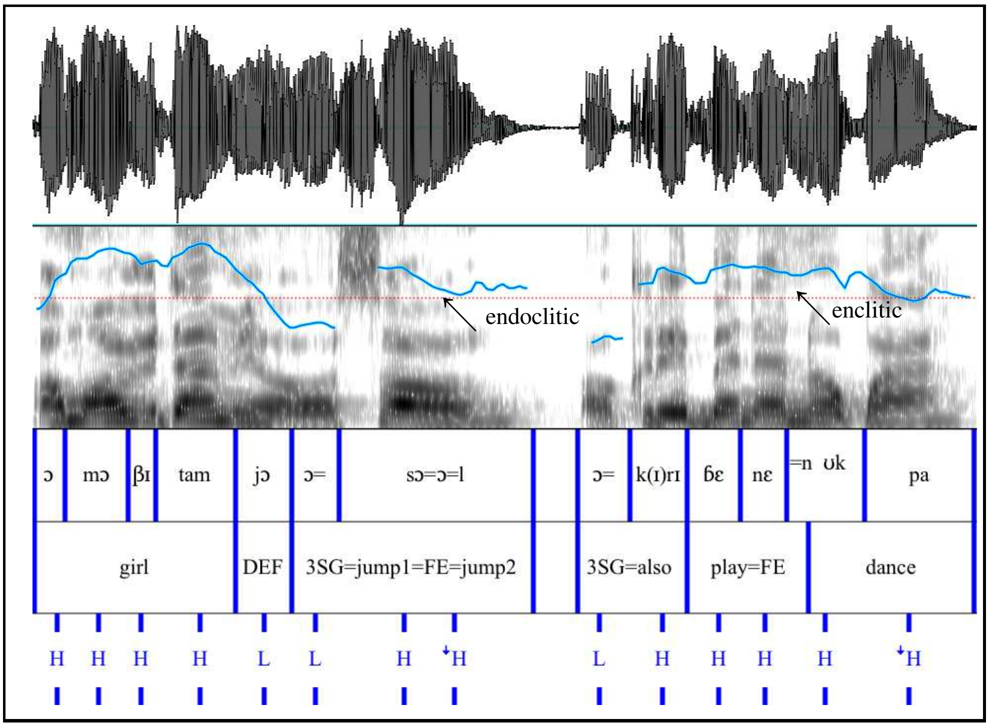


Figure 1: Speech signal for (8): 'The girl jumped and danced.'

Figure 1 consists of two IntP. The first IntP is terminated by the factative clitic. Since the host ends in a consonant, the clitic moves into the host and the *n* is deleted. The clitic's vowel is marked by a downstepped High tone, as indicated by the first arrow in the speech signal, where the pitch clearly moves from a high pitch mark to a lower one.

The second part of the sentence contains a factative clitic in a medial IntP position. Here, the vowel is not realised and no downstep occurs; the factative clitic is represented by an *n*, as indicated by the second arrow in the speech signal.

### 4.3 Prosodic phrase or syntactic clause

As mentioned before, the sentence in Figure 1 can be prosodically divided into two intonational phrases (IntP). This division is isomorphic to the syntactic analysis of the sentence in that each IntP matches a larger syntactic phrase. And indeed, as the following example shows, the realisation of the phrase-final en(do)clitic is not only restricted to the sentence-final IntP position, but also occurs at the final position of a subordinate clause and/or a matrix clause ((9)) forming an IntP.

(9) [E=kótú mé=↓**en**] do̩ mí=meme
3Pl=call me=FE but 1Sg.NEG=answer
'They called me but I didn't answer.' (Kari 2004, 139)

These examples raise another question: If the intonational phrase boundary and the syntactic clause boundary are isomorphic then which module (syntactic or prosodic) is responsible for triggering the factative endoclitic? Evidence for the intonational phrase boundary as a trigger for the factative endoclitic comes from the definite marker *yo̩* which usually appears directly behind the noun. However, this sequence can be interrupted by a subordinate clause. In this case, the marker can appear behind the factative clitic ((10), round brackets indicate prosodic phrasing and square brackets indicate syntactic phrasing).

(10) Mi̩=món owéy ([nú̩ (b̩a̩w) e=kótú=**n**] yo̩)
1Sg=see=FE person that they 3Pl=call=FE DEF
'I saw the person who they called.' (Kari 2004, 53)

In the above example, the definite marker *yo̩* is phrased into the same intonational phrase as the clitic. Syntactically, however, the definite marker is external, as it belongs to the 'person' of the sentence. If the form of the clitic was determined syntactically, then the endoclitic should be triggered in (10). Instead, the clitic is realized as if in phrase medial position which follows from the fact that the clitic indeed is not final if considering not the syntactic, but the prosodic phrasing. Following its paradigm for the medial IntP position between a vowel and a consonant, the factative is thus realised as the enclitic *n* in (10).

## 5 Issues caused by endoclisis

The concept of endoclisis poses a challenge to linguistic theory. As it involves several modules of language it is the optimal candidate for interface discussions. In the following sections, two of the issues are discussed in detail.

### 5.1 Lexical Integrity

One of the seemingly difficult problems is the violation of the concept of Lexical Integrity, as stated in Bresnan (2001, 92):

(11) **Lexical Integrity:**
Morphologically complete words are leaves of the c-structure tree and each leaf corresponds to one and only one c-structure node.

Clitics are independent syntactic items which occupy a separate terminal node (Butt and King 2005) and should not be able to disrupt a morphologically complete word. Endoclitics move into the word (stem), which is why they have been named a challenge to the principle of Lexical Integrity, especially to the Strong Lexicalist Hypothesis which states that rules of phrase formation cannot access any part of a given word.[5]

However, one should carefully distinguish between the different components involved in the generation of endoclitics. The principle of Lexical Integrity is concerned with the interaction between syntax and morphology and the separation between words and phrases. The Degema clitics, on the other hand, also involve postlexical phonology in p-structure and it is the discussion of this component and the resulting architectural decisions that will allow for the realization that lexical integrity and endoclisis are not exclusionary concepts, but, on the contrary, are complemetary from a specific architectural viewpoint.

## 5.2 Modularity

The previous section briefly addressed the fact that the analysis of endoclitics requires a theory of interfaces between different modules of grammar. In the case of Degema endoclitics, the analysis requires an interaction of several modules/components of grammar: c-structure, p-structure and postlexical phonology, and the lexicon. The involvement of several modules requires careful definition of boundaries and responsibilities, because it is commonly assumed that one module cannot refer to or process vocabulary of another module in the grammar.

> *From a formal point of view, the hypothesis of [...] Modularity claims that the informational architecture of the mind strictly segregates phonological, syntactic, and conceptual representations from each other. Each lives in its own module; there can be no 'mixed' repesentations that are partly phonological and partly syntactic, or partly syntactic and partly semantic. Rather, all coordination among these representations is encoded in correspondence rules.* (Jackendoff 1997, 83)

This means that, e.g., postlexical phonological rules cannot refer to syntactic boundaries, because they do not understand about syntactic boundaries. To enable communication between modules, the output of one module has to be 'translated' into the vocabulary of the receiving module. Only then can information be processed.

While Jackendoff's approach is slightly different from the approach presented here, the above quote fits nicely into the architectural ideas and concepts of LFG.

[5] See Asudeh et al. (2013) for a thorough discussion of the concept of Lexical Integrity in LFG.

Correspondence rules project (and 'translate') information between modules, thus preserving each module's inherent processes and vocabulary, while at the same time allowing for a correspondence between the different modules by means of projections. The challenge here lies in the question as to how the information on syntactic structure should be 'translated' into prosodic information that can be referred to by the postlexical phonological rules, especially under the assumption that prosodic and syntactic constituent boundaries can be mismatched (see, e.g., Nespor and Vogel (1986)). However, before a solution can be discussed, some basic assumptions about the string in LFG have to be established.

# 6 Assumptions about "the string"

Discussions about modularity, lexical integrity and endoclisis tend to involve a discussion about the nature of the string as well. Dalrymple and Mycock (2011) proposed a distinction between p(honological)- and s(yntactic)-string as two sides of the string. They place this at the heart of the prosody-syntax interface, with the lexicon as a reference to match the two sides of the string. While a set of (lexical) phonological rules apply between p-forms and p-string, (postlexical) phonological rules, whose domains are the higher prosodic units, are assumed to apply between p-string and p-structure. Prosodically triggered phenomena like Degema endoclisis would thus be part of the relation between p-string and p-structure while the parallelity of p-string and s-string would be preserved.[6]

The following sections pursue the question if the linear order of the string that we perceive in listening is equal to the linear order of the string that we analyse syntactically; or if we put it into the terms coined by Dalrymple and Mycock (2011): Is the p(honological)-string parallel to the s(yntactic)-string? Or, as a final perspective: Are the postlexical phonological rules which operate on the postlexical string a translator between s- and p-string or are they an external interpreter needed for the recognition of lexical elements (thus leaving the parallelity of s- and p-string intact)? Each of the options for the postlexical phonological rules component has consequences for the nature of the string interface. The following sections give an overview by discussing the two possible architectural assumptions from the viewpoint of perception/parsing via the following example, where the factative clitic is attached phrase-finally to an object pronoun (*ɓáw*).

(12) ɔ= nʊ́ ɓá↓**a**w
3Sg= hit them.FE
'S/he hit them.' (Kari 2002, 45)

The conclusion that the syntactic and the phonological string are non-parallel implies specific assumptions about the grammar architecture whose concrete realisation will be shown in Section 7.

[6] However, as Dalrymple and Mycock (2011) do not focus on this particular area, an exact elaboration of these processes and the resulting issues within their framework is part of future work.

## 6.1 Postlexical phonological rules in a translation related function


Figure 2: Partial syntactic tree and architecture for s-string ≠ p-string.

In Figure 2, the s-string is not parallel to the p-string; the clitic occupies its own terminal node, following its host in an *en*clitic position. The postlexical phonological rules component, which is ultimately responsible for the positioning of the clitic within the host, is situated between the s- and the p-string and has a translation related function in that it decomposes the incoming speech signal before the lexical analysis according to the language's inherent postlexical phonological rules. As a result, p- and s-string are parallel most of the time, but might differ in the case of phonological intervention (endoclisis, second position clitics). From this perspective, the principle of lexical integrity is not violated, as the clitic occupies its own terminal node. Furthermore, an analysis in general is much easier, as the clitic is not locked into another syntactic (and possibly completely unrelated) element (e.g., the pronoun). However, there are also drawbacks to this view, e.g., if the 'original' position of the clitic is unknown, as it is the case with some second position clitics: If they do not have a corresponding full form, it is difficult to motivate their 'movement' through the application of postlexical phonological rules.

## 6.2 Postlexical phonological rules in a interpreting function

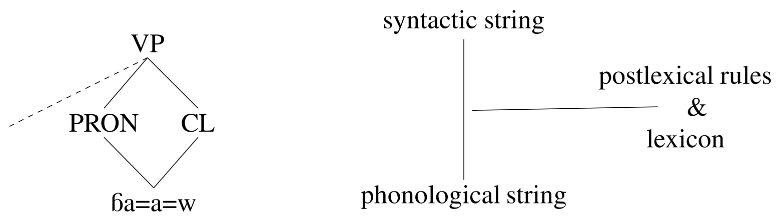


Figure 3: Partial syntactic tree and architecture for s-string = p-string.

Under this view, the parallelity between p- and s-string is preserved. The postlexical component is an external resource which is used together with the lexicon to align the speech signal with the syntax. And although the clitic is located (locked) within another syntactic element, an analysis could be possible with the application of inside-out functional uncertainty (e.g. Nordlinger 1998).

However, there are two serious issues with this approach: First, the concept of two terminal nodes sharing one lexical item is a violation of the principle of Lexical Integrity.[7] Second, there is also a problem from the perspective of modularity. The analysis under one terminal node can only be explained from the perspective of *perception/parsing*, because only then is the information on prosodic phrasing available before lexical and syntactic analysis; i.e., the trigger for endoclisis is available before the clitic and its host are analysed by syntax. However, it is difficult to explain how the endoclitic came to be within the pronoun if the opposite direction (*production/generation*) is considered. In this case, the trigger for the process of endoclisis, the intonational phrase boundary, is 'not available' as of yet, but will only be available at a 'later' stage.

Both of these issues are unresolvable under the current assumptions. It can thus be concluded that the postlexical phonological rules have a translation related function and that while the s- and p-string are isomorphic most of the time, under certain circumstances, they do not have to be. The following section formalizes this approach and shows how modularity and lexical integrity can be maintained through the proposed analysis of endoclisis on the basis of two assumptions:

1. The linear order of the "speech signal" (the p-string) is not necessarily equal to the linear order of the s(yntactic)-string

2. Assuming modularity, the postlexical phonological rule responsible for endoclisis refers to prosodic (and not syntactic) boundaries.

## 7 Endoclisis and the syntax-prosody interface

Figure 4 gives an overall overview of the assumed architecture applied to example (12).[8]

[7] At this point it is worth discussing why the approach presented in this paper is to be preferred to the Lexical Sharing approach presented by Wescoat, specifically relating to his analysis of Udi endoclisis (see Wescoat (2009) and references therein). First of all, the clitic types discussed in the two papers are of a different nature. In contrast to the Degema factative clitic, Udi (endo)clitics are not triggered by prosody. Second, Lexical Sharing cannot explain per se the occurence of endoclisis. The approach has to rely on additional formal power (in the form of Optimality Theory) to account for these phenomena. Third, it has been shown in Bögel (2010) that the treatment of clitics within the lexicon, as proposed by Lexical Sharing, results in a listing of possible combinations, which, in the case of promiscuous clitics, can be quite extensive. This potentially infinite enlargement of the lexicon is replaced by a (finite) set of abstract rules accounting for endoclisis in p-structure. Fourth, the approach presented here keeps the principle of Lexical Integrity intact. In contrast, Lexical Sharing relies on a modified version thereof, the *Homomorphic* Lexical Integrity which states that the precedence relation between two terminal nodes must be identical to the precedence relation of the corresponding lexical exponents, thus allowing for a one-to-many relation between the lexical exponent and the corresponding terminal node(s) (strictly speaking, the precedence relation is no longer given with endoclisis). It can thus be concluded that, in the case of prosodic clitics the approach presented here should be preferred, because it respects the concept of Lexical Integrity and the concept of modularity while at the same time explaining a complex phenomena without the application of additional formal power outside of the grammatical modules assumed in linguistic analysis.

[8] For space reasons, Figure 4 is reduced to the information needed for the analysis of en(do)clisis.

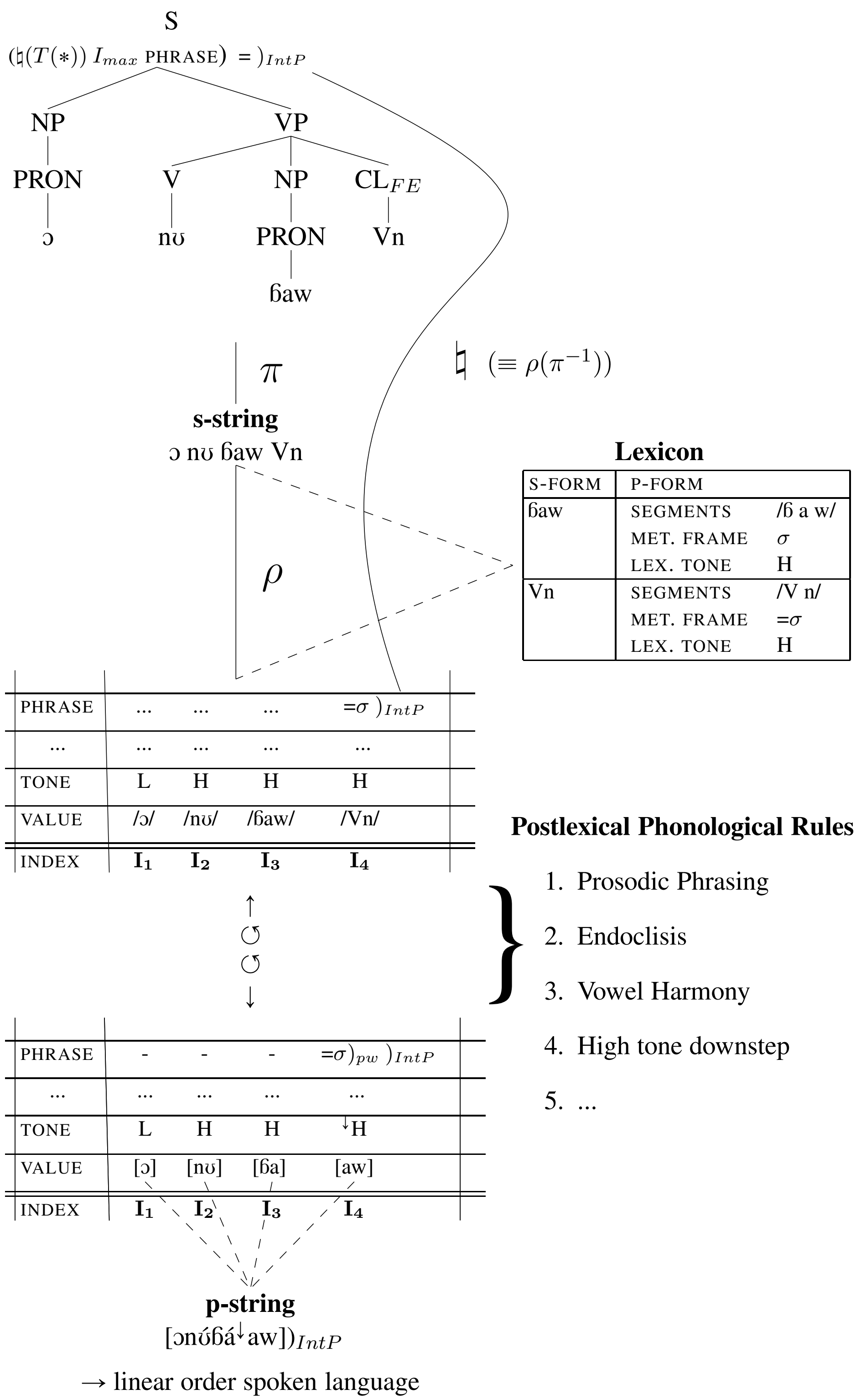


Figure 4: The integration of prosody and postlexical phonology into LFG.

The architecture proposed in Figure 4 shows how postlexical phonology and prosody can be integrated into LFG. The upper part represents c-structure. The lower part, consisting of the two p-diagrams and the set of postlexical phonological rules, represents p-structure. In accordance with the assumptions made in the introduction about the directionality of each act of language, the 'upper' (henceforth 'preliminary') p-diagram represents the *input* to the p-structure module, consisting of information from two other grammar components: syntax and lexicon.[9]

The *postlexical phonological rules* are the constraints and rules stored in the p-structure module. They apply to the input (the information stored in the preliminary p-diagram) in a cyclic manner (indicated by ↻), as the output of one rule often creates the context that triggers another rule. In Degema, for example, this means that the creation of a prosodic word domain has to be completed before the process of Vowel Harmony can apply, as it is restricted to this particular domain. (Postlexical) phonological rules are thus members of an ordered cascade, which can include sets of rules applying in parallel, but which allows for the application of rules to contexts that have been altered by previous rules. The 'lower' (henceforth *final*) version of the p-diagram is the output of p-structure after the phonological rules have applied.

All three parts belong to the module of p-structure, although their description can change. In the case of perception/parsing, the above process would be reversed: The formerly *final* p-diagram is the input, the cascade of rules applies in the opposite direction, and the formerly *preliminary* p-diagram would be the output of the p-structure module. This is of course a simplified description, as not all processes of production are reversible to become processes of perception, but there are two major insights. First, the underlying concept stays the same: There is an input to which rules and constraints are applied to form an output, and second: It is vital for any linguistic analysis to state the perspective from which an analysis is conducted.

The following sections will explain the architectural assumptions behind the syntax→prosody interface and the processes in p-structure step by step: First by distinguishing between two major interface interactions: The *transfer of vocabulary* on the one hand and the *transfer of structure* on the other.[10] Following this will be a section of the postlexical phonological rules that are inherent to p-structure.

## 7.1 Transfer of vocabulary

*Transfer of vocabulary* refers to the transformation of syntactic items (s-forms) to phonological representations. At the heart of this process lies the multi-layered lexicon which contains the respective information and serves as a medium for the lexical look-up (Bögel 2013). The multi-layered lexicon distinguishes between three dimensions for each lexical entry (cf. Levelt et al. 1999): a (semantic) concept, a s(yntactic)-form and a p(honological)-form. The lexicon's output is assumed to consist of (morphologically) complete words as proposed by Butt and Kaplan

[9]The integration of information from other modules is left for further research.

[10]These terms were coined by Scheer (2011, 558), but have a slightly different meaning here.

(2002). The lexicon as it is represented here can thus be viewed as a *lexical surface representation* (Mohanan 1982). It is accessed between c- and p-structure,[11] aligning possible p-forms with corresponding s-forms and vice versa. The dashed lines emphasize its role as a look-up instrument. Table 1 shows the lexical entries for the factative clitic and the pronoun *ɓaw* 'they' (example (12)).

| CONCEPT | S-FORM | P-FORM | |
|---|---|---|---|
| 'they' | ɓaw PRON (↑ PRED) = 'they' | P-FORM | [ɓáw ] |
| | ... | SEGMENTS | /ɓ a w/ |
| | ... | MET. FRAME | $\sigma$ |
| | ... | LEX. TONE | H |
| *factative* | Vn CL (↑ EVENT-TYPE) = factative | P-FORM | [V́n] |
| | ... | SEGMENTS | /V n/ |
| | ... | MET. FRAME | $=\sigma$ |
| | ... | LEX. TONE | H |

Table 1: Lexical entries for the factative clitic and and the pronoun *ɓaw* 'they'.

Table 1 focuses on the p-form[12] which has (in this case) four attributes: SEGMENTS represents the single segments of a p-form; METRICAL FRAME shows the number of syllables and, in the case of the clitic's entry, describes the prosodic status: $=\sigma$ indicates that the corresponding p-form is prosodically deficient and needs to lean on a host to its left. LEXICAL TONE indicates the tone attached to each syllable. Finally, P-FORM represents the element as it would be expressed in *isolation*.

In the case of a vocabulary transfer, the syntactically tokenized s-string is divided into s-forms which are matched with the related p-form in the lexical entry. The information gathered in the p-form is then projected syllable by syllable via the relation $\rho$ to the (prelinary) p-diagram, namely the value of the respective syllable and lexical tone.[13] Furthermore, *structure* up to the word level is transferred to the PHRASE section in the form of the lexical metrical frame.[14]

| | | | | |
|---|---|---|---|---|
| PHRASE | ... | ... | ... | $=\sigma$ |
| LEX. TONE | L | H | H | H |
| VALUE | /ɔ/ | /nʊ/ | /ɓaw/ | /Vn/ |
| INDEX | $\mathbf{I_1}$ | $\mathbf{I_2}$ | $\mathbf{I_3}$ | $\mathbf{I_4}$ |

Table 2: *Transfer of vocabulary* from lexicon to p-diagram, encoding example (12).

[11]Note that this paper does not make a point on the exact position of the lexicon. It is assumed that the position shown in Figure 4 is one of many possible access positions to the lexicon.

[12]The semantic CONCEPT is only superficially represented, as it is of no interest here. The S-FORM contains all information usually connected with lexical entries in LFG (cf. Butt and Kaplan 2002).

[13]In contrast to the original p-diagram introduced by Bögel (2012), the index is now indicated by the capital letter I (formerly S) to avoid confusion with S=syllable and S=sentence.

[14]The transfer of structure below the word-level as it is shown in Table 2 is reduced to the facts relevant for the discussion. See Bögel (forthcoming) for an extended version.

## 7.2 Transfer of structure

Under the assumption that syntax influences prosody at least on the higher levels, this paper follows the proposal by Selkirk (2011) in that every syntactic clause matches an intonational phrase (IntP) and every syntactic phrase matches a phonological phrase (PhP). This means that if there is a CP/S in c-structure, then there will be an (IntP) border indication in the p-diagram and so on.[15] This information is projected from the respective syntactic nodes via the following annotation pattern:

$$\begin{gathered}\text{S}\\(\natural(T(*))\ I_{max}\ \text{PHRASE}) = )_{IntP}\end{gathered}$$

The relation $\natural$ is defined as $\rho(\pi^{-1})$ (cf. Bögel 2013) and directly projects information from c-structure to the p-diagram. This annotation can thus be read in the following way: Consider all the terminal nodes of the current node (T(*)) (i.e., S). From these nodes take the syllable with the maximum I index ($I_{max}$=$I_4$ in the p-diagram). Add the value $)_{IntP}$ (a right IntP boundary) to the attribute PHRASE at this specific index position. The result is shown in Table 3, where the information about the higher prosodic units is added to the already present prosodic units below the word-level.

| | | | | |
|---|---|---|---|---|
| PHRASE | ... | ... | ... | =$\sigma$ $)_{IntP}$ |
| LEX. TONE | L | H | H | H |
| VALUE | /ɔ/ | /nʊ/ | /ɓaw/ | /Vn/ |
| INDEX | $\mathbf{I_1}$ | $\mathbf{I_2}$ | $\mathbf{I_3}$ | $\mathbf{I_4}$ |

Table 3: Preliminary p-diagram, encoding *structure* and *vocabulary* of ex. (12).

This very first version of the p-diagram preserves the syntactic linear order – it is mainly a 'translation' of syntactic terms into phonological terms. The preliminary version of the p-diagram in Table 3 allows for a reference to segments and their respective features as well as to an interim version of prosodic phrasing. However, missing is an explanation of endoclisis and other postlexical processes. These final adjustments are accomplished p-structure internally via a set of postlexical phonological rules operating on the preliminary version of the p-diagram.

## 7.3 The postlexical phonological rules component

As the name already suggests, postlexical phonological rules operate on a postlexical level, thus following the assumption that there are two levels where phonological rules apply: Lexical and postlexical (Kiparsky 1982, Lahiri 2000, a.o.) where

[15] This is in principle only a translation of inherently syntactic terms which has been criticised by, e.g., Scheer (2011). However, there is no denying syntactic influence on prosodic formation and it will soon become clear how these 'mere translations' are transformed into 'real' prosodic units.

the latter is taken to be (partly) responsible for a mismatch between the p-string and the s-string. In Figure 4, the postlexical phonological rule component consists of a set of ordered rules operating on the preliminary p-diagram derived by the transfer of vocabulary and structure. As a first step, prosodic phrasing is adjusted, for example, it can be assumed that the clitic forms a prosodic word together with its host. Adjustments can also be carried out at higher prosodic levels, thus accounting for non-isomorphism between syntactic and prosodic boundaries (see (13) below). Other postlexical processes operate on the segmental level, e.g., the realisation of the factative in different contexts. On the basis of the Degema data presented in Section 4, the following paradigm can be derived:

| phrase position | phonological environment |
|---|---|
| medial | xxV=**n** Cxxx |
| medial | xxV=**n** Vxxx |
| medial | xxC=**n** Vxx |
| medial | xxC $\varnothing$ Cxxx |
| final | xV$^{\downarrow}$**V**C |
| final | xV=$^{\downarrow}$**Vn** |

Table 4: Paradigm of the factative clitic in Degema.

This paradigm can be realised by the following constraints and processes in the order presented here (where $)_{pw}$ stands for a right prosodic word boundary, V stands for Vowel, C for Consonant and $v$ for an underspecified vowel).

1. if clitic present then incorporate into prosodic word domain of host:
   ... $)_{pw}$ =$\sigma$ $\longrightarrow$ ... =$\sigma)_{pw}$ (can be applied repeatedly)

2. if factative in IntP medial position, then realise as *n*; delete in context C _ C:
   =$v$n $\longrightarrow$ n / C _ V, V _ C, V _ V and =$v$n $\longrightarrow$ $\varnothing$ / C _ C

3. if factative in IntP final position, then realise as $vn$:
   =$v$n $\longrightarrow$ =$v$n / [...] _ $)_{IntP}$

   - if host ends in C, then swap position with C and delete *n*:
     C$v$n $\longrightarrow$ $v$C / _ $)_{IntP}$

4. apply vowel harmony: $v \longrightarrow$ V$_i$ / V$_i$ _ C$)_{IntP}$

5. apply tone downstepping: [+H][+H] $\longrightarrow$ [+H][↓H]

Applied in this order to the preliminary p-diagram in Table 3, the application of these postlexical processes presented here derives the final p-diagram for example (12), which can be viewed as the combined information provided by syntax, lexicon and postlexical phonological rules to the speech-signal-in-production.

| | | | | | |
|---|---|---|---|---|---|
| PHRASE | ... | ... | ... | $\sigma)_{pw})_{IntP}$ | |
| ... | ... | ... | ... | ... | |
| LEX. TONE | L | H | H | ↓H | |
| VALUE | [ɔ] | [nʊ] | [ɓa] | [aw] | |
| INDEX | $\mathbf{I_1}$ | $\mathbf{I_2}$ | $\mathbf{I_3}$ | $\mathbf{I_4}$ | |

Table 5: The final p-diagram of of example (12).

## 7.4 A note on Perception/Parsing and Production/Generation

Architectural assumptions should always consider both: parsing/perception and generation/production. The above analysis described the interface from the generation/production side. This section will quickly show some of the differences that arise if both directions, parsing and generation, are considered.

The first difference affects the representation of the p-diagram: Depending on generation or parsing, the representation changes slightly: In parsing, very concrete facts from the speech signal itself can be encoded, e.g. the Hertz values of the pitch, but not lexical information (e.g., lexical tone). From the perspective of generation, this data from the speech signal is not available. Thus, the final p-diagram from the viewpoint of generation is the combined information provided by syntax, the lexicon and postlexical phonological rules while the p-diagram from the viewpoint of parsing is rather a representation and interpretation of the speech signal itself.

Another difference is concerned with the reversibility of postlexical phonological processes. In generation, the *transfer of vocabulary* is similar to the transfer in parsing: The interaction is mediated via the multi-layered lexicon in both directions; postlexical phonological processes like the formation of an endoclitic are reversible because the corresponding rule can be applied backwards, separating the two lexical items so they can be matched against the lexicon.

In contrast, the *transfer of structure* differs between generation and parsing. From the perspective of generation, the transfer of structure gives a first indication of prosodic phrasing, which is retained, if syntax and prosody happen to be isomorphic. However, in cases like (10), repeated in (13), where the two components are non-isomorphic, prosodic phrasing is adjusted as part of the postlexical phonological processes.

(13) Owéy ([nú ábo i=vúwóy] yo)
person that hands 3Pl=be dirty.FE DEF
'The person whose hands are dirty.' (modified Kari 2004, 202)

The transfer of structure applied to (13) results in two nested Intonational Phrases, as the overall sentence as well as the embedded clause project an IntP to the prelimary p-diagram: i̩=vúwóy$)_{IntP}$ yo̩$)_{IntP}$. However, in the corresponding speech signal, *yo̩* is phrased together with the preceeding IntP of the embedded clause.

It can thus be assumed that in cases, where the outer IntP of a nested structure contains only a small amount of material to the right of an embedded IntP, then the outer IntP boundary is deleted and the material is phrased together with the preceeding (internal) IntP. The following table exemplifies this process.

| | |
|---|---|
| Transfer of structure:<br>Every CP/S projects an IntP | ([Owéy ([nú ábo i=vúwóy]$_{CP})_{IntP}$ yo]$_{S})_{IntP}$ |
| Prosodic Rephrasing:<br>Adjustment of IntP | ([Owéy [nú ábo i=vúwóy]$_{CP}$ yo]$_{S})_{IntP}$ |

Table 6: Structure transfer and prosodic rephrasing in cases of non-isomorphism.

The prosodic rephrasing is not ‘reversible’ if coming from the perspective of parsing. In the speech signal, there is no indication of an IntP boundary before the definite marker *yo*. The information that a CP boundary is present at this position is only available at a ‘later stage’.

As a consequence, it can be assumed that prosodic phrasing is not necessarily vital for the parsing of syntactic constituents – i.e., a missing IntP boundary after the CP in example (13) will not result in a failure of syntactic phrasing, albeit prosodic phrasing *can* reflect syntactic phrasing and aid in the disambiguation of syntactic ambiguities (see, e.g., Bögel (2013)).

## 8 Conclusion

This paper showed how the linguistic issues caused by endoclisis (namely the violation of Lexical Integrity and modularity) can be resolved by the introduction of a postlexical phonological rules component inherent to p-structure. These rules operate on a preliminary version of the p-diagram, derived via a) the *transfer of structure* (c-structure to prosodic phrasing) and b) the *transfer of vocabulary* via the multi-layered lexicon. Combined, these transfer processes form the c-structure–p-structure interface (or more commonly phrased: the syntax–prosody interface). The output, the ‘final p-diagram’, is the contribution of syntax, the lexicon and postlexical phonology to the speech signal.

It has also been shown that it is vital for the analysis to take a specific directional perspective: From meaning to form or vice versa. Furthermore, the opposite direction should be considered as well during the analysis in order to uncover wrong conclusions that are not identifiable as such from a monodirectional perspective. The resulting architectural assumptions allow for an analysis of endoclisis independently of syntax; thus, the modularity of the different components is preserved and the concept of Lexical Integrity is kept intact.

Returning to the initional question as to how the s- and p-string should be defined and how they relate to each other, it can be concluded that s-string and p-string are parallel most of the time, but they do not necessarily have to be. In cases of endoclisis (or, e.g., second position clitics), the linear order of the p-string may change. The s-string is thus defined as the *linear order of elements as they* *would be syntactically analysed* while the p-string represents *the linear order of the elements as they would be pronounced* in the final p-diagram. With the architectural assumptions proposed in this paper, this difference in linear order can be easily explained and forms a stable construction for the analysis of other complex phenomena at the syntax-prosody interface.

## References


Asudeh, Ash. 2006. Direct Compositionality and the Architecture of LFG. In M. Butt, M. Dalrymple and T. H. King (eds.), *Intelligent Linguistic Architectures: Variations on themes by Ronald M. Kaplan*, CSLI Publications.

Asudeh, Ash. 2009. Adjacency and Locality: A Constraint-based Analysis of Complementizer-Adjacent Extraction. In *Proceedings of LFG09*, CSLI Publications.

Asudeh, Ash, Dalrymple, Mary and Toivonen, Ida. 2013. Constructions with Lexical Integrity. *Journal of Language Modelling* 1(1), 1–54.

Asudeh, Ash and Toivonen, Ida. 2010. Lexical-Functional Grammar. In B. Heine and H. Narrog (eds.), *The Oxford Handbook of Linguistic Analysis*, Chapter 17, pages 425–458, Oxford: Oxford University Press.

Boersma, Paul and Weenink, David. 2013. Praat: doing phonetics by computer [Computer program], Version 5.3.56, retrieved 15 September 2013 from http://www.praat.org/.

Bögel, Tina. 2010. Pashto (Endo)clitics in a Parallel Architecture. In *Proceedings of LFG10*, CSLI Publications.

Bögel, Tina. 2012. The P-diagram – A Syllable-based Approach to P-structure. In *Proceedings of LFG12*, CSLI Publications.

Bögel, Tina. 2013. A Prosodic Resolution of German Case Ambiguities. In *Proceedings of LFG13*, CSLI Publications.

Bögel, Tina. forthcoming. *The Prosody-Syntax Interface in LFG*. Ph. D.thesis, University of Konstanz.

Bögel, Tina, Butt, Miriam, Kaplan, Ronald M., King, Tracy Holloway and Maxwell III., John T. 2009. Prosodic Phonology in LFG: A New Proposal. In *Proceedings of LFG09*, CSLI Publications.

Bresnan, Joan. 2001. *Lexical-Functional Syntax*. Blackwell.

Butt, Miriam and Kaplan, Ronald M. 2002. 'The Morphology-Syntax Interface', Handout presented at the Lexical Functional Grammar Conference, Athens, Greece.

Butt, Miriam and King, Tracy Holloway. 2005. The Status of Case. In V. Dayal and A. Mahajan (eds.), *Clause Structure in South Asian Languages*, pages 153–198, Kluwer Academic Publishers.

Dalrymple, Mary. 2001. *Lexical Functional Grammar*, volume 34 of *Syntax and Semantics*. Academic Press.

Dalrymple, Mary and Mycock, Louise. 2011. The Prosody-Semantics Interface. In *Proceedings of LFG2011*, CSLI Publications.

Fulop, Sean, Kari, Ethelbert E. and Ladefoged, Peter. 1998. An Acoustic Study of the Tongue Root Contrast in Degema Vowels. *Phonetica* 55, 80–98.

Halpern, Aaron. 1995. *On the Placement and Morphology of Clitics*. CSLI Publications.

Jackendoff, Ray. 1997. *The Architecture of the Langugae Faculty*. Cambridge, MA: MIT Press.

Kaplan, Ronald M. 1987. Three Seductions of Computational Psycholinguistics. In P. Whitelock, M. McGee Wood, H. L. Somers, R. Johnson and P. Bennett (eds.), *Linguistic Theory and Computer Applications*, pages 149–181, London: Academic Press.

Kari, Ethelbert E. 2002. On Endoclitics: Some facts from Degema. *Journal of Asian and African Studies* 63.

Kari, Ethelbert E. 2004. *A Reference Grammar of Degema*. Köln: Köppe.

Kari, Ethelbert E. 2007. Vowel Harmony in Degema, Nigeria. *African Study Monographs* 28(2), 87–97.

Kiparsky, Paul. 1982. Lexical Morphology and Phonology. In *Linguistics in the Morning Calm*, pages 3–91, Seoul, Korea: Hanshin Publishing Company.

Lahiri, Aditi. 2000. Phonology: Structure, Representation, and Process. In L. Wheeldon (ed.), *Aspects of Language Production*, Chapter 7, pages 165–226, Psychology Press.

Levelt, Willem J.M. 1999. Models of word production. *Trends in Cognitive Sciences* 3(6), 223–232.

Levelt, Willem J.M., Roelofs, Ardi and Meyer, Antje S. 1999. A Theory of Lexical Access in Speech Production. *Behavioral and Brain Sciences* 22, 1–75.

Mohanan, Karuvannur Puthanveettil. 1982. *Lexical Phonology*. Ph. D.thesis, Massachusetts Institute of Technology.

Nespor, Marina and Vogel, Irene. 1986. *Prosodic Phonology*. Dordrecht: Foris.

Nordlinger, Rachel. 1998. *Constructive Case: Evidence from Australian Languages*. Dissertations in Linguistics, Stanford, CA: CSLI Publications.

Rose, Sarah. 2014. Degema. In D. Nurse, J. Hewson and S. Rose (eds.), *Verbal Categories in Niger-Congo*, Unpublished. http://www.mun.ca/linguistics/nico/.

Scheer, Tobias. 2011. *A guide to morphosyntax-phonology interface theories: How extra-phonological information is treated in phonology since Trubetzkoy's Grenzsignale*. Berlin: De Gruyter Mouton.

Selkirk, Elisabeth O. 2011. The Syntax-Phonology Interface. In J. Goldsmith, J. Riggle and A. C. L. Yu (eds.), *The Handbook of Phonological Theory*, pages 435–484, Malden, MA: Blackwell.

Wescoat, Michael T. 2009. Udi Person Markers and Lexical Integrity. In *Proceedings of LFG09*, CSLI Publications.

# SYNTAX FROM THE BOTTOM UP: ELICITATION, CORPUS DATA, AND THICK DESCRIPTIONS

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**Abstract:** Syntacticians working in language documentation need to approach syntax in the context of an overall documentation program, which often includes creation of a lexicon and collection of texts. In such an environment, syntactic research needs to use both a text corpus and elicitation in a careful way. A deeper understanding of several unusual syntactic properties of Copala Triqui has emerged from syntactic research conducted in the context of such a language documentation program.

## 1 Top down and bottom up paradigms[1]

Linguists engaged in investigating the syntax of the world's languages might roughly be divided into two camps, which I will call top down syntacticians and bottom up syntacticians. Researchers in the top down paradigm are interested in some linguistic phenomena (such as control, anaphora, or the passive voice). As a result of this interest, the researcher chooses some languages of interest for research. The researcher then works alone or with language specialists or students on these topics, and authors or co-authors books, articles, and chapters with analyses of specific grammatical phenomena. Work from the top-down paradigm has been extremely influential in syntactic theory and this paradigm is the predominant model in both generative and typological approaches to syntax.

Another approach is the one that I will call the bottom up paradigm, and this is often the way of doing syntax that is most appropriate for those engaged in language documentation. In the bottom up paradigm, the researcher establishes a working relationship with members of some language community and commits to long-term work on language documentation. The research agenda in such a situation is partly determined by community needs and interests. A typical language documentation project needs a grammar, a text corpus, and/or dictionary. In such a situation, syntactic research needs to be integrated with the overall documentation agenda. For languages where there has been prior work by SIL, such as a dictionary or a Bible translation, it is also important to consider how academic linguists can use this material intelligently.

This paper focuses on syntactic research within the context of the Copala

1 I extend my sincere thanks to four Copala Triqui speakers – Román Vidal López, Monica de Jesus Ramírez, José Fuentes, and Irma Fuentes – who have helped me in learning about this language. I also thank my current and former students Edgar Martín del Campo, Kosuke Matsukawa, Susan Perdomo, Sharone Horowit-Hendler, Ruth Scipione, and Ashley LaBoda for their help in understanding Triqui grammar. Thanks are also due to Barbara Hollenbach, who has graciously answered many questions.

Triqui language documentation project, and identifies some insights that the bottom up approach to this language has yielded.

## 2 The Copala Triqui language documentation project[2]

I and my students at University at Albany have been engaged in a language documentation project on the Copala Triqui language since about 1998. Copala Triqui (TRC) is a Mixtecan language, and Mixtecan languages are part of the larger Otomanguean stock.[3] There about 30,000 speakers in Oaxaca, Mexico (and in other parts of Mexico and the United States). Copala Triqui communities have been subject to external and intercommunal violence, which has resulted in a diaspora. There are now large Triqui communities in California and in the Albany, NY area.

### 2.1 Texts from our documentation project

We have produced two books and an online dictionary of Copala Triqui during this period. The first book is Broadwell et al (2009). This book is a traditional Triqui story of the origin of the sun and moon as twin brothers. The brothers have various adventures, slay a monster, and rise to the sky to become the sun and moon. The second book is Vidal-López (2012). This book was written by our primary language consultant, Román Vidal-López, after he had worked with our group for several years. Nana̱ nagua̱n' rihaan nij síí chihaan' 'Words of counsel for the Triqui people', describes the necessary steps for peace in the Copala Triqui community.

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2 The orthography used in this paper is based on the practical orthography developed by Barbara and Bruce Hollenbach of the Summer Institute of Linguistics. I follow their usage in the representation of the consonants, including the following conventions: <x> = [ʃ], <xr> = [ʂ] (a retroflex alveopalatal sibilant), <ch> = [tʃ], <chr> = [tʂ], <c> = [k] (before front vowels), <qu> = [k] before back vowels, [v] = [β] and <j> = [h]. <Vn> represents a nasalized vowel. Copala Triqui has five level tones (1, 2, 3, 4, 5) and three contour tones (13, 31, 32), as discussed in Hollenbach (1984). This paper uses the predominant popular orthography, in which the high tones (4, 5) are marked with acute accent, the low tones (1, 2) are marked with an underscore, and the mid tones (3, 32) are unmarked. This tone-marking is sufficient to show all the relevant morphological distinctions of the language.
Glosses use the following abbreviations: acc = accusative, com = completive aspect, decl = declarative, f = feminine, m = masculine, n = neuter, neg = negative, p = plural, part = particle, pot = potential, s = singular.

3 In some places, the name of this language is spelled *Trique*, but speakers we have consulted prefer *Triqui*, and that is the form we use here.

Our primary software tool for most of this work is Fieldworks Language Explorer (SIL International 2014), which provides integrated lexicography and text corpus analysis.

### 2.2 Prior work on Copala Triqui

Barbara Hollenbach of SIL has written a popular grammar in Spanish (2004), a long grammatical sketch (1992), a dissertation on the phonology and morphology (1984), published collections of folktales (1977, 1988), and many articles about the grammar. There is also a very good Copala Triqui-Spanish dictionary (Hollenbach 2005).

In addition to the folkloric texts, there is also a version of the New Testament in Copala Triqui, translated by Barbara and Bruce Hollenbach. Because electronic versions of the text are available at scriptureearth.org, we were able to import these texts into Fieldworks Language Explorer, using the method described in Broadwell (2012). This has resulted in a text corpus that currently contains about 258,000 words.

### 2.3 Difficulties in Copala Triqui language documentation

Despite the large amount of literature from Hollenbach, speakers we worked with found it very hard to write Triqui, partly because of the tones. As a practical matter, we decided that we would like to concentrate on making an audio dictionary of the language, where speakers could hear the words to reinforce the link between spelling and sound. Because many speakers now live in the United States, we also wanted a trilingual (Triqu-Spanish-English) dictionary. Our online, searchable dictionary of Copala Triqui is http://copalatriqui.webonary.org, and it currently contains about 2200 words, with about 3000 audio files illustrating the headwords and example sentences.

### 2.4 Enriching the lexicography of Copala Triqui

Although Hollenbach's dictionary is excellent, its examples are limited and there is not much information about how words are used in context. We decided that we would like to develop a text corpus and supplement the dictionary with a much 'thicker' set of information about the way Copala Triqui words are used in texts, illustrating entries with both elicited and textual examples.

Clifford Geertz (1994) has used the term 'thick description' to talk about the ways in which we ought to approach the interpretation of cultures – from the viewpoint of their rich interplay of symbols, histories, and contexts. Adapting his terminology to lexical knowledge, a lexicon that only lists part of speech and translation is a 'thin' model of speaker knowledge; speakers actually have rich knowledge of possible contexts for words, their relationships to other words, etc. We can only get a sense of the true range of lexical syntax and semantics by observing words in natural, non-elicited contexts. This leads us to 'thick lexical descriptions'.

## 3 Syntactic documentation and thick lexical description

Our language consultants work long hours and have limited time to work with us (about two hours per week). We'd like to make the experience rewarding by focusing most of the time on activities that they have chosen (dictionary and text). Thus there is some time for syntactic elicitation, but we need to use it wisely. If possible, we try to use the text work to reinforce the syntactic work.

One consequence has been that much of our syntactic research has been focused on understanding the syntactic properties of different classes of verbs. For example, our corpus contains many textual examples of compound verbs like *me rá* 'want, love' (627 instances), *uun rá* 'do willingly' (343 instances), and *uun che'e̱* 'begin' (130 instances). What can we learn about these verbs from our corpus, and what additional information needs to be investigated in elicitation?

Since our dictionary needs many example sentences that illustrate the use of words, we take two main approaches to finding the examples. First, we search the text corpus for instances of words in natural contexts. Second, since the texts don't always contain good examples of words, we also ask speakers to produce sentences that use words in context. Depending on the syntactic properties of these corpus examples and volunteered examples, we may try altering properties like word order or pronoun choice to see if this affects grammaticality or interpretation.

The remainder of this paper is organized in the following way. After discussing some basic properties of Copala Triqui syntax and inflection (§4), this paper discusses two overlapping parts of the system: the syntax of compound verbs (§5) and the syntax of control verbs (§6). Most control verbs in the language are compounds, so §5 focuses on the constituent structure of the verb class which includes compounds, and §6 focuses on the interclausal relationship between control verbs and their complements. The paper ends with a discussion of future challenges (§7) and a conclusion (§8).

## 4 Basic properties of Copala Triqui syntax

### 4.1 Word order and case marking

Copala Triqui is a head-initial VSO language, as seen in the following example:

| | | | | | | |
|---|---|---|---|---|---|---|
| 1. | A’níí | Mariá | chraa | rá | yoó | a. |
| | put | Maria | tortilla | in | container | decl |

'Maria puts the tortilla in the tenate (straw container).'

Copala Triqui has differential object marking before the object. An accusative particle *man* is obligatory before pronominal objects and optional before other objects:

| | | | | |
|---|---|---|---|---|
| 2. | Que-ne'e | Mariá | (man) | Juán. |
| | com-see | Maria | (acc) | Juan. |

Maria saw Juan.

| | | | | |
|---|---|---|---|---|
| 3. | Que-ne'e | Mariá | man | so'. |
| | com-see | Maria | acc | 3:s:m |

Maria saw him.

| | | | |
|---|---|---|---|
| 4. | *Que-ne'e | Mariá | so'. |
| | com-see | Maria | 3:s:m |

(Maria saw him.)

### 4.2 Pro-drop and gaps

Pro-drop is very limited, and found only in a few coordination contexts. Thus in contrast to (2), it is not grammatical to say either of the following, regardless of discourse context:

| | | | | | | |
|---|---|---|---|---|---|---|
| 5. | *A’níí | ___ | chraa | rá | yoó | a. |
| | put | ___ | tortilla | in | container | decl |

'(S/he) puts the tortilla in the tenate (straw container).'

| | | | | | | |
|---|---|---|---|---|---|---|
| 6. | *A’níí | Mariá | ___ | rá | yoó | a. |
| | put | Maria | ___ | in | container | decl |

'Maria puts (it/them) in the tenate (straw container).'

Grammatical versions of both the sentences above would require pronouns:

| | | | | | | |
|---|---|---|---|---|---|---|
| 7. | A’níí | no' | chraa | rá | yoó | a. |
| | put | 3:s:f | tortilla | in | container | decl |

'She puts the tortilla in the tenate (straw container).'

| | | | | | | |
|---|---|---|---|---|---|---|
| 8. | A’níí | Mariá | man yo' | rá | yoó | a. |
| | put | Maria | acc 3:s:n | in | container | decl |

'Maria puts it in the tenate (straw container).'

While it is ungrammatical to omit arguments, gaps do appear when noun phrases and prepositional phrases have been dislocated from their positions after the verb. This can happen through Topicalization, Wh-fronting, Neg-fronting, and Relativization. Topicalization takes an argument or adjunct of the verb and puts it in a preverbal position, sometimes with a particle *ro'*.

In the following example the phrase *nu̱' rej siu̱u̱ tan'* 'all the bottoms of the ears of corn' is the subject of the verb 'stay behind', and has undergone the Topicalization rule. The ____ shows the expected position of the subject after the verb:

| | | | | | | |
|---|---|---|---|---|---|---|
| *9. …* | ne̱ | nu̱' | rej | siu̱u̱ | tan' | ro' |
| | ne̱ | nu̱' | rej | siu̱u̱ | tan' | ro' |
| | and | all | place | bottom | ear of corn | topic |

| | | | | | | |
|---|---|---|---|---|---|---|
| quináj | ___ | riaan | ya'anj | tu'vi̱i | xana̱ | a |
| qui- | náj | riaan | ya'anj | tu'vi̱i | xana̱ | a |
| com- | stay behind | to | god | thunder | woman | part |

…as for the bottom parts of the ears, they went to the female thunder god.

(Thunder walked 16)

Wh-fronting also displaces noun phrases and prepositions to a clause-initial position, leaving a gap. Again, ___ shows the expected postverbal position for the subject:

| | | | | | | |
|---|---|---|---|---|---|---|
| 10. | Me síí | c-aráán | ___ | chrej | rihaan | soj? |
| | who | com-prevent | ___ | road | to | 2:pl |

'Who blocked your road?'

Neg-fronting occurs with constituent negation, and is triggered by a few elements like *a̱ 'ó* 'not any' and *nuveé* 'not'. In the following example, the gap is shown by __ after the accusative *man.* The preverbal ne̱ and sentence final ma' show sentential negation, and the *a̱ 'ó* shows that *soj* 'you (pl)' is focused.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 11. | 'O̱ se | a̱ 'ó | soj | ne | qui-'ya̱j chi'i̱i̱ | núj | man | __ | ma'. |
| | because | not any | 2:pl | neg | com-harm | 1:pl | acc | ___ | neg |

'Because we did not harm any of you.' [2 Cor 7:2]

## 4.3 Aspect inflection

### 4.3.1 High and Low Register Stems

In Copala Triqui there is a system of 8 tones – 5 in the high register, and 3 in the low register.[4] In the practical orthography, the low register tones are shown by the underscore on vowels. (Hollenbach 1984, 2004 has a much more extensive discussion of the tonal system.)

Each verb in Copala Triqui has two stems – a high register stem and a low register stem. These two stems play an important role in the aspect and negation system of the language.

### 4.3.2 Aspect prefixes

Aspect is indicated by a prefix /k(V)-/. This prefix signals completive aspect with a high register stem. The same /k(V)-/ prefix signals potential aspect when used with a low register stem.[5] The stem without a prefix is the continuative aspect.

12. a. Ne'en Juán man so'.
    see Juan acc 3:m:s
    'Juan sees him.'
  b. Que-ne'en Juán man so'.
    com-see Juan acc 3:m:s
    'Juan saw him.'
  c. Que-ne'e̱n Juán man so'.
    pot-see:LOW Juan acc 3m
    'Juan will see him.'

The majority of verbs in Copala Triqui have this paradigm, which I label the **full paradigm**. A smaller number of verbs do not take the /k(V)-/ prefix and show a single high register form for the completive/continuative, contrasting with a low register stem in the potential. I call these **reduced paradigm** verbs.

### 4.3.3 Negation

When a negative particle appears – *ne* (in completive and continuative

4 Register here refers to pitch register, and is not used in with any sociolinguistic connotation.

5 In the practical orthography, /k/ is written <c> before <a,o,u> and <qu> before <i, e>. The vowel after /k/ is not (synchronically) predictable, and thus must be listed in the entry. For monosyllabic stems with an initial vowel, the prefix is /g-/ in place of /k-/.

aspects) or *se̱* (in potential aspect) – there is a surprising effect on the register of the following verb. As Hollenbach (1976) notes, the pattern of association between aspect and register is inverted after negative particles. In the negative context, the completive appears with low register and the potential with high register. Compare the affirmative sentences below with their negative counterparts.

13. a. Ne'en Juán man so'.
see Juan acc 3:m:s
'Juan sees him.'

b. Ne ne'en Juán man so'.
neg see Juan acc 3:m
'Juan does not see him.'

c. Que-ne'en Juán man so'.
com-see Juan acc 3:m:s
'Juan saw him.'

d. Ne que-ne'e̱n Juán man so'.
neg com-see:LOW Juan acc 3:m
'Juan did not see him.'

e. Que-ne'e̱n Juán man so'.
pot-see:LOW Juan acc 3:m
'Juan will see him.'

f. Se̱ que-ne'en Juán man so'.
neg:pot pot-see Juan acc 3m
'Juan will not see him.'

Thus low register is not a consistent marker of aspect, since verb register is determined by a combination of aspect and polarity.

## 5 Compound verbs

In addition to the simple verbs discussed above, Copala Triqui also has many compound verbs which are made up of two or three separate phonological words. Our current dictionary contains about 550 verbs, and more than a quarter of these are compounds. Consider *anoó ra'á* 'touch with the hand' in the following example:

14. C-ano̱ ra'á so̱' cúú yave̱ so̱'
pot-touch hand 2s head 2s
'Touch your head.'

A lexicographic concern for compound verbs is that only some compositional in their syntax, and they do not all have the same syntactic structure.

The evidence for this difference can be found by looking at the occurrence possibilities of adverbs in sentences with complex verbs. A number of manner adverbs such as *uxrá* 'a lot' or *sa̱'* 'well' appear either at the beginning of the clause or after the verb of the clause.

15. a. Uxrá chá Juán rnee.
much eat Juan bean
'Juan eats beans a lot.'
b. Chá uxrá Juán rnee.
eat much Juan bean
'Juan eats beans a lot.'

Ndo 'many, much, many times' and *tia'* ‘much, many times’ are also manner adverbs, but they cannot appear in clause-initial position. Thus *ndo* must appear after V in a VSO clause:

16. a. Chá ndo Juán rnee.
eat much Juan bean
'Juan eats beans a lot.'
b. *Ndo chá Juán rnee.
much eat Juan bean
('Juan eats beans a lot.')

Compound verbs fall into three types with respect to adverbs of this type. All compound verbs begin with a word which is a verb. The second element in a compound verb may belong to several different categories, as detailed below. Let us call the first part of a compound verb V and the second part X.

Using this terminology, the three types are differentiated by the degree to which VX forms a constituent. In the **incorporation** type of compound verb, V+X forms a single syntactic word. In the **adjunction** type of compound verb, X is head-adjoined to V to form a larger V. And in the **non-constituent** type, V and X are lexically linked to each other, but they do not form a syntactic constituent.

Adverbs in postverbal position are sensitive to the type of compound. For an incorporation compound verb like *toco' vaj* 'hang', the only possible position is after the X portion of the compound:

17. | Toco' | (*ndo) | vaj | (ndo) | xnii | se | navḛ | so' | a.
---|---|---|---|---|---|---|---|---|---
 | hang | (*much) | hang | (much) | boy | poss | hat | 3:s:m | decl

'The boy hung up his hat many times.'

In contrast, an adjunction compound verb like *ru'maan che'ẹ* 'stomp' allows a postverbal adverb after either V or X:

18. | Ru'maan | (ndo) | che'ḛ | (ndo) | Juán | man | nij | xcuaa.
---|---|---|---|---|---|---|---|---
 | put | (much) | foot | (much) | Juan | acc | pl | ant

'Juan stomped on the ants many times.'

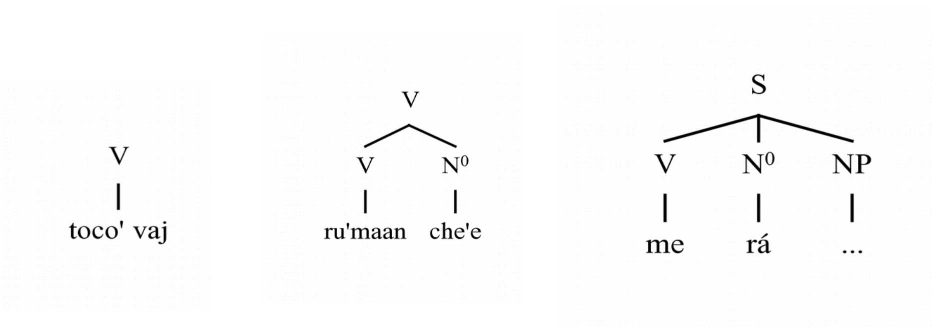
Finally, for non-constituent compound verbs like *me rá* 'want', an adverb must appear after V, but cannot appear after X:

19. | Me | (ndo) | rá | (*ndo) | no' | gaa | ta'nii | no'.
---|---|---|---|---|---|---|---|---
 | want | (much) | part | (much) | 3:s:f | pot:exist | child | 3:s:f

'She wanted very much to have children.'
Lit. 'She wanted very much for her children to exist.'

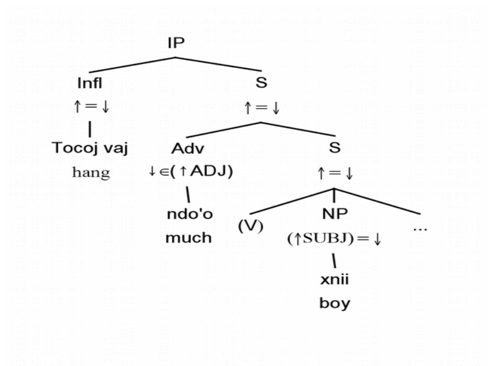
Compound verbs raise questions of both a theoretical and practical nature. From a theoretical perspective, what is the difference in syntactic structure that accounts for this difference in behavior? From a practical point of view, how much information about the constituency of compounds needs to be included in a lexical entry?

To address the theoretical question first, I suggest that these three types of compounds correspond to structures like the following:

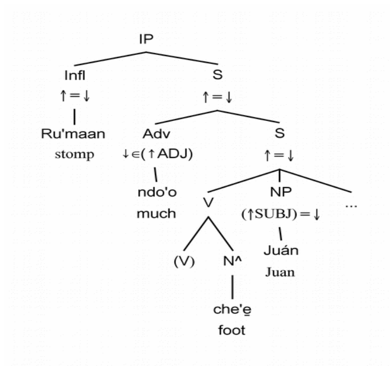


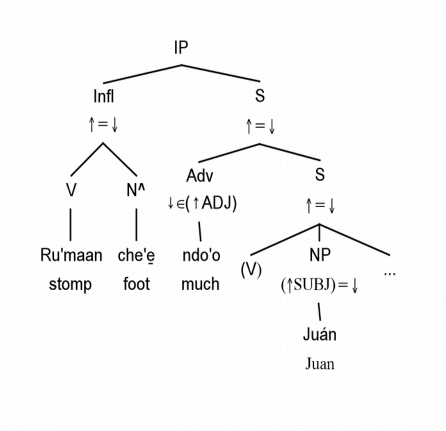

*Three types of compound verb*

I will assume that adjectives like *ndo* are adjoined to S, and that the word orders observed are due to a principle of Copala Triqui grammar that places verbs in a higher functional projection, here labelled Infl. For incorporating compounds, the entire compound appears in Infl.

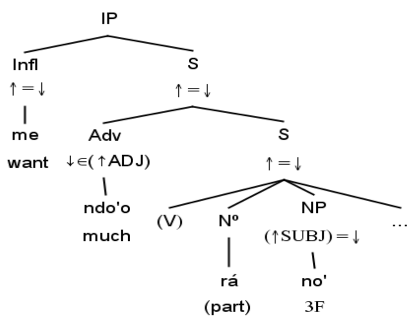



For adjunction compounds, there are two possibilities: positioning the entire [V X] in Infl or positioning just the V portion of the compound in Infl.






Finally, the non-constituent compounds have a structure like the following:




Thus the compounds have a structure that is useful to understanding the overall clausal organization of Copala Triqui, and the different types are important to understanding the syntax.

As a practical lexicographic question, how do we know whether a combination of a V plus another element counts as a compound which should be listed in the lexicon? Here the strict VSO order of Copala Triqui is very helpful – we have taken as a general principal whenever a V X $NP_{SUBJ}$ sequence in our texts, [V X] is a candidate compound verb if X is not an adverb. We select all candidates of this type in our text corpus and check them with our speakers. The corpus has revealed many such verbs that probably would not have arisen in elicitation. A harder question is determining which type a compound belongs to. Here we must turn from corpus to elicitation to check our speakers' judgments.

## 6 Control in Copala Triqui

### 6.1 Control verbs

Copala Triqui has a type of control which is very infrequent cross-linguistically, a pattern known as ***copy control*** (Polinsky and Potsdam 2006). Let us refer to the matrix clause containing a control verb as C1, and its complement as C2. Using this terminology, the normal pattern in Copala Triqui is that the subject of C2 must be a copy of the subject in C1.[6]

| | | | |
|---|---|---|---|
| *20.* | *Nó xcúún* | *Juán* **ca-'na̱'** | *Juán* |
| | obliged | Juan pot-come:LOW | Juan |
| | 'Juan needs to come/Juan must come.' | | |

Nearly all of the control verbs in Copala Triqui are also compound verbs. In addition to the problem of distinguishing the three compound types, control verbs present an additional set of complication, since they may impose different register restrictions on their complements.

What are the general properties of control in Copala Triqui and what aspects of the syntax of these verbs are lexically specific?

### 6.2 Register restrictions on control complements

There are no infinitival forms of verbs in Copala Triqui, but there is a special relationship between the aspect of the verb of C1 and the verb of C2. One class (the majority) of verbs of control requires the aspect of C2 to be in the potential aspect (low register). The other class of verbs requires that the tone register of the verb of C2 match the tone register of the verb of C1 (Hollenbach 1992:218-220).

The verb *uun rá* 'act voluntarily' is in the class that requires potential aspect (low register) on the verb of C2. Consider the following example:

6 As an aid to understanding the structure, I have used red text to show the coreferential argument of C1 and C2. Green text shows the verbs of C1 and C2.

21.

| | | | | |
|---|---|---|---|---|
| Dan me se | ga̱a | guun | rá | Pedró |
| dan me ze | ga̱a | g- | uun ráa | Pedró |
| (new paragraph) | when | com | act:volunt | Peter |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| catu̱u̱ | | Pedró | rá | ve' | , | ne̱ | nari' | |
| c- | atuu̱ | Pedró | rá | ve' | | ne̱ | na- | ri' |
| pot | enter:LOW | Peter | in | house | | and | rep | meet, |

| | | | |
|---|---|---|---|
| tuvi' | Cornelió | ga̱ | so' |
| tuvi' | Cornelió | ga̱ | so' |
| friends, family | Cornelio | with | 3:m:s |

'As Peter entered the house, the family of Cornelius met him …' (Acts 10:25)

A verb like *uun che'e̱* 'begin' is in the second class of control verb, and requires that the register of verb of the subordinate clause match the main verb. In (22), the register of *cataj xna'anj* 'testify' must be high register because *guun che'e̱* is in the completive aspect and is thus high register.

22.

| | | | | | | |
|---|---|---|---|---|---|---|
| Ga̱a ne̱ | guun | che'e̱ | Pedró | cataj | xna'anj | nica̱ |
| ga̱a ne̱ | g- | uun che'e̱ | Pedró | ca- | taj xna'anj | nica̱ |
| then | com | begin | Peter | com | testify, say | straight |

| | | |
|---|---|---|
| so' | rihaan | nij so' |
| so' | rihaan | $nij^3$ $so'^3$ |
| 3mSg | to | they |

'Then Peter began to testify to them…' (Acts 11:3)

But if the verb uun che'e̱ 'begin' changes register, the register of its complement also changes, as in (23). In this example, the verbs *go̱', cha̱, co'o̱*, and *gu̱un* are in the low register because *gu̱un che'e̱* is low register due to its potential aspect.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 23. | ...ga̱a ne̱ | gu̱un che'e̱ | | so' | go̱' | | so' | man |
| | ga̱a ne̱ | g- | u̱un che'e̱ | so' | g- | o̱' | so' | man |
| | then | pot. | begin:LOW | 3mSg | pot | hit:LOW | 3mSg | acc |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| yo'ó | nij | mozó | do̱' | , | man | nij | mozó | cha̱na̱ |
| yo'ó | nij | mozó | do̱' | | man | nij | mozó | cha̱na̱ |
| other | plural | servant | and | | acc | plural | servant | woman |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| do̱' | , | ne̱ | cha̱ | so' | co'o̱ | | so' | ne̱ |
| do̱' | | ne̱ | cha̱ | so' | co- | 'o̱ | so' | ne̱ |
| and | | and | eat:LOW | 3mSg | pot | drink:LOW | 3mSg | and |

| | | | | | |
|---|---|---|---|---|---|
| gu̱un | | xno̱ | so' | a | . |
| g- | u̱un | xno̱ | so' | a | |
| pot. | become:LOW | drunk | 3mSg | part | |

'… and will begin to beat the other servants, both men and women, and to eat and drink and get drunk.' (Luke 12:45)

Why call this register agreement rather than aspect agreement? We can see the difference when the verb of C1 appears with a negative:

| | | | | | | |
|---|---|---|---|---|---|---|
| 24. | Ne | gu̱un yucua̱n' | | rej | che̱j | so' |
| | ne | g- | u̱un yucuan' | rej | che̱j | so' |
| | neg | com | be able:LOW | father | in-law | 3mSg |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| c-una̱nj | rej | che̱j | so' | rique | lléé | ma' | . |
| c-una̱nj | rej | che̱j | so' | rique | lleé | ma' | |
| com-run:LOW | father | in-law | 3mSg | in | clearing | neg | |

'His father-in-law didn't have time to run from the clearing.' (Thunder god fights 24)

In this example, although the aspect of C1 is completive, its register is low, due to the preceding negative. Here the verb of C2 shows low register agreement; not the normal high register of the completive. Thus many control contexts show register agreement, not aspect agreement.[7]

7 Hollenbach (1992:210) notes the same descriptive phenomenon, though her account does not use the idea of register agreement.

## 6.3 Types of control verbs

### 6.3.1 Inventory of verbs

Copala Triqui has verbs with subject control, object control, and oblique control by the object of a preposition. The following is a partial list of control verbs, grouped by control type and register type of the complement

| Control type | Aspect/register of complement | Copala Triqui | Gloss |
|---|---|---|---|
| Subject control | potential (low register) | *me rá* | want |
| | | *nó xcúún* | should |
| | | *a'vej rá* | be willing, consent |
| | | *na'vej rá* | refuse |
| | | *uun rá* | want, do intentionally |
| | | *síj rá* | dare |
| | matching register | *uun che'e̱* | begin |
| | | *uun nucua̱j* | have the strength, be able |
| | | *'yaj canaán* | succeed in |
| | | *uun yucuan'* | hurry to, have time to |
| | | *navij rá* | decide |
| Object control | potential (low register) | *a'néé* | send, order |
| | | *nago' ... chrej sa̱'* | encourage |
| Oblique control | potential (low register) | *aráán … chrej* | prevent |
| | | *vaa ya'núj* | be free to |

### 6.3.2 Control by object and oblique

Previous examples have shown control by the subject of C1. In the following examples, the subject of C2 must be identical to a.) the object of C1 or b.) an oblique (the object of a subcategorized preposition) in C1.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 25. | ... gaa ne | ca'néé | | so' | man | nij so' | ca'anj | | nij so' |
| | gaa ne | c- | a'néé | so' | man | nij so' | ca- | 'anj | nij so' |
| | then | com | order | 3mSg | acc | they | pot | go:LOW | they |

| | | |
|---|---|---|
| chuman' | Jope | ... |
| chuman' | Jope | |
| town | Joppa | |

'… and he sent them to Joppa.' (Acts 10:8)

ei.

emph

'…but Satan prevented us from coming to you' (Lit. '...prevented *to* us...) (1 Thes 2:18)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 26. | Tzaj ne | sese | gaa ya'núj | rihaan | mozó | guun | | |
| | tzaj ne | sese | gaa ya'núj | rihaan | mozó | g- | uun | |
| | but | if | pot:be free to | to | servant | pot | become:LOW | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| yaníj | so' | rihaan | ru'vee | rii ta'nga' | rihaan | so' | ··· |
| yaníj | so' | rihaan | ru'vee | rii ta'nga' | rihaan | so' | |
| apart | 3mSg | to | boss | be in charge of | to | 3mSg | |

'But if the servant is free from to leave the master who rules him ...' (1 Cor 7:22)

### 6.3.3 The form of the second subject

The coreferential subject of C2 must be a repetition of the subject of C1. The options are a.) Total repetition, b.) Pronominal repetition, or c.) a gap repetition.

The distribution of the three kinds of repetition is complex and will require more research. However, the most usual pattern is that total repetition and pronominal repetition are both acceptable for light, non-pronominal subjects. Pronominal subjects and heavy pronominal subjects allow only pronominal repetition. Gapped subjects normally allow only gap repetition.

#### 6.3.3.1 Total repetition

Total repetition is frequent when the subject of C1 is a.) a proper name, b.) a generic, or c.) a pronoun.

In the following example, the proper noun *Diose̱* 'God' is repeated in both C1 and C2, illustrating the most frequent pattern for proper names:

27. … gu̱un nucua̱j Diose̱ ti̱nanii

g- u̱un nucua̱j Diose̱ ti̱nanii

pot have strength, be able:LOW God pot:save:LOW

Diose̱ man ní' rihaan sayuun ado̱nj .

Diose̱ man ní' rihaan sayuun ado̱nj

God acc we (inclusive) to problem intens

'…God is able to save us from problems.' 1 Cor 1:18c

Generic nouns like chana̱ 'woman' and yuvii̱ 'people' are also frequently repeated in both C1 and C2

28. Ne nó xcúún chana̱ ca'mii̱ chana̱ ma' .

ni nó xcúúńn chana̱ c- a'mii chana̱ ma'

neg be obliged woman pot speak:LOW woman neg

'Women should not speak.' (1 Cor 14:33)

29. Se̱ gu̱un yucua̱n' nij yuvii̱ xca̱j

se̱ g- u̱un yucuan' nij yuvii̱ xcaj … cuentá

not com be able:LOW plural people pot:learn:LOW

nij yuvii̱ cuentá da̱j vaa rá so' ma' .

nij yuvii̱ cuentá da̱j vaa rá so' ma'

plural people learn in this way think 3mSg neg

'People are not able to learn this, according to him.' (1 Cor 2:11)

The final type of full repetition is found when the subject of C1 is a pronoun, and in this case, pronominal repetition is the only possibility.

30. … 

| | | | | | | |
|---|---|---|---|---|---|---|
| me rá | núj | nata̱' | núj | se nana̱na̱na̱ | | Diose̱ |
| me rá | núj | nata̱ ' | núj | se | nana̱ | Diose̱ |
| want | we (excl) | pot:explain | we (excl) | poss | word | God |

| | |
|---|---|
| rihaan | soj |
| rihaan | soj |
| to | 2pl |

'…we want to explain the word of God to you.' (1 Thes 2:16)

### 6.3.3.2 Pronominal resumption

Pronominal resumption occurs when the subject of C1 is a non-pronominal, while the subject of C2 is a coreferential pronoun.

31. 

| | | | | | |
|---|---|---|---|---|---|
| Nana̱ | nihánj | me se | , | nó xcúún | nij |
| nana̱ | nihánj | me ze | | nó xcúúńn | nij |
| word | this | cleft marker | | have the obligation | plural |

| | | | | | | |
|---|---|---|---|---|---|---|
| xnii | cuno̱ xre̱j | | nij so' | vaa | ne̱ | . |
| xnii | c- | uno xre̱j re̱j | nij so' | vaa | ne̱ | |
| youth | pot | listen:LOW | 3:m:p | part | and | |

'Boys have the obligation listen to these words.' (Nana̱ nugua̱n' 1:13)

An interesting subclass of pronominal resumption is found when the subject of C1 is a pronoun + appositive. There are two possibilities. The first is resumption solely by the pronoun.

32. 

| | | | | | |
|---|---|---|---|---|---|
| Ne | nó xcúún | núj | sno̱'o | ca̱ráán | |
| ne | nó xcúúńn | núj | sno̱'o | c- | a̱ráán |
| negative | be obliged | we (exclusive) | male | pot | cover:LOW |

| | | | | |
|---|---|---|---|---|
| núj | raa̱ | núj | ma' | . |
| nuj[5] | raa̱ | núj | ma' | |
| we (exclusive) | head of | we (exclusive) | neg | |

We men should not cover our heads. (1 Cor 11:7)

But a more complex type of resumption is seen in the following example. Here the logical subject of C1 is 'you, the authorities', but the appositive portion alone appears in C1, with the pronominal portion in C2.

| | | | | | |
|---|---|---|---|---|---|
| 33. Nana̱ | nihánj | me se | , | nó xcúún | nij |
| nana̱ | nihánj | me se | | nó xcúúńn | nij |
| word | this | cleft marker | | be obliged | plural |

| | | | | |
|---|---|---|---|---|
| síí nica̱j suun | cuno̱ xre̱j | | nij soj | do̱' |
| síí nica̱j suun | c- | uno̱ xre̱j | nij soj | do' |
| authority | pot | listen:LOW | 2:pl | and |

'You who hold office have the obligation to listen to these words.' (Nana̱ nugua̱n' 1:20)

The reverse pattern, where the pronominal is in C1 and its appositive is in C2 is unattested:

| | | | | | |
|---|---|---|---|---|---|
| 34. *Nana̱ | nihánj | me se | , | nó xcúún | nij soj |
| nana̱ | nihánj | me se | | nó xcúúńn | nij soj |
| word | this | cleft marker | | be obliged | 2:pl |

| | | | | |
|---|---|---|---|---|
| cuno̱ xre̱j | | nij | síí nica̱j suun | do̱' |
| c- | uno̱ xre̱j | nij | síí nica̱j suun | do' |
| pot | listen:LOW | plural | authority | and |

(You who hold office have the obligation to listen to these words.)

It is important to notice that in examples like (34) above, the subject of C1, 'authorities', is [PERSON 1], while the subject of C2, 'you (pl)' is [PERSON 2]. This feature incompatibility seems to indicate that an approach to control via subsumption, as in Sells (2006), cannot work for Copala Triqui. The features of C2 cannot be a superset of those for C1, due to the potential incompatibility of the PERSON feature.

#### 6.3.3.3 Subject gaps

If the subject of C1 is a gap, then the subject of C2 must also be a gap. For instance, in example (35), the relative subject *nij síí* 'the ones who' precedes the control verb *na'vej rá* 'refuse' and is associated with a gap after the verb of control (C1). Accordingly, the subject of C2 is also a gap:

35.

| | | | | | | |
|---|---|---|---|---|---|---|
| Da̲nj | cata̲j | soj | rihaan | nij | síí | na'vej rá __ |
| da̲nj | ca- ta̲j | soj | rihaan | nij | síí | na'vej rá |
| thus | pot say | 2pl | to | pl | one(s) who | refuse |

| | | | | | | |
|---|---|---|---|---|---|---|
| cuno̲ | __ | nana̲ | ca'mii | soj | a | . |
| c- uno̲ | | nana̲ | c- a'mii | soj | a | |
| com hear | | word | com speak | 2pl | decl | |

'Thus you will say to the ones who refuse to hear the words that you speak.' (Luke 10:11)

Similarly, in (37), the topicalized subject *roj* 'you (pl)' precedes the control verb *nó xcúún* 'should' and leaves a gap. A gap is also found after the subject of *nari'* 'meet'.[8]

36.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sane̲ | a̲ | , | asino ña̲a̲n | soj | ro' | , | nó xcúún __ | doj |
| sane̲ | a̲ | | asino ña̲a̲n | soj | ro' | | nó xcúún | doj |
| but | now | | first | 2pl | top | | should | more |

| | | | | | | |
|---|---|---|---|---|---|---|
| nari' | __ | sa̲' | ñanj | ga̲ | xna'ánj xlá | ... |
| na- ri' | | sa̲' | ñanj | ga̲ | xna'ánj xlá | |
| rep meet | | well | paper | and | Spanish language | |

'But first you should learn your subjects and Spanish well...' (*Nana̲ nugua̲n)*

Consider example (38) where the subject *yo'ó tinúú ní'* 'other brothers of ours' appears twice. When it is in-situ (post-verbal) in the first sentence, a pronominal resumptive appears. When the same noun phrase is clefted in the second and third sentences, a gap appears after the verb in both C1 and C2.

8 *Nari'...ñanj,* literally 'meet paper' is idiomatic for 'learn'.

37. …ne̱ uun nucua̱j yo'ó tinúú ní' tinahuun
and be able other brother (of a man) we (incl) heal
so' man síí ran' … Yo'ó tinúú
3:m:s acc one(s) who suffer other brother (of a man)
ní' me síí uun nucua̱j __ 'yaj suun __ sa̱' noco̱o ,
we (inclusive) who be able work good big
ne̱ yo'ó tinúú ní' uun nucua̱j __ nata' __
and other brother (of a man) we (incl) be able explain
nana̱ …
language

'And another of our brothers is able to heal those who suffer.… Another of our brothers is able to work miracles and another of our brothers can translate languages.' (1Cor 12:9-10)

Substitution of a pronoun for the second gap in sentences of this sort is judged possible (39), though perhaps somewhat less natural. This contrasts with the ungrammatical pattern where a pronoun substitutes for the first gap (40):[9]

38. ? Da̱nj cata̱j soj rihaan nij síí na'vej rá __
da̱nj ca- ta̱j soj rihaan nij síí na'vej rá
thus pot say 2pl to pl one(s) who refuse
cuno̱ nij so' nana̱ ca'mii soj a .
c- uno̱ nij so' nana̱ c- a'mii soj a
com hear 3:m:pl word com speak 2pl decl

'Thus you will say to the ones who refuse to hear the words that you speak.' (Luke 10:11)

9 We might account for the ungrammaticality of (36) as a "condition D" effect (Lasnik 1986), where a pronoun may not c-command a coreferent r-expression.

39. *Da̲nj cata̲j soj rihaan nij síí na'vej rá nij so'

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| da̲nj | ca- | ta̲j | soj | rihaan | nij | síí | na'vej rá | nij so' |
| thus | pot | say | 2pl | to | pl | one(s) who | refuse | 3:m:pl |

cuno̲ __ nana̲ ca'mii soj a ·

| | | | | | | |
|---|---|---|---|---|---|---|
| c- | uno̲ | nana̲ | c- | a'mii | soj | a |
| com | hear | word | com | speak | 2:pl | decl |

'Thus you will say to the ones who refuse to hear the words that you speak.' (Luke 10:11)

## 7. Challenges and future research questions

Though we understand much of the syntax of compound verbs and control in Copala Triqui, there are still some problematic areas. For compound verbs, it is difficult to document all the possibilities and to predict the type of a compound. For the overlapping domain of control verbs, there are also some challenges. These include a.) the possibility of covert copies, b.) the length of the copy, and c.) the relation of normal control in Copala Triqui to the emotion auxiliary construction.

### 7.1 Covert copies

In our texts, the subject of C2 is almost always an overt copy. Of several thousand textual examples, we have found less than ten where an in-situ subject in C1 lacks a copy in C2. Such examples have a syntax similar to English or Spanish, where the subject of C2 is covert:

40. Me rá xrej ca-'a̲nj Ø.

want priest pot-go

'The priest wants to go.'

Despite their textual rarity, our language consultants readily accept constructed examples of this sort, though they do not usually volunteer them. We suspect that the acceptability of these sentences may reflect language change in progress. Our language consultants are about 50 years younger than the consultants for the New Testament (who worked with the Hollenbachs in the 1960s). Our speakers are also more strongly bilingual or trilingual in Spanish and English than earlier generations of Copala Triquis.

### 7.2 Length restrictions

Our textual examples also show an unusual restriction on the length of the subject of C2 which is difficult for most syntactic theories to capture. The subject of C1 may be of any length, but only short subjects are accompanied by a full copy. In our texts, a full copy is almost always 1-2 words. We have no examples of a copy that is longer than three words.

Copala Triqui pronouns are one or two word long, with an optional preceding plural marker or quantifier (e.g. all, each, other). Thus pronominal echos are also 1-3 words long. Similarly, in elicitation our speakers usually reject constructed examples with an copy longer than 2 words:

41. *?Me rá chana̠ chre̠' nihánj ca-'a̠nj chana̠ chre̠' nihánj.

want woman short that pot-go woman short that

(Intended reading: That short woman wants to go.)

### 7.3 Control and the emotion auxiliary construction

Copy control in Copala Triqui shares many traits with the emotion auxiliary construction (Broadwell 2013). In this construction, subjects of emotion predicates (C1) optionally control a second verb *ne'e* 'see' or *ni'ya̠j* 'look' (C2):

42. Nachri' nii ni'ya̠j nii man núj.

hate indef look indef acc we (excl)

'People hate us.' (≈ 'They hate to regard us')

All the constraints on the register of C2 and on the shape of the copy in C2 are same as in copy control. In particular, the register of *ne'e* 'see' or *ni'ya̠j* 'look' must match the register of the verb in C1. However, the semantic contribution of the second verb in emotion auxiliary constructions is problematic, and the emotion predicates in C1 do not seem to be standard control verbs. Control and emotion constructions thus need an analysis that captures their shared morphosyntactic properties while distinguishing their syntax.

### 7.4 Copala Triqui control within a typology of control

The kind of control seen in Copala Triqui is probably best analysed as obligatory anaphoric control (Bresnan 1982, Dalrymple 2001, inter alia). However, previous descriptions typically use equations like

43. $(\uparrow \text{COMP SUBJ PRED}) = \text{'PRO'}$

$((\uparrow \text{COMP SUBJ})\sigma \text{ ANTECEDENT}) = (\uparrow \text{SUBJ})\sigma$

(Dalrymple 2001:327)

This clearly will not work for Copala Triqui, since the subject of C2 need not be a gap. However it is not a trivial matter to revise these equations to model the Triqui data. In particular, it is difficult to capture the generalizations that

A.) The PRED of the COMP SUBJ can be either PRO or the PRED of the controller

B.) In appositives, the COMP SUBJ may be quantified or contain PERSON features distinct from its controller.

C.) The COMP SUBJ obeys a length restriction that limits its size.

## 8. Conclusion

Though there are still many unanswered questions, we have begun to get closer to a 'thick' description of Triqui compound and control verbs, and the range of syntactic contexts associated with them. To the extent that we have made good progress, it has been through a mix of elicitation and corpus work. We would not have figured out the full range of data solely from the corpus.

On the other hand, we probably would not have discovered the full range of facts from elicitation; they only came to light in a large corpus of the language. The combined power of the two methods of work can yield results that are more powerful than either method alone.

We have also benefitted from sharing the research direction with the community. Dictionary-making and text collection were the parts of linguistic research that members of the local Copala Triqui community valued as a way to preserve their language for future generations. We might not have focused as much energy on these parts of our language documentation project without the guidance of our community language partners.

## References

Bresnan, Joan. (1982). Control and complementation. In *The mental representation of grammatical relations* (J. Bresnan, ed) Cambridge: MIT Press.

Broadwell, George A; Matsukawa, Kosuke; Martín del Campo, Edgar; Scipione, Ruth; and Susan Perdomo (eds). (2009). *The origin of the sun and moon: A Copala Triqui legend* (Román Vidal López, narrator). Munich: Lincom Europa.

Broadwell, George A. 2012. Un método para añadir textos religiosos rápidamente a una base de datos lingüística: un estudio del Triqui de Copala. Presented at Coloquio sobre lenguas otomangues y vecinos, Oaxaca, Mexico 2012.

Broadwell, George A. 2013. An emphatic auxiliary construction for emotions in Copala Triqui. *Proceedings of LFG13,* (M. Butt and T. Holloway King, eds). *Stanford: CSLI Publications*.

Dalrymple, Mary (2001). Lexical Functional Grammar. San Diego: Academic Press.

Geertz, Clifford. (1994). Thick description: Toward an interpretive theory of culture. Readings in the philosophy of social science, 213-231.

Hollenbach, Barbara E. 1976. Tense—negation interplay in Copala Trique. International Journal of American Linguistics 42:126–32.

Hollenbach, Barbara. 1984. The phonology and morphology of tone and laryngeals in Copala Trique. Ph.D. thesis, University of Arizona.

Hollenbach, Barbara E.. 1992. A syntactic sketch of Copala Trique. Pages 173–431 in C. Henry Bradley and Barbara E. Hollenbach, editors. Studies in the syntax of Mixtecan languages, Volume 4. Dallas: Summer Institute of Linguistics and the University of Texas at Arlington.

Hollenbach, Barbara. 2004. Gramática popular del triqui de Copala. ms. (Posted at http://www.sil.org/~hollenbachb/Posted.htm)

Hollenbach, Barbara. 2005 Vocabulario preliminar de triqui de San Juan Copala, Oaxaca. ms. (Posted at http://www.sil.org/~hollenbachb/Posted.htm)

Lasnik, Howard. 1986. On the necessity of binding conditions. *Essays on anaphora,* H Lasnik (ed.). Dordrecht: Kluwer

Polinsky, Maria, & Potsdam, Eric. 2006. Expanding the scope of control and raising. *Syntax*, *9* (2), 171-192.

Sells, Peter. 2006. Using subsumption rather than equality in functional control.*Proceedings of LFG06,* (M. Butt and T. Holloway King, eds). *Stanford: CSLI Publications*.

SIL International. 2014. Fieldworks Language Explorer (FLEx). SIL Fieldworks. http://fieldworks.sil.org/flex/.

Vidal-Lopez, Román. (2012). Nana naguan' rihaan nij síí chihaan' | Consejos para la gente Triqui | Words of counsel for the Triqui people. Edited by George A Broadwell, Ashley LaBoda, Sharone Horowit-Hendler, and Gabriela Aquino Dehesa. IMS Occasional Publication No. 16. Albany NY: University at Albany.

# QUESTIONS AND INFORMATION STRUCTURE IN URDU/HINDI

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**Abstract**

The overall goal of this paper is to open up a new perspective on questions in Urdu/Hindi. The paper focuses particularly on word order variation involving *wh*-elements. An analysis is developed which seeks to understand these variations not in terms of syntax-specific movement triggers, but via an integration of i(nformation)-structure, more precisely in terms of strategies for information packaging and Common Ground Management.

# 1 Introduction

The overall goal of this paper is to open up a new perspective on questions in Urdu/Hindi. The empirical domain is word order variation found with *wh*-elements. The analysis proposed understands these variations not in terms of syntax-specific movement triggers, but via an integration of i(nformation)-structure, more precisely in terms of *information packaging* (Chafe 1976, Vallduví 1992, Krifka 2008).

The basic idea is as follows. Given that word order variation in Urdu/Hindi in declaratives correlates with information status (e.g., Gambhir 1981, Kidwai 2000, Butt and King 1996, 1997), then why not assume that word order variation plays a similar role in questions? In particular, the analysis involves an assumption of *Common Ground Management* (CG Management) in the sense of Krifka (2008) coupled with existing ideas on the relationship between i-structure and questions developed within LFG (Mycock 2006, 2013).

The paper takes a closer took at word order variation found in: 1) constituent questions; 2) polar questions involving the question marker *kya* 'what'. The analysis sees word order variation in constituent questions as expressing pragmatic information with respect to CG Management. The polar *kya*, on the other hand, serves to partition the clause into a focus part and a background/given part, whereby the background part is not available for questioning.

Relevant background information on word order and information structure in Urdu/Hindi declarative clauses is presented in Section 2. Section 3 discusses constituent question formation. The main components for an alternative analysis are provided in section 4 and a sample analysis for immediately preverbal vs. immediately postverbal *wh*-constituents is presented in section 5. Positional variation with respect to the polar question marker *kya* 'what' is dealt with in section 6. The paper concludes with section 7.

# 2 Word Order and Information Structure in Urdu/Hindi

The default word order in Urdu/Hindi is SOV. All major consituents can scramble. Hindi/Urdu is not strictly verb-final, which means that material can appear after the verb. Topics are generally found clause initially, focus in the immediately preverbal positions (e.g., Gambhir 1981, Kidwai 2000).

However, one cannot assume a simple one-to-one mapping between position and information structure. Gambhir (1981) has shown that the clause-final position, for example, has several functions. One central function is de-emphasis (which mostly involves pronominals), dubbed BACKGROUND in Butt and King (1996, 1997). However, postverbal material can also signal added emphasis on new information that is presented, e.g., in a TV/radio announcement style (or for the creation of suspense). Processing may also play a role in that "heavy" items can be shifted to the end of the clause (cf. heavy NP-shift in English).

Similarly, Gambhir (1981) shows that the clause initial position is not always a topic, but can also be used for scene setting. Given her description, this can be thought of as "frame setting" in Krifka's (2008) sense. An illustrative example from English is given in (1), where *healthwise* is not a topic, but a frame setter.

(1) A. How is John?

B. {Healthwise}, he is [FINE]$_{\mathrm{F}}$.

Urdu/Hindi also contains some discourse particles. The discourse particle *to* generally marks preceding constituents as topics (cf. Kidwai 2000) or frame setters. The particle *hi* 'only' serves to emphasize and/or focus preceeding constituents.

Based on the above patterns and on a small corpus study of Bollywood movie dialogs, Butt and King (1996, 1997) developed a four-way i-structure analysis in terms of [$\pm$ prom(inent)] and [$\pm$new], as shown in Table 1.

| **Type** | **Definition** | **Position** |
|---|---|---|
| Topic | [$-$New,$+$Prom(inent)] | Clause-Initial |
| Focus | [$+$New,$+$Prom(inent)] | Immediately Preverbal |
| Background | [$-$New,$-$Prom(inent)] | Postverbal |
| Completive Information | [$+$New,$-$Prom(inent)] | Between Topic and Focus |

Table 1: Four major types of i-structure categories (Butt and King 1996, 1997)

Their proposal incorporated ideas by Vallduví (1992) on information packaging, Choi's (1996) realization of information structure within LFG and Kiss' (1995) notion of discourse configurationality. Butt and King proposed that a clause could be partitioned into four main information structural components: topic, focus, background and completive information. An example of a sentence containing all four types of i-structure categories is provided in (2), where "T" stands for topic, "F" for focus, "CI" for completive information and "B" for background.

(2) [nadya]$_T$ (to) [ɑb$^h$i] [ṭɔfi]$_{CI}$ [bazar=se]$_F$ xɑrid
Nadya.F.Nom indeed just now toffee.F.Nom market.M=from buy

rɑh-i t$^h$-i [mere=liye]$_B$
stay-Perf.F.Sg be.Past-F.Sg I.Gen.Obl=for
'Nadya was just buying toffee at the market for me.'

Butt and King's system is fairly simple and in need of expansion. For example, the system as presented does not deal with embedded clauses, nor does it provide a complete analysis of when and how pro-drop is possible.[1] Some critical discussion and further development of the system can be found in Mycock (2006, 2013).

# 3 Constituent Questions

## 3.1 Basic Data

Urdu/Hindi has traditionally been characterized as a *wh*-in-situ language (but also see Bayer (2006)). This is illustrated in (3), where (3b) is the interrogative version of (3a). The *wh*-element *kıs=ko* in occurs in exactly the same linear position in (3a) as *ram=ko* does in (3a).

(3) a.

| | | | | |
|---|---|---|---|---|
| sita=ne | $d^h$yan=se | **ram=ko** | dek$^h$-a | t$^h$-a |
| Sita.F=Erg | carefully | Ram.M=Acc | see-Perf.M.Sg | be.Past-M.Sg |

'Sita had looked at Ram carefully.'

b.

| | | | | |
|---|---|---|---|---|
| sita=ne | $d^h$yan=se | **kıs=ko** | dek$^h$-a | t$^h$-a? |
| Sita.F=Erg | carefully | who.Obl=Acc | see-Perf.M.Sg | be.Past-M.Sg |

'Who had Sita looked at carefully?'

However, the traditional characterization is not quite correct as the default position for *wh*-elements is actually the immediately preverbal position, which has in turn independently been established as a focus position (Kidwai 2000). (4) shows the default word order for the questioning of an ergative subject. The *wh*-element is not in-situ, but immediately preverbal.

(4)

| | | | | |
|---|---|---|---|---|
| ram=ko | $d^h$yan=se | **kıs=ne** | dek$^h$-a | t$^h$-a? |
| Ram.M=Acc | carefully | who.Obl=Erg | see-Perf.M.Sg | be.Past-M.Sg |

'Who had looked at Ram carefully?'

Similarly, the default order for a how-question is illustrated in (5c). The *wh*-element is in the immediately preverbal position and not in the in-situ position. When it appears in-situ, as in (5b), the clause expresses an additional dimension of meaning, e.g., some degree of wonder.

(5) a.

| | | | | |
|---|---|---|---|---|
| sita=ne | **$d^h$yan=se** | ram=ko | dek$^h$-a | t$^h$-a |
| Sita.F=Erg | carefully | Ram.M=Acc | see-Perf.M.Sg | be.Past-M.Sg |

'Sita had looked at Ram carefully'

[1]Any argument can in principle be dropped in Urdu/Hindi. Pro-drop cannot be argued to be licensed via agreement or any other morphological or syntactic factors. Butt and King (1997) suggest that pro-drop is linked to old information status. An in-depth corpus study conducted by Prasad (2000, 2003) suggests that grammatical relations are a significantly conditioning factor so that object pro-drop is more likely if the subject of the clause has been dropped.

b. sita=ne **kaise** ram=ko dek$^h$-a t$^h$-a?
Sita.F=Erg how Ram.M=Acc see-Perf.M.Sg be.Past-M.Sg
'How had Sita managed to see Ram?' (expresses degree of wonder)

c. sita=ne ram=ko **kaise** dek$^h$-a t$^h$-a?
Sita.F=Erg Ram.M=Acc how see-Perf.M.Sg be.Past-M.Sg
'How had Sita looked at Ram?' (default order for a how-question)

*Wh*-constituents are not restricted to the default focus position or the in-situ position — they have the same kind of scrambling possibilities as non-interrogative NPs (Manetta 2012). However, when they appear in non-default positions, this correlates with an additional pragmatic effect (cf. (5b) vs. (5c)). To date, a comprehensive analysis of these pragmatic effects does not exist.

### 3.2 Scope and Scope Marking

The left clausal periphery has received the most overall attention to date. This is because the literature has focused on why, given a general assumption of covert *wh*-movement for Urdu/Hindi, *wh*-words in embedded clauses cannot take matrix scope (e.g., Mahajan 1990, Srivastav 1991, Dayal 1994, 1996, 2014, Lahiri 2002a, Bhatt and Dayal 2007, Manetta 2010, 2012).

This issue is the most obvious one to tackle from an LF-based perspective in which the *wh*-word is assumed to move to a position where it can act as a scope operator (usually SpecCP). Since the *wh*-word in Urdu/Hindi can stay in situ, LF-based approaches have to assume that the *wh*-word undergoes covert (invisible) movement to the appropriate operator position. But then, what prevents covert movement from applying in examples such as (6), where the *wh*-element cannot take matrix scope?

(6) rɑvi jan-ta t$^h$-a
Ravi.M.Nom know-Impf.M.Sg be.Past-M.Sg

[ke sita=ne d$^h$yan=se **kɪs=ko** dek$^h$-a t$^h$-a]
that Sita.F=Erg carefully who.Obl=Acc see-Perf.M.Sg be.Past-M.Sg
'Ravi used to know [who Sita had looked at carefully].'
*'Who did Ravi use to know [Sita had looked at carefully]?'

I do not go into the various (movement or copy-theory) solutions proposed in the literature since *wh*-extraction is not the main focus of the paper (see Mycock (2006) for an LFG approach). Instead, I focus on some empirical issues.

Empirically, there are two ways of achieving matrix scope for embedded *wh*-elements. The *wh*-constituent can either appear in the matrix clause ("extraction"), as shown in (7).[2] Alternatively, the so-called *scope marking* construction can be employed, as illustrated in (8)–(9).

[2]The acceptability of long-distance extraction as in (7) has been disputed (e.g., Stepanov and Stateva 2006). The first reported instances are in Gurtu (1985). It has since been established that they are definitely acceptable under certain intonational contours (Dayal 2014).

(7) | **kya**$_i$ | tʊm | jan-te | ho
--- | --- | --- | --- | ---
 | what | you.Pl.Nom | know-Impf.M.Pl | be.Pres.2.Pl

| [ ki | ʊs=ne | ___$_i$ | ki-ya]? |
| --- | --- | --- | --- |
| [ that | 3.Sg.Obl=Erg | | do-Perf.M.Sg] |

‘What did you know that he did?’ (Srivastav 1991:766) **wh-extraction**

(8) | rɑvi | **kya** | jan-ta | hɛ
--- | --- | --- | --- | ---
 | Ravi.M.Nom | what.Nom | know-Impf.M.Sg | be.Pres.3.Sg

| [ke | sita | **kɪs=ko** | pɑsɑnd | kɑr-ti | hɛ]? |
| --- | --- | --- | --- | --- | --- |
| that | Sita.F | who.Obl=Acc | liking | do-Impf.F.Sg | be.Pres.3.Sg |

‘Who does Ravi know Sita likes?’
Lit.: ‘What does Ravi know, who does Sita like?’ **scope marking**

In the scope marking construction, *kya* ‘what’ is introduced in the matrix clause and the embedded *wh*-element remains in-situ. The matrix *kya* signals that the embedded *wh*-element must be interpreted as having matrix scope. Note that the *kya* in the scope marking construction is the same *kya* that acts as a standard *wh*-element and means ‘what’, cf. (7). Dayal has argued for an indirect dependency account by which the embedded *that*-clause is anaphorically related to the *kya* in the matrix clause, which in turn is not seen as an expletive, but as a “thematic” ‘what’, i.e., a full *wh*-element (Srivastav 1991, Dayal 1994, 1996, 2014).

(9) Scope Marking Construction, f-structure for (7)

$$\left[\begin{array}{ll}
\text{PRED} & \text{‘think}\langle\text{SUBJ, OBJ}\rangle\text{’} \\
\text{SUBJ} & \left[\text{PRED} \quad \text{‘Sita’}\right] \\
\text{OBJ} & \left[\begin{array}{ll}
\text{PRED} & \text{‘what’} \\
\text{ADJUNCT} & \left\{\left[\begin{array}{ll}
\text{PRED} & \text{‘come}\langle\text{SUBJ}\rangle\text{’} \\
\text{SUBJ} & \left[\text{PRED} \quad \text{’who’}\right] \\
\text{FOCUS-INT} & [\ ] \\
\text{PRON-INT} & [\ ] \\
\text{COMP-FORM} & \text{that}
\end{array}\right]\right\}
\end{array}\right] \\
\text{FOCUS-INT} & [\ ] \\
\text{PRON-INT} & [\ ]
\end{array}\right]$$

I follow Dayal’s overall indirect dependency analysis and render the ‘that’-clause as an adjunct modifying the thematic *kya*, as shown in (9). This instantiates the indirect dependency approach, by which the *kya* ‘what’ is analyzed as a proper (not expletive) argument of the matrix verb and the embedded ‘that’-clause modifies the *kya* argument of the matrix clause.[3] The analysis also follows the overall approach to questions established within the ParGram effort.[4]

In contrast, Mycock (2006) adopts a direct dependency approach (cf. McDaniel 1989) for her LFG analysis of Hungarian scope marking. A direct dependency approach has also been proposed for Hindi by Manetta (2010), but Dayal (2014) shows that this does not make the right predictions.

### 3.3 Word Order Variation in Constituent Questions

In this section, I return to the issue of word order variation with respect to *wh*-elements. Recall that a *wh*-constituent can appear anywhere an NP can (Manetta 2012). In particular, the following examples have recently been discussed in some detail (Bhatt and Dayal 2007, Manetta 2012).

(10) a. sita=ne dʰyan=se **kɪs=ko** dekʰ-a tʰ-a?
Sita.F=Erg carefully who.Obl=Acc see-Perf.M.Sg be.Past-M.Sg
'Who had Sita looked at carefully?' (*wh*-in-situ/preverbal focus)

b. sita=ne dʰyan=se dekʰ-a tʰ-a **kɪs=ko**?
Sita.F=Erg carefully see-Perf.M.Sg be.Past-M.Sg who.Obl=Acc
'Sita had looked carefully at who?' (*wh* postverbal)

c. sita=ne dʰyan=se dekʰ-a **kɪs=ko** tʰ-a?
Sita.F=Erg carefully see-Perf.M.Sg who.Obl=Acc be.Past-M.Sg
Reading 1: 'Who had Sita looked at carefully?' (*wh* in verbal complex)
Reading 2: 'Who had Sita really looked at carefully?'
(i.e., she had not looked at anybody carefully)

(10a) is a standard *wh*-question with the *wh*-element in the default preverbal focus position (it is also in-situ). (10b) is analyzed as an echo question by Bhatt and Dayal (2007). For (10c), Bhatt and Dayal (2007) propose a Rightward Remnant Movement analysis in which the verb moves for topicalization purposes.

Manetta (2012) investigates a larger range of data than Bhatt and Dayal and argues that their analysis does not cover enough empirical ground. She insteads advocates a scrambling account in which movement is triggered by probe-goal relationships involving features such as Q(uestion), wh, E(cho)) and the EPP (Extendend Projection Principle). While these features can be motivated theory-internally, several hold no explanatory power when viewed from an external perspective.

However, rather than delving into this issue, I would like to pursue an alternative analysis which invokes pragmatic, information structural concerns in order

[3]A reviewer expressed worry on how to restrict the appearance of such CP adjuncts. The adjunct version of a CP is constrained by the following factors: a) it must contain a *wh*-phrase (checked for via PRON-INT (interrogative pronoun)); b) the matrix clause must contain a *kya*; c) the matrix verb must be of the right type (cf. Lahiri 2002b); d) if a COMP analysis is possible, then that is preferred via OT-Marks (Frank et al. 2001).

[4]http://typo.uni-konstanz.de/redmine/projects/pargram/wiki/Questions

to explain the word order variation. Manetta and Bhatt and Dayal already each invoke information structural notions as part of their analysis. Bhatt and Dayal assume verb topicalization and Manetta explicitly refers to existing work on information structure as well as scrambling in Urdu/Hindi (Gambhir 1981, Butt and King 1996, Dayal 2003). She concludes that Topic/Focus is the result of leftward scrambling while Backgrounded/Old Information is the result of rightward scrambling. However, both Manetta and Bhatt and Dayal propose syntax-specific movement triggers, rather an assuming an independent information-structural component.

For one, recall that (10b) has been analyzed as an echo question by Bhatt and Dayal. Bhatt and Dayal posit that the postverbal *wh*-constituent cannot be interpreted as a standard information-seeking question because it is trapped in a remnant VP, which acts as an island. Manetta derives the echo reading from the old/background information analysis of the postverbal position. However, echo questions have been analyzed as involving a type of focus (Artstein 2002, Truckenbrodt 2012). Given this, the echo reading of *kis=ko* in (10b) cannot follow from the background/old information connection drawn by Manetta. It is also not immediately obvious how being trapped in a VP island would focus a constituent.

Now consider the occurrence of the *wh*-constituent within the verbal complex, as in (10c). When the *wh*-element is in this position, an extra pragmatic meaning dimension can be added to the question. One interpretation of (10c) is that the speaker is not actually expecting an answer to the question (giving rise to a type of rhetorical question). This does not follow from Manetta's account, nor does it follow from Bhatt and Dayal's short distance topicalization of the verb. Further examples of this type, along with an alternative analysis, are provided in section 5.

# 4 Information Packaging

The proposal put forward here is that word order variation of *wh*-constituents should not be understood primarily in terms syntactic considerations, but in terms of *information packaging* (Chafe 1976, Vallduví 1992).

## 4.1 Krifka's proposal

Krifka (2008) cuts through the existing plethora of proposals for topic and focus by providing a combinatory interaction between semantics and pragmatics. He proposes that information structure consists of two major parts:

1. Common Ground Content: truth conditionally relevant information
2. Common Ground Management: pragmatics, packaging of information to fulfill communicative needs/structure the discourse in a certain way.

Among other issues, Krifka argues that understanding information structure in terms of features such as [$\pm$new] (as done in Butt and King (1996, 1997) for example) is not useful. He shows that these features does not yield the right semantic/pragmatic effects. Instead, he proposes to understand focus and topic in terms of CG Management. Krifka sees both topic and foucs as being interpreted with respect to alternative sets, as per Rooth's (1985) Alternative Focus Semantics. This means that the relevant instance out of a larger set of possible alternatives is identified as part of the communicative effort. With respect to both topic and focus, the notion of *givenness* is centrally important — this is what is (or what is assumed to be) already in the Common Ground. The particulars of CG Management are realized via a type of "File Card Semantics" à la Heim (1982). The overall idea is that for each entity introduced as part of a discourse, a "file card" is opened up and information about that entity, including whether it is given or not, is recorded.

The idea of a file card semantics is reminiscent of what was more fully fleshed out within Discourse Representation Theory (Kamp and Reyle 1993). A variant is also assumed by Vallduví (1992) and it appears to be very similar to the "sorting key" notion adopted by Mycock (2006). For the purposes of this paper, I remain agnostic as to which particular technology to adopt.

Important for the analysis is Krifka's separation of information structure into CG Content vs. CG Management and the idea of understanding topic and focus in terms of Rooth's alternative semantics. In particular, the use of word order variation for information packaging falls under CG Management.

## 4.2 Mycock's LFG Perspective

Mycock (2006) investigates *wh*-constituent questions from a typological perspectiven and works out an analysis within a parallel LFG architecture in which phonology/prosody and morphosyntax can contribute to the overall interpretation of an utterance on a equal footing. Mycock posits that all question phrases must have focus status. This status can encoded at one or more levels of linguistic structure. Thus, focus status could be signaled via syntactic position and/or intonation or (an interaction of) other linguistic devices. Mycock explicitly integrates information structure into her overall analysis. Her proposal provides an immediate account of why the default position for *wh*-constituents in Urdu/Hindi is the immediately preverbal position: this position syntactically encodes focus status and is thus one very basic way to ensure that a *wh*-phrase has focus status.

With respect to truth-conditional semantics, Mycock adopts Ginzburg and Sag's (2000) propositional abstract semantics. Under this approach, *wh*-words introduce a parameter which is to be filled in. Interrogative vs. non-interrogative focus is distinguished explicitly via a feature, as shown (12) for the example in (11). Additionally, Butt and King's four-way i-structural distinction between topics, focus, background and completive information is adopted.

The calculation of the semantics of interrogative scope is effected via a meaning constructor **[interrog-scope]**, which can be introduced via the syntax (annotation on c-structure rules) or via prosodic information.

(11) [What]$_{\text{FOCUS}}$ did [CHARLIE]$_{\text{FOCUS}}$ eat?

(12) **i-structure**

$$\left[\begin{array}{ll} \text{FOCUS} & \left[\begin{array}{ll} \text{interrog} & \left\{ \text{x} \right\} \\ \text{non-interrog} & \left\{ \left[ \text{`Charlie'} \right] \right\} \end{array}\right] \\ \text{BACK.INF} & \left\{ \left[ \text{`eat'} \right] \right\} \end{array}\right]$$

### 4.3 Combining Ideas

Mycock does not deal with non-canonical interpretational effects produced by word order variation. Krifka does not deal (explicitly) with questions or with the effects of information structure in SOV languages like Urdu/Hindi. Each of the proposals has elements that are important for an overall analysis of the word order variation found with *wh*-elements in Urdu/Hindi.

I assume an LFG architecture in which i-structure is represented as a separate projection (as per King 1997 and Mycock 2006) and in which information about i-structure flows together from morphosyntax and prosody. However, instead of feature-based notions of topic, focus, background and completive information, I adopt Krifka's basic notions of topic, focus and givenness. At the same time, I do allow for finer grained distinctions within those categories (encoded via an X-TYPE feature). This is also consistent with Krifka's approach.

The revised i-structure analysis of (2), repeated here as (13), is as in (14). The focus is on 'bazar', all other information is registered as given, with the postverbal material additionally being marked as backgrounded. The values for Topic, Focus and Given are sets because one can have multiple instances of these.

The default values for X-TYPE are provided via c-structure annotations in the syntactic positions associated with them. These default values can be "overridden" by information coming from morphology, prosody, lexical items such as the focus clitic *hi* (cf. Butt and King 1998) or the overall structure of the discourse. In practice, the annotations take the form of disjunctions. The default disjunct applies in the absence of other, more particular information.

(13)

| | | | | | |
|---|---|---|---|---|---|
| [nadya]$_T$ | (to) | [ɑb$^h$i] | [ṭɔfi]$_{CI}$ | [bazar=se]$_F$ | xɑrid |
| Nadya.F.Nom | indeed | just now | toffee.F.Nom | market.M=from | buy |

| | | |
|---|---|---|
| rɑh-i | t$^h$-i | [mere=liye]$_B$ |
| stay-Perf.F.Sg | be.Past-F.Sg | I.Gen.Obl=for |

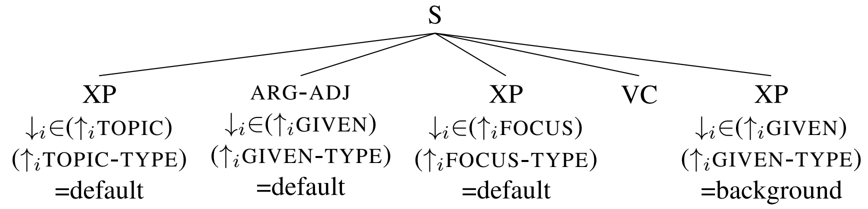
'Nadya was just buying toffee at the market for me.'

(14) i-structure for (13)

$$\left[\begin{array}{ll}
\text{TOPIC} & \left\{\left[\begin{array}{ll}\text{PRED-FN} & \text{Nadya}\\ \text{TOPIC-TYPE} & \text{default}\end{array}\right]\right\}\\[1ex]
\text{FOCUS} & \left\{\left[\begin{array}{ll}\text{PRED-FN} & \text{bazar}\\ \text{FOCUS-TYPE} & \text{default}\end{array}\right]\right\}\\[1ex]
\text{GIVEN} & \left\{\begin{array}{l}\left[\begin{array}{ll}\text{PRED-FN} & \text{toffee}\\ \text{GIVEN-TYPE} & \text{default}\end{array}\right]\\ \left[\begin{array}{ll}\text{PRED-FN} & \text{I}\\ \text{GIVEN-TYPE} & \text{background}\end{array}\right]\end{array}\right\}
\end{array}\right]$$

The tree in (15) shows the basic c-structure assumed for Urdu. There is little to no evidence for a matrix-level VP in Urdu and major constituents can scramble. This is reflected in the flat, exocentric structure of (15). The ARG-ADJ stands for a metacategory that expands into any or no number of arguments and adjuncts.

(15)




The *i* subscript on the annotations indicates that the information is projected to the i-structure. As mentioned, the annotations are more complex than indicated in (15), with a typical annotation featuring a disjunct as in (16) whereby the second half of the disjunct tests for relevant conditions when the focus type is not default.

(16) $\downarrow_i \in (\uparrow_i\text{FOCUS})$

$\{\ (\uparrow_i\text{FOCUS-TYPE})\text{=default}$
$\mid\ (\uparrow_i\ \text{FOCUS-TYPE}) \neq \text{default}$
$\quad \ldots\}$

The overall semantics and pragmatics of an utterance are assumed to be calculated via a Discourse Representation Theory (DRT) style of analysis, or, more precisely, a Segmented DRT (SDRT) style analysis (e.g., Asher and Lascarides 2003, Lascarides and Asher 2007), whereby the i-structure information flows into a CG Management system. A CG Management system in the sense of Krifka has so far not been incorporated into SDRT; however, pragmatic information management/update has been integrated. The exact mechanics of this go beyond the scope of this paper. As a theory of syntax, LFG is in principle compatible with several different types of semantic/pragmatic analyses and I am assuming that the spirit of the Krifka approach to information packaging can be integrated into SDRT. SDRT itself is in principle compatible with LFG.

The approach taken here differs from Dalrymple and Nikolaeva (2011), who reject a Krifka type structured meaning approach by which a sentence is partitioned into given vs. not (Krifka 1992, 2008). They instead see information structure as partitioning sentence meaning into i-structure categories. In contrast, I follow Krifka in viewing information structure as providing instructions for CG Management. The overall ramifications of the differing proposals with respect to i-structure need to be investigated in detail, but again go beyond the scope of this paper.

## 5 Analysis: immediately postverbal *wh*-constituent

This section takes a closer look at *wh*-constituents in the immediately postverbal position within the verbal complex as in (10c). The verbal complex in Urdu/Hindi can consist of various light verbs, auxiliaries and modals (cf. Butt and Rizvi 2010).[5] The examples in (17) and (18) are from a Bollywood movie and an actual conversation, respectively. They both feature *kya* 'what'.

(17) vɑrna nicʰe log socʰ-ẽ-g-e pɑta nahı̃
otherwise underneath people think-3.Pl-Fut-3.M know not

ye log us kɑmre=mẽ kɑr **kya** rɑh-e hɛ̃
this people that.Obl room.M.Sg.Obl=in do what stay-Perf.M.Pl be.Pres.3.Pl

ɪtn-i der=se
this much-F.Sg time.F.Sg=Inst
'Otherwise the downstairs people will think: What are these people doing in that room for such a long time?'
(Lit. Otherwise the downstairs people will think: Don't know WHAT these people are doing in that room for such a long time.)
From Bollywood Movie *Socha Na Tha*

(18) ʊn=ke gʰɑr=mẽ **saman** tʰ-a
Pron.3.Pl=Gen.M.Obl house.M.Sg=in luggage.M.Sg.Nom be.Past-M.Sg

**kya** pɑhle?
what before
'What possessions did they even have in their house before (then)?'
(implies: they had no possessions before) Parveen Butt, July 2014

Tests show that the *wh*-constituent cannot appear anywhere else within the verbal complex. The *wh*-constituent is generally stressed. These two facts speak for a priviliged immediately postverbal position within the verbal complex that is associated with focus. A further piece of evidence concerns negation. Manetta (2013)

[5]When the verb occurs on its own, the immediately postverbal position is ambiguous: it could be within the verbal complex, or it could be postverbal material outside of the verbal complex.

notes that clausal negation can occur either immediately preverbally or immediately postverbally, but not elsewhere. The Urdu/Hindi *nahı̃* 'not' is generally taken to have incorporated the focus particle *hi* 'only'. This again suggests that the immediately postverbal position is privileged and that it is associated with focus.

A secondary focus position has been argued for in Romance (see Zubizarreta 1998, Samek-Lodovici 2005) and I propose that the immediately postverbal position functions as a secondary focus position in Urdu/Hindi.

Examples as in (17) and (18) are also associated with stress on the verb. Indeed, in (17) and (18) the verb is in focus. In (17) the context is a conversation being held between two people that is intense, but sexually innocent. The speaker states that the two of them should now leave the room before people begin to speculate as to possible non-innocent activities taking place. The primary focus is thus on the 'doing' rather than the 'what'. The context of (18) is a conversation revolving around an allegation of dowry theft. The primary focus is on the copula verb: what is at question is whether the alleged perpetrators had possessions in their house before the theft or not—not what kinds of possessions they may have had.

The focus on the verb also serves to convey an additional meaning dimension with respect to the *wh*-constituent. (17) expresses that the speaker anticipates that people will not be able to come up with a plausible innocent explanation of what two people could possibly be doing in a room for such a long time, (18) carries the implication with it that there were no possessions (luggage) in the house before. In particular, contrast (18) with (19), whose dominant reading is a straightforward information-seeking one. Here the *kya* 'what' appears preverbally together with its head noun, whereas in (18) the *kya* 'what' is immediately postverbal and separated from its head noun.[6]

(19) ʊn=ke gʰɑr=mẽ [**kya saman**]
Pron.3.Pl=Gen.M.Obl house.M.Sg=in what luggage.M.Sg.Nom

tʰ-a pɑhle?
be.Past-M.Sg before
'What possessions did they have in their house before?'

The analysis proposed here is that the immediately postverbal position within the verbal complex is a secondary structural focus position. It is used when the verb receives primary focus and is being questioned.[7] As an illustration, consider the question-answer pair in (20). Example (20b) constitutes a perfectly good answer to (20a) even though it does not contain an object argument that would serve to answer the *kya* 'what' in (20a).

[6]At present, I have no good analysis for discontinuous NPs in Urdu. Rather than leaving the example out, I have featured it to draw attention to the fact that serious work remains to be done on scrambling possibilities in Urdu/Hindi. Genitives can generally scramble out of their NP constituents (akin to quantifier float, which also occurs in Urdu/Hindi, cf. Bögel and Butt (2012)) and constituents and heads can be scrambled among each other within the NP (e.g., Raza and Ahmed (2011)).

[7]A reviewer points me towards Dik's (1997) taxonomy of focus. However, the type of focus discussed here does not appear in Dik's taxonomy.

(20) a. ye log kɑmre=mẽ **kɑr kya** rɑh-e hɛ̃
this people room.M.Sg.Obl=in do what stay-Perf.M.Pl be.Pres.3.Pl
'What are these people doing in the room?'

b. vo **k$^h$a** rɑh-e hɛ̃
they eat stay-Perf.M.Pl be.Pres.3.Pl
'They are eating.'

I propose that if the verb is to be focused in a question, the question word (or phrase) is placed in the immediately postverbal position within the verbal complex in order for the verb to receive the standard intonation associated with focus in Urdu/Hindi (cf. Patil et al. 2008 on standard focus patterns in Hindi).[8] In terms of Krifka's Alternative Semantics approach to information structure this could be understood as follows: the placement of a *wh*-element in this position signals that the speaker is not expecting an answer for the *wh*-phrase and that therefore no set of alternative answers should be opened up for the XP containing the question word.

This approach offers an immediate explanation of why (21b) is pragmatically illformed, but (21a) is fine. Abush (2010) proposes that several elements, including questions and focus, trigger defeasible (soft) presuppositions. However, the *wh*-element *konsi* 'which' carries with it a strong presupposition that there is a set of alternative answers to the question posed and that this set is non-empty, i.e., that the questioned entity exists. Placing *konsi* 'which' in the immediately postverbal position thus leads to an interpretational clash: a strong presupposition of the existence of an entity in an alternative set of answers vs. a presupposition that no set of alternatives should be considered since the answer is not at issue in the first place.

(21) a. sita [konsi ɣɑzɑl] ga-ti
Sita.F.Nom which.M.Sg song.M.Sg.Nom sing-Impf.F.Sg

rɑh-ti t$^h$-i?
stay-Impf.F.Sg be.Past-F.Sg
'Which song (ghazal) did Sita keep singing?'

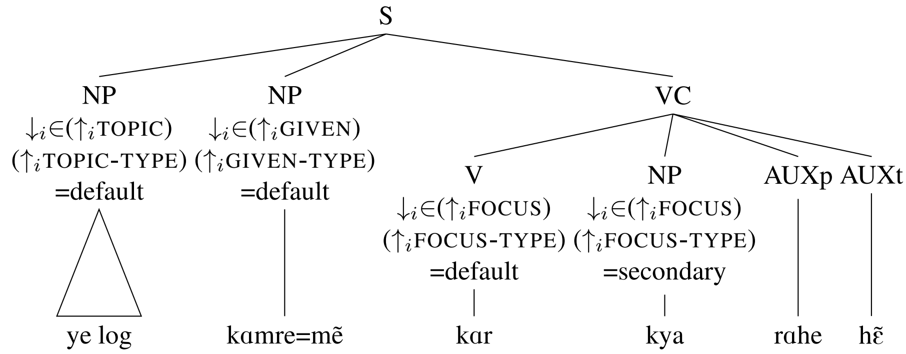
b. #sita ga-ti [konsi ɣɑzɑl]
Sita.F.Nom sing-Impf.F.Sg which.M.Sg song.M.Sg.Nom

rɑh-ti t$^h$-i?
stay-Impf.F.Sg be.Past-F.Sg
'Which song (ghazal) did Sita keep singing?'

As a sample analysis, (22) and (23) provide c- and i-strucure representations of (20a). The postverbal position functions as a syntactic secondary focus position. Additionally, when this position is filled, it goes hand in hand with the verb being in focus (one could think of this as a type of construction). The linear order of auxiliaries (and light verbs) within the verbal complex in Urdu is very strict, the analysis here follows the pattern described in Butt and Rizvi (2010).

[8]This analysis is originally due to an observation by Farhat Jabeen.

(22)




(23)
$$\left[\begin{array}{ll} \text{TOPIC} & \left\{\begin{bmatrix}\text{PRED-FN} & \text{log}\\ \text{TOPIC-TYPE} & \text{default}\end{bmatrix}\right\} \\ \text{GIVEN} & \left\{\begin{bmatrix}\text{PRED-FN} & \text{kɑmre}\\ \text{GIVEN-TYPE} & \text{default}\end{bmatrix}\right\} \\ \text{FOCUS} & \left\{\begin{array}{l}\begin{bmatrix}\text{PRED-FN} & \text{kɑr}\\ \text{FOCUS-TYPE} & \text{default}\end{bmatrix} \\ \begin{bmatrix}\text{PRED-FN} & \text{kya}\\ \text{FOCUS-TYPE} & \text{secondary}\end{bmatrix}\end{array}\right\} \end{array}\right]$$

# 6 Polar Questions

This section shows that the overall information structural perspective on word order variation with respect to *wh*-elements also provides an analysis for the ordering possibilities of *kya* ‘what’ in polar questions.

As shown in (24), polar questions in Urdu/Hindi take the syntactic form of declaratives. Intonation must be used to distinguish between a declarative (24a) and an interrogative (24b). As shown in (25) and (26), polar questions can also be overtly marked morphosyntactically via *kya* ‘what’. This *kya* has been dubbed “Polar *kya*” by Bhatt and Dayal (2014).

(24) a. anu=ne uma=ko kɪtab d-i
Anu.F=Erg Uma.F=Dat book.F.Sg.Nom give-Perf.F.Sg
‘Anu give a/the book to Uma. — declarative

b. anu=ne uma=ko kɪtab d-i?
Anu.F=Erg Uma.F=Dat book.F.Sg.Nom give-Perf.F.Sg
‘Did Anu give a/the book to Uma? — polar question

(25) **kya** anu=ne uma=ko kɪtab d-i?
what Anu.F=Erg Uma.F=Dat book.F.Sg.Nom give-Perf.F.Sg
‘Did Anu give a/the book to Uma? — polar *kya*

Traditional grammars only mention the clause initial position for polar *kya* (e.g., Glassman 1977). However, Bhatt and Dayal (2014) report a relatively free distribution of polar *kya*, cf. (26).

(26)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (**kya**) | anu=ne | (**kya**) | uma=ko | (**kya**) | kıtab | (**kya**) | d-i? |
| what | A.F=Erg | what | U.F=Dat | what | book.F.Sg.Nom | what | give-Perf.F.Sg |

'Did Anu give a/the book to Uma?

Bhatt and Dayal suggest that the different possible positions result from topicalization. That is, in (26), 'Anu' is topicalized when it precedes the *kya* and when the *kya* appears immediately preverbally, then all three of the arguments have been topicalized. Bhatt and Dayal adduce evidence for topicalization from interactions with weak indefinites, idiomatic objects and gapping. Again, a clear connection is drawn between the position of the question element and information structure.

Bhatt and Dayal (2014) seek to understand polar *kya* as a speech act operator in the sense of Krifka (2014). I propose an alternative analysis, which is still consonant with Bhatt and Dayal's finding that the items to the left of *kya* show evidence of topicalization. However, rather than assuming topicalization, I propose that the polar *kya* in clause medial position partitions a clause into given vs. not, as per Krifka's Structured Meaning approach (Krifka 1992, 2008). Everything to the left of *kya* must be interpreted as given, everything to the right as not.

Evidence for this analysis comes from data[9] as in (27), which involves alternative questions. As can be seen, anything to the right of *kya* is available for questioning. However, material to the left of *kya* is not. This is consonant with an analysis under which everything to the left of *kya* is part of what is presupposed/given and not available for focus and hence not for questioning.

(27) a.

| | | | | | | |
|---|---|---|---|---|---|---|
| ram=ne | sita=ko | **kya** | kıtab | d-i | ya | ãguṭ$^h$i? |
| Ram.M=Erg | Sita.F=Dat | what | book.F.Nom | give-Perf.F.Sg | or | ring.F.Nom |

'Did Ram give a book or a ring to Sita?'

b.

| | | | | |
|---|---|---|---|---|
| ram=ne | **kya** | sita=ko | kıtab | d-i |
| Ram.M=Erg | what | Sita.F=Dat | book.F.Nom | give-Perf.F.Sg |

| | |
|---|---|
| ya | amra=ko/*ravi=ne? |
| or | Amra.F=Dat/Ravi.M=Erg |

'Did Ram give a book to Sita or Amra?/
*Did Ram or Ravi give a book to Sita?'

Under this approach polar *kya* is a type of focus-sensitive operator that determines which parts of a clause are backgrounded/presupposed and which are open for further discussion. When *kya* appears in clause initial position, there is no given part of the clause.

Further support for the analysis comes from the fact that, as shown in (28), polar *kya* cannot appear immediately postverbally. This restriction makes sense

[9]The data are due to Rajesh Bhatt.

if the immediately postverbal position is indeed a special focus position in which lexically contentful constituents can be interpreted. In this position focus-sensitive operators (which create their own focus domains) are misplaced.

(28) *sita=ne $d^h$yan=se ram=ko $dek^h$-a **kya** $t^h$-a?
Sita.F=Erg carefully see-Perf.M.Sg who.Obl=Acc what be.Past-M.Sg
'Did Sita carefully look at Ram?'

Technically, the partitioning of a clause into a given part vs. a focus part is accomplished via annotations in the c-strucure introduced by the lexical entry of polar *kya*.[10] Via f-precendence everything that is to the left of polar *kya* can be determined to be GIVEN at i-structure. This is illustrated in (29) for (27a).

(29) i-structure for (27a)

$$\left[\begin{array}{ll} \text{TOPIC} & \left\{\begin{bmatrix}\text{PRED-FN} & \text{Ram}\\ \text{TOPIC-TYPE} & \text{default}\end{bmatrix}\right\} \\ \text{FOCUS} & \left\{\begin{array}{l}\begin{bmatrix}\text{PRED-FN} & \text{kitab}\\ \text{FOCUS-TYPE} & \text{default}\end{bmatrix}\\ \begin{bmatrix}\text{PRED-FN} & \text{ãguṭ}^{\text{h}}\text{i}\\ \text{FOCUS-TYPE} & \text{default}\end{bmatrix}\end{array}\right\} \\ \text{GIVEN} & \left\{\begin{array}{l}\begin{bmatrix}\text{PRED-FN} & \text{Ram}\\ \text{GIVEN-TYPE} & \text{background}\end{bmatrix}\\ \begin{bmatrix}\text{PRED-FN} & \text{Sita}\\ \text{GIVEN-TYPE} & \text{background}\end{bmatrix}\end{array}\right\} \end{array}\right]$$

## 7 Summary

This paper has examined word order variation in constituent and polar questions in Urdu/Hindi. Rather than understanding the word order variation in terms of syntactic triggers, the paper has laid out an approach which leverages the correlation between i-structure status and linear position established for declarative clauses. The paper further proposes to understand i-structure in terms of Krifka's (2008) proposals for information structure, in particular, in terms of CG Management.

In constituent questions, word order variation was proposed to signal strategies for GC Management. The paper concerned itself particularly with the immediately postverbal position within the verbal complex. This is analyzed as a secondary structural focus position. Furthermore, the verb is in focus and the CG Management expectation is for there to be no answer for the *wh*-constituent.

Word order variation with respect to polar *kya* is also analyzed via i-structure status. However, it is seen as an operator which serves to partition a clause into a

[10]This is analogous to how the meaning constructor **[interrog-scope]** is introduced by Mycock.

focus part and a background (given) part, whereby the given part is presupposed and thus not available for questioning.

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## References

Abush, Dorit. 2010. Presupposition Triggers from Alternatives. *Journal of Semantics* 27(1), 37–80.

Artstein, Ron. 2002. A focus semantics for echo questions. In Á. Bende-Farkas and A. Riester (eds.), *Workshop on Information Structure in Context*, pages 98–107, Stuttgart: IMS: University of Stuttgart.

Asher, Nicholas and Lascarides, Alex. 2003. *Logics of Conversation*. Cambridge: Cambridge University Press.

Bayer, Josef. 2006. Wh-in-situ. In Martin Evaraert and Henk van Riemsdijk (eds.), *The Blackwell Companion to Syntax*, Oxford: Blackwell.

Bhatt, Rajesh and Dayal, Veneeta. 2007. Rightward Scrambling as Rightward Movement. *Linguistics Inquiry* 38(2), 287–301.

Bhatt, Rajesh and Dayal, Veneeta. 2014. Polar *kyaa*, talk presented at the *Workshop on Non-Canonical Questions and Interface Issues*, Konstanz, February 2014.

Bögel, Tina and Butt, Miriam. 2012. Possessive clitics and *ezafe* in Urdu. In Kersti Börjars, David Denison and Alan Scott (eds.), *Morphosyntactic categories and the expression of possession*, pages 291–322, Amsterdam: John Benjamins, (Linguistik Aktuell/Linguistics Today 199).

Butt, Miriam and King, Tracy H. 1996. Structural Topic and Focus without Movement. In M. Butt and T. H. King (eds.), *Proceedings of the First LFG Conference*, CSLI Publications.

Butt, Miriam and King, Tracy Holloway. 1997. Null Elements in Discourse Structure, written to be part of a volume that never materialized, http://ling.uni-konstanz.de/pages/home/butt/main/papers/nulls97.pdf.

Butt, Miriam and King, Tracy Holloway. 1998. Interfacing Phonology with LFG. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG98 Conference*, CSLI On-line Publications.

Butt, Miriam and Rizvi, Jafar. 2010. Tense and Aspect in Urdu. In Patricia Cabredo-Hofherr and Brenda Laca (eds.), *Layers of Aspect*, pages 43–66, Stanford: CSLI Publications.

Chafe, Wallace. 1976. Givenness, contrastiveness, definiteness, subjects, topics and point of view. In Charles Li (ed.), *Subject and Topic*, pages 27–55, New York: Academic Press.

Choi, Hye-Won. 1996. *Scrambling: Optimality-theoretic Interaction between Syntax and Discourse*. Ph. D. thesis, Stanford University.

Dalrymple, Mary and Nikolaeva, Irina. 2011. *Objects and Information Structure*. Cambridge: Cambridge University Press.

Dayal, Veneeta. 1994. Scope Marking as indirect wh-dependency. *Natural Language Semantics* 2(2), 137–170.

Dayal, Veneeta. 1996. *Locality in WH Quantification*. Dordrecht: Kluwer Academic Publishers.

Dayal, Veneeta. 2003. Bare nominals: Non-specific and contrastive readings under scrambling. In Simin Karimi (ed.), *Word Order and Scrambling*, pages 67–90, Oxford: Blackwell.

Dayal, Veneeta. 2014. Questions and the vP Phase in Hindi-Urdu, ms. Rutgers University.

Dik, Simon C. 1997. *The Theory of Functional Grammar, Part 1*. Berlin: Mouton de Gruyter.

É. Kiss, Katalin. 1995. *Discourse Configurational Languages*. Oxford: Oxford University Press.

Frank, Anette, King, Tracy Holloway, Kuhn, Jonas and Maxwell III, John. 2001. Optimality Theory style constraint ranking in large-scale LFG grammars. In Peter Sells (ed.), *Formal and Empirical Issues in Optimality Theory*, pages 367–397, Stanford: CSLI Publications.

Gambhir, Vijay. 1981. *Syntactic Restrictions and Discourse Functions of Word Order in Standard Hindi*. Ph. D. thesis, University of Pennsylvania, Philadelphia.

Ginzburg, Johnathan amd Ivan A. Sag. 2000. *Interrogative Investigations: The Form, Meaning, and Use of English Interrogatives*. Stanford, CA: CSLI Publications.

Glassman, Eugene H. 1977. *Spoken Urdu*. Lahore: Nirali Kitaben.

Gurtu, Madhu. 1985. *Anaphoric Relations in Hindi and English*. Ph. D. thesis, CIEFL, Hyderabad.

Heim, Irene. 1982. *The semantics of definite and indefinite noun phrases*. Ph. D. thesis, University of Massachusetts, Amherst.

Kamp, Hans and Reyle, Uwe. 1993. *From Discourse to Logic*. Dordrecht: Kluwer Academic Publishers.

Kidwai, Ayesha. 2000. *XP-Adjunction in Universal Grammar: Scrambling and Binding in Hindi-Urdu*. Oxford: Oxford University Press.

King, Tracy Holloway. 1997. Focus Domains and Information Structure. In Miriam Butt and Tracy Holloway King (eds.), *On-Line Proceedings of the LFG97 Conference*, CSLI On-line Publictions.

Krifka, Manfred. 1992. A Compositional Semantics for Multiple Focus Constructions. In Joachim Jacobs (ed.), *Informationsstruktur und Grammatik*, pages 17–53, Opladen: Westdeutscher Verlag.

Krifka, Manfred. 2008. Basic Notions of Information Structure. *Acta Linguistica Hungarica* 55(3–4), 243–276.

Krifka, Manfred. 2014. Embedding Illocutionary Acts. In Thomas Roeper and Margaret Speas (eds.), *Recursion: Complexity in Cognition*, Berlin: Springer.

Lahiri, Utpal. 2002a. On the proper treatment of expletive wh in Hindi. *Lingua* 112, 501–540.

Lahiri, Utpal. 2002b. *Questions and Answers in Embedded Contexts*. Oxford: Oxford University Press.

Lascarides, Alex and Asher, Nicholas. 2007. Segmented Discourse Representation Theory: Dynamic Semantics with Discourse Structure. In H. Bunt and R. Muskens (eds.), *Computing Meaning: Volume 3*, pages 87–124, Kluwer Academic Publishers.

Mahajan, Anoop. 1990. *The A/A-Bar Distinction and Movement Theory*. Ph. D. thesis, MIT.

Manetta, Emily. 2010. *Wh*-expletives in Hindi-Urdu: The vP phase. *Linguistic Inquiry* 41(1), 1–34.

Manetta, Emily. 2012. Reconsidering Rightward Scrambling: Postverbal Constituents in Hindi-Urdu. *Linguistic Inquiry* 43(1), 43–74.

Manetta, Emily. 2013. Copy theory in wh-in-situ languages: Sluicing in Hindi-Urdu. *Journal of South Asian Linguistics* 6, 3–22.

McDaniel, Dana. 1989. Partial and Multiple Wh-Movement. *Natural Language and Linguistic Theory* 7(4), 565–604.

Mycock, Louise. 2006. *The Typology of Constituent Questions: A Lexical-Functional Grammar Analysis of wh-questions*. Ph. D. thesis, University of Manchester.

Mycock, Louise. 2013. Discourse Functions of Question Words. In M. Butt and T.H. King (eds.), *Proceedings of the LFG13 Conference*, Stanford: CSLI Publications.

Patil, Umesh, Kentner, Gerrit, Gollrad, Anja, Kügler, Frank, Féry, Caroline and Vasishth, Shravan. 2008. Focus, Word Order and Intonation in Hindi. *Journal of South Asian Linguistics* 1(1), 55–72.

Prasad, Rashmi. 2000. A Corpus Study of Zero Pronouns in Hindi: An Account Based on Centering Transition Preferences. In *Proceedings of DAARC2000*, pages 66–71, Lancaster University.

Prasad, Rashmi. 2003. *Constraints on the Generation of Referring Expressions, with Special Reference to Hindi*. Ph. D. thesis, University of Pennsylvania, Philadelphia.

Raza, Ghulam and Ahmed, Tafseer. 2011. Argument Scrambling within Urdu NPs. In *Proceedings of the LFG11 Conference*, Stanford, CA: CSLI Publications.

Rooth, Mats. 1985. *Association With Focus*. Ph. D. thesis, University of Massachusetts, Amherst.

Samek-Lodovici, Vieri. 2005. Prosody-syntax interaction in the expression of focus. *Natural Language and Linguistic Theory* 23, 687–755.

Srivastav, Veneeta. 1991. Subjacency Effects at LF: The Case of Hindi wh. *Linguistic Inquiry* 22(4), 762–769.

Stepanov, Arthur and Stateva, Penka. 2006. Successive cyclicity as residual wh-scope marking. *Lingua* 116, 2107–2153.

Truckenbrodt, Hubert. 2012. An analysis of prosodic F-effects in interrogatives: Prosody, syntax and semantics. *Lingua* 124, 131–175.

Vallduví, Enric. 1992. *The Informational Component*. New York: Garland Press.

Zubizarreta, Maria Luisa. 1998. *Prosody, Focus and Word Order*. Cambridge, MA: The MIT Press.

# PERCEPTUAL REPORTS IN (DIALECTS OF) ARABIC

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**Abstract**

This paper offers what is to our knowledge the first description and analysis of the encoding of perceptual reports in Arabic: we focus here on Modern Standard Arabic (MSA) and Maltese (MT) building on the analytic framework offered by Asudeh and Toivonen (2012) (henceforth AT). We show that a range of different syntactic constructions are used to encode perceptual reports with *seem*-class predicates while the core semantic observation developed in AT, concerning the distinction between types of PSOURCE, is found to hold robustly in these languages. In the light of the data we outline, an important question for future work turns out to be that of distinguishing cases of (genuine) copy-raising from constructions with thematic subjects (for the verbs in question). While Maltese is ideologically and sociolinguistically a separate language, it shares many key aspects of its syntax with the Western vernaculars of Arabic, and is fruitfully considered as a dialect of Arabic for the purposes of cross-dialectal comparison.

# 1 Background: Perceptual Reports

Building on insights from previous literature, most significantly Rogers (1973) and Potsdam and Runner (2001), Asudeh (2004, 2012) and Asudeh and Toivonen (2012) (henceforth AT) develop an account of perceptual reports in LFG. They draw a distintion between copy raising verbs, such as English *seem* and *appear*, and the class of perceptual resemblance verbs, exemplified by *look, sound, smell*.

**Copy raising verbs** (*seem, appear*) occur in subject-to-subject raising (SSR) and expletive subject (EXPL) constructions, as shown in (1), and also with copy raising syntax, where the subject of the 'raising' verb is the antecedent of a copy pronoun in the embedded clause, as in (2). Copy raising constructions are the locus of a good deal of dialectal variation, with speakers varying as to whether they accept copy pronouns in non-subject positions (see Asudeh (2012) and AT for extensive discussion). Copy raising syntax in English obligatorily involves the use of a predicate denoting similarity or comparison (*like, as if, as though*).

(1) a. It seemed that Kim enjoyed the hike.

b. It seemed like Kim enjoyed the hike.

c. Kim seemed to enjoy the hike.

(2) a. Chris seemed **like he** enjoyed the marathon.

b. John seems **like** the judges ruled that **he** defeated Mary.

c. John seems **like** Mary defeated **him**.

[†]We thank participants at LFG2014, the editors, and the external reviewer for helpful comments and feedback.

**Perceptual resemblance verbs** (*look, sound, smell, etc*) occur in expletive subject constructions, with a similarity or comparison predicate (*like, as if, as though*) as in (3), but not in subject-to-subject raising (for most speakers). Additionally, they also occur with a non-expletive subject and a full sentential complement which may or may not involve a pronominal coreferential with the subject of the perceptual resemblance predicate itself (see (4)). A relatively small number of speakers (AT's Dialect D) also accept the copy raising verb *seem* in a non-copy raising usage with no pronominal copy, as in (5).

(3) It sounded like Bill had found the remote.

(4) John looked/sounded/smelled **like** Bill had served asparagus.
John looked/smelled **like** he'd been running.

(5) Chris seemed **like** Mary got the prize.

The key points about copy raising (henceforth CR) in the AT analysis (for what follows) are the following. CR is mediated in English by an intervening *like/as if* predication and involves an obligatory pronominal copy. A core property which distinguishes the EXPL and SSR versions of these verbs from the true CR version is that a copy raised (non-expletive, non idiom chunk) subject must be interpreted as a perceptual source PSOURCE: "a copy raising subject is interpreted as the PSOURCE - the source of perception - and ascribing the role of PSOURCE to the subject is infelicitous if the individual in question is not perceivable as the source of the report" (Asudeh and Toivonen, 2012). The notion of PSOURCE (which goes back to the work of Rogers (1973)) is best illustrated with an example scenario, for which purpose we borrow AT's puzzle of the 'absent cook'. On entering an empy kitchen which shows clear signs of recent cooking (dirty pots around, open jars, etc), *It seems like Pete has been cooking again!* is felicitous (Pete being a disorganised and untidy cook) while *Pete seems like he has been cooking again!* is not felicitous. This sentence is *only* appropriate if Pete the cook is visible: AT (and see also Asudeh (2004, 2012)) propose that in cases of CR the subject is always a (visible) PSOURCE, and hence directly observable.[1] They argue that PSOURCE is not a *thematic argument* of the CR verb, but is an entailed participant in the state that the verb denotes.

In SSR and EXPL constructions, on the other hand, some aspect of the eventuality is interpreted as the PSOURCE, and hence (as shown in the 'absent cook' scenario above) these constructions may be used in a wider set of circumstances. A similar point can be made about perceptual resemblance verbs, which alternate between an expletive use and a thematic subject use: in the latter case, an aspect of the subject is necessarily interpreted as the perceptual source.

[1]It should be noted that other work takes a different view of the PSOURCE constraint. For example, Landau (2011, 786) holds that "the P-source interpretation is not a necessary feature of all CR subjects".

Asudeh (2004, 2012) and AT propose a syntactic analysis of CR based on the standard analysis of SSR in LFG. The 'raised' subject is not a thematic argument of *seem* (despite being a PSOURCE). The CR verb in (2) thus involves the f-description shown in (6). The syntactic analysis hinges on the status of *like* (*as (though), as (if)*), which is argued to be a predicative element rather than just a complementiser. It heads an XCOMP and takes a COMP. A CR example such as those in (2) would involve *like* with the PRED value in (7).[2]

(6) $(\uparrow \text{PRED}) = \text{`SEEM} < \text{XCOMP} > \text{SUBJ'}$
$(\uparrow \text{XCOMP SUBJ}) = (\uparrow \text{SUBJ})$

(7) $(\uparrow \text{PRED}) = \text{`LIKE} < \text{SUBJ, COMP} > \text{'}$

Other examples such as *There seems like there is a big problem with the heating system.* require *like* with a non-thematic subject:

(8) $(\uparrow \text{PRED}) = \text{`LIKE} < \text{COMP} > \text{SUBJ'}$

CR verbs additionally introduce a standard binding relation between the subject and the pronoun occurring (somewhere) in the complement of the XCOMP. For example, the syntactic part of the lexical entry for a CR verb in the dialect of English which restricts the pronoun to the highest embedded subject position would be as in (9): other, less restrictive dialects allowing CR from other functions would differ in the nature of the path to the pronoun. For example (11) is the f-structure for (10) in the dialect of English which permits dependencies into non-subject positions.

(9) $seem_{like}$ $(\uparrow \text{PRED}) = \text{`SEEM} < \text{XCOMP} > \text{SUBJ'}$
$(\uparrow \text{XCOMP SUBJ}) = (\uparrow \text{SUBJ})$
$(\uparrow \text{SUBJ})_\sigma = ((\uparrow \text{XCOMP COMP SUBJ})_\sigma \text{ ANTECEDENT})$

(10) John seems **like** Mary defeated **him**.

(11)
$$\left[\begin{array}{ll} \text{PRED} & \text{`SEEM'} \\ \text{SUBJ} & a\left[\begin{array}{ll}\text{PRED} & \text{`JOHN'}\end{array}\right] \\ \text{XCOMP} & \left[\begin{array}{ll} \text{PRED} & \text{`LIKE'} \\ \text{SUBJ} & \\ \text{COMP} & \left[\begin{array}{ll} \text{SUBJ} & \text{`MARY'} \\ \text{PRED} & \text{`DEFEAT'} \\ \text{OBJ} & p\left[\begin{array}{ll}\text{PRED} & \text{PRO}\end{array}\right] \end{array}\right] \\ \text{PTYPE} & \text{CL-COMPAR} \end{array}\right] \end{array}\right]$$

[2]It should be noted that Asudeh (2012) and Asudeh and Toivonen (2012) do not provide syntactic argument structure lists in the PRED values of *like*, and Asudeh (2012) dispenses with them altogether. Clearly, given a fully explicit semantics, it can be argued that there is no real role for a syntactic argument structure. We maintain the use of syntactic argument structure lists here for maximum clarity. We also maintain the distinction between COMP and XCOMP here.

Semantically, the non-expletive CR version and the plain raising version **evaluate** to the same meaning (modulo the nature of PSOURCE and contribution of *like* itself), but they **compose** differently, as is evident from the the meaning terms in (12)-(13). For reasons of space and simplicity, we generally omit the glue side of the meaning constructors throughout this paper.

A key aspect of the analysis of the difference between SSR and CR concerns the semantic role of perceptual source, or PSOURCE, first discussed in Rogers (1973), which AT argue is defined for all perceptual eventualities (in English and Swedish). In true CR the PSOURCE is the individual denoted by the SUBJ of the perceptual report verb, accounting for the observation that the individual must be present.

In contrast, in SSR and in expletive cases, it is of type *eventuality* (so this requirement is consequently weaker): AT postulate existential closure over the PSOURCE role, which in this case is of type *eventuality*, see (13), where $\epsilon$ is an eventuality metavariable over state and event variables. CR involves a comparison between a state of something seeming to be the case and an eventuality (state or event) in the embedded *like* clause.

(12) **seem.cr***:* $\lambda P \lambda x \lambda s.[seem(s, P(x)) \wedge \textsc{psource}(s) =_\tau x]$

(13) **seem***:* $\lambda p \lambda s' seem(s', p)$
$\lambda S \lambda s \exists v_\epsilon [S(s) \wedge \textsc{psource}(s) =_\tau v_\epsilon]$

(14) For any two eventualities $\alpha$ and $\beta$, $\alpha \sim \beta$ is true if and only if there is a property P such that P($\alpha$) is true and P($\beta$) is true

(15) **like***:* $\lambda$P$\lambda$s$\exists\epsilon$.[(s $\sim \epsilon$ ) $\wedge$ P($\epsilon$)] Asudeh (2012)

In semantic composition the pronominal resource is removed by a manager resource, as in resumption (for a general introduction to glue semantics, see Dalrymple (2001)).

(16) **mr**: $\lambda f \lambda x.x$: $[a \multimap (a \otimes p)\ ] \multimap (a \multimap a)$
**pn**: $\lambda y.y \times y$: $a \multimap (a \otimes p)$

(17) $\exists$s.seem (s, $\exists$e [(s $\sim$ e) $\wedge$ defeat(e,m,j) $\wedge$ PSOURCE(s) = j ])

All expletive subject versions also evaluate to the same meaning (again, modulo any additional contribution associated with *like*): they share the compositional structure of standard raising (in which *seem* composes directly with its propositional argument, and lacks the manager resource).

(Thematic) perceptual resemblance verbs differ from CR and raising predicates, and compose with an additional thematic argument as shown in (18).

(18) $\lambda p \lambda x \lambda s.[sound(s, aural(\textsc{psource}(s)), p) \wedge \textsc{psource}(s) =_\tau x]$

## 2 Modern Standard Arabic

We exemplify the behaviour of perceptual report verbs in MSA with *yabdū* ‘seem’ (other verbs, including *yaẓharu* ‘appear’ also behave in similar fashion). (19) shows *yabdū* with a single propositional argument and default (3SGM) agreement, that is, in a construction corresponding to the EXPL subject construction with English *seem*. The propositional argument is a normal tensed clause, introduced by the complementiser *ʔanna*. Although MSA has rather flexible word order, the predominant order is VSO. However, since this complementiser itself must be directly followed by a nominal element (which may be a pronominal affix on the COMP itself) in the accusative case, the embedded sentences cannot be in VSO word order in this case.[3]

(19) y-abdū ʔanna l-ʔawlād-a qad ḥaḍar-ū
3-seem.IPFV.SGM COMP DEF-boys-ACC PTL come.PFV-3PLM
It seems that the boys have come. MSA: Soltan:102

Soltan (2007) discusses at some length the status of examples such as (20) in which the subject of the complement occurs in initial position. The question which arises here is whether the initial NP is in subject position or some other fronted position. Note that it is not possible to place a subject NP immediately after the matrix verb *yabdū* before the complement sentence (that is, in a putative VSO structure).

(20) al-ʔawlād-u y-abdū ʔanna-hum qad ḥaḍar-ū
the-boys-NOM 3-seem.IPFV.SGM COMP-3PL.ACC PTL come.PFV-3PLM
The boys, it seems that they came. MSA: Soltan:102

Working within a Minimalist framework, he argues that such putative raising cases do not involve raising. He analyzes (20) as a base-generated left dislocation structure, providing a number of clear arguments in favour of thisconclusion. Note that although MSA shows full verbal agreement in SVO word order, the matrix verb in (20) must appear in default 3SGM form rather than reflecting the 3PL features of the subject.[4] The embedded clause is not in dependent subjunctive mood (Arabic does not have infinitives) but is a tensed indicative form. The embedded subject (corresponding to the left dislocated NP) is expressed (obligatorily) as a pronominal affix (or clitic) on the complementiser *ʔanna*, just as it is expressed as a pronominal resumptive when NPs corresponding to other functions are fronted, as in (21).

[3] Transliterations and glosses in some examples from sources have been slightly modified to conform to the practice adopted in this paper.

[4] MSA shows partial agreement (that is, agreement defective in number), with non-pronominal subjects in the alternative VSO order.

(21) hāḏā al-kitāb-u y-abdū ʔanna Zayd-an
this the-book-NOM 3-seem.IPFV.SGM COMP Zayd-ACC
qaraʔa-hu
read.PFV.3SGM-3SGM.ACC
This book, it seems that Zayd read it. MSA: Soltan 2007: 104

We conclude with Soltan (2007) that perceptual report verbs in the *seem* class in MSA take (finite, indicative) complements introduced by the particle *ʔanna* and do not exhibit SSR: the pattern illustrated in (20)-(21) is a left dislocation structure.

Of interest however is a further construction in which the complement is introduced by *kaʔanna* and the NP corresponding to the embedded subject appears between the *seem* verb and the complement sentence, as in (22): this structure is ungrammatical with the complementiser *ʔanna*, as noted above. For the moment, we gloss *kaʔanna* as 'as.if'. The matrix verb here shows partial agreement (in gender but not in number), as is typical of VS structures in MSA.

(22) bad-at-i l-bint-u kaʔanna-hā katab-at-i
seem.PFV-3SGF-INDIC DEF-girl-NOM as.if-ACC write.PFV-3SGF-INDIC
r-risālat-a
the-letter-ACC
The girl seemed as if she wrote the letter. MSA: Salih 1985: 138

In (22), the embedded subject, co-referential with the subject of the *seem* clause, is expressed as a pronominal affix (or clitic) on the presentential particle *kaʔanna*. The following examples demonstrate that in fact the pronominal copy may occur in a range of nominal GF functions: (23)-(25) illustrate OBJ, OBJ of preposition and indirect (dative) OBJ respectively.

(23) t-abdū kaʔanna-hum y-ḥabb-ūna-hā
3-seem.IPFV.SGF as.if-3PL.ACC 3-love.IPFV-PL-3SGF.ACC
She seems (e.g. showing on her face) as though they love her.

(24) t-abdū kaʔanna-hum ẖarağ-ū maʕa-hā
3-seem.IPFV.SGF as.if-3PL.ACC went.out.PFV.3-PL with-3SGF.ACC
She seems (e.g. showing on her face) as though they went out with her.

(25) t-abdū kaʔanna-hum ʔarsal-u la-hā
3-seem.IPFV.SGF as.if-3PL.ACC sent.PFV.3-PL to-3SGF.ACC
risālat-an
letter-INDEF.ACC
She seems (e.g. showing on her face) as though they sent a letter to her.

Further, the copy pronoun may be more deeply embedded in the complement:

(26) t-abdū kaʔanna Ahmad-a rafaḍa ʔan
3-seem.IPFV.SGF as.though Ahmad-ACC refuse.PFV.3SGM that
y-aštarī la-hā fostān-an ğadīd-an
3-buy.IPFV.SGM to-3SGF.ACC dress-INDEF.ACC new-INDEF.ACC
She seems like Ahmad refused to buy her a new dress.

As well as serving as the antecedent of a copy pronoun, as AT argue for cases of CR in English and Swedish, it seems to be the case that the matrix subject is necessarily interpreted as the PSOURCE. The free translation in (23)-(25) is intended to indicate that such examples are only felicitious as reports of direct perception in which some aspect of the matrix subject serves as the source of perception. Although we will have nothing further to say about this possibility here, we note that it is also possible to express the PSOURCE by means of a PP as shown in (27).

(27) ʔanā qult-u ʔanna-hā y-abdū **ʕalay-hā**
I said.PFV-1SG that-3SGF.ACC 3-appear.IPFV.SGM on-3SGF.GEN
(wa) kaʔanna-hum qatal-ū umma-hā
(CONJ) as.if-3PL.ACC killed.PFV.3-PL mother-3SGF.GEN
I said that it seems (on her) as though they killed her mother.

So to summarize, verbs such as *yabdu* 'seem' appear with a single propositional argument in an EXPL construction and do not exhibit SSR raising. The complement is introduced by the complementising particle *ʔanna*. However, if the complement is instead introduced by *kaʔanna*, we see the characteristics of copy raising with this perceptual report verb: a lexical NP may occur in subject position controlling verb agreement, and serves as the antecedent of a pronominal copy within the complement clause.[5] The pronoun may occur in a range of different grammatical functions.

A further question is whether or not the copy pronoun is obligatory. If no copy is required then it is possible that these verbs (like English perceptual ressemblance verbs) can occur with a thematic subject. We have so far come across no authentic examples lacking a copy pronoun, and an example such as (28) is judged by informants to be bad, consistent with the view that what we have is a case of genuine CR.

(28) *t-abdū ʕalay-ha wa kaʔanna al-awlād-a
3-seems.IPFV.SGM on-3SGF.ACC CONJ as.though DEF-children-ACC
y-akrah-ūna John
3-hate.IPFV-PL John
She seems as though the children hate John.

What is the status of the element *kaʔanna*, and in particular, is it a prepositional predicate heading an XCOMP and taking a propositional argument, or is it

[5] Verbs in this class may also occur with a predicative complement, which we do not discuss here.

a simple complementiser or particle? Since (if we are correct) there is no SSR with perceptual report verbs in MSA then there is no independent motivation for proposing an XCOMP headed by *kaʔanna*. On the other hand, MSA (and Classical Arabic (CA)) has a rich system of presentential elements (traditionally '*ʔinna* and her sisters'), which include *kaʔanna* and *ʔanna* (see earlier examples). Traditional grammar treats these as members of a separate part of speech, that of particle. These particles must be followed by a nominal element in the accusative case. A governed pronominal occurs as an affix (or clitic) attached to the particle itself, see (23)-(25).[6]

Within the generative tradition, the element *ʔanna* is standardly assumed to be a COMP, though there is very little discussion of the wider set of particles including *kaʔanna*. Reflecting a broad consensus, Aoun et al. (2010) state there are two broad classes of complementiser in Arabic, introducing finite and non-finite clauses (exemplified by *ʔanna* and *ʕan* respectively in MSA), where 'non-finite' denotes a sentence lacking independent temporal interpretation. They present only cases in which the element after the complementiser is the subject. The fact that the COMP assigns ACC to the adjacent SUBJ (e.g. (29) and (19) above), while it is NOM in uncomplementised finite clauses motivates more elaborated layers of functional projections in some accounts, but the assumption that the particles themselves are in COMP is maintained across these variant analyses.

(29) ʔaʕtaqid-u ʔanna l-walad-a fī l-bayt-i
believe.IPFV-1SG that the-child-ACC in the-house-GEN
I believe that the child is in the house. MSA: Aoun et al:16

Working in a dependency grammar framework El Kassas (2005) takes the structure of the embedding (that is, the constituent governed by *yabdū*) in (30) to be a sort of proleptic construction in which the embedded proposition is the head, governing the evidential phrase, as indicated schematically by the bracketing in (30) (the same analysis is extended to the full set of particles).[7]

[6]In Hebrew CR is possible in the *ke-ilu* construction. Lappin (1984, 246-247) gives the examples below and states that '... in Hebrew the "as if" phrase in "seems as if" constructions takes an S with a "that" complementiser'. According to Landau (2011, 783) *ke* is the preposition 'as' and *ilu* is the counterfactual complementiser 'if'. It is possible to delete either the preposition or the counterfactual complementiser, but not both.

(i) a. (ze) nireh ke-ilu še Ḥaim sameaḥ
It appears as-if that Haim (is.happy)
It appears as if Haim is happy.

b. Ḥaim nireh ke-ilu še hu sameaḥ
Haim appears as-if that he happy
Haim appears as if he is happy. Hebrew: Lappin 1983:247

[7]The glossing and transliteration of (30) have been modified to increase consistency with other examples in this paper.

(30) y-abdū [[ ʔanna al-ʔawlād-a] [yalʕab-ūn (huma)]]
3-seem.IPFV.SGM that DEF-children-ACC 3-play.IPFV-PL (3PL)
It seems that the children are playing. MSA: El Kassas: 262

Within a dependency-based approach, this analysis reflects both the lexemic status of the particles and the semantic contribution which they make. El Kassas (2005) argues that the particles (which she takes to be evidential Prepositions (which unlike other Prepositions, govern the ACC case)) are evidentiality markers: the tabulation in (31) summarises the broad outlines of the meanings which she ascribes to the different elements.[8]

(31)

| | |
|---|---|
| *ʔinna* | statement, direct evidentiality (visibly, I perceive that..) |
| *laʕalla* | probablity |
| *layta* | desirability |
| *ʔanna* | observation based on supposition, inference, certitude |
| *kaʔanna* | evaluation, comparison |
| *lakinna* | concessive, contradictory |

The relationship between the choice of presentential particle and notions of evidentiality is clearly a promising direction for further investigation. However within the framework of assumptions we adopt, the fact that such elements carry varieties of evidential meaning does not entail that they cannot be treated as complementisers, and we will adopt this analysis. Developing an account of their case marking properties, and of the requirement that they must be directly followed by a nominal element falls outside the scope of this paper but see Aoun et al. (2010) for some rather inconclusive discussion of the case marking issue. The crucial point from the present perspective is that there is no basis for proposing that *kaʔanna* itself heads an XCOMP and subcategorises a COMP argument. Given this, the f-structure for a sentence such as (32) is as shown in (33).

(32) t-abdū mona kaʔanna-hum y-ḥibb-ūna-ha
3-seem.IPFV.SGF mona as.though-3PL.ACC 3-love.IPFV-PL-3SGF.ACC
Mona seems (e.g. showing on her face) as though they love her.

[8] The syntactic behaviour of these elements is largely identical, however two of them, *kaʔanna* and *ʔinna* can introduce a main clause, while the others cannot.

(i) kaʔanna al-samāʔ-a t-umtiru
as.though DEF-sky-ACC 3-rains.IPFV.SGF
As though it is raining.

(33)
$$\left[\begin{array}{ll} \text{PRED} & \text{`SEEM} < \text{COMP} > \text{SUBJ'} \\ \text{SUBJ} & a\left[\text{PRED} \quad \text{`MONA'}\right] \\ \text{COMP} & \left[\begin{array}{ll} \text{OBJ} & p\left[\text{PRED} \quad \text{`PRO'}\right] \\ \text{SUBJ} & \left[\begin{array}{ll}\text{PRED} & \text{`PRO'}\\ \text{NUM} & \text{PL} \\ \text{PERS} & 3\end{array}\right] \\ \text{PRED} & \text{`LOVE} < \text{SUBJ, OBJ} > \text{'} \\ \text{COMPFORM} & \text{KAʔANNA}\end{array}\right]\end{array}\right]$$

Our hypothesis, then, is that the verb *yabdū* 'seem' is a CR predicate in the presence of the complementiser *kaʔanna* (as with other cases of CR, the SUBJ of *yabdū* is not thematically licensed by this predicate, but anaphorically identified with the embedded pronominal. In other cases it occurs with an expletive subject. Under this hypothesis, we expect that the CR examples are really only possible when the SUBJ can be interpreted as a perceptual source.

(34) shows the lexical entry for the expletive case — *yabdū* takes a single COMP argument, selects the complementiser *ʔanna* (we simply use the string form as the value name). For consistency with standard LFG assumptions about the obligatory nature of the SUBJ, the verb is specified as selecting a non-thematic subject which cannot have a PRED value, but so-called 'expletive subjects' are not overt in Arabic.[9] The verb is associated with the *seem* meaning constructors proposed by Asudeh and Toivonen (2012) - *seem* is a one place predicate semantically and the PSOURCE is some aspect of the eventuality.

(34) *yabdū*$_{expl}$ (↑ PRED) = 'SEEM< COMP> SUBJ'
(↑ COMP COMPFORM) = ʔANNA
¬ (↑ SUBJ PRED)
(↑ SUBJ NUM) = SG
(↑ SUBJ PERS) = 3
(↑ SUBJ GEND) = M
**seem**: $\lambda p \lambda s' seem(s', p)$
$\lambda S \lambda s \exists v_\epsilon [S(s) \wedge \text{PSOURCE}(s) =_\tau v_\epsilon]$

A partial entry for copy-raising *yabdū* is shown in (35) (the verbal inflection optionally introduces a PRED PRO value for the SUBJ since Arabic is a pro-drop language, and relevant agreement constraints, but these are omitted here). The complementiser is required to be *kaʔanna* and the 'raised' SUBJ is specified as the antecedent of some appropriate pronominal. The variable COPYPATH stands for the set of paths to possible copy pronouns — the examples above illustrate a range of such functions. The verb is associated with the *seem*$_{cr}$ meaning constructors

[9]An alternative to the negative constraint is to have the 3SGM form of the verb optionally introduce a SUBJ FORM feature. In the present context, nothing hangs on this.

proposed by Asudeh and Toivonen (2012) - *seem* is a one place predicate semantically and the PSOURCE is required to be some aspect of the entity which is the SUBJ.

(35) *yabdū*$_{cr}$ (↑ PRED) = 'SEEM< COMP> SUBJ'
(↑ COMP COMPFORM) = KAʔANNA
(↑ SUBJ)$_\sigma$ = ((↑ COPYPATH)$_\sigma$ ANTECEDENT)
**seem.cr**: $\lambda P \lambda x \lambda s.[seem(s, P(x)) \wedge \text{P-SOURCE}(s) =_\tau x]$
**mr**: $\lambda f \lambda x.x$: $[a \multimap (a \otimes p)] \multimap (a \multimap a)$

As the examples above have shown, the complementiser serves the same purpose as the intervening *as if* or *like* predicate of English (although it differs syntactically in that it does not head an predication). An attractive feature of the flexible syntax-semantics interface in LFG is that one meaning can be associated with different syntaxes (and glue terms guiding the composition), as shown in (36) and (37) below.

(36) *kaʔanna*$_{cr}$ (↑ COMPFORM) = KAʔANNA
$\lambda P \lambda s.\exists \epsilon.[(s \sim \epsilon) \wedge P(\epsilon)]$:
$[(\uparrow_\sigma \text{ EVENT}) \multimap (\uparrow_\sigma)] \multimap ((\text{COMP} \uparrow_\sigma) \text{ EVENT}) \multimap \uparrow_\sigma$

(37) *like* (↑ PRED) = 'like'
$\lambda P \lambda s.\exists \epsilon.[(s \sim \epsilon) \wedge P(\epsilon)]$:
$[(\uparrow \text{COMP}_\sigma \text{ EVENT}) \multimap (\uparrow \text{COMP}_\sigma)] \multimap ((\text{XCOMP} \uparrow_\sigma) \text{ EVENT}) \multimap \uparrow_\sigma$

If the principles of completeness and coherence are adopted as constraints on well-formed f-structures, as they are in standard LFG, then a structure such as (33) is ill-formed. This is because the SUBJ of *seem* is in a non-thematic position (the thematic position being occupied by the pronominal with which it is co-indexed). In order to account for such structures, we propose extending the **Extended Coherence Condition** to cover SUBJ as well as the UDF functions (TOP and FOC).

(38) **Revised Extended Coherence Condition**
A UDF **or SUBJ** must be linked to the semantic predicate argument structure of the sentence, either by being functionally equated with, or by binding an integrated grammatical function.

There are several other alternatives to this approach. One possibility is that the RP may be syntactically inactive, rather than syntactically active. If the PRED value is restricted out, then the dependency would be a case of functional control and the structure would be coherent (see Asudeh (2012) for this approach to inactive resumptives). Another possibility is that notions of *syntactic* completeness and coherence are abandoned in favour of a purely semantic approach. Discussion of these alternatives would take us well beyond the scope of the current paper.

To summarize, we have argued that MSA verbs in the preceptual report class show two distinct patterns, an expletive SUBJ variant involves a COMP introduced by *ʔanna*, and places no particular PSOURCE restriction while the CR variant involves a COMP introduced by *kaʔanna*. This is associated with a CR semantics, the lexical requirement for a pronominal copy, and the relevant manager resource, in line with the analysis developed in Asudeh (2004, 2012) and AT.

# 3 Maltese Perceptual Reports

Perceptual report predicates in Maltese (henceforth MT) include the verb *deher* 'seem/appear', the pseudo-verbs *donn*+PRN, diachronically the imperative of 'believe/think', and *qis*+PRN both '(seem/appear/taste/sound) as.though/as.if'.[10] (39) exemplifies the expletive construction with *deher*, in which the verb appears in default 3SGM form and the subject is expressed only in the embedded COMP. In (40) the subject is in the matrix clause and both matrix and embedded verbs agree with it. Similarly in (41) the embedded (non-verbal) predicate shows agreement with the matrix subject. The embedded subject cannot be overt in these examples and the evidence from standard tests for raising (idiom chunks, meaning preservation under passivisation, expletives, etc) suggest that these are examples of SSR (MT like MSA and the Arabic vernaculars lacks an infinitive form). A plausible f-structure for (41) is thus (42), while (43) shows the f-structure corresponding to the expletive subject example (39).

(39) J-i-dher t-tfal sejr-in tajjeb
3-FRM.VWL-appear.IPFV.SGM DEF-children going.ACT.PRT-PL good.SGM
It seems the children are doing well.

(40) It-tfal dehr-u qed j-ieħd-u gost
DEF-children appear.PFV.3-PL PROG 3-take.IPFV-PL pleasure
The children seem (as though) they are enjoying themselves (lit: taking pleasure).

(41) Dehr-et imdejjq-a
seemed.PFV-3SGF sad-SGF
She seemed sad.

(42)
$$\left[\begin{array}{ll} \text{PRED} & \text{`SEEM}<\text{XCOMP}>\text{ SUBJ'} \\ \text{SUBJ} & \left[\begin{array}{ll} \text{PRED} & \text{`PRO'} \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{FEM} \\ \text{PERS} & 3 \end{array}\right] \\ \text{XCOMP} & \left[\begin{array}{ll} \text{PRED} & \text{`SAD}<\text{SUBJ}>\text{'} \\ \text{SUBJ} & \end{array}\right] \end{array}\right]$$

[10]The Preposition *bħal* 'like/as' and the related complementiser *bħallikieku* (bħal-(li-kieku)), where *li* is the usual COMP and (li-)kieku is the full and shortened version of the counterfactual COMP may also be used to express perceptual reports in combination with, or in the absence of, the predicates listed in the text. We leave full consideration of this element to one side. See Camilleri and Sadler (In prep) and Camilleri (In prep) for further work on Maltese perceptual reports.

(43)
$$\left[\begin{array}{ll}
\text{PRED} & \text{`SEEM} < \text{COMP} > \text{SUBJ'} \\
\text{SUBJ} & \left[\text{FORM} \quad \text{IT}\right] \\
\text{XCOMP} & \left[\begin{array}{ll}
\text{PRED} & \text{`GO-WELL} < \text{SUBJ} > \text{'} \\
\text{SUBJ} & \left[\begin{array}{ll}
\text{PRED} & \text{`CHILDREN'} \\
\text{NUM} & \text{PL} \\
\text{GEND} & \text{MASC} \\
\text{PERS} & 3
\end{array}\right]
\end{array}\right]
\end{array}\right]$$

Suppressing irrelevant details, we might posit the following simplified entry for the EXPL and SSR instances of *deher*, which differ syntactically but share the same semantics (again, we give only the meaning side of the meaning constructors).

(44) *jidher*$_{expl/ssr}$ { (↑ PRED) = 'SEEM< COMP> SUBJ'
¬ (↑ SUBJ PRED) |
(↑ PRED) = 'SEEM< XCOMP> SUBJ'
(↑ XCOMP SUBJ) = (↑ SUBJ) }
**seem**: $\lambda p \lambda s' seem(s', p)$
$\lambda S \lambda s \exists v_\epsilon [S(s) \wedge \text{P-SOURCE}(s) =_\tau v_\epsilon\ ]$

However Maltese *deher* also allows examples such as (45) to (48), which are strongly reminiscent of copy raising. Here the matrix verb *deher* shows 3SGF agreement (MT is a pro-drop language), indicating that *she* is the subject of the clause, coreferential with a pronoun in embedded OBJ function. In (45) no complementising element introduces the finite embedded clause - (46) shows that the prepositional or complementising element *bħal/bħallikieku* is optionally possible.

(45) T-i-dher ġa ta-w-ha xebgħa
3-FRM.VWL-seem.IPFV.SGF already give.PFV.3-PL-3SGF.ACC smacking
xogħol x't-a-għmel!
work what.3-FRM.VWL-do.IPFV.SGF
She$_i$ seems like they already gave her$_i$ a whole load of work to do!

(46) T-i-dhr-u (bħallikieku) xi ħadd
2-FRM.VWL-appear.IPFV-PL as.though some no.one
qal-i-l-kom biex
said.PFV.3SGM-EPENT.VWL-DAT-2PL in.order.to
t-i-tilq-u
2-FRM.VWL-leave.IPFV-PL
You$_i$ seem like someone told you$_i$ to leave.

The pseudo-verbs *donn-* and *qis-* may also optionally occur with *jidher*. As pseudo-verbs, these forms encode agreement (here with the matrix subject) by means of ACC affixes. In (48) the copy pronoun is the object of a preposition, and hence also ACC. In fact pseudo-verbs can also occur as the matrix predicate in SSR and CR constructions, and the analysis we put forward here of SSR and CR extends to the pseudo-verbs in these constructions, although we focus here only on *deher*.

(47) Marija t-i-dher (donn-ha)
Mary 3-FRM.VWL-seems.IPFV.SGF as.though-3SGF.ACC
daħħl-u lil omm-ha l-isptar
enter.CAUSE.PFV.3-PL ACC mother-3SGF.GEN DEF-hospital
Mary$_i$ seems (as though) they admitted her$_i$ mother to hospital.

(48) Dehr-**et** qis-**ha** donn-**ha** għajjt-u
seem.PFV-3SGF as.though-3SGF.ACC as.though-3SGF.ACC shout.PFV.3-PL
magħ-**ha**
with-3SGF.ACC
She$_i$ seemed as though they shouted at her$_i$.

Recall that a key claim of Asudeh and Toivonen (2012) is that there is an important interpretive difference between CR and SSR with verbs in the perceptual report class (such as English *seem*). In CR the PSOURCE is necessarily the SUBJ while in SSR it is an aspect of the eventuality. Given that in Maltese the embedded predicates in the putative SSR examples (such as (40)) show agreement (with the 'raised' subject), and Maltese is a pro-drop language, the question arises as to whether these examples are in fact SSR (as proposed above) or better treated as instances of copy raising. Our argument that these two processes are distinct in Maltese is based on a clear contrast in terms of the PSOURCE role in relevant examples. Consider (45). This is infelicitious if inferred from a pile of files on the desk, but fully appropriate if she is present and looking panicky and stressed. That is, this sentence is only appropriate then if 'she' is the direct source of perception. The same constraint holds over the circumstances in which (46)-(48) are appropriate: the PSOURCE is necessarily the individual.

This is in marked contrast with examples of putative SSR, such as (40). In these cases, the PSOURCE can be the individual or any other aspect of the eventuality. Thus (49) might be felicitously uttered after entering a room and discovering that she was not present in the room, corresponding to an epistemic reading (concluding from the evidence). Similarly, a scenario for (50) might be one in which the 'she' in question habitually puts on slippers when returning to the house, again as a conclusion from the evidence (the absence of the slippers).

(49) T-i-dher ġa telq-et
3-FRM.VWL-seem.IPFV.SGF already leave.PFV-3SGF
She seems to have left already (e.g. the room is empty).

(50) T-i-dher ġie-t mill-mixi
3-FRM.VWL-seem.IPFV.SGF come.PFV-3SGF from.DEF-walking
She seems to be back from walking (e.g. her slippers have gone).

A further difference between CR and SSR (Lappin, 1984; Potsdam and Runner, 2001) concerns the scoping possibilities. CR verbs cannot take scope over their quantified subjects, but SSR verbs can do so. In the glue approach developed by Asudeh (2012) and Asudeh and Toivonen (2012) this difference follows from the differences in composition (i.e. in the glue side of the meaning constructors) between CR and SSR verbs.[11] The following English examples demonstrate (Asudeh and Toivonen, 2012).

(51) No runner seemed like she was exhausted.
For no runner x, x seemed like x was exhausted.
no>seem, *seem>no

(52) No runner seemed to be exhausted.
For no runner x, x seemed to be exhausted.
It seemed to be the case that for no runner x, x was exhausted.
no>seem, seem>no

The putative SSR examples and the CR examples in Maltese also appear to differ in exactly this manner. That is, the raising cases permit both wide and narrow scope for a quantified subject (see (53)), while case of CR permit only wide scope for the quantified subject (see (54)).

(53)

| | | | | | |
|---|---|---|---|---|---|
| Kull | saħħara | t-i-dher | qars-et | lil | Marija. |
| every | witch | 3-FRM.VWL-seem.IPFV.SGF | pinch.PFV-3SGF | DEF | Mary |

Every witch seems like she pinched Marija.
(every>seem and seem>every)

(54)

| | | | |
|---|---|---|---|
| Kull | saħħara | t-i-dher | li |
| every | witch | 3-FRM.VWL-seem.IPFV.SGF | COMP |

| | |
|---|---|
| qaras-ha | Mario. |
| pinch.PFV.3SGM-3SGF.ACC | Mario |

Every witch seems like Mario pinched her. (every>seem)

Note that the behaviour of examples with non-subject copy pronouns (such as (54)) in permitting only wide scope interpretations for the quantified subject is equally consistent with an analysis which treats the subject as a thematic argument (similar to English perceptual ressemblance verbs such as *sound like*). Such verbs also permit only a wide scope interpretation of the subject, as shown in (55) and (56). In principle, then, either a thematic subject or a copy-raising analysis of such examples with *seem* might be appropriate, but we will continue to refer to cases such as (54) as CR.

[11] We refer the interested reader to Asudeh and Toivonen (2012, 31-32) to a clear and general statement of why the narrow scope for subject reading cannot be derived.

(55) Kull saħħara n-x<t>amm-et bħal marr-et t-għum.
every witch REFL-smell.PFV-3.SGF as.though go.PFV-3SGF 3F-swim
Every witch smelled as though she went swimming. (every>smell)

(56) Kull saħħara n-s<t>emgħet bħal qaras-ha
every witch REFL-hear.PFV.3SGF as.though pinch.PFV.3SGM-3SGF.ACC
xi ħadd.
someone
Every witch sounded as though someone pinched her. (every>sound)

Before moving on, we note that choice of complementiser does not play a determining role in Maltese. The preposition/complementiser *bħal//bħallikieku* also occurs in SSR (and in expletive subject examples) and is not required in the CR construction. The choice of complementising element is related in some way to the evidential basis: (57) (with *li*) is appropriate if the observation is factual, whereas (58) indicates that an evaluation/interpretation is involved.

(57) Marija t-i-dher (li) ma ta-t-x
Mary 3-FRM.VWL-seem.IPFV.SGF (COMP) NEG give.PFV-3SGF-NEG
kas / ma semgħ-et xejn
notice / NEG hear.PFV-3SGF nothing
Mary seems (as if) she didn't bother/she heard nothing.

(58) Marija t-i-dher bħallikieku ma ta-t-x
Mary 3-FRM.VWL-seem.IPFV.SGF COMP NEG give.PFV-3SGF-NEG
kas / ma semgħ-et xejn
notice / NEG hear.PFV-3SGF nothing
Mary seems as though she didn't bother/she heard nothing.

Taking the construction shown in (45) and (46) to be copy raising, the additional feature of MT is that the complementiser is not required. Just as in MSA, no intervening (prepositional) XCOMP is required. The structure of (59) would be as given in (60).

(59) Marija t-i-dher weġġagħ-ha sew,
Mary 3-FRM.VWL-appears.SGF hurt.CAUSE.PFV.3SGM-3SGF.ACC well
Mario
Mario
Mary seems as though Mario hurt her a lot.

(60)
$$\begin{bmatrix} \text{PRED} & \text{`SEEM}\langle \text{COMP}\rangle\ \text{SUBJ'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{`MARIJA'} \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{FEM} \\ \text{PERS} & 3 \end{bmatrix} \\ \text{COMP} & \begin{bmatrix} \text{PRED} & \text{`HURT}\langle \text{SUBJ, OBJ} \rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'MARIO'} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{PRO} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

The (partial) lexical entry for the CR use of *deher* 'seem' in the examples we have discussed so far is shown in (61), very similar to (35) for MSA. The second line specifies that the copy pronoun fills a non-subject function in the COMP.[12]

(61) $jidher_{cr}$ ($\uparrow$ PRED) = 'SEEM< COMP> SUBJ'
($\uparrow$ SUBJ)$\sigma$ = (($\uparrow$ COMP GF-SUBJ)$\sigma$ ANTECEDENT)
**seem.cr**: $\lambda P \lambda x \lambda s.[seem(s, P(x)) \wedge \text{P-SOURCE}(s) =_{\tau} x]$
**mr**: $\lambda f \lambda x.x$: $[a \multimap (a \otimes p)] \multimap (a \multimap a)$

However CR is not limited to the immediately embedded COMP, and in more deeply embedded positions the pronominal is not limited to non-subject functions. Example (62) would be appropriate in a scenario in which the addressee has been to an interview for a child-minding post, and some aspect of his/her demeanour indicates that the prospective employers ('they') have seen that the addressee can deal well with children.

(62)

| | | | | | |
|---|---|---|---|---|---|
| T-i-dher | ǧa | j-af-u | li | t-af | t-mur |
| 3-FRM.VWL | already | 3-know.IPFV.PL | COMP | 2-know.SG | 2-go.IPFV.SG |

mat-tfal.
with.DEF-children

You seem (from some positive and upbeat aspect of your demeanour) as though they already know that you know how to deal with children.

This suggests that the CR pattern is restricted to non-subject functions only within the topmost COMP, and hence the second line in (61) should be replaced by:

(63) ($\uparrow$ SUBJ)$\sigma$ = (($\uparrow$ COMP { GF-SUBJ | COMP$^{+}$ GF } )$\sigma$ ANTECEDENT)

We have already seen that it is possible to combine a number of perceptual resemblance predicates. An example of this sort is given in (64), where the matrix predicate is *deher* 'seem' and the next (the highest embedded) predicate is the pseudo-verb *donn* +PRN 'as if, as though'.[13] This suggests that the embedded verb heads an XCOMP, and the structure involves both SSR and a CR dependency.

[12] We will amend this very shortly when further examples are considered.
[13] Recall that the pseudo-verbs appear with ACC morphology marking their subject arguments.

(64) Marija t-i-dher donn-ha
Mary 3-FRM.VWL-appears.SGF as.though-3SGF.ACC
weġġagħ-ha sew, Mario.
hurt.CAUSE.PFV.3SGM-3SGF.ACC well Mario
Mary seems as though Mario hurt her a lot.

(65)
$$\left[\begin{array}{ll}
\text{PRED} & \text{`SEEM}<\text{XCOMP}>\text{SUBJ'} \\
\text{SUBJ} & \left[\begin{array}{ll} \text{PRED} & \text{`MARIJA'} \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{FEM} \\ \text{PERS} & 3 \end{array}\right] \\
\text{XCOMP} & \left[\begin{array}{ll}
\text{PRED} & \text{`AS.THOUGH}<\text{COMP}>\text{SUBJ'} \\
\text{SUBJ} & \\
\text{COMP} & \left[\begin{array}{ll} \text{PRED} & \text{`HURT}<\text{SUBJ, OBJ}>\text{'} \\ \text{SUBJ} & \left[\text{PRED} \;\; \text{'MARIO'}\right] \\ \text{OBJ} & \left[\text{PRED} \;\; \text{PRO}\right] \end{array}\right]
\end{array}\right]
\end{array}\right]$$

(48) above shows three perceptual report predicates occurring together in a chain of raising structures, which suggests a lexical description along the lines (66) for the version of copy-raising *deher* which takes an XCOMP.

(66) *jidher*$_{cr}$ ($\uparrow$ PRED) = 'SEEM< XCOMP> SUBJ'
($\uparrow$ XCOMP SUBJ) = ($\uparrow$ SUBJ)
($\uparrow$ SUBJ)$\sigma$ = (($\uparrow$ XCOMP$^+$ {COMP GF-SUBJ | COMP$^+$ GF})$\sigma$ ANT)
**seem.cr**: $\lambda P \lambda x \lambda s.[seem(s, P(x)) \wedge$ P-SOURCE$(s) =_\tau x]$
**mr**: $\lambda f \lambda x.x$

Finally, the MT constructions, similar to the MSA constructions, motivate the extension of the **Extended Coherence Condition** given in (38) above.

Recall that in some dialects of English (including Asudeh (2012) and Asudeh and Toivonen (2012)'s dialect D), copy raising *seem* may occur with no pronominal copy, as shown in (5), repeated here for convenience:

(67) Chris seemed **like** Mary got the prize.

Such examples are taken to involve an instance of *seem* with a thematic argument (much like the perceptual resemblance verbs *sound like*, *look like* and so on). These share the key properties with CR verbs — the subject is interpreted as the PSOURCE which must take wide scope over the perception verb. This is also possible in Maltese, where we have examples such as (68), showing that the matrix subject is not necessarily coreferential with a pronominal in the embedded clause. The subject appears to be thematic in such examples, captured in the partial entry (69).

(68) T-i-dher (li) Marija/hi ħad-et gost
3/2-FRM.VWL-seems.IPFV.SGF COMP Mary/she takes.PFV-3SGF fun
You/She$_i$ seem(s) like Mary$_j$ enjoyed herself$_j$.

(69) *jidher$_{th}$* ($\uparrow$ PRED) = 'SEEM< SUBJ, COMP> '
**seem.th**: $\lambda p \lambda x \lambda s.[seem(s,x,p) \wedge \text{P-SOURCE}(s) =_{\tau} x]$

It is also possible to intercalate further perceptual report predicates between the matrix clause and the complement sentence, as in (70) below. A question then arises as to which predicate in the cascade takes a thematic subject. A natural assumption is that it is the lowest predicate in the XCOMP cascade that takes a thematic subject and a complement clause, while the higher verbs and pseudo-verbs are raising predicates. However this leads us to expect that the pseudo-verbs can occur (alone) in structures such as (68), and this is not the case. We conclude therefore that *deher* alone has an additional subcategorisation with a thematic subject. The proposed f-structure for (70) (which has a thematic subject *they* expressed inflectionally) is shown in (71).

(70) J-i-dhr-u qis-hom Marija ħad-et gost
3-FRM.VWL-seem.IPFV-PL as.though-3PL.ACC Mary took.PFV-3SGF fun
warakollox!
after.all
They seem as though Mary had fun after all.

(71)
$$\left[\begin{array}{ll} \text{PRED} & \text{`SEEM}< \text{SUBJ, XCOMP}>\text{'} \\ \text{SUBJ} & \left[\begin{array}{ll}\text{PRED} & \text{`PRO'}\\ \text{NUM} & \text{PL}\\ \text{PERS} & 3\end{array}\right] \\ \text{XCOMP} & \left[\begin{array}{ll} \text{PRED} & \text{`AS.THOUGH}< \text{COMP}> \text{SUBJ '} \\ \text{SUBJ} & \\ \text{COMP} & \left[\begin{array}{ll}\text{PRED} & \text{`TAKE}< \text{SUBJ, OBJ} >\text{'}\\ \text{SUBJ} & [\text{PRED} \quad \text{'MARIJA'}] \\ \text{OBJ} & [\text{PRED} \quad \text{FUN}]\end{array}\right]\end{array}\right]\end{array}\right]$$

# 4 Conclusion

This paper has investigated the encoding of perceptual reports in MSA and in Maltese, making a contribution to the understanding of this area of syntax and semantics in the Semitic languages. We have seen that while there are a number of syntactic differences between the constructions found in Maltese and MSA, concerning both the availability of raising itself and the role of a mediating 'as if' complementiser, the key semantic observation of AT concerning the PSOURCE is found to hold also for these dialects of Arabic. In the absence of a mediating *like* predication in

CR, we have proposed an extension of the Extended Coherence Condition to satisfy syntactic coherence in these structures.

## References


Aoun, Josef, Elabbas Benmamoun, and Lina Choueiri. 2010. *The syntax of Arabic*. Cambridge: Cambridge University Press.

Asudeh, Ash. 2004. *Resumption as Resource Management*. Ph.D. thesis, Stanford University.

Asudeh, Ash. 2012. *The Logic of Pronominal Resumption*. Oxford: Oxford University Press.

Asudeh, Ash and Ida Toivonen. 2012. Copy raising and Perception. *Natural Language and Linguistic Theory* 30/2:321–380.

Camilleri, Maris. In prep. *Aspects of Verbal Complementation in Maltese*. Ph.D. thesis, University of Essex.

Camilleri, Maris and Louisa Sadler. In prep. Reporting Perceptions in Maltese.

Dalrymple, Mary. 2001. *Lexical Functional Grammar*. New York: Academic Press.

El Kassas, Dina. 2005. *Une étude contrastive de l'arabe et du français dans une perspective de génération multilingue*. Ph.D. thesis, Université Paris 7 Denis Diderot.

Landau, Idan. 2011. Predication vs aboutness in copy raising. *Natural Language and Linguistic Theory* 29(3):779–813.

Lappin, Shalom. 1984. Predication and raising. In C. Jones and P. Sells, eds., *Proceedings of NELS 14*, pages 236–252.

Potsdam, Eric and Jeffrey T. Runner. 2001. Richard Returns: Copy Raising and Its Implications. In *Papers from the 37th Chicago Linguistic Society, Main Session*, vol. 1. CLS.

Rogers, Andy. 1973. *Physical Perception Verbs in English: a study in lexical relatednedd*. Ph.D. thesis, UCLA.

Salih, Mahmud. 1985. *Aspects of Clause Structure in Standard Arabic: A Study in Relational Grammar*. Ph.D. thesis, SUNY at Buffalo.

Soltan, Usama. 2007. *On Formal Feature Licensing in Minimalism: Aspects of Standard Arabic Morphosyntax*. Ph.D. thesis, University of Maryland.

# ANCHOR: A DF IN DP

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**Abstract**

Possessors may occupy a DF position within DP, either in SPEC DP, or adjoined to NP, in line with Bresnan's (2011) Endocentric Mapping Principles. Their default discourse function is that of ANCHOR. This accounts for phenomena such as possessor doubling, and alternative positions for possessors with different semantic and pragmatic constraints.

# 1 Introduction

I suggest that constituents conventionally referred to as 'possessors' are generally manifestations of a discourse function, anchor, and in some cases, express only the DF, ANCHOR, and not the GF POSS as more commonly assumed. Prince (1981) defines an anchor as an NP properly contained in another and linking the containing NP to a discourse referent. Because the anchor must itself be evoked, inferable, or anchored in turn, it renders the otherwise inaccessible referent of the containing NP accessible to the addressee. Thus anchors are, of necessity, embedded within nominal structures, and may be recursively embedded. NPs properly contained in other NPs include those within a prepositional phrase modifying a noun as in (1), those within relative clauses as in (2) and possessors as in (3) [1]; (4) illustrates recursive possessive anchors.

(1) a. a friend of [John's]$_{\text{ANCHOR}}$
b. the President of [the United States]$_{\text{ANCHOR}}$
c. the man from [U.N.C.L.E.]$_{\text{ANCHOR}}$

(2) a guy who works with [Sam]$_{\text{ANCHOR}}$

(3) [my]$_{\text{ANCHOR}}$ neighbour

(4) [[my]$_{\text{ANCHOR}}$ neighbour's]$_{\text{ANCHOR}}$ dog

Some anchors are within complements, as in (1a) and (2b), others within adjuncts as in 1c) and (2), but the status of 'possessors' like those in (3) and (4) is a bit more controversial, and it is with these that this paper is concerned. I will argue that what unifies 'possessors' is not a shared argument status, but their shared discourse function.

Discourse functions manifest in different ways. In some cases they are functions in information structure (i-structure) which may

[1] Assuming D and N are functional co-heads (Bresnan, 2001), the relevant relationships still hold in the DP structure adopted here.

affect the pragmatic interpretation of elements in c-structure, without any direct syntactic relationship to them. In other cases, there is a grammaticalised DF that is subject to the Extended Coherence Condition (ECC) and can link to either an argument or the adjunct GF. In other cases, a GF has a default discourse function: e.g., topic for SUBJ and focus for OBJ. I will argue that anchors manifest in all these ways. The more familiar case is when a GF POSS has a default function as an anchor, and I will propose a mechanism whereby this relationship is established for Hungarian dative possessors, but I will also argue that a grammaticalised DF ANCHOR (ANCH) is involved in other Hungarian possessive structures, in Mandarin, and in Low Saxon, where it may be linked to an ADJUNCT.

I'll first discuss issues arising from previous analyses of possessors as arguments, and review evidence for and against such an analysis. I'll then outline the current views on DFs in LFG, and indicate how ANCH would fit within these frameworks, and then present analyses of different possessor constructions in Hungarian and Low Saxon to illustrate and support my proposals.

## 2 When a 'possessor' is not a possessor

One defining characteristic of an argument is that its semantic role is entailed by a predicate. Generally 'possessors' that share this key characteristic do not actually possess; for those that do, the role-assigning predicate is not always evident. Consider:

(5) a. My hat/dog/lunch
   b. My neighbour/father/friend
   c. My arrival/surprise/action

The nouns in (5a) are common nouns, those in (5b), inherently relational and those in (5c), deverbal; the semantic role of *my* is different in each case. Clearly, relational nouns like those in (5b) entail the existence of another entity related to their own referent, in the way they specify. Likewise, the semantic roles of theme, experiencer and agent associated with *my* in (5c) are roles entailed by the specific deverbal noun the modify. So, in (5b) and (5c) *my* is clearly an argument of the nouns it modifies, and should be mapped to an argument GF. On the other hand in (5a), *my* is consistently interpreted as a possessor *sensu stricto*, a role that is not entailed by any common noun: their referents can all exist without being possessed. This absence of entailed meaning distinguishes common nouns like *hat*, from relational and deverbal nouns like *neighbour* or *arrival*. Henceforth, I will call possessors of common nouns, 'semantic possessors' and those of relational or deverbal nouns 'quasi-possessors', when the distinction is relevant.

Some have suggested that semantic possessors are extrinsic arguments of common nouns (Sadler, 2000), making N a kind of raising predicate; Bresnan (2001) suggests that a POSS GF is added freely to any noun by a lexical redundancy rule, making common nouns into simple predicates, while Szabolcsi (1994) suggests the possessor role may be introduced by an abstract predicate or inflection. However, Laczkó (2007) points out that these approaches all violate either the completeness or the coherence condition. If a common noun appears with an extrinsic POSS, such as proposed by Sadler (2000), then there is no predicate to assign the possessor role to the 'raised' argument, though it clearly has such a role. Conversely, if predicate nouns appear in structures with an intrinsic POSS, as proposed by Bresnan, then there are too many semantic arguments for the number of GFs available: the semantic possessor and quasi-possessor must compete for the same GF. Laczkó also takes issue with the idea that when an affixed predicate is assumed, "the Poss predicate (that is, the possessive marker), realised by a morpheme attaching to the possessed noun" is a co-head of the possessed noun's and yet the possessive relationship is not visible outside the DP. In other words, in a co-head analysis, the separation of sentence-level and DP level predications is not clear from f-structure.

Nevertheless, Laczkó argues for a uniform analysis and suggests a lexical redundancy rule makes any possessed noun into a raising predicate which has *two* arguments: an extrinsic POSS and an intrinsic XCOMP. The XCOMP contains the predicate Poss which selects an intrinsic POSS argument obligatorily controlled by the extrinsic POSS of the raising noun. The lexical entry of a possessed noun in Laczkó's analysis is thus: (↑PRED) = 'N <(↑XCOMP)> (↑POSS)' (↑POSS) = (↑XCOMP POSS). He identifies the underlying form of the Poss predicate in Hungarian as the suffix -*ja* which is clearly evident in examples like (6) (from Laczkó, 2007, p.3) and (7) (from Chisarik and Payne, 2000, p.7).

(6) *(az én) kalap-ja-i-m*
the I hat- Poss-pl-1sg
'my hats'

(7) *a lány macská-ja*
ART girl cat-Poss.sg.3sg
'the girl's cat'

In (6) -*ja* is followed by a plural marker referring to the host noun, *kalap* 'hat', and an agreement marker –*m* indicating that the possessor is 1$^{st}$ person singular. The presence of the Poss morpheme is also assumed in other agglutinating and fusional forms. A comparison of (6) and (7) shows that singular number for the possessed noun, and 3$^{rd}$ person singular for the possessor are not overtly marked, but can be inferred from the occurrence of *-ja* without further suffixes. This has implications for the analysis of the feature-structure of *-ja*, which will be discussed in detail below.

While Laczkó's analysis provides a source for the semantic role of possessor, it does not do the same for the role of possessum. Moreover, in a true raising construction, there is no semantic relationship between the 'raised argument' and the raising predicate. Intuitively, the host noun should be the possessum of Poss, but it is simply unclear how the host noun gets this interpretation in Laczkó's analysis, or most of the others. And there are further problems for Laczkó's analysis, that relate specifically to languages like Hungarian, where possessive structures with common nouns express relationships other than possession. The examples in (8) are from Chisarik and Payne (2000, p.10). (8a) with a semantic possessor is a repetition of (7) above; (8b) involves an attributive modifier, and (8c) an equative relationship in the same structure.

(8) a . *a lány macská-ja*
ART girl cat-3
'the girl's cat'
b. *a boldogság perc-e-i*
ART happiness minute-Poss.PL
'the minutes of happiness'
c. *Budapest város-a*
Budapest city-Poss.sg.3sg
'the city of Budapest'

Another such language is Mandarin; the examples in (9) are adapted from Charters (2004); (9a) involves a semantic possessor, but the counterpart constituent in (9b) is an attributive modifier.

(9) a. *wǒ de shū*
1sg DE book
'my book'
b. *yíng mùtóu de zhuōzi*
hard wood DE table
'table made of hard wood'

I will refer to non-possessive modifiers in structures like those in (8) and (9) as 'attributive possessors'. The fact that common nouns can have either a semantic or an attributive 'possessor' in the same structure makes it harder to argue that 'possessors' are always functionally controlled by the POSS argument of some specific predicate, Poss, as Laczkó's analysis implies. However, there is another possessive structure in Hungarian which is more restricted, to which Laczkó's analysis could potentially apply. Chisarik and Payne, (2001) discuss similarities and differences between the Hungarian structure in (6) - (8) above, and that in (10) below. Where possessors in (6) – (8) have no case marking and cannot be followed by an article, the possessor in (10) carries a dative case-marker, *-nak,* and can be followed by an article. The attributive possessors in (8b) and (8c) cannot occur in the dative structure, as shown in (11) (from Chisarik and Payne, 2001, p.10).

(10) a. *a lány-nak a macská-ja*
ART girl-DAT ART cat-3
'the girl's cat'

(11) a. **a boldogság-nak a perc-ei*
art happiness-DAT ART minute-3-PL.SUBJ
'*happiness' minutes'
b. **Budapest-nek a város-a*
Budapest-DAT ART city- 3sg-SUBJ
'*Budapest's city'

Since dative possessors are restricted to semantic and quasi-possessors, it is plausible to suggest that they do involve a Poss predicate whose *semantic* argument, the possessor, is optional, making way when necessary for higher ranked obligatory roles selected by predicate nouns. The problem then is how to explain the similarity in form of the 'possessed' noun in both structures. Whether the possessor is in dative case or not, the inflections on the host noun are the same, so in Laczkó's raising analysis, both should involve the same lexical process and the same raising predicate, introducing the same GFs, XCOMP and POSS (x2). While his account might be possible for semantic and quasi-possessors, it cannot easily account for attributive ones, or the difference in the range of meanings possible in the two structures.

In Chisarik and Payne's account, each noun has an optional possessor role in a-structure but this requires two different lexical entries, one selecting a dative SUBJ, and the other, a genitive[2] NCOMP. Both are identified as unrestricted functions, but no explanation is offered of how different restrictions on acceptable semantic roles come to be enforced on each; ideally, Lexical Mapping Theory should account for GF selection in a more general way. Also, Chisarik and Payne's proposal departs significantly from the usual LFG account of displaced arguments: a link between a syntactically

[2] Traditionally called nominative, Chisarik and Payne argue that possessors in (6) – (8) belong to a 'new genitive' paradigm, on the grounds of a few distinctive forms. Unmarked nouns will be glossed as GEN in examples and f-structures henceforth.

unrestricted DF and any GF. Below I show how this standard account can be adapted to explain the variation in possessive structures.

In fact, Charters (2004) proposed such an analysis to account for a contrast in restrictiveness between two possessive structures in Mandarin; the examples in (9) above illustrate a structure with no restrictions, comparable to the Hungarian genitive structure while (12) below illustrates a structure with even greater restrictions than the Hungarian dative: in Mandarin, only the arguments of relational and some predicate nouns can appear immediately prior to the noun that selects them, without the particle *de* intervening, as shown in (12a) and (12b) respectively. In (12d) a modifier with *de* is used to clarify the position of *mùtóu* 'wood'; here, it cannot be interpreted as a syntactically independent modifier of the noun *zhuōzi* 'table', as it is in (9c); the only available interpretation is a nonsensical one where the string *mùtóu zhuōzi* 'wooden table' functions as a compound noun.

(12) a. *wǒ māma*
1sg mother
'my mother'
b. *nà liăng chē lĭmian*
that Class car inside
'inside that car'
c. **wǒ gǒu*
1sg dog
d. ?*zìjĭ zhǒng de mùtóu zhuōzi*
self grow DE wood table
'?the wooden table we grew ourselves'
NOT: 'the table made of [wood we grew ourselves]'

In Charters (2004), I suggested that this variation occurs because the position immediately prior to the noun is an argument position, Spec NP, but the unrestricted position prior to *de* is a DF[3] position in Spec DP, whence a constituent can control either an argument or an adjunct (see Charters, 2004, p. 17 for a full structural analysis). I believe this analysis can be extended to account for variation in possessive structures in Hungarian and potentially in other languages too. Before presenting that analysis a discussion of discourse functions in LFG is in order.

## 2 DFs and i-structure in LFG

In the introduction I referred to three different manifestations of discourse functions: as functions restricted to i-structure with no

[3] In that analysis I referred to the DF as MOD for modifier. I now believe the label ANCHOR better reflects the discourse function such elements serve.

specific f-structure exponent; as DFs expressed in c-structure and f-structure, and subject to the ECC; and as default associations with a specific GF. I suggest the unrestricted genitive possessors in Hungarian, and the constituents preceding *de* in Mandarin are manifestations of the second type: they occupy a DF position in c-structure and are subject to the ECC. I suggest the DF they instantiate is that of ANCHOR.

According to Dalrymple and Nikolaeva "when the features TOPIC and FOCUS appear at f-structure, they are taken to be **grammaticalised** discourse functions whose synchronic role is purely syntactic, related to but different from the information-structure roles of topic and focus" (Dalrymple and Nikolaeva, 2011, p. 62, original emphasis). in contrast, discourse roles represented only at the independent level of information structure (i-structure) are based on broader notions of topicality, presupposition, contrast, newness etc., as discussed in Stalnaker (1974); Chafe (1976); Prince (1981); Reinhart (1982); Lambrecht (1987); Firbas (1996) and others. On the other hand, Asudeh (2004, 2010) argues that it is really displacement that should be represented at f-structure by a generic Unbounded Dependency Function (UDF), leaving the distinct DF labels TOPIC and FOCUS to be realised in i-structure.

I sympathise with Asudeh's view, but believe that it and Dalrymple and Nikolaeva's statement that DFs in f-structure are purely syntactic, ignore important distinctions between DFs and ungrammaticalised discourse roles on the one hand, and between DFs and GFs on the other. However discourse functions are integrated with syntax, principled distinctions can be drawn in both directions. Firstly, *grammaticalised* DFs are routinely linked, whether directly or via a generic UDF, to an f-structural constituent, never to a non-constituent. Other discourse roles (like background information or contrastive focus) may have no direct link to any constituent or GF in f-structure (see King, 1997 for a discussion of such mis-matches). Thus it is important to maintain a distinction between grammaticalised DFs, with links to f-structural constituents, and pure discourse functions without such links.

Secondly, DFs are clearly distinct from GFs, not in their syntactic treatment or effects, but in their fixed status in information structure terms. Though Dalrymple and Nikolaeva (2011, p. 62, fn 3) argue that SUBJECTs should not be included as a DF because they display different syntactic characteristics from topics and foci, they concede later that "[v]arious linguistic cues can be used to signal the information structure of an utterance to the addressee...Interestingly, *such cues are often the same as those that languages use to signal grammatical functions*" (Dalrymple and Nikolaeva, 2011, p. 67, emphasis added). Even failure to subcategorise predicates does not set DFs apart because the GFs SUBJ and ADJ do not do this either: all predicates have a Subject and any head can have an adjunct.

What distinguishes SUBJECT from DFs like TOPIC and FOCUS is that the last two are *tied inextricably* to the discourse roles of i-structure after which they are named, while GFs like SUBJ and OBJ are free to realise discourse functions other than their default, or none at all. Thus we have expletive subjects and objects, but not expletive topics or foci. The lack of expletive possessors argues in favour of their analysis as DFs. Moreover, the view that GFs and DFs are distinct is encapsulated in recent analyses of GFs as atoms defined by features that relate directly to information structure (Choi, 1999; Butt and King, 2000; Dalrymple and Nikolaeva, 2011; Mycock and Lowe, 2014). Most of these omit SUBJECT and include TOPIC, FOCUS and BACKGROUND with some variants thereof (see Dalrymple and Nikolaeva, 2011. pp, 65-8 for a comparison).

So, if ANCH is a valid DF, as I suggest, its exponents must always serve the function of anchor, just as TOPICS must be topical, and it should share the features that define other DFs in a combination that makes it distinct. In the typology of DFs proposed by Butt & King (2000) and adopted by Dalrymple & Nikolaeva (2011) anchors are simply subsumed in BACKGROUND, but Mycock and Lowe's (2014) typology which defines as many DFs as others, rests on more features, which provides an opportunity to define with some precision, what makes anchors different from other DFs, and background items. Of particular relevance are the features +about, which indicates "a matter of concern" that the proposition is about; +informative, which means "an element establishes a relationship with another element of the proposition ... resulting in a change in the addressee's representation of the world" and +update which means an element "develops the communication" due to its "novel information structure status" (Mycock and Lowe, 2014, p. 2). These account for the DFs $TOP_e$ (a first-time TOPIC), non-contrastive FOC, $TOP_c$ (a continuing TOPIC) and BACKGROUND, as shown in (13). BACKGROUND has a minus value for all these features, but I suggest that ANCH is + INFORM. I have added the DF ANCH, whose features, I believe, complement those of the first three.

(13)

| DF | ± about | ± inform | ± update | ±d-new | ± h-new |
|---|---|---|---|---|---|
| $TOP_e$ | + | – | + | ± | – |
| $FOC_{NI}$ | – | + | + | + | ± |
| $TOP_c$ | + | – | – | – | – |
| ANCH | – | + | ± | ± | – |
| BACKGD | – | – | – | ± | ± |

Anchors are -about, and +inform, like foci, but are –update, like topics. Explicitly, anchors do not name a "matter of concern", but help to identify such a matter by establishing a relationship between it and their own referent. Consequently, unlike foci, anchors do not 'develop the communication' at the level of the main proposition. Their –about value reflects the fact observed by Laczkó (2007) that possessors are not visible at the level of the main proposition, and Anchors are restricted to DPs within DPs because this is where their function is best served. If we have a GF, POSS restricted to positions in DP, it seems only natural to allow a DF with similar restrictions.

So, ANCH can be defined using existing features in a way that makes it distinct from established DFs. But DFs also need to conform to syntactic requirements: being subject to the ECC, they must be linked to some GF, argument or adjunct, and ideally their structural locations will fit the predictions of Bresnan's (2001) Endocentric Mapping Principles (EMPs). These predict that a DF will typically be the specifier of a functional head or adjoined to a phrase. In nominal structure the relevant functional head is D, and the phrases to which it might be adjoined are NP, DP or possibly some other functional levels within DP, where these are indicated. Many standard analyses of possessive structures suggest possessors occupy precisely such positions. However as the next section reveals, they also assume, contrary to the EMPs, that these are *argument* positions.

## 3 Possessors, GFs and DFs in phrase structure

It is generally agreed in the LFG literature, that 'possessors' are arguments with a POSS GF, but there is some variation in where the GF is said to be assigned. Possessors have been said to occur in Spec NP (Sadler 2000, Charters 2004, Laczkó 2007, Lødrup 2011); Spec DP/FP (Charters, 2004; Strunk 2005); adjoined to NP (Chisarik and Payne 2001); adjoined to N (Lødrup 2011), and in the complement of N (Chisarik and Payne 2001). This basically covers all possible positions in which a phrase can occur in an extended projection of NP, and one (adjoined to N), where it normally cannot! Of these positions, only one (sister of N) is defined by the EMPs as an argument position, specifically for 'non-discourse arguments'. Chisarik and Payne are the only ones to suggest such a position for possessors of the type discussed here, and they assign it a complement function NCOMP.

The most commonly assumed positions (Spec DP, and adjoined to NP) are defined as DF positions by the EMPs, and the fourth (Spec NP) is not mentioned. If we accept the general validity of the EMPs, and conventional wisdom about the location of possessors in c-structure, we must re-assess the idea that possessors are arguments pure and simple. Of course, under the EMPs, one argument, the Subject may also occupy a DF position, because of its stipulated dual status as a GF and a DF. If we exclude SUBJ from the set of DFs, we have to re-assess its position in phrase structure; or, if SUBJ can be assigned in Spec TP by virtue of having a default association with the DF TOPIC, this supports my proposal that POSS also has a default association with a different DF. The next section presents analyses of possessive structures involving the DF ANCH.

## 4 The DF ANCHOR in possessive structures

I follow Laczkó and others in assuming the involvement of an abstract or inflectional Poss predicate but I suggest it is underlyingly transitive, and for reasons that will become clear below, I suggest that its PRED feature is optional[4]. In a language like Hungarian, where an overt Poss entails the involvement of a possessor with specific feature values, even when the possessor is not overt, I assume Poss also introduces an optional(↑PRED) = 'pro' feature for its higher ranked argument, *x* and in some cases, can also specify features for that argument. Before GF assignment, this would give the schematic feature structure:

(14) ((↑PRED) = 'Poss <$x_{possessor}$,$y_{possessum}$>')
((*x* PRED) = 'pro')
((*x* NUM) = $\alpha$)
((*x* PERS) = $\beta$)

However, as an abstract morpheme or bound morph, Poss cannot head a phrase in c-structure so it combines with a lexical head. I suggest this proceeds by linking the possessum role of Poss to a suitable host noun in semantic structure, and integrating the PRED values of Poss and the host in a-structure, combining all other features to create a lexical structure much like that proposed by Bresnan (2001). At the point of incorporation, a GF replaces the generic reference, '*x'* as determined by Lexical Mapping Theory. In this case, the GF POSS is selected.

(15) $N_{possessum}$-Poss: (↑ PRED) = '$N_{possessum}$ of <(↑POSS)>'

This analysis readily accounts for the addition of a semantic possessor to a common noun in either of the Hungarian possessives, shown in (16) (based on Chisarik and Payne, 2001). Lexical structures are shown in (17), c-structures in Figs 1 and 2 and f-structures in (18) and (19).

(16) a . *a lány-nak a macská-ja*
ART girl-DAT ART cat-3
'the girl's cat'

[4] Other alternations, such as that between English pronoun *this*, with a PRED feature, and determiner *this*, a co-head with a noun, also require optional PRED values.

b. *a lány macská-ja*
ART girl cat-3
'the girl's cat'

(17) *a* (↑DEF) = +
*lány* (↑PRED) = 'girl' (↑NUM) = SG
(↑PERS) = 3 ((↑CASE) = GEN)
*lány-nak* (↑PRED) 'girl' (↑NUM) = SG
(↑PERS) = 3 (↑CASE) = DAT
(↑POSS) = (↑ANCH)
*macská-ja* (↑PRED) = 'cat of <(↑POSS)>' (↑NUM) = SG
((↑POSS PRED) = 'pro') ((↑POSS NUM) = SG)
((↑POSS PERS) = 3)

I also assume that the dative case-marker replaces an optional case feature specified by the noun stem and equates the GF POSS with the DF ANCH. The reasons for this will become clearer below. In both structures, the common noun hosts the Poss predicate, and the possessor is mapped to the GF POSS, which replaces *x* in the generic feature specifications. To explain why the dative possessor can precede an article Chisarik and Payne suggest it is adjoined to NP, but this does not hold in a DP analysis, where the article c-commands NP. These days a DP analysis is more generally assumed, is a 'universal default' under the EMPs, and provides as good an account of ordering constraints if we place the dative possessor in Spec DP, as in Fig. 1.

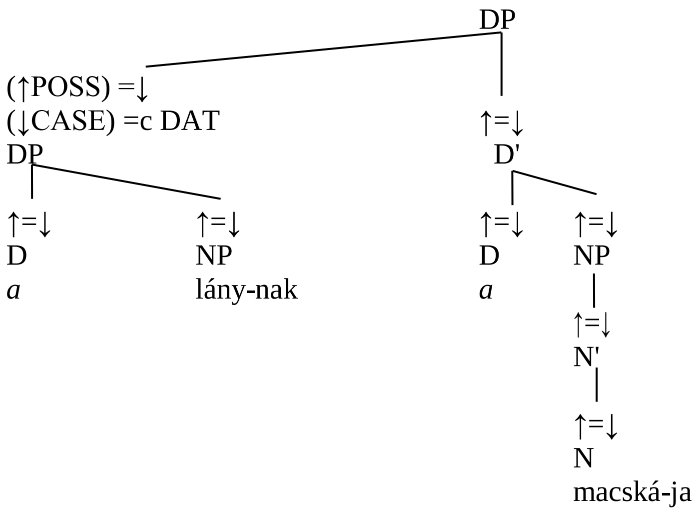


Fig. 1 Hungarian Dative Possessive

The GF POSS is assigned in SPEC DP, and the dative case marker equates this with an ANCH DF, that is absent from c-structure, but appears in f-structure (18).

(18)

PRED ‘cat of <(↑POSS)’>;  NUM SG; DEF +; PERS 3
POSS [PRED ‘girl’; NUM SG; DEF +; PERS 3; CASE DAT]
ANCH [  ]

In Fig. 2, it is the DF ANCH, not the GF POSS that is assigned in c-structure; it is then linked to the GF POSS in f-structure (19) to satisfy the ECC and the completeness condition.

NP

(↑ANCH) =↓ ↑=↓
DP NP

↑=↓ ↑=↓ ↑=↓
D NP $N^0$
*a* lány macská-ja

Fig. 2 Hungarian ‘new genitive’ possessive.

(19)

PRED ‘cat of  <(↑POSS) >; NUM SG; PERS 3
POSS [  ]
ANCH [PRED ‘girl’; NUM SG; DEF +; PERS 3; CASE DAT]

The Poss predicate could also contribute a PRED Pro and other features to POSS in f-structure, in which case we would have anaphoric control, but those features are all optional.

To account for the incorporation of predicate nouns, as in (20) (adapted from Laczkó, 2000 e.g. 7) the optional PRED feature of *-ja* is simply omitted during incorporation, accounting for the absence of a strictly possessive interpretation: *Janos* is a theme here, not a possessor.

(20) a. *János-nak az érkez-és-e*
John -dat the arrive-NOM-sg.Poss.3.sg
‘John’s arrival’ / ‘the arrival of John’s’

b. *János érkez-és-e*
John  arrive- NOM-sg.Poss.3.sg
‘John’s arrival’

The optional agreement and ((*x* PRED) = ‘pro’) features remain, so with omission of its PRED feature  *-ja* becomes either an incorporated pronoun, when ((*x* PRED) = ‘pro’) is retained, or a functional morph when it is not. Also,  *-ja* can contribute singular number for the host noun, and 3.sg agreement values if needed, or act as a stem for other agreement features, which block those optionally associated with *-ja*. When they are used, the PRED ‘pro’ contributed by *ja* and any agreement features are linked to the external argument of the incorporated noun. I assume this receives the GF POSS, as part of the nominalisation process for deverbal nouns. Lexical entries for the predicate noun in (20) are shown in (21).

(21) *érkez* (↑PRED) = 'arrive <(↑SUBJ[5])>'
*érkez-és* (↑PRED) = {'arrival' | 'arrival <(↑POSS)>'}
*érkez-és-e* (↑PRED) = {'arrival' | 'arrival <(↑POSS)>'}
(↑ NUM) = SG
(↑ POSS NUM) = SG
(↑POSS PERS) = 3
((↑POSS PRED) = 'pro')

The c-structures for (20a) and (20b) are analogous to those in Fig. 1 and Fig. 2, respectively. The f-structures are shown in (22) and (23).

(22)

$$\begin{bmatrix} \text{PRED 'arrival <(↑POSS)>'; NUM SG; DEF +; PERS 3} \\ \text{POSS [PRED 'NAME}_{\text{JOHN}}\text{'; NUM SG; DEF +; PERS 3; CASE DAT]} \\ \text{ANCH [ ]} \end{bmatrix}$$

(23)

$$\begin{bmatrix} \text{PRED 'arrival <(↑POSS)>'; NUM SG; DEF +; PERS 3} \\ \text{POSS [ ]} \\ \text{ANCH [PRED 'NAME}_{\text{JOHN}}\text{'; NUM SG; DEF +; PERS 3; CASE GEN]} \end{bmatrix}$$

As before, *-ja* could contribute a [PRED Pro] to the f-structure of POSS if there were no overt DP in the anchor position, and if it did so, the PRED Pro feature in (23) would be anaphorically controlled by the overt anchor constituent.

This brings us to common nouns that agree with 'attributive possessors' as in (24) which according to Chisarik and Payne (2001), can occur in the genitive structure (24a), but not the dative (24b). Consider the former first.

(24) a. *a boldogság perc-e-i*
ART happiness.GEN minute-3-PL
'the minutes of happiness'
b. **a boldogság-nak a perc-e-i*
ART happiness.DAT ART minute-3-PL

In (24a) the PRED feature of *-ja* cannot be included, as it would impose a possessor/possessum relationship between the anchor and the

[5] To simplify matters, I omit oblique arguments; see Laczkó, (2000) for the complications and a proposed account.

host noun, which is semantically inappropriate in this instance. However, the host noun is not a predicate. This means there is no semantic argument in a-structure with which '*x*' can be linked. Note that, if we replaced *x* in lexical structure with an unspecified GF, the prediction would be that the noun could agree with any argument or with any adjunct, which is not the case. Therefore, I propose that the agreement source is actually identified by reference to a function that is not syntactically required, but is often pragmatically required: the DF ANCH. A DF is not tied to any specific GF, but can associate with any GF, including ADJUNCT, as long as the adjunct serves the discourse purpose specified. Attributive possessors in this structure do seem to serve this function, by adding greater specificity to an otherwise over-general noun. The idea that 'possessed' nouns agree with an ANCH, rather than an argument is little different from the idea that a verb may agree with a TOPIC rather than a SUBJECT, or indeed that Subject-verb agreement may have arisen out of topic-verb agreement (Givon, 1976; Lehmann, 1982; Dalrymple and Nikolaeva, 2011). I therefore propose that the lexical structure of the form *-ja* is actually:

(25) *-ja* ((↑PRED) = 'of < $x_{\text{poss}}$ , $y_{\text{possessum}}$>')
((↑ANCH PRED) = 'pro')
((↑ANCH NUM) = SG)
((↑ANCH PERS) = 3)

I assume the features of other agreement markers are similarly designated. The lexical structure of the inflected common noun is shown in (26); the c-structure of (24a) is analogous with that in Fig.2 above; the f-structure is shown in (27).

(26) *perc-e-i* (↑PRED) = 'minutes'
(↑NUM) = PL
((↑ANCH PRED) = 'pro')
(↑ANCH NUM) = SG
(↑ANCH PERS ) = 3

(27)

$$\begin{bmatrix} \text{PRED 'minutes'; NUM PL; DEF +} \\ \text{ANCH [PRED 'happiness'; PERS 3; NUM SG; CASE GEN]} \\ \text{ADJ [ ]} \end{bmatrix}$$

As a grammaticalised DF, ANCH is subject to some form of the Extended Coherence Condition (ECC), and since no argument function is available for it to link to, an ADJ GF is included to satisfy the ECC. This means adjuncts that are not anchors cannot trigger agreement on the noun. As the agreement features in this case are optional they may unify with those expressed by the ANCH in c-structure, or be omitted.

Now, consider the analysis of (24b). As before, I assume the PRED value of *-ja* is ruled out by semantic factors. While inanimate *happiness* might possess an attribute like *unexpected*, *minutes* does not express such a concept. Duration is a measure, not an attribute, and cannot, I suggest, be construed as a possession of *happiness*[6]. On the other hand, if the PRED feature of *-ja* were omitted, as for (24a), and the predicate noun in (20), there would be two related problems, one in c-structure and one in f-structure. Suppose the dative DP *a boldogság-nak* 'happiness' were placed in Spec DP, analogous to the dative possessors in Fig. 1. It would be assigned the GF POSS in c-structure which would lead to an incoherent f-structure because no predicate in f-structure designates a POSS GF, as shown in (28). This is true whether an ANCH is constructed in f-structure from the inflections on N, or not.

(28)

$$\begin{bmatrix} \text{PRED `minutes'; NUM PL; DEF +} \\ \text{POSS [PRED `happiness'; PERS 3; NUM SG; CASE GEN]} \\ \text{ANCH [PRED `pro'; PERS 3; NUM SG]} \end{bmatrix}$$

If, instead the dative-marked possessor were adjoined to NP, like a genitive possessor in Fig. 2, and the ADJ GF were included to satisfy the ECC, as in (27), this would not only make it impossible to include an article after the possessor, counter to fact, it would also violate the control equation expressed by the dative case-marker, which equates ANCH with a POSS GF. Inserting the POSS GF in f-structure instead of ADJ would create the same violation of the coherence condition shown in (28).

A DF ANCH can also explain some other aspects of possessive structures in Hungarian and other languages.

## 4.1 Other structures explained

According to Chisarik and Payne, in Hungarian a noun carrying plural agreement can be accompanied by a plural marked dative possessor (29a), but not a genitive one, (29b) (Chisarik and Payne's (11)).

(29) a. *a lány-ok-nak a macská-juk*
ART girl-PL-DAT ART cat-3
'the girls' cat'
b. **a lány-ok macská-juk*
ART girl-PL.GEN cat-3PL

[6] In fact, durations are more often treated as 'possessors': 'an hour's work' etc.

Chisarik and Payne suggest that an explanation may involve a distinction between agreement and incorporated pronouns, and perhaps, binding features, but do not propose a clear analysis. They also suggest this contrast supports the idea that two distinct entries are required for every noun, one referring to SUBJ (i.e. dative possessors) and the other to NCOMP (genitive possessors) so the restriction can be imposed somehow in lexical structure. In my analysis it can be explained as a characteristic of the form *–juk*, without entailing split lexical entries for very noun. If *–juk* assigns a value specifically to POSS, and indicates that POSS is not linked to the DF ANCH, the f-structure of (29a) would be complete and coherent, as in (30), but the f-structure of (29 b) would not satisfy the ECC, as shown in (31)

(30)

$$\begin{bmatrix} \text{PRED 'cat of <(}\uparrow\text{POSS)>; NUM SG; DEF +; PERS 3} \\ \text{POSS [PRED 'girl'; NUM PL; DEF +; PERS 3; CASE GEN]} \end{bmatrix}$$

(31)

$$\begin{bmatrix} \text{PRED 'cat of <(}\uparrow\text{POSS)>; NUM SG; PERS 3} \\ \text{POSS [PRED 'pro}_i\text{'; NUM PL; DEF +; PERS 3; CASE GEN]} \\ \text{ANCH [PRED 'girl}_j\text{'; NUM PL; DEF +; PERS 3; CASE GEN]} \end{bmatrix}$$

In (31) the ANCH DF gets its features from the overt DP adjoined to NP, and the POSS GF gets its features from *–juk*. It imposes disjoint reference, indicated by sub-scripts, which prevents the ANCH from satisfying the ECC.

Chisarik and Payne also say that a topic pronoun cannot appear in the dative structure, as shown in (32a), while pronominal possessors in the genitive structure have contrastive focus (32b).

(32) a. **nekem a lany-om*
I-DAT ART daughter-Poss.sg.1sg
b. *az-én lany-om*
I-GEN daughter -Poss.sg.1sg
'MY daughter'

In my analysis, topic pronouns would be excluded from Spec DP, as long as the dative case indicates that POSS and ANCH are linked because TOPIC is characterised as +about and ANCH as – about. At the same time, a constituent identified as an ANCH in f-structure could still coincide with contrastive focus in i-structure. In most feature-based typologies of DFs, contrastive focus is not a grammaticalised DF in the sense used here, but an *i*–structure value freely associated with anything in c-structure. Moreover, no overt ANCH is required when its referent is retrievable from an incorporated pronoun and discourse context, so it is likely that a more marked discourse function would be assigned to an overt pronoun in the DF position, ANCH. It is effectively a contrastive anchor.

Optional possessor doubling also suggests some possessors occupy a DF position. According to Strunk (2005), a pronominal possessor in Low Saxon can appear alone or with a coreferent lexical possessor as in (33a) but the lexical possessor cannot appear alone, as in (33b); examples from Strunk, 2005.

(33) a. *(d'en Jung) sein Vadder*
the.$_{\text{M.SG.ACC}}$ boy.$_{\text{M.SG.ACC}}$ his father
'the boy's father'
b. **d'en Jung Vadder*
the$_{\text{M.SG.ACC}}$ boy$_{\text{ACC}}$ father

Strunk places the pronominal possessor in D and suggests it introduces an optional ((↑POSS PRED) = 'pro'), which must be omitted when the lexical possessor appears, but does not explain why the lexical possessor cannot appear alone. Strunk proposes a constraint requiring POSS to express a + POSS feature that only the pronominal possessor can supply. Satisfaction of this constraint depends upon the features of the two possessors being combined in f-structure. If, instead, Saxon does not assign the GF POSS in c-structure, but relies on its being specified by the pronoun, the rest follows automatically. Only a pronoun can occupy D, the lexical possessor must occupy a *DF* position in Spec DP, and the optionality of the lexical possessor and obligatory presence of the pronominal follows automatically. The c-structure of (33a) shown in Fig. 3, below is analogous to that in Fig. 1.above, but with an ANCH DF assigned in Spec DP, and a possessive pronoun in place of the article.

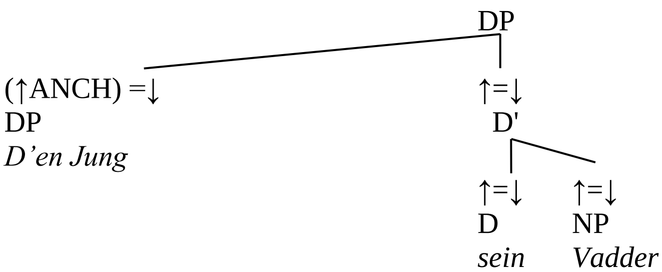

Fig. 3 Possessor doubling in Low Saxon

The f-structure is as shown (34); note that unlike in Strunk's account, the GF POSS is introduced to f-structure only by the pronominal possessor, it is not evident in c-structure.

(34)

PRED ‘father of <(↑POSS)>’; NUM SG; DEF +; PERS 3
POSS [PRED ‘pro$_i$’; NUM SG; DEF +; PERS 3]
ANCH [PRED ‘boy$_i$’;NUM SG; DEF +; PERS 3; CASE ACC]

When there is no lexical possessor involved, the ANCH is simply absent from f-structure, but when the prior discourse does not actually warrant use of a pronominal possessor alone, an overt ANCH can anaphorically control the pronominal POSS, providing additional identifying information. The f-structure of (33b) is incomplete and violates the ECC due to the lack of a POSS argument as shown in (35).

(35)

PRED ‘father of <(↑POSS)>’; NUM SG; DEF +; PERS 3
ANCH [PRED ‘boy$_i$’;NUM SG; DEF +; PERS 3; CASE ACC]

## 5 Conclusions

I have argued that, synchronically, we need to maintain a distinction between DFs and GFs on the one hand, and non-grammaticalised discourse roles on the other, and that the DF ANCH fills a gap in typologies of DFs, distinguished in a systematic way from other recognised DFs. I have suggested that ‘possessors’ often appear in a GF position linked to that DF, but sometimes appear in a position in which the DF ANCH is directly assigned, from where they can control the GF POSS or the GF ADJ in f-structure. I have then shown how a Poss predicate can have a simple lexical structure, but still be multi-functional: a predicate, an incorporated pronoun or an agreement marker, depending how its optional features are omitted or included to meet semantic and syntactic demands of the context. With these assumptions it has been possible to explain, within a relatively uniform account, differences between and restrictions on marked and unmarked possession in Mandarin, dative and genitive possessives in Hungarian, and possessor doubling in Low Saxon, three unrelated and typologically different languages. Moreover, these analyses have removed the need for widespread lexical splits and complex raising constructions proposed in previous accounts, allowing exceptions shown to follow logically from the properties of anchors. The involvement of the DF ANCH could be dispensed with in accounting for the prototypical alignment of semantic and quasi-possessors, seen cross-linguistically, but it is only through involvement of this DF that we can achieve a relatively simple and uniform account of all the phenomena discussed here.

Finally, accepting that possessors sometimes have a DF status in Spec DP affords a clearer possible account of how a GF might develop diachronically from a discourse role. It is often proposed that the GF

SUBJ developed through grammaticalisation of a discourse role topic, but little is said about how this might come to pass, or what intermediate stages might look like. The discussion of anchors presented here included ungrammaticalised anchors, as in (1) and (2), the grammaticalised DF ANCH in Mandarin marked and Hungarian genitive possessives; and the GF POSS tied to the DF ANCH by a lexical specification, in Hungarian dative possessives. It is plausible to think that a c-structure position originally associated loosely, but with some frequency with a particular role in *i*–structure, might start to encode that DF directly, being linked either to an adjunct or an argument GF for coherence in f-structure; the higher frequency of higher ranked meanings serving that function could facilitate a change of status from a DF to an unrestricted GF, and at that point, the GF could in principle be released from the discourse function originally associated with that position. Given the light it can throw on synchronic and diachronic relationships between DFs and GFs, a DF analysis for possessor NPs, and recognition of the grammaticalised DF ANCH are both long overdue.

## References


Asudeh, Ash. 2004. *Resumption as Resource Management.* PhD. thesis, Stanford University.

Asudeh, Ash. 2010. Towards a Unified Theory of Resumption. In: Rouveret, Alain (ed), *Resumptive Pronouns at the Interfaces.* Amsterdam: John Benjamins.

Bresnan, Joan. 2001. *Lexical Functional Syntax* Malden, Mass: Blackwell.

Butt, Miriam, and King, Tracy Holloway. 2000. *Null Elements in Discourse Structure*. In Subbarao, K. V. (ed), Papers from the NULLS Seminar. Delhi: Motilal Banarsidass.

Chisarik, Erika and Payne, John. 2001. Modelling Possessor Constructions in LFG: English and Hungarian. In M. Butt and T. H. King (eds.). *Proceedings of the LFG07 Conference.* Stanford: CSLI Online Publications.

Choi, Hye-Woon. 1999. *Optimizing Structure in Context: Scrambling and information structure.* Dissertations in Linguistics. Stanford, CA: CSLI Publications .

Dalrymple, Mary, and Nikolaeva, Irina. 2011. *Objects and Information Structure*. Cambridge University Press.

Firbas, Jan. 1996. Exploring Vilém Mathesius' use of the term theme. Linguistica Pragensia 1996: 5-23, 63-86.

Givón, Talmy. 1976., Topic, Pronoun, and Grammatical Agreement. In: Li, C. N. (ed.) *Subject and Topic*. New York: Academic Press, pp. 149-188.

King, Tracy Holloway. 1997. Focus Domains and Information Structure. In M. Butt & T. H. King (eds.), *Proceedings of the LFG97 Conference.*

Laczkó, Tibor. 2007. Revisiting Possessors in Hungarian DPs: A new perspective. In M. Butt & T. H. King (eds.), *Proceedings of the LFG07 Conference.* Stanford: CSLI Online Publications, pages 343-362.

Lambrecht, Knud. 1987. Sentence Focus, information structure and the thetic-categorial distinction. In *Proceedings of the 13th Annual Meeting of the Berkeley Linguistics Society,* pages 366-82.

Lehmann, Christian. 1982. *Thoughts on Grammaticalization. A programmatic Sketch*. Vol. I. Arbeiten des Kölner Universalien-Projekts, Nr. 48. Köln,.

Lødrup, Helge. 2011. Norwegian Possessive Pronouns: phrases, words or suffixes? In M. Butt & T. H. King (eds.), *Proceedings of the LFG11 Conference.* Stanford: CSLI Online Publications, pages 339-359.

Mycock, Louise and Lowe, John J. 2014. *S-structure features for information structure analysis.* Paper presented to the LFG14 conference, Ann Arbor, Michigan. July, 2014.

Prince, Ellen. 1981. Toward a taxonomy of given-new information. In P. Cole (ed.), *Radical pragmatics*, 223-55. New York: Academic Press.

Reinhart, Tanya. 1982. Pragmatics and linguistics. An analysis of sentence topics. *Philosophica* 27. 53 - 94

Sadler, Louisa. 2000. Noun phrase structure in Welsh. In M. Butt & T. H. King (eds.), *Argument Realization*, 73-109. Stanford: CSLI Publications.

Stalnaker, Robert. 1974. Pragmatic presuppositions. In M. K. Munitz & P. K. Unger (eds.), *Semantics and Philosophy* . 197–214. New York: New York University Press.

Strunk, Jan. 2005. Pro-drop in Nominal Possessive Constructions. In Miriam Butt & Tracy Holloway King (eds.), *Proceedings of the LFG05 Conference.*

Szabolcsi, Anna. 1994. The Noun Phrase. The Syntactic Structure of Hungarian. *Syntax and Semantics* 27. F. Kiefer and K. É. Kiss (eds.). New York: Academic Press, pages 179–274.

# MODERN GREEK TENSE IN MAIN AND *NA* SUBORDINATED CLAUSES: AN LFG/XLE TREATMENT

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**Abstract**

In the framework of a Modern Greek LFG/XLE grammar development project at ILSP/"Athena" RC, we implemented a novel multilevel analysis of tense in main and *na* subordinated clauses. Existing analyses of tense and the subjunctive mood in Modern Greek do not cover the entirety of tenses available in this language, do not provide a unified analysis of the tense system and the subjunctive mood and do not encode facts of sequence of tenses in subordinated clauses with verbs in the subjunctive mood. Our proposal draws on Reichenbach's ideas and provides a unified analysis of a wide range of tense and subjunctive data. We rely on corpus data retrieved from the HNC (http://hnc.ilsp.gr/).

## 1. Introduction

Representation of tense is one of the most serious problems that we have encounterd in our ongoing effort to develop a corpus-inspired grammar of Modern Greek. There exists a vast literature on the nature of *na* subordinated clauses of Modern Greek (Philippaki-Warburton et al. 1984, Holton et al. 1997), however the focus is more on the nature of *na* and the problems it poses to linguistic theory rather than on an organised and detailed description of phenomena such as the number of tenses available and the sequence of tenses. Here we report on a novel analysis and representation of grammatical tense in Modern Greek that we used in our grammars. Our approach is novel in that it accommodates in a unified system all the verb forms/tenses that support a main declarative clause in Modern Greek (including all the verb forms traditionally considered as tensed plus two more forms) as well as the manifestations of the subjunctive mood in *na* subordinated clauses.

The paper is structured as follows. In Section 2 a brief overview is given of the verb types that have been attested in main declarative clauses retrieved from the HNC. In Section 3, the characteristic semantic contribution of each of the verb types is briefly presented. The proposed analysis of Modern Greek grammatical tense is presented in Section 4. In Section 5 the analysis is shown to accommodate an enriched set of grammatical tenses as compared to the set of tenses discussed in standard literature of Modern Greek. In Section 6 the relation of the proposed analysis to Reichenbach's approach (1974) is discussed. How subjunctive can be accommodated in the proposed analysis of grammatical tense is discussed in Section 7. In Section 8 we introduce the LFG/XLE implementation and the discussion is concluded in Section 9.

## 2. The verb types that support main clauses in Modern Greek

The verb types that support main clauses are summarized in Table 1. We use the regular verb *paizw* (play) as a case study. Throughout this document, we refer to each verb form (and the tense that it encodes) with the number assigned to it in Table 1. Some verb forms are synthetic (1-3) and others analytic (4-10).

| Verb type | Greek Form | English Gloss | Comments |
|---|---|---|---|
| 1 | paizw | play/be playing | Present form: the 'base form' of the verb. Subject agreement. * |
| 2 | epaiza | was playing | Past imperfective form. Subject Agreement. |
| 3 | epaiksa | played | Past perfective form. Subject agreement. |
| 4 | tha paizw | will be playing | The particle *tha* (will) plus the *present form* of the verb. Subject Agreement. |
| 5 | tha paiksw | will play | The particle *tha* plus a verbal form that morphologically coresponds to the past perfect subjunctive.** |
| 6 | tha epaiza | would play | The particle *tha* plus the *past perfective form* of the verb. Subject Agreement. |
| 7 | echw paiksei | have played | The base form of the auxiliary *echw* (have) plus the third person singular of the "subjunctive". *echw*: Subject Agreement. Verb form: indeclinable. |
| 8 | eicha paiksei | had played | The past form of the auxiliary *eicha* (had) plus the third person singular of the "subjunctive". *eicha*: Subject Agreement. Verb form: indeclinable. |
| 9 | tha echw paiksei | will have played | The particle *tha* plus the base form of the auxiliary *echw* plus the third person singular of the "subjunctive". *echw*: Subject Agreement. Verb form: indeclinable. |
| 10 | tha eicha paiksei | would have played | The particle *tha* plus the past form of the auxiliary *echw* plus the third person singular of the "subjunctive". *eicha*: Subject Agreement. Verb form: indeclinable. |

**Table 1.** Analysis of verbal tenses in Modern Greek.

* "Subject Agreement" is a short hand for "the auxilary/verb form agrees with the subject in person and number".
**Past perfect subjunctive was available to older versions of the Greek language. In Modern Greek, this "subjunctive" is exclusively used to form analytical verb forms, it never occurs on its own and gives Subject Agreement.

We would like to note here that Table 1 contains two verb forms that are not usually listed in the relevant literature (Triantafullidhs:146, M.Tzevelekou & V.Κάntzou & S.Stamoulh, 2013:112) as encoding tenses, namely the types 6 and 10. We will discuss those two tensed verb forms in Section 5.

## 3. Brief description of the characteristic semantic function of the 10 verb types

In this section we briefly describe how each of the verb types in Table 1 stands for a member of the grammatical tense system of Modern Greek, therefore it should be accommodated in the unified representation system of tense. As a working definition of "Grammatical tense" in MG we adopt the one proposed by Mozer (2009:15), who defines tense as 'the grammatical category that locates a situation in time in order to indicate when the situation takes place'. Drawing on corpus (HNC) data, we bring evidence that each grammatical tense type in Table 1 has a characteristic semantic function in language that cannot be fullfilled by another verb type - of course, there are other 'semantic functions' that overlap (Klairhs & Babiniotis, 2005, Mozer, 2009). The idea that each verb form has to fulfill a characteristic semantic function is in accordance with the principle of language economy (Babinioths 1998, 114-115, Martinet 1973, 201-206).

### A. Verb Type 1 (enestos "present'-the "base" form)

(1) **Trww/** *ephaga/ *eicha faei auth th stigmh (Vt1)[1]
eat.Vt1.1SG/ *eat.Vt3.1Sg/ *eat.Vt8.1SG at this moment
"I am eating/*ate/*had eaten right now."

Present is the only tense to indicate that an action/event/situation (in what follows we will use the term 'event' as a generic term) takes place at the moment of speaking. The beginning of the event is located somewhere in the past and its end somewhere in the future but both the beginning and the end time are undefined. The speaker focuses only in the event at that specific time.

### B. Verb Type 7 (parakeimenos) vs Verb Type 2 (aoristos)

(2) **Echei teleiwsei** oles tis ergasies tou. (Vt7)
finish.Vt7.3Sg all his homework.
"He has done his homework."

[1] Verbs will be glossed according to the verb types in Table 1; 'Vt1' stands for verb type 1, etc.

(3) **Teleiwse** oles tis ergasies tou. (Vt3)
finish.Vt3.3Sg all his homework.
"He did his homework."

(4) ***Echei teleiwsei** oles tis ergasies tou molis twra. (Vt7)
*finish.Vt7.3SG all his homework right now.
"He has just done his homework."

(5) **Teleiwse** oles tis ergasies tou molis twra. (Vt3)
finish.Vt3.3SG all his homework right now.
"He just did his homework."

(6) ***Echw archisei** *na* ginomai sunaisthhmatikos sthn efhveia. (Vt7)
*start.Vt7.1SG to become.Vt1.1SG emotional in my youth.
"I started being sentimental in my youth."

(7 )**Archisa** *na* ginomai sunaisthhmatikos sthn efhveia. (Vt3)
start.Vt3.1SG to become.Vt1.1SG emotional in my youth.
"I started being sentimental in my youth."

Verb type 7 denotes an event completed in the past with consequences that reach the speaker's time (the present). In (2) the emphasis is on the results of the event and not on setting the exact time at which the event took place, therefore verb type 3, but not verb type 7, can combine with temporal determinations expressing near-immediate past (4), (5). It can also combine with specific clear time reference (6), (7).

**C. Verb Type 2 vs Verb Type 3 vs Verb Type 8**

(8) Chtes otan **pires** tilefono diavaza Logikh. (Vt2)
Yesterday when take.Vt2.2SG call study.Vt2.1SG Logics.
"When you called yesterday I was studying Logics."

(9) Chtes **diavasa** Logikh. (Vt3)
Yesterday study.Vt3.1SG Logics.
"Yesterday I studied Logics."

(10) **Eicha paei** gia ipno otan egine o seismos. (Vt8)
go.Vt8.1SG for sleeping when happen.Vt3.3SG the earthquake.
"I had gone to bed when the earthquake took place."

Verb type 3 is used to describe an event that was completed in the past with no reference to its duration (9). Duration or repetitions are expressed with verb type 2 (8). Thus, the difference between verb type 2 and verb type 3 is that verb type 2, but not verb type 3, is used when one focuses on the internal organization of the event therefore the difference is an aspectual one. Lastly, verb type 8 (past perfect) denotes that the event described by the verb was completed before a certain point of time (10).

(11) **Eiche teleiwsei** o agwnas, otan eftase sto ghpedo. (Vt8)
finish.Vt8.3SG the game when come-Vt3-3SG to the court.
"The game was over already when she came to the court."

(12) **Teleiwse** o agwnas otan eftase sto ghpedo. (Vt3)
finish.Vt3.3SG the game when come.Vt3.3SG to the court.
"The game was over when she came to the court."

(13) **Teleiwne** o agwnas otan eftase sto ghpedo. (Vt2)
finish.Vt2.3SG the game when come.Vt3.3SG to the court.
"The game was about to be over when she came to the court."

(11), (12), (13) do not share the same denotation. (11) says that the game was over before Mary arrived at the court, (12) that the game was over exactly when Mary arrived at the court and (13) that when Mary arrived at the court, the game was about to finish.

### D. Verbs with *tha* : Verbs types 4, 5, 6, 9 and 10

(14) **Tha paizw** podosfairo gia panta. (Vt4)
play.Vt4.1SG soccer forever.
"I will be playing soccer forever."

(15) **Tha paiksw** basket mono gia shmera. (Vt5)
play.Vt5.1SG basket only for today.
"I will play basketball only today."

(16) O athlhths **tha epaize** me enesh. (Vt6)
The athlete.NOM.SG play-v6-3SG with injection.
"The athlete would play with an injection."

(17) Otan ertheis, o Nikos **tha echei fugei** gia th douleia. (Vt9)
When come.Vt2.2SG, the Nick leave.Vt9.3SG from the work.
"When you arrive tomorrow, Nick will have been off to work."

(18) Oi politikoi **tha eichan upograpsei** prin th cthesinh diaskepsh. (Vt10)
The politicians sign.Vt10.3PL before the yesterday conference.
"The politicians would have signed before the yesterday conference."

Both verb types 4 (14) and 5 (15) express an event that will take place in the future. Their difference is of an aspectual nature: verb type 4 expresses duration and repetition while verb type 5 does not.

Verb type 6 is not included in the traditional list of tenses (Triantafullidhs,1941, M.Tzevelekou & V.Kάntzou & S.Stamoulh, 2013, Klairhs & Babiniotis, 2005). On the other hand, our corpus data show that it can support a main clause (16). Interestingly, verb type 6 is morphologically marked for both past and "future" (the particle *tha* contributes the "future"[2] dimension). We postpone the discussion on the denotation of verb type 6 as well as verb type 10 for the next section. Verb type 9 denotes an event that will be completed in the future before another event or a certain point of time.

## 4. A multi-level analysis of Modern Greek grammatical tense

It has already been said that the existing literature does not capture the entirety of the Modern Greek tense types. Furthermore, it does not provide a unified system of representation of grammatical tense. The relevant proposals (Mozer, 2010, Tsaggalidis, 2007) employ just two features, namely TENSE with values +/- past and TELICITY with values +/- perfective. Therefore, they do not provide enough combinations for encoding the traditionally accepted 6 tenses, let alone the 10 tenses attested in the corpus data (Table 1 and Section 5). We, on the other hand, had to face the challenge of developing an LFG/XLE grammar that would model tense usage in both main and subordinate clauses. In this section we describe our system for tense representation that accommodates an enriched tense system as compared to the one accepted in traditional grammars of Modern Greek and the subjunctive (discussed in Section 7).

Most Indo-European languages, including Greek, are considered to have a binary system of tense in the indicative (past versus non-past) where non-past includes the present and future tenses (Mozer, 2009:57). According to Jaewon Yu (1983:14-19), this binary contrast is not what is usually called "Grammatical tense". He called it "Linguistic Time" and argues that it expresses the location of events on the axis of time in relation to the speaker time. Linguistic Time is the basic property of Grammatical tense that is a more complex concept. We adopt the term "Linguistic Time" to encode the

[2] In the next section (section 4) we argue that the term "future" should be replaced by the term "anticipation" as regards the denotation of the verb types of Modern Greek that are formed with the particle *tha.*

binary contrast +/-PAST that should be encoded because it is the only visible morphological distinction of time in Modern Greek: it is actually the case that verb forms use either the +PAST morphological type or the –PAST one (Tsangalidis, 1998 & 1995).

In addition to "Linguistic Time", "aspect designates the perspective taken regarding the internal temporal organization of the situation by denoting different ways of viewing the internal temporal constituency of the same situation". (Comrie 1976:3) In Modern Greek, as Xydopoulos & Tsangalidis (2007) note, the speaker uses aspectual distinctions to express her viewpoint. Thus, if she describes a situation viewed as a simple whole, that is as a unit without internal structure, the aspect is perfective (18), otherwise the aspect is imperfective (19) (Mozer, 2009:61-69).

(19) **Egrapsa** thn ergasia mou. (perfective)
write.Vt3.1SG my essay.
"I wrote my essay."

(20) **Egrapha** thn ergasia mia oloklhrh vdomada. (imperfective)
write.Vt2.1SG my essay for an entire week.
"I was writing my essay for an entire week."

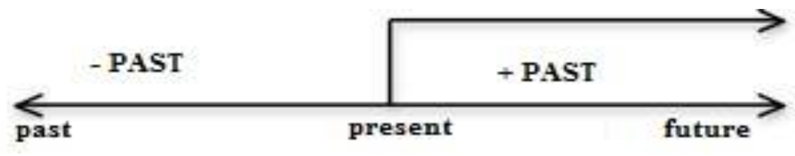
For the purposes of our XLE grammar, we had to develop a unique description for each Modern Greek verb type. To this end, we adopted a multi-feature approach in the spirit of Reichenbach (1947). Reichenbach introduces three abstract time points: Speech time (S), Event time (E) and Reference time (R). In his system, tenses are expressed as sets of relations among these three points. Two types of relation are defined in Reichenbach's system: to "precede" and to "coincide". These assumptions enable the system to produce all possible tenses in terms of the three primitives (S, E, R) involved in the two relations ("precede" and "coincide").

In what follows, we first present our approach and then we compare it with Reichenbach's system. Table 2 gives the relation of the three time points that we assign to each verb type of Table 1. '=' denotes the 'coincide' relation and X → Y the 'X precedes Y' one.

| | Verb types | Time point relations |
|---|---|---|
| 1 | H Maria *paizei* raketes kathe kalokairi.<br>"Maria plays rackets every summer." | S = R = E |
| 2 | H Maria *epaize* raketes gia polla xronia.<br>"Maria was playing rackets for many years." | R = E →S |
| 3 | H Maria *epaikse* raketes chtes.<br>"Maria played rachets yesterday." | R= E →S |
| 4 | H Maria *tha paiksei* raketes aurio.<br>"Maria will play rackets tomorrow." | S = R → E |
| 5 | H Maria *tha paizei* raketes kathe apogeuma.<br>"Maria will be playing rackets every noon." | S = R → E |
| 6 | H Maria *tha epaize* raketes mechri to vradu.<br>"Maria would play rackets till night." | E → R =S |
| 7 | H Maria *echei paiksei* raketes schedon se oles tis paralies. "Maria had played rackets on almost every beach." | E → R→S |
| 8 | H Maria *eiche paiksei* raketes se epagelmatiko epipedo. "Maria had played rackets professionally." | E → R → S |
| 9 | H Maria *tha echei paiksei* raketes mechri *na* kaneis mbanio. "Maria will have played rackets by the time you have a swim." | S → E → R |
| 10 | Prin na fugoun xthes to apogevma, h Maria tha *eiche paiksei* raketes. "Before they were gone yesterday afternoon, Maria would have played rackets." | E → R → S |

**Table 2.** The relation of the three time points

The binary distinction +/-PAST (Mozer, 2009:57) (Schema 1) that we have adopted, is understood to indicate the relation of speech and event time. We define the feature Linguistic Time (LING_TIME) to encode the relation between S (Speech time) and E (Event time). +PAST is modeled with E →S and –PAST with the other two options (S = E, S → E).




**Schema 1.** Time axis

While +PAST is assigned a single representation, namely R→ S, –PAST is related with two representations, namely S = R and S → R. Of them, the first corresponds to the present tense while the second to tenses denoting the "future". These tenses are always and exclusively formed with the particle *tha* (Table 1). We note here that Yu argues that the particle *tha* of Modern Greek denotes both the future and uncertainty (Yu, 1983). Drawing on this idea, we introduce the feature ANTICIPATION (ANTIC) to encode the notion of "an event that is anticipated to take place". Only the particle *tha* is specified for the feature ANTIC in the lexicon. The intuition is that *tha* sets a time point indicating when the anticipation for a certain event occurred.

tha PART * (↑ PART_FORM) = tha
(↑ ANTIC)

The ANTICIPATION (ANTIC) value of a verb form is specified in the syntax with a rule as verb forms with *tha* are always analytic. With verb types 4, 5 and 9 this time point is understood to coincide with the speaker time while with verb types 6 and 10 it is understood to be situated in the past because the anticipated event itself is situated in the past as well.

We now come to the issue of aspect. The importance of aspect in the organization of the Greek verbal system has been long established (Mozer, 2008). Terminology about aspect is rather complicated. Here we adopt the terminology and the proposal of Tsaggalidis (2007), namely that grammatical aspect in Modern Greek expresses TELICITY. TELICITY is the property of a verb or verb phrase that presents an event as being complete, a "unit' in some sense: a verb or verb phrase with this property is said to be perfective. On the other hand, a verb or verb phrase that looks into the temporal constitution of an event (whether it is ongoing, incomplete) is said to be imperfective (Mozer, 2009:61-69). Thus, we define the feature TELICITY (TEL) with values "perfective" and "imperfective". The verb types 2 and 3 differ from each other exactly in the values of TEL (the feature T_FR will be introduced immediately below):

Verb type 2
epaiza V * (↑ LING_TIME)= +
(↑ T_FR)= IDEN
(↑ TELICITY)= IP.
Verb type 3
epaiksa V * (↑ LING_TIME)= +
(↑ T_FR)= IDEN
(↑ TELICITY)= PE.

The verb types 4 and 9 (as well as 3 and 8) pose an interesting problem. Verb type 4 says that a certain event is anticipated to take place at a given time point ahead of the speaker time (what we normally call 'the future'). Verb type 9 says that a certain event will have taken place at some time point before another time point and both points are situated 'in the future'. Both verb types are specified as LING_TIME=-, TEL=+, ANTIC=+. We need one more feature that will encode the difference between these two verb types, a difference that boils down to whether R and E coincide or not. Drawing on work by Poulson (2011), we define the feature Time Frame (T_FR) that encodes the relation between R and E with values Non Identical (NIDEN), if E is not identical to R ( E → R, R → E) and Identical (IDEN) if E and R coincide.

Verb type 4:
tha paiksw V * (↑ LING_TIME)= -
(↑ T_FR) = IDEN.
Verb type 9:
tha echv paiksei V * (↑ LING_TIME)= +
(↑ T_FR) = NIDEN.

In summary, the proposed modeling of the denotation of the verb types in Table 1 as regards Grammatical tense uses four features and a closed set of values as shown below:
1. LING_TIME {+ PAST,-PAST}
2. T_FR {NIDEN, IDEN}
3. TEL {IP, PE}
4. ANTIC{+}

Table 3 shows the representation of the verb types in Table 1 in terms of the system of features and values discussed so far. Each verb type is assigned a unique combination of values of these features although two different verb types may share the same value for a certain feature. For instance, verb types 2 and 3 share the same Reichenbachian representation, namely R=E->S and the T_FR value but differ in terms of TELICITY values. The overall system is over-expressive in the sense that the total number of

Modern Greek verb types is smaller than the number of the possible combinations of the features. We have no principled explanation to offer about this fact but a possible line of research would be to explore the effect of time adverbials on verb type meaning.

| | Greek Form | English Gloss | Tr. Anal. | TENSE | T_FR | Telicity | ANTIC | Reich. Anal. |
|---|---|---|---|---|---|---|---|---|
| 1 | paizw | play/be playing | -PAST | -PAST | IDEN | IP | - | S=R=E |
| 2 | epaiza | was playing | +PAST | +PAST | IDEN | IP | - | R=E→S |
| 3 | epaiksa | played | +PAST | +PAST | IDEN | PE | - | R=E→S |
| 4 | tha paizw | will be playing | -PAST | -PAST | IDEN | IP | + | S=R→E |
| 5 | tha paiksw | will play | -PAST | -PAST | IDEN | PE | + | S=R→E |
| 6 | tha epaiza | would play | Ø | +PAST | IDEN | IP | + | E→S=R |
| 7 | echw paiksei | have played | +PAST | +PAST | NIDEN | PE | - | E→R→S |
| 8 | eicha paiksei | had played | +PAST | +PAST | NIDEN | PE | - | E→R→S |
| 9 | tha echw paiksei | will have played | Ø | -PAST | NIDEN | PE | + | S→E→R |
| 10 | tha eicha paiksei | would have played | Ø | +PAST | NIDEN | PE | + | E→R→S |

**Table 3.** Analysis of verbal tenses in Modern Greek

## 5. Two new tenses

We now turn to the two tenses that we have introduced in Table 1 but did not discuss in Section 3, namely verb type 6 and verb type 10. Traditional Modern Greek grammars do not treat these verb forms as tensed forms. However, our corpus data and our intuitions as native speakers show that both verb type 6 and verb type 10 are used in main declarative sentences (http://www.alexandrafiotaki.com/New-proposed-tenses). Also, Yu (1983), in his study of the sequence of tenses in MG, treated both verb type 6 and verb type 10 as widely accepted tenses.

From the point of view of tense modeling, the interesting feature of these tenses is that they express anticipation and past at the same time. Verb type 6 denotes an event that was anticipated to happen in the past. In Section 4 we mentioned that the particle *tha* contributes a time point at which the anticipation about an event occurs.

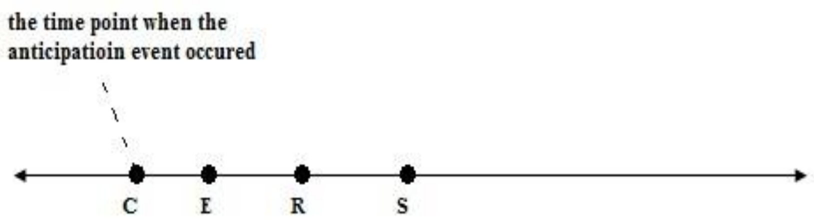
(21) says that the described event would occur at some time point in the past that is preceded by another time point at which the anticipation about the "playing event" occurred. Thus, the interpretation of (21) is: "At some time point t1 the anticipation occurred that at some later time point t2 the athlete would play with an injection. The speaker delivers this information at

the time point t3 and it is the case that t1 precedes t2 precedes/coincides with t3."[3]

(21) O athlhths **tha epaize** me enesh. (Vt6)
The athlete play.Vt6.3SG with an injection.
'The athlete would play with an injection.'

We turn now to verb type 10. It denotes an event that was anticipated to take place in the past before a specific temporal point before the speaker time. The particle *tha* contributes the same information described for verb type 6 above. For example, (22) says that a signing event was anticipated to take place and, contrary to verb type 6, it would be concluded in the past. Point C in Schema 2 represents the time when the anticipation occurred about the signing event that would take place after the time point C and before the speaker time.

(22) Oi politikoi **tha eichan upograpsei** prin thn cthesih diaskepsh. (Vt10)
The politicians sign.v10.3PL before the yesterday conference.
'The politicians would have signed before the yesterday conference.




**Schema 2.** *tha* introduces a time point after which an event is anticipated to take place

Apart from their tensed usage in language, as exemplified in (21) and (22), both verb types 6 and 10 occur in apodoses of conditionals, however, conditionals are out of the scope of this discussion.

### 6. Reichenbach's theory (1947) vs our analysis

We briefly presented Reichenbach's approach in Section 4. Reichenbach (1947) uses the concepts of speech, event and reference time point and the relations between them and details the structure of nine tenses (Table 4), namely past, present and future that may take a simple, anterior or posterior form.

[3] More research is needed in order to argue in favor of t2 < t3 or t2=t3.

| | Temporal relations | Tense category | Traditional label | Example |
|---|---|---|---|---|
| 1. | E–R–S | Anterior Past | Past Perfect | I had passed the exam by the end of the winter. |
| 2. | E,R–S | Simple Past | Simple Past | I passed the exam. |
| 3.a | R–E–S | Posterior Past | -- | I did not know that he would win. (yesterday) |
| 3.b | R–S,E | Posterior Past | -- | I did not know that he would be here. (right now) |
| 3.c | R–S–E | Posterior Past | -- | I did not know that he would come. (tomorrow) |
| 4. | E–S,R | Anterior Present | Present Perfect | I have passed the exam. |
| 5. | S,R,E | Simple Present | Present | I see John. |
| 6. | S,R–E | Posterior Present | Simple Future | I shall see John. |
| 7a | S–E–R | Anterior Future | Future Perfect | I will have passed the exam by the end of the winter. |
| 7.b | S,E–R | Anterior Future | Future Perfect | John will have fixed the car by tonight.(already repaired) |
| 7.c | E–S–R | Anterior Future | Future Perfect | I will have fixed the car by tonight. (just repairing it) |
| 8. | S–R,E | Simple Future | Simple future | I will see John tomorrow. |
| 9. | S–R–E | Posterior Future | | I shall be going to see him. |

**Table 4.** Reichenbachs's tenses (Reichenbach, 1947)

In Table 4 certain English tenses are assigned more than one representation, for instance the Future Perfect is assigned three representations (Comrie, 1985) implying that the framework results in serious ambiguity. Furthermore, Reichenbach's system contains tenses that are not morphologically realized in English or in Modern Greek (or in any language (Comrie 1981, 1985)). The overcapacity of the Reichnbachian system has been strictly critized by Declerck (1986:307). However, the main issue is not the overcapacity of the system since (some of) the combinations that are not used in English may be useful in other languages; rather it is the fact that Reichenbach had tried to prove that each combination of the three points captures a different tense.

Comrie (1985) who distinguishes two types of tense, namely absolute tenses (present, past and future) and relative tenses (complex tenses), suggests that R (Reference time) is necessary only for the representation of complex tenses. As regards Modern Greek, we have argued that R is necessary for the representation of the meaning of verb types 9 and 10 (and possibly 6) that are complex tenses. In all other cases, R is identical to S or to E.

## 7. Accommodating the Subjunctive in the proposed tense system

It is generally accepted that all verb forms of Modern Greek that are preceded by the particle *na* are manifestations of the subjunctive mood. However, our work with corpus data has yielded the following types of *na* clauses:

1. Main clauses expressing a variety of modalities
2. Main clauses introduced with *na* and expressing the imperative
3. Subordinate clauses introduced with *na*

Here we will be concerned with clauses of type (3) only. Such clauses are universally considered as typical "subjunctives" (see examples (23) ,(24)).

The syntactic nature of *na* is a controversial topic in MG linguistics. Warburton &Veloudis (1984) have analyzed *na* as a subjunctive marker and argued that *na* is not a complementizer when it introduces subordinated clauses. Similarly, Tsimpli (1990) analyzed *na* as a modality marker that selects agreement and untensed phrases. On the other hand, Agouraki (1991) claims that *na* is a complementizer and, despite the fact that the verb of a *na* subordinated clause is tensed, its meaning depends on the time reference of the main verb. Fiotaki (2014) treats *na* as a complementizer that introduces main and subordinated clauses expressing different modalities.

The observation that verb heads of *na* subordinated clauses[4] are untensed (Tsimpli (1990), Agouraki (1991)) is important. The phenomenon has also been noticed with English subjunctives: von Stechow (1995) claimed that "The semantic effect of the subjunctive will be that it selects Ø-tense". However, depending on the semantics of the main verb, some amount of tense information is available with subordinated *na* clauses (23), (24). So while Linguistic Time is the same in both clauses, namely –PAST as regards both (23) and (24), the subordinated clause may have its own T_FR value as is clearly the case with (24).

(23) H Maria **schediazei** *na* **teleiwsei** th douleia ths avrio.
The Maria plan.Vb1.3SG to finish.3SG her work tomorrow.
"Maria plans to finish her work tomorrow."

(24) H Maria **schediazei** *na* **echei teleiwsei** prin to meshmeri.
The Maria plan.Vb1.3SG to finish.Vb7.3SG before noon.
"Maria plans to have finished her work before noon."

In spoken Modern Greek, there exist no distinct morphological types for the moods indicative and subjunctive although, of course, the moods exist (Mozer, 2009). The morphological distinction between the corresponding verb forms in written Modern Greek was abandoned after 1976 when an attempt for orthographic simplification was made. Since in Modern Greek there is no evidence that the indicative and the subjunctive have distinct morphological manifestations, the same verb form has to be used for both these moods. However, a disjunctive value of the feature MOOD "indicative/subjunctive" is not possible because indicative mood is tensed and subjunctive mood is untensed (at least, in *na* subordinated clauses). Furthermore, if, despite the lexical proliferation it implies, the traditional approach is adopted that assigns a binary value (+/-PAST) to the feature

[4] Controlled na subordinated clauses are generally accepted to be untensed, however, more research is needed as regards the tensed/untensed nature of uncontrolled ones.

LING_TIME, the feature LING_TIME has to be eliminated in order to encode the notion 'untensed' and that would leave out facts like (24).

Facts about the *na* subordinated clauses can be modeled in our tense system naturally with the use of notions and mechanisms of LFG, namely control and restriction. We thus propose that the LING_TIME feature is restricted when it combines with *na* and then, the subcategorizing verbs impose their own LING_TIME on the subordinated verb with control. The remaining tense features of the subordinated verb are active as can been seen in (24).[5] Thus "subjunctive" is not a lexical property of verbs but it is formed in the syntax. No special verb entries are needed for the subjunctive since the same verb type is used for both the indicative and the subjunctive moods. The treatment of the subjunctive mood we have proposed is provided for free by the tense analysis and the representation system we introduced in Section 4. Table 5 contrasts the representation of subjunctive mood according to our model with the representation of subjunctive mood according to the traditional model and explains why facts like (24) can be captured with our proposal but not with the traditional approach.

The feature ANTIC(IPATION) of a subjunctive verb is set to '-' because of the complementary distributions of the complementizer *na* and the particle *tha*. Again this comes for free from the tense analysis and representation system presented in Section 5. Lastly, the feature TEL is a morphological characteristic defined by the verb type.

| **VERB TYPES** | **OUR MODEL** | **TRADITIONAL MODEL** |
|---|---|---|
| na echw paiksei | NIDEN/PE | PE |
| na eicha paiksei | NIDEN/PE | PE |
| na epaiksa: | IDEN/PE | PE |
| na epaiza | IDEN/IP | IP |
| na paiksw: | IDEN/PE | PE |
| na paizw: | IDEN/IP | IP |

**Table 5**. Annotation of "subjunctive" verb types

5 The issue of *na* subordination is more complex than described here. However, the main mechanism, namely restriction of the LING_TIME feature and then control, applies to all types of *na* subordination.

## 7. LFG/XLE treatment

We have integrated the analysis of tense and subjunctive presented here into the fragment of the LFG/XLE Modern Greek grammar that we have developed.

In our implementation, auxiliaries are not specified for a PRED value (Frank et al., 1998) but they contribute the agreement, LING_TIME and T_FR features. TELICITY is always specified by the main verb. Verbs supporting main clauses are specified for all the four tense features. The main verb form Vinf (*paiksw,* Table 3: 5) does not support a clause on its own, it is declinable for person and number and combines with *tha* to support a main clause. On the other hand, *paiksei* (3-sg of *paiksw)* is indeclinable when it combines with the auxiliary *echw* to yield the verb forms 7 & 9 and with the auxiliary *eicha* to yield the verb forms 8 & 10. Rule 1 uses restriction to yield these analytic verb forms.

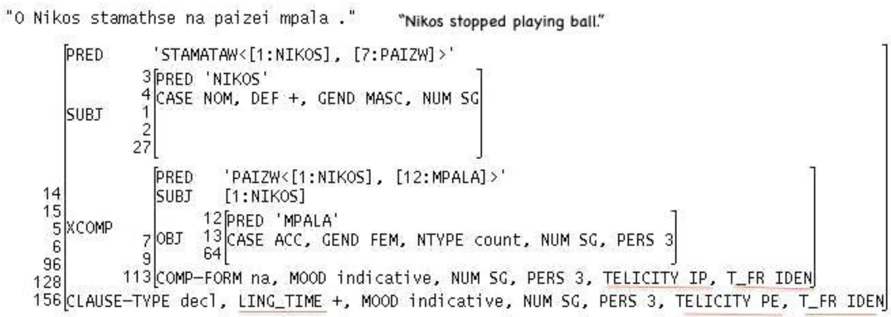
**Rule 1**

```
 Vtns -->
{#For parsing the verb types 4 and 6
PART: (^ PART_FORM) = tha;  V: ^=!

#For parsing verb type 5
 |PART: (^ PART_FORM) = tha;  Vinf: ^=! @(LING_TIME -)

#For parsing verb type 7
 |{AUX:(^ AUX_FORM)= eiche  ;  Vinf: ^=! /PERS/NUM

 #For parsing verb type 8
 |AUX:(^ AUX_FORM)= echei;  Vinf: ^=! /PERS/NUM}

#For parsing verb type 9 and 10
 |PART: (^ PART_FORM) = tha;
 AUX:(^ AUX_FORM)= echei (^ NUM_PERS)=c 3SG   ;  Vinf: ^=!
/PERS/NUM

#For parsing verb type 10
|PART: (^ PART_FORM) = tha;
AUX:(^ AUX_FORM)= eiche  (^ NUM_PERS)=c 3SG  ;   Vinf: ^=!
/PERS/NUM}.
```

We have already explained that the verb heads of *na* subordinated clauses are not specified for LING_TIME; rather their LING_TIME value is controlled by the main verb. On the other hand, the verb heads of *na* subordinated clauses may be specified for T_FR and TEL(ICITY). No minimally different lexical entries are needed in the grammar lexicon, as the LING_TIME feature is restricted when the *na* complement is formed. Restriction of LING_TIME is performed in the syntax with Rule 2. In this way, loss of temporal information is avoided and there is no need of new lexical entries

**Rule 2.**
VPcomp →
#Introduction of the complementizer *na*
COMPL:^ =! (! COMPL_FORM) =c na ;
#Introduction of the verb with no LING_TIME feature
VP : ^=!\ LING_TIME.

The f-structure below was developed by XLE for the string "O Nikos stamathse na paizei mpala" - "Nikos stopped playing ball". The underlined parts of the schema show that the value of the feature "LING_TIME" of the subordinated verb is controlled by the value of the verb of the main clause.




## 2 Conclusion

In a nutshell, the main advantage of our proposal is that grammatical tense is represented as a complex construction; therefore representations become more flexible and expressive. This flexibility makes our proposal the first unified representation of Modern Greek tenses that accommodates all types of main clauses; therefore it can be used for grammar development.

Of course, there is a difference between tense and temporal reference. The adverbs that can affect the meaning of tenses, also assign specific temporal reference that is not provided by the morphology of the verb type. In this sense, our proposal is about the "prototypical" meanings of the verb types in Table 1.

Depending on their lexical semantics, matrix verbs impose different requirements on the tense features of the *na* subordinated clause and probably on whether they are tensed or untensed. For instance, the 'aspectual' verbs *archizw* 'start', *sunechizw* 'continue', *stamataw* 'cease' etc. require that *na* subordinated clauses are headed by verbs with the following specifications: TEL (-imperfective), LING_TIME (–PAST) and T_FR (–IDEN). Our future work will focus on the study and grammar modeling of these requirements. In this way a detailed picture of the usage of the "subjunctive" in Modern Greek will be obtained.

## References


Agouraki, Yoryia. 1991. "A Modern Greek complementizer and its significance for UG." UCL Working Papers in Linguistics 3:1–24.

Babiniotis, Giorgos. 1998. Theoretical linguistics. Athens.

Butt, Miriam. 2013, Control vs. complex predication: Identifying non-finite complements. Natural Language and Linguistic Theory.

Comrie, Bernard. 1976. Aspect: An Introduction to the Study of Verbal Aspect and Related Problems . Cambridge: Cambridge University Press.

Fiotaki, Alexandra. 2014, Study of –na and –oti complementizers in Modern Greek: an LFG/XLE treatment. Master Thesis. University of Athens.

Frank, Annette and Zaenen, Annie. 1998. Tense in LFG: Syntax and Morphology. Xerox Research Center Europe.

Holton, David. Mackridge, Peter. and Philippaki – Warburton, Irene. 1997. Greek: a Comprehensive Grammar of the Modern Language. London & New work: Routledge.

Klairhs, Christos. and Babiniotis, Giorgos. 2005. Modern Greek Grammar. Athens: Ellinika Grammata.

Mackridge, Peter. 1985. The Modern Greek Language: a descriptive analysis of standard Modern Greek. Oxford / New York: Oxford University Press.

Martinet, Andre. 1973. Elements de linguistique generale. Paris : Libriaire Armand Colin.

Mozer, Amalia. 2009. Apopsi kai xronos stin istoria tis Ellinikis [Aspect and Tense in the History of Greek]. Parousia Monograph n. 77. Athens: National and Kapodistrian University of Athens.

Mozer, Amalia. 2008. "The changing relationship of tense and aspect in the history of Greek". Language Typology and Universals 61: 5-18.

Philippaki-Warburton, Irene. and Veloudis, Ioannis. 1984. The subjunctive in complement clauses. Studies in Greek Linguistics 5:149-167.

Poulson, Laurie. 2011. Meta-modeling of Tense and Aspect in a Cross-linguistic Grammar Engineering Platform. UW Working Papers in Linguistics, 28.

Reichenbach, Hans. 1947. The Tenses of Verb. In Elements of Symbolic Logic. New York: Macmillan Co.

Sadler, Louisa. and Nordlinger, Rachel. 2001. Nominal tense with nominal scope: a preliminary sketch. In Proceedings of the LFG01 Conference, M. Butt and T. H. King (eds).

Tsangalidis, Anastasios. 1998, "From Mood to Aspect: Grammaticalisation Theory and the Greek 'Aorist Subjunctive'". In S. Lambropoulou (editor), Proceedings of the 12 International Conference on Theoretical and Applied Linguistics, Aristotle University of Thessaloniki, School of English: Language and Literature.

Tsangalidis, Anastasios. 1995, "On the Interaction of Aspect and Modality: An Argument for the Syntactic Relevance of Aspect in Modern Greek". In E. Mela-Athanasopoulou (editor), Proceedings of the 10th

Tsimpli, lanthi -Maria. 1990. The clause structure and word order of Modern Greek. UCL Working Papers in Linguistics, 2, 220 - 258.

Triadafullidhs, Manolis. 1941. Neoellhnikh Grammatikh. Athina

Tzevelekou, Maria & Kantzou, Vicky & Stamoulh, Spyridoula. 2013. Grammar of Modern Greek. ILSP

Xydopoulos, George. and Tsangalidis, Anastasios. 2007. Verbal aspect in Greek and the relations E, R, S. Studies in Greek Linguistics 27: 322-336

von Stechow, Armin. 1995, 'On the Proper Treatment of Tense', in M. Simons and T. Galloway (eds.), Proceedings of SALT V, CLC Publications, Cornell University, Ithaca, NY, 362-386.

Yu Jaewon. 1983 The sequence of tenses in Modern Greek, Dissertation. UOA.

# SELECTION AND BLOCKING IN THE NORTHEAST DENE VERB

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## Abstract[1]

Dene (Athabaskan) verbs are famous both for their highly complex morphophonemics, and for their often complex, idiosyncratic, and/or discontinuous morphological dependencies. The latter refers mainly to selection and blocking restrictions: two morphemes, in different positions in the verbal template, are either forbidden from appearing together on the surface (blocking), or one morpheme requires the presence of another morpheme (selection). This paper will show how both positive and negative *constraining equations* (Bresnan 2001, Dalrymple 2001) within LFG may be used to capture these effects. Data are taken from the Wıılıìdeh and Tetsǫ́t'ıné languages, based on the author's own fieldwork.

## 1.0 Introduction: the Dene Verbal Template[2]

The Dene (Athabaskan) language family is one of the largest language families in North America, spoken in Alaska, the Yukon Territory, Northwest Territories, British Columbia, Alberta, Saskatchewan, Manitoba, Oregon, California, and the American Southwest. These languages have long been famous both for their highly complex morphophonemics, as well as for their often complex, idiosyncratic, and/or discontinuous morphological dependencies. The data in this paper will be taken primarily from Tetsǫ́t'ıné or Yellowknife, a dialect of Dëne Sųłıné spoken in Dettah, Ndılǫ, Łútsëlk'é, Denínu Kųę́, and Deschaghé, Northwest Territories, Canada, based on my own fieldwork; additional examples will also be taken from the Wıılıìdeh, a dialect of the Tłı̨chǫ (Dogrib) language, spoken in Dettah and Ndılǫ--examples are from Tetsǫ́t'ıné unless otherwise specified. Both of these languages belong to the subgroup termed Northeast Dene or Northeast Athapaskan (Ackroyd 1976). Both of these languages exhibit morphological selection and blocking restrictions: two morphemes, in different positions in the verbal template, are either forbidden from appearing together on the surface (blocking), or one morpheme requires the presence of another morpheme (selection). This paper will show how both positive and negative *constraining equations* (Bresnan 2001, Dalrymple 2001) within LFG may be used to capture these effects.

[1] I wish to thank the many Yellowknives and Akaitcho Dene who provided me with the data for this paper, including especially Emerence Cardinal and Fred Sangris. I also wish to thank Keren Rice for sharing her many insights on Dene verb structure, as well as Peter Sells, participants of LFG14, and two anonymous reviewers for comments on previous versions of this paper. This work was supported in part by the NSF Postdoctoral Fellowship in Polar Regions Research, Award ID#: 000574776.

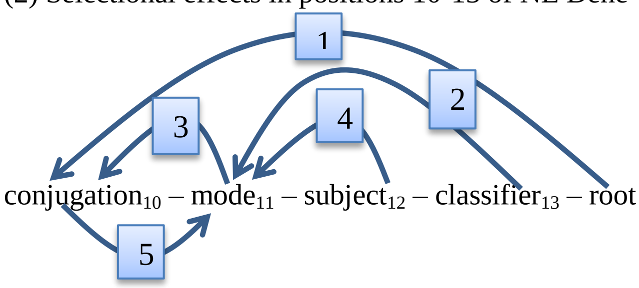
[2] List of abbreviations used: ACC—accomplishment, ACH—achievement, ACT—activity, ADV—adverbial, ASP—aspect, CAUS—causative, CONT—continuative, IMP—imperfective, IMPRS—impersonal MID—middle, OBJ—object, OBL—oblique, OPT—optative, PERAMB—perambulative, PERF—perfective, REFL—reflexive, SEM—semelfactive, SUBJ—subject, VPT—viewpoint.

It is traditionally assumed that the prefixes of the Dene verb are organized into a series of positions called a *template* (Hoijer 1945, Kari 1989). Specifically, I assume the template model in (1), originally proposed for Slave (Rice 1989), for all of the NE Dene languages.

(1) Template model of NE Dene verb structure
preverb$_1$ – distributive$_2$ – iterative$_3$ – incorporate$_4$ – number$_5$ – object$_6$ – deictic subject$_7$ – qualifier$_8$ – aspect$_9$ – conjugation$_{10}$ – mode$_{11}$ – subject$_{12}$ – classifier$_{13}$ – root

This paper will restrict itself to those selectional effects in positions 10-13 of the verbal template, as represented schematically in (2). Note that the direction of the arrows represents the direction of selection.

(2) Selectional effects in positions 10-13 of NE Dene Verbal Template




The terms used in (1) and (2) are the traditional names given to these template positions in the Athabaskanist literature (e.g. Hoijer 1945, Li 1946). Terms such as 'conjugation' and 'classifier' reflect the older view that the prefixes in these positions designate arbitrary verb classes, with little or no semantic contribution. More recently, these prefix positions have been re-analyzed as semantically meaningful, most notably in the work of Rice (2000). Thus, 'conjugation' (position 10) is re-analyzed as *situation aspect* (Rice 2000: 251-281), distinguishing the categories *accomplishment*, *achievement*, *activity*, and *semelfactive*. 'Mode' (position 11) is re-analyzed as *viewpoint aspect*, distinguishing the categories *perfective*, *imperfective*, and *optative* (Rice 2000: 246-251). Finally, the 'classifier' (position 13) is re-interpreted as a *voice/valence* marker (Rice 2000: 126-169), which distinguishes the categories *active voice*, *middle voice*, and *causative* or *causative-middle*.

While all of these categories are *a priori* logically independent of each-other, in Dene languages the prefixes which contribute this morphosyntactic information enter into complex interdependencies with each-other, as suggested by the arrows in (2). For example, the presence of a middle voice marker in position 13 blocks the perfective viewpoint aspect marker *ne* in position 11. In some cases, different prefix positions can mutually constrain each other, as is the case with positions 10 and 11 (see §4.1). The goal of this paper is to elaborate upon the selectional patterns suggested in (2), and formalize them in an LFG framework, using constraining equations.

## 2.0 Lexical Phonology and the Dene Verb

While the templatic representations above are suggestive of a sort of 'flat' structure, it was noted early on that the positions in (1) also seem to have some sort of internal constituency, at least from a phonological perspective. Fang-Kuei Li (1946) first used the terms *conjunctive* and *disjunctive* to describe this constituency, along with a third class of 'in-between' prefixes which seemed to fall into neither group. In later work, within the framework of Lexical Phonology (Kiparsky 1982, 1985), the distinction between conjunct and disjunct prefixes was re-interpreted as corresponding to Stem Level and Word Level, respectively (Rice 1982, 1989; Hargus 1988, Jaker 2012, 2013a). This synthesis of the template model with Lexical Phonology is referred to as the Stem-Core model (Halpern 1992), or else the "Hargus model," as illustrated in (3).

(3) Stem-core model (complete)

Postlexical (Level 5)

Word Level (Level 4)

Outer Stem Level (Level 3)

Inner Stem Level (Level 2)

| | | | | |
|---|---|---|---|---|
| Clitics – | Disjunct – Prefixes | Outer – Conjunct Prefixes | Inner - Conjunct Prefixes | Root Level (Level 1) [Classifier + Root + Suffix][3] |
| 000-0 | 1-5 | 6-7 | 8-12 | 13 |

[3] Suffixes in Dene langauges historically included *-ɬ* (progressive, negative perfective), *-$\chi$* (reversative), *-k* (repetitive-customary), *-x* (semelfactive non-perfective), and *-t* (semelfactive perfective) (Leer 1979). While this system of suffixation is still productive in some Dene languages, in others it has either been lost entirely, or the suffixes have fused with the stem to yield different stem allomorphs (i.e. 'ablaut'). For the purposes of this paper, I assume that suffixes do not directly contribute to f-structure, but rather are selected by the f-structures introduced by other prefixes. In other words, suffixes are listed only with constraining equations, not defining equations.

The representation in (3) is still templatic in the sense that affix ordering is not determined by any independently motivated syntactic or semantic princniples (Nordlinger 2010), and derivation is interleaved with inflection. However, the same representation is also layered (Simpson & Withgott 1986), in the sense that the word is built inside-out from the root, in a series of levels or strata, with different sets of phonological rules applying to each stratum.

From an LFG perspective, it is important to note that Lexical Phonology is a "lexical-incremental" theory of morphology (Stump 2001). This means that both phonological forms and grammatical features are introduced by morphemes, where each morpheme projects a partial f-structure via the ϕ-function (Bresnan 2001, Dalrymple 2001). The layered structure of Lexical Phonology also has implications for the way in which f-structures are built up in LFG. According to the Bracket Erasure Convention, separate morphemes in the input are fused into larger units at the end of each cycle (Pesetsky 1979, Kiparsky 1982). The f-structures projected by these morphemes are then combined via unification (Sells 1995, Nordlinger 1997). To illustrate, let us consider the imperfective or optative stem of the verb 'cook', in Tetsǫ́t'ıné, *łt'éth*. This stem is derived from the root *t'eth* 'cook', *ł*- 'causative', and a floating High tone suffix, as shown in (4a-c).

(4a) Input to Level 1: 3 separate morphemes: /ł- t'eth -H/

**ł:** $V_{Prefix}$ – Level 1
@CAUSATIVE

**t'eth:** $V_{Root}$ – Level 1
(↑ PRED) = 'cook <SUBJ>'

**H:** $V_{Suffix}$ – Level 1
(↑ ASP VPT) $=_c$ IMP ∨ OPT

(4b) Output of Level 1: a phonological form and an f-structure.

**łt'éth** $\xrightarrow{\phi}$ [PRED 'cook <SUBJ, OBJ>']

(4c) Input to Level 2: a single, more complex morpheme: /łt'éth/

**łt'éth:** $V_{Stem}$ – Level 2
(↑ PRED) = 'cook <SUBJ, OBJ>'
(↑ ASP VPT) $=_c$ IMP ∨ OPT

In the lexical entry for *ł*- 'causative', I assume the formal device of *templates* in LFG (Dalrymple, Kaplan, and King 2004; Asudeh, Dalrymple, and Toivonen 2013). That is, the template @CAUSATIVE designates a collection of equations which add an argument to either an intransitive or transitive verb. Thus we see that while the input in (4a) contains an intransitive root and a causativizing prefix, the output consists of a transitive stem, which projects a partial f-structure via the ϕ-function in (4b). This output then becomes the basis of a new lexical entry in (4c), which combines all of the defining and constraining equations in (4a), via unification. I assume that this process of bracket erasure and unification proceeds through all 5 levels of the derivation, as shown in (3). If, at any point in the derivation, coherence or negative constraining equations are violated, the derivation will crash. However, if completeness is not satisfied, or positive constraining equations are not satisfied, the derivation will not crash, because these are evaluated only for complete utterances, not partial f-structures. For example, the constraining equation in (4a) requires the f-structure in (4b) to have either imperfective or optative viewpoint aspect, which it does not. However, this feature may be introduced at a later level, by a prefix such as *ghu* 'optative', as in (5a-b).

(5a) Input to Level 2: Optative prefix plus IMP/OPT stem: /ghu-łt'éth/

| | | | |
|---|---|---|---|
| **ghu:** | $V_{Prefix}$ – Level 2 | **łt'éth:** | $V_{Stem}$ – Level 2 |
| | ($\uparrow$ ASP VPT) = OPT | | ($\uparrow$ PRED) = 'cook <SUBJ, OBJ>' |
| | | | ($\uparrow$ ASP VPT) $=_c$ IMP $\vee$ OPT |

(5b) Output of Level 2: phonological form and f-structure

**ghułt'éth** $\xrightarrow{\phi}$ $\begin{bmatrix} \text{PRED} & \text{'cook <SUBJ, OBJ>'} \\ \text{ASP} & [\text{VPT} \quad \text{OPT}] \end{bmatrix}$

To summarize, violations of coherence, or negative existential equations, cause a derivation to crash immediately, because there is no way for the derivation to recover. On the other hand, violations of completeness or positive constraining equations do not end a derivation, because they may be satisfied by affixes or other material elsewhere in the structure—hence, these cannot crash a derivation until the entire structure is processed.

### 3.0 Voice/valence and perfectivity interactions.

### 3.1 Data.

The Athabaskanist literature traditionally recognizes four classifiers: *d*, *l*, *ł*, and Ø (e.g. Rice 1989). These contribute the semantics of middle voice, causative-middle, causative, and active voice, respectively (Rice 2000: 142-164). The main descriptive generalization to be presented in this section is that the perfective marker *ne* occurs only in Ø/*ł*-classifier verbs, but not *d/l*-classifier verbs. Where *ne* is blocked, a Ø-allomorph of the perfective is used instead to express perfective meaning, as shown in (6).

(6) Classifiers select perfective allomorph.

| | | | | |
|---|---|---|---|---|
| | **ne** | | **Ø/ł** | |
| conjugation$_{10}$ – | mode$_{11}$ – | subject$_{12}$ – | classifier$_{13}$ – | root |
| | **Ø** | | **d/l** | |

The *d*- and *l*-classifiers both contribute *middle voice* (Rice 2000: 142-164). Historically, it is likely that the pattern in (6) arose because perfectivity was left unspecified in middle voice verbs (Hopper & Thompson 1980). Synchronically, however, it is best regarded as an arbitrary allomorph selection pattern. (7) and (8) present the perfective paradigms of Ø- and *ł*-classifier verbs, where *ne* occurs in the perfective.

(7a) Perfective of *hetsagh* ‘cry,’ surface forms (Ø-classifier).

| | singular | dual/plural |
|---|---|---|
| 1st person | hıtságh | hítságh |
| 2nd person | h**ı̨**tságh | huhtságh |
| 3rd person | h**ı̨**tságh | h**ı̨ı̨**tságh |
| Impersonal | ts’**ı̨ı̨**tságh | |

(7b) Perfective of *hetsagh* ‘cry,’ underlying forms (Ø-classifier).

| | singular | dual/plural |
|---|---|---|
| 1st | /ı-tságh/<br>12-stem<br>1sgS.PERF-cry.PERF | /ghe-Ø-híd-tságh/<br>10-11-12-stem<br>ACT-PERF-1plS-cry.PERF |
| 2nd | /ghe-**ne**-ne-tságh/<br>10-**11**-12-stem<br>ACT-**PERF**-2sgS-cry.PERF | /ghe-Ø-uh-tságh/<br>10-11-12-stem<br>ACT-PERF-2plS-cry.PERF |
| 3rd | /ghe-**ne**-tságh/<br>10-**11**-stem<br>ACT-**PERF**-cry.PERF | /he-ghe-**ne**-tságh/<br>7-10-**11**-stem<br>3plS-ACT-**PERF**-cry.PERF |
| Imprs | /ts’e-ghe-**ne**-tságh/<br>7-10-**11**-stem<br>IMPRSS-ACT-**PERF**-cry.PERF | |

(8a) Perfective of *łaałthır* ‘kill one animal,’ surface forms (*ł*-classifier).

| | singular | dual/plural |
|---|---|---|
| 1st person | łaıłthër | łaíldhër |
| 2nd person | ła**ı̨**łthër | łaułthër |
| 3rd person | ła**ı̨**łthër | łah**ı̨ı̨**łthër |
| Impersonal | łats’**ı̨ı̨**łthër | |

(8b) Perfective of *łaałthır* ‘kill one animal,’ underlying forms (*ł*-classifier).

| | singular | dual/plural |
|---|---|---|
| 1st | /ła-ı-**ł-**thër/<br>1-12-**13**-stem<br>ADV-1sgS.PERF**-CAUS-**die.PERF | /ła-ghe-Ø-híd**-ł-**thër/<br>1-10-11-12-**13**-stem<br>ADV-ACT-PERF-1plS**-CAUS-**die.PERF |
| 2nd | /ła-ghe-**ne-**ne**-ł-**thër/<br>1-10-**11**-12-**13**-stem<br>ADV-ACT**-PERF-**2sgS**-CAUS-**die.PERF | /ła-ghe-Ø-uh**-ł-**thër/<br>1-10-11-12-**13-**stem<br>ADV-ACT-PERF-2plS**-CAUS-**die.PERF |
| 3rd | /ła-ghe-**ne-ł-**thër/<br>1-10-**11-13-**stem<br>ADV-ACT**-PERF-CAUS-**die.PERF | /ła-he-ghe-**ne-ł-**thër/<br>1-7-10-**11-13-**stem<br>ADV-3plS-ACT**-PERF-CAUS-**die.PERF |
| Imprs | /ła-ts’e-ghe-**ne-ł-**thër/<br>1-7-10-**11-13-**stem<br>ADV-IMPRSS-ACT**-PERF-CAUS-**die.PERF | |

In (7) and (8) we see that, in Ø/*ł*-classifier verbs, the perfective prefix *ne* appears in position 11, in the 2sg, 3sg, 3du/pl, and impersonal forms. In the other forms, *ne* is absent for historical phonological reasons (Jaker 2012), and a Ø-allomorph of the perfective is used instead. However, in *d/l*-classifier verbs, *ne* is not present in any of the forms, as shown in (9) and (10).

(9a) Perfective of *hejën* ‘sing,’ surface forms (*d*-classifier).

| | singular | dual/plural |
|---|---|---|
| 1st person | hesjën | híjën |
| 2nd person | hı̨jën | huhjën |
| 3rd person | hejën | heejën |
| Impersonal | ts’eejën | |

(9b) Perfective of *hejën* ‘sing,’ underlying forms (*d*-classifier).

| | singular | dual/plural |
|---|---|---|
| 1st person | /ghe-**Ø**-s-**d**-shën/<br>10-**11**-12-**13-**stem<br>ACT**-PERF-**1sgS**-MID-**sing | /ghe-**Ø**-híd-**d**-shën/<br>10-**11-**12-13-stem<br>ACT**-PERF-**1plS**-MID-**sing |

| | | |
|---|---|---|
| 2nd person | /ghe-**Ø**-ne-**d**-shën/<br>10-**11**-12-**13**-stem<br>ACT-**PERF**-2sgS-**MID**-sing | /ghe-**Ø**-uh-**d**-shën/<br>10-**11**-12-**13**-stem<br>ACT-**PERF**-2plS-**MID**-sing |
| 3rd person | /ghe-**Ø-d**-shën/<br>10-**11-13**-stem<br>ACT-**PERF-MID**-sing | /he-ghe-**Ø-d**-shën/<br>7-10-**11-13**-stem<br>3plS-ACT-**PERF-MID**-sing |
| Impersonal | /ts'e-ghe-**Ø-d**-shën/<br>7-10-**11-13**-stem<br>IMPRSS-ACT-**PERF-MID**-sing | |

(10a) Perfective of *dek'enáaltsıl* 'wash one's self,' surface forms (*l*-classifier)

| | singular | dual/plural |
|---|---|---|
| 1st person | dek'enáastsël | dek'enáí**l**tsël |
| 2nd person | dek'enáı̨**l**tsël | dek'enáu**ł**tsël |
| 3rd person | dek'enáa**l**tsël | dek'enáhee**l**tsël |
| Impersonal | dek'enáts'ee**l**tsël | |

(10b) Perf. of *dek'enáaltsıl* 'wash one's self,' underlying forms (*l*-classifier).

| | singular | dual/plural |
|---|---|---|
| 1st | /de-k'e-ná-ghe-**Ø**-s-**l**-tsël/<br>0-1-1-10-**11**-12-**13**-stem<br>REFLO-PERAMB-CONT-ACT-**PERF**-1sgS-**CAUS.MID**-wet.PERF | /de-k'e-ná-ghe-**Ø**-híd-**l**-tsël/<br>0-1-1-10-**11**-12-**13**-stem<br>REFLO-PERAMB-CONT-ACT-**PERF**-1plS-**CAUS.MID**-wet.PERF |
| 2nd | /de-k'e-ná-ghe-**Ø**-ne-**l**-tsël/<br>0-1-1-10-**11**-12-**13**-stem<br>REFLO-PERAMB-CONT-ACT-**PERF**-2sgS-**CAUS.MID**-wet.PERF | /de-k'e-ná-ghe-**Ø**-uh-**l**-tsël/<br>0-1-1-10-**11**-12-**13**-stem<br>REFLO-PERAMB-CONT-ACT-**PERF**-2plS-**CAUS.MID**-wet.PERF |
| 3rd | /de-k'e-ná-ghe-**Ø-l**-tsël/<br>0-1-1-10-**11-13**-stem<br>REFLO-PERAMB-CONT-ACT-**PERF-CAUS.MID**-wet.PERF | /de-k'e-ná-he-ghe-**Ø-l**-tsël/<br>0-1-1-7-10-**11-13**-stem<br>REFLO-PERAMB-CONT-3plS-ACT-**PERF-CAUS.MID**-wet.PERF |
| Imprs | /de-k'e-ná-ts'e-ghe-**Ø-l**-tsël/<br>0-1-1-7-10-**11-13**-stem<br>REFLO-PERAMB-CONT-IMPRSS-ACT-**PERF-CAUS.MID**-wet.PERF | |

In (9) and (10) we see that, in both *d*- and *l*-classifier verbs, the *ne* perfective marker appears nowhere, and instead the Ø-allomorph of the perfective is used throughout the paradigm. The reason for positing a Ø-allomorph in these paradigms is, briefly, that in a morpheme-based theory, it is necessary that every morphosyntactic feature be introduced by some morpheme (as in (15)). Without a Ø-allomorph of the perfective, it would be necessary to assert that the paradigms in (9) and (10) are left unspecified for viewpoint aspect. However, there is evidence that these forms are indeed perfective, even though no overt perfective marker is present. This evidence will be explored in greater detail in §4.0.

**3.2 Analysis: *ne* is constrained not to appear with middle voice.**

In this section, I formalize the constraints which prohibit the *ne* perfective marker from appearing in *d*- and *l*-classifier verbs. Following Rice (2000: 126), I assume that the *ł*-classifier is a causativizer, *d*-classifier represents middle voice, and *l*-classifier is a causative-middle. The lexical entries for these prefixes are given in (11).

(11) Lexical entries for classifiers (voice/valence).

| | | |
|---|---|---|
| **ł:** $V_{Prefix}$ – Level 1 | **d:** $V_{Prefix}$ – Level 1 | **l:** $V_{Prefix}$ – Level 1 |
| @CAUSATIVE | (↑ VOICE) = MID | @CAUSATIVE |
| | | (↑ VOICE) = MID |

This being the case, I claim that the lexical entry for *ne* is sensitive to the middle voice feature on *d/l*-classifiers. Specifically, it is constrained not to occur with middle voice, as shown in (12).

(12) Lexical Entry for /ne/

**ne:** $V_{Affix}$ – Level 2
(↑ ASP VPT) = PERF
(↑ VOICE) ¬= MID

These constraining equations then act as a filter on derivations. If *ne* occurs with the Ø- or *ł*-classifier, the output is well-formed, as in (13), whereas if *ne* occurs with the *d*- or *l*-classifier, the output is ill-formed, as in (14).

(13) Well-formed output: /ghe-ne-tságh/ → *hįtságh* 'he/she cried' (PERF).
*Input to Level 2:*

| | | |
|---|---|---|
| **ghe:** $V_{Prefix}$ – Level 2 | **ne:** $V_{Prefix}$ – Level 2 | **tságh:** $V_{Stem}$ – Level 2 |
| (↑ASP SIT) = ACT | (↑ ASP VPT) = PERF | (↑ PRED) = 'cry <SUBJ>' |
| | (↑ VOICE) ¬= MID | (↑ ASP VPT) $=_c$ PERF |

*Output of Level 2:*

$$\textbf{hįtságh} \xrightarrow{\phi} \begin{bmatrix} \text{PRED} & \text{'cry <SUBJ>'} \\ \text{ASP} & \begin{bmatrix} \text{VPT} & \text{PERF} \\ \text{SIT} & \text{ACT} \end{bmatrix} \end{bmatrix}$$

(14) Ill-formed output: /ghe-ne-d-shën/ → **hɪ̦jën* ‘he/she sang’ (PERF).

*Input to Level 1:*

**d:** V$_{Prefix}$ – Level 1
(↑ VOICE) = MID

**shën:** V$_{Root}$ – Level 1
(↑ PRED) = ‘sing <SUBJ>’

*Output of Level 1:*

**jën** —ϕ→ [ PRED ‘sing <SUBJ>’ ; VOICE MID ]

| | |
|---|---|
| PRED | ‘sing <SUBJ>’ |
| VOICE | MID |

*Input to Level 2:*

**ghe:** V$_{Prefix}$ – Level 2
(↑ASP SIT) = ACT

**ne:** V$_{Prefix}$ – Level 2
(↑ ASP VPT) = PERF
**(↑ VOICE) ¬= MID**

**jën:** V$_{Stem}$ – Level 2
(↑ PRED) = ‘sing <SUBJ>’
(↑ VOICE) = MID

Output of Level 2—***CRASH***.

**hɪ̦jën** —ϕ→

| | | |
|---|---|---|
| PRED | ‘sing <SUBJ>’ | |
| **VOICE** | **MID** | |
| ASP | VPT | PERF |
| | SIT | ACT |

At Level 1, the root *shën* ‘sing’ (which exists independently as a noun meaning ‘song’) combines with *d* to form the middle voice verb stem *jën*. However, if at Level 2 this stem combines with the perfective marker *ne*, the feature [VOICE MID] in the lexical entry of *jën* conflicts with the negative constraining equation in the lexical entry of *ne*, which prohibits the latter prefix from co-occuring with middle voice, and, as a result, the derivation crashes. Thus, constraining equations act as a filter on outputs. In reality, for this verb, the Ø-allomorph of the perfective is used instead: /ghe-Ø-d-shën/ → *hejën*. The lexical entry for this Ø-perfective is given in (15).

(15) Lexical Entry for /Ø/

**Ø:** V$_{Affix}$ – Level 2
(↑ ASP VPT) = PERF

This morpheme functions as the “elsewhere” perfective allomorph. As the lexical entry in (15) does not contain any constraining equations referring to person, number, or aspect, some independent principle is necessary to ensure that Ø is not used everywhere, in place of *ne*—for example, a constraint such as REALIZEMORPHEME (Kurisu 2001—see §5.2).

## 4.0 Perfectivity and situation aspect (‘conjugation’) interactions

### 4.1 Data.

The Athabaskanist literature traditionally recognizes four ‘conjugation markers’: *the* (< **s*), *ghe*, *ne*, and *í* (e.g. Rice 1989). While the term ‘conjugation’ suggests arbitrary verb classes, more recent work has argued that these prefixes represent accomplishment, activity, achievement, and semelfactive situation aspect, respectively (Rice 2000: 251-281). Under this analysis, *the* ‘accomplishment’ and *ghe* ‘activity’ are lexical aspects selected by verbal roots. The main generalization to be described in this section is that *the* and *ghe* occur only in the perfective; in the imperfective, these same verbs are left unspecified for situation aspect.

(16) Lexical aspect distinguished only in the perfective.

the/ghe ne/Ø
conjugation$_{10}$ – mode$_{11}$ – subject$_{12}$ – classifier$_{13}$ – root

In other words, before using either *the* or *ghe*, two conditions must be met: a) the verbal root/verb theme must select the conjugation marker, and b) either *ne* or Ø must introduce the feature perfective into f-structure. This is illustrated in (17)-(18) with *nálzé*, a *the*-conjugation verb, and in (19)-(20) with *shétį* ‘eat’, a *ghe*-conjugation verb.

(17) The verb *nálzé* ‘hunt’ selects *the* conjugation in the perfective.

a. Perfective of ‘hunt’, surface forms.

| | singular | dual/plural |
|---|---|---|
| 1st person | ná**the**szé | ná**thí**lzé |
| 2nd person | ná**thį**lzé | ná**thuł**zé |
| 3rd person | ná**the**lzé | náh**ee**lzé |
| Impersonal | náts’**ee**lzé | |

b. Perfective of *nálzé* ‘hunt’, underlying forms.

| | singular | dual/plural |
|---|---|---|
| 1st | /ná-**the-Ø-**s-l-zé/<br>1-**10-11-**12-13-stem<br>CONT-**ACC-PERF-**1sgS-CAUS.MID-hunt | /ná-**the-Ø-**íd-l-zé/<br>1-**10-11-**12-13-stem<br>CONT-**ACC-PERF-**1plS-CAUS.MID-hunt |
| 2nd | /ná-**the-Ø-**ne-l-zé/<br>1-**10-11-**12-13-stem<br>CONT-**ACC-PERF-**2sgS-CAUS.MID-hunt | /ná-**the-Ø-**uh-l-zé/<br>1-**10-11-**12-13-stem<br>CONT-**ACC-PERF-**2plS-CAUS.MID-hunt |

| | | |
|---|---|---|
| 3rd | /ná-**the-Ø-**l-zé/<br>1-**10-11-**13-stem<br>CONT-**ACC-PERF-**<br>CAUS.MID-hunt | /ná-he-**the-Ø-**l-zé/<br>1-7-**10-11-**13-stem<br>CONT-3plS-**ACC-PERF-**<br>CAUS.MID-hunt |
| Imprs | /ná-ts’e-**the-Ø-**l-zé/<br>1-7-**10-11-**13-stem<br>CONT-IMPRSS-**ACC-PERF-**CAUS.MID-hunt | |

(18) *the*-conjugation is absent in the imperfective.
a. Imperfective of *nálzé* ‘hunt’, surface forms.

| | singular | dual/plural |
|---|---|---|
| 1st person | nászé | náílzé |
| 2nd person | nánelzé | nółzé |
| 3rd person | nálzé | náhelzé |
| Impersonal | náts’elzé | |

b. Imperfective of *nálzé* ‘hunt’, underlying forms.

| | singular | dual/plural |
|---|---|---|
| 1st | /ná-s-l-zé/<br>1-12-13-stem<br>CONT-1sgS-CAUS.MID-hunt | /ná-híd-l-zé/<br>1-12-13-stem<br>CONT-1plS-CAUS.MID-hunt |
| 2nd | /ná-ne-l-zé/<br>1-12-13-stem<br>CONT-2sgS-CAUS.MID-hunt | /ná-uh-l-zé/<br>1-12-13-stem<br>CONT-2plS-CAUS.MID-hunt |
| 3rd | /ná-l-zé/<br>1-13-stem<br>CONT-CAUS.MID-hunt | /ná-he-l-zé/<br>1-7-13-stem<br>CONT-3plS-CAUS.MID-hunt |
| Imprs | /ná-ts’e-l-zé/<br>1-7-13-stem<br>CONT-IMPRSS-CAUS.MID-hunt | |

(19) The verb ‘eat’ selects *ghe* conjugation in the perfective.
a. Perfective of *shétį* ‘eat’, surface forms.

| | singular | dual | plural |
|---|---|---|---|
| 1st person | sh**ée**stį | sh**íí**tį | sh**íí**lyı |
| 2nd person | sh**į́į̨**tį | sh**úu**htį | sh**úu**łyı |
| 3rd person | sh**ée**tį | shéh**ee**tį | shéh**ee**lyı |
| Impersonal | shéts’**ee**tį | | |

b. Perfective of *shétį* ‘eat’, underlying forms.[4]

| | singular | dual | plural |
|---|---|---|---|
| 1st | /shé-**ghe-Ø-**s-d-tį/<br>4-**10-11-**12-13-stem<br>food-**ACT-PERF-**1sgS-MID-sit.human | /shé-**ghe-Ø-**híd-d-tį/<br>4-**10-11-**12-13-stem<br>food-**ACT-PERF-**1plS-MID-sit.human | /shé-**ghe-Ø-**híd-l-yı/<br>4-**10-11-**12-13-stem<br>food-**ACT-PERF-**1plS-CAUS.MID-food |
| 2nd | /shé-**ghe-Ø-**ne-d-tį/<br>4-**10-11-**12-13-stem<br>food-**ACT-PERF-**2sgS-MID-sit.human | /shé-**ghe-Ø-**uh-d-tį/<br>4-**10-11-**12-13-stem<br>food-**ACT-PERF-**2plS-mid-sit.human | /shé-**ghe-Ø-**uh-l-yı/<br>4-**10-11-**12-13-stem<br>food-**ACT-PERF-**2plS-CAUS.MID-food |
| 3rd | /shé-**ghe-Ø-**d-tį/<br>4-**10-11-**13-stem<br>food-**ACT-PERF-**MID-sit.human | /shé-he-**ghe-Ø-**d-tį/<br>4-7-**10-11-**13-stem<br>food-3plS-**ACT-PERF-**MID-sit.human | /shé-he-**ghe-Ø-**l-yı/<br>4-7-**10-11-**13-stem<br>food-3plS-**ACT-PERF-**CAUS.MID-food |
| Imprs | /shé-ts’e-**ghe-Ø-**l-yı/<br>4-7-**10-11-**13-stem<br>food-IMPRSS-**ACT-PERF-**CAUS.MID-food | | |

(20) *ghe*-conjugation is absent in the imperfective.

a. Imperfective of *shétį* ‘eat,’ surface forms.

| | singular | dual | plural |
|---|---|---|---|
| 1st person | shéstį | shíítį | shíílyı |
| 2nd person | shénetį | shúhtį | shúłyı |
| 3rd person | shétį | shéhetį | shéhelyı |
| Impersonal | shéts’elyı | | |

b. Imperfective of *shétį* ‘eat’, underlying forms.

| | singular | dual | plural |
|---|---|---|---|
| 1st | /shé-s-d-tį/<br>4-12-13-stem<br>food-1sgS-MID-sit.human | /shé-híd-d-tį/<br>4-12-13-stem<br>food-1plS-MID-sit.human | /shé-híd-l-yı/<br>4-12-13-stem<br>food-1plS-CAUS.MID-food |
| 2nd | /shé-ne-d-tį/<br>4-12-13-stem<br>food-2sgS-MID-sit.human | /shé-uh-d-tį/<br>4-12-13-stem<br>food-2plS-MID-sit.human | /shé-uh-l-yı/<br>4-12-13-stem<br>food-2plS-CAUS.MID-food |

[4] In Dene languages, there are different stems to ‘sit’, depending on the number, position, and physical characteristics of the object: *theda* ‘a human is sitting’, *theʔą* ‘a heavy object is sitting’, *thełchúth* ‘a piece of fabric is sitting’, etc. The verb ‘eat’ uses the singular human stem for ‘sit’, plus the incorporated noun food, thus literally ‘I food-sit (as a human)’.

| | | | |
|---|---|---|---|
| 3rd | /shé-d-tı̨/<br>4-13-stem<br>food-MID-sit.human | /shé-he-d-tı̨/<br>4-7-13-stem<br>food-3plS-MID-sit.human | /shé-he-l-yı/<br>4-7-13-stem<br>food-3plS-CAUS.MID-food |
| Imprs | /shé-ts'e-l-yı/<br>4-7-13-stem<br>food-impS-CAUS.MID-food | | |

In (17), we see that the verb *nálzé* 'hunt' selects the conjugation marker *the* (accomplishment). However, this prefix occurs only in the perfective forms in (17), not the imperfective forms in (18). Similarly, the verb *shétı̨* 'eat' selects the conjugation marker *ghe* (activity). However, *ghe* occurs only in the perfective forms in (19), not the imperfective forms in (20).

Assuming that *the* and *ghe* occur only in the perfective, this poses a problem given what we observed earlier, that the perfective marker *ne* does not occur in *d*- or *l*-classifier verbs. Since *shétı̨* is a *d*-classifier verb, and *nálzé* is an *l*-classifier verb, what introduces the feature <PERF> in these forms? Recall that, in a morpheme-based theory, every attribute-value pair in f-structure must be introduced by some morpheme. This is the reason for positing a phonologically null allomorph of the perfective prefix /Ø/, as shown in (17) and (19). The purpose of this phonologically null allomorph is to introduce the feature <PERF> and thereby license the presence of the *the* and *ghe* conjugation markers. This intuition is formalized in §4.2.

### 4.2 Analysis: *the* and *ghe* appear only in the perfective.

According to Rice, the prefix *ghe* represents *activity situation aspect*, or durative atelic events, while *the* (< *s) represents *accomplishment situation aspect*, or durative telic events (2000: 256). Rice argues that these prefixes are present only in the perfective, because "in imperfective and optative viewpoints…there is usually no distinction between durative verbs with natural and arbitrary endpoints: duratives are morphologically unmarked and generally undifferentiated in these viewpoints" (2000: 275). Thus, in the imperfective, *the*- and *ghe*-conjugation verbs are not only morphologically unmarked for situation aspect, but semantically unspecified for telicity as well. This intuition can be formalized in LFG through constraining equations in the lexical entries of *the* and *ghe*, as illustrated in (21).

(21) Lexical entries for *the* and *ghe*.[5]

**the:** $V_{Prefix}$ – Level 2
($\uparrow$ ASP SIT) = ACC
($\uparrow$ ASP VPT) $=_c$ PERF

**ghe:** $V_{Prefix}$ – Level 2
($\uparrow$ ASP SIT) = ACT
($\uparrow$ ASP VPT) $=_c$ PERF

These lexical entries ensure that the conjugation markers *the* and *ghe* are allowed to appear only in the perfective viewpoint. The choice of conjugation marker itself, however, is determined by the verb stem, i.e. "lexical aspect". In (22), where we see that the stem *lzé* 'hunt' is constrained to appear with accomplishment situation aspect (i.e. *the*), while the stem *tį* 'eat' is constrained to appear with activity situation aspect (i.e. *ghe*).

(22) Lexical entries for verb stems constrain choice of conjugation marker.

**lzé:** $V_{Stem}$ – Level 2
($\uparrow$ PRED) = 'hunt <SUBJ, (OBL$_\theta$)>'
($\uparrow$ VOICE) = MID
($\uparrow$ ASP SIT) $=_c$ ACC

**tį:** VStem – Level 2
($\uparrow$ PRED) = 'eat <SUBJ, (OBL$_\theta$)>'
($\uparrow$ VOICE) = MID
($\uparrow$ ASP SIT) $=_c$ ACT

To summarize, the conjugation markers *the* and *ghe* require the presence of a perfective prefix Ø or *ne*, and must be compatible with the lexical aspect of the verb stem. A sample derivation of the form *nátheszé* 'I hunted' is given in (23).

(23) Sample derivation of *nátheszé* 'I hunted' (PERF).

*Input to Level 2:*

**the:** $V_{Prefix}$ – Level 2
($\uparrow$ ASP SIT) = ACC
($\uparrow$ ASP VPT) $=_c$ PERF

**Ø:** $V_{Prefix}$ – Level 2
($\uparrow$ ASP VPT) = PERF

**s:** $V_{Prefix}$ – Level 2
($\uparrow$ SUBJ PERS) = 1
($\uparrow$ SUBJ NUM) = SG

**lzé:** $V_{Stem}$ – Level 2
($\uparrow$ PRED) = 'hunt <SUBJ, (OBL$_\theta$)>'
($\uparrow$ VOICE) = MID
($\uparrow$ ASP SIT) $=_c$ ACC

*Output of Level 2:*

$$\textbf{theszé} \xrightarrow{\phi} \left[\begin{array}{ll} \text{PRED} & \text{`hunt <SUBJ, (OBL}_\theta\text{)>'} \\ \text{VOICE} & \text{MIDDLE} \\ \text{SUBJ} & \left[\begin{array}{ll}\text{PERS} & 1 \\ \text{NUM} & \text{sg}\end{array}\right] \\ \text{ASP} & \left[\begin{array}{ll}\text{VPT} & \text{PERF} \\ \text{SIT} & \text{ACC}\end{array}\right] \end{array}\right]$$

[5] Strictly speaking, template position numbers should be added to these and other lexical entries, to ensure that all morphemes are realized in the correct linear order.

*Input to Level 4:*

**ná:** $V_{Prefix}$ – Level 4
(↑ ADV) = CONT
(↑ ASP SIT) $=_c$ ACC

**theszé:** $V_{Stem}$ – Level 4
(↑ PRED) = 'hunt <SUBJ, (OBL$_\theta$)>'
(↑ VOICE) = MID
(↑ ASP SIT) = ACC
(↑ ASP VPT) = PERF
(↑ SUBJ PERS) = 1
(↑ SUBJ NUM) = SG

*Output of Level 4:*

$$\textbf{náthesz\'e} \xrightarrow{\phi} \left[\begin{array}{lll} \text{PRED} & & \text{`hunt <SUBJ, (OBL}_\theta\text{)>'} \\ \text{ADV} & & \text{CONT} \\ \text{VOICE} & & \text{MID} \\ \text{SUBJ} & \text{PERS} & \left[\begin{array}{ll} 1 & \\ \text{NUM} & \text{SG} \end{array}\right] \\ \text{ASP} & & \left[\begin{array}{ll} \text{VPT} & \text{PERF} \\ \text{SIT} & \text{ACC} \end{array}\right] \end{array}\right]$$

The adverbial prefix *ná* is termed 'continuative' in the Athabaskan literature, abbreviated as CONT in the above examples. This prefix carries both a directional and aspectual meaning, and is also a "conjugation chooser," in the sense that it is required to occur with *the*-conjugation in the perfective (Ackroyd 1982, Rice 2000). The fact that a Level 4 prefix can select conjugation is problematic for a level-ordered model, as it constitutes a case of look-ahead (Rice 2000: 14, 262-268), but see Jaker (2013b) for discussion. Thus, to summarize, for the conjugation markers *the* and *ghe* to appear, they must be licensed by the verb stem, the presence of a perfective morpheme (*ne* or Ø), and, in some cases, the adverbial prefix.

### 5.0 A case of constraint conflict: *the*-conjugation, Ø/*ł*-classifier verbs

### 5.1 Data: optionality / alternate perfective paradigms

We have already seen that the *d*/*l*-classifiers select the Ø allomorph of the perfective, while Ø/*ł*-classifier verbs use the overt allmorph *ne*. However, there is one additional restriction: *the* cannot co-occur with *ne* (e.g. Rice & Hargus 1989). This sets up a conflict situation: in Ø/*ł*-classifier, *the*-conjugation verbs, the classifier requires *ne*, while *the* prohibits *ne*, as illustrated in (24).

(24) Classifier and conjugation marker make conflicting demands.

the ??? Ø/ł
conjugation$_{10}$ – mode$_{11}$ – subject$_{12}$ – classifier$_{13}$ – root

However, recall also that *the* conjugation itself is (usually) selected by the root. Thus, one way out of this problem is to switch the conjugation marker, from *the* to *ghe*. In fact this is exactly what happens: it seems that most verbs which are historically *the*-conjugation and Ø/*ł*-classifier have an alternate form which takes *ghe*-conjugation. This effect is most pronounced in Wıılıìdeh, where it appears that some innovative speakers are switching all Ø/*ł*-classifier verbs over to *ghe*-conjugation—thus, the Weledeh Verb Dictionary includes alternate perfective paradigms for all such verbs (Jaker, Sangris & Sundberg 2012—henceforth JSS). However I have also observed this in Tetsǫ́t’ıné, and similar variation has been reported in Dëne Sųłıné (Cook 2004) and in the Behchokǫ̀ dialect of Tłı̨chǫ (Leslie Saxon, p.c.). Some examples of alternate paradigms from Wıılıìdeh dialect are given in (25) and (26) below. Note that, in this dialect, *the* is pronounced as *whe*, and the *ł*-classifier is realized as *h*, by regular sound changes.

(25a) Perfective of *xàeht’è* ‘cook’, *the*-conjugation

| | singular | dual | plural |
|---|---|---|---|
| 1st person | xà**whı**ht’e | xà**whì**t’e | xàts’**eè**ht’e |
| 2nd person | xà**whe**neht’e | xà**wha**ht’e | xà**wha**ht’e |
| 3rd person | xà**whe**ht’e | xàg**eè**ht’e | xàg**eè**ht’e |

(25b) Alternate perfective of *xàeht’è* ‘cook’, *ghe*-conjugation

| | singular | dual | plural |
|---|---|---|---|
| 1st person | xà**ı**ht’e | xà**ì**t’e | xàts’**ı̨ı̨**ht’e |
| 2nd person | xà**nee**ht’e | xà**a**ht’e | xà**a**ht’e |
| 3rd person | xà**ı̨**ht’e | xàg**ı̨ı̨**ht’e | xàg**ı̨ı̨**ht’e |

(26a) Perfective of *nàehdì* ‘buy, purchase’, *the*-conjugation

| | singular | dual | plural |
|---|---|---|---|
| 1st person | nà**whı**hdì | nà**whì**dì | nàts’**eè**hdì |
| 2nd person | nà**whe**nehdì | nà**wha**hdì | nà**wha**hdì |
| 3rd person | nà**whe**hdì | nàg**eè**hdì | nàg**eè**hdì |

(26b) Alternate perfective of *nàehdì* ‘buy, purchase’, *ghe*-conjuation

| | singular | dual | plural |
|---|---|---|---|
| 1st person | nà**ı**hdì | nà**ì**dì | nàts’**ı̨ı̨**hdì |
| 2nd person | nà**nee**hdì | nà**a**hdì | nà**a**hdì |
| 3rd person | nà**ı̨**hdì | nàg**ı̨ı̨**hdì | nàg**ı̨ı̨**hdì |

### 5.2 An informal, OT-style analysis.

The variation shown in (25) and (26) could be described informally in OT using three conflicting constraints, each of which stands in for a constraining equation, or a series of equations: 1) Ø/*ł*-classifier verbs select *ne*; 2) *the* blocks *ne*; and 3) The verbal root selects *the*. This is shown in the tableau in (27). The examples are in Wıılıideh; thus recall that *the* → *whe* and *ł* → *h* in this dialect.

(27) Informal, OT-style tableau.

| | *the* blocks *ne* | Ø/*ł*-classifier selects *ne* | Verb root selects *the* |
|---|---|---|---|
| a. /xà-whe-ne-h-t'e/ → **xàwhįht'e** 'he/she cooked' (PERF) | *! | | |
| ☞b. /xà-whe-Ø-h-t'e/ → **xàwheht'e** 'he/she cooked' (PERF) | ✓ | * | |
| ☞c. /xà-ghe-ne-h-t'e/ → **xàįht'e** 'he/she cooked' (PERF) | ✓ (satisfied vacuously) | | * |

The highest constraint is that *the* blocks *ne*: this is never violated. In fact, this seems to be true throughout the Dene language family, as there is no evidence that these prefixes ever occurred together historically (Sharon Hargus, p.c.). The remaining two constraints are lower-ranked, and unranked relative to each-other; this is why there is variation in the language: one may either maintain *the*-conjugation and omit *ne*, as in candidate (b), or include *ne* and change the conjugation marker, as in candidate (c). The above presentation is merely informal, of course—the exact way in which LFG constraining equations may be formalized as OT constraints is a question for further research.

**6.0 Conclusion.**

Dene languages show widespread selection and blocking effects across different template positions. These effects are different from other types of "blocking" reported in the morphological literature, where a more specific affix blocks a more general one, i.e. the "elsewhere condition" (e.g. Anderson 1992). While such effects have often been described informally in the Athabaskan literature (e.g. Rice 1989), they have, to date, not been formalized precisely in any theoretical framework. In this paper, I have shown how the LFG device of *constraining equations* provides a convenient way to formalize selection and blocking effects in Dene languages. A direction for future empirical research is to further cases of variation, where there are conflicting selectional restrictions, or where a verb may belong to more than one verb class. To account for such cases, LFG constraining equations could be re-formulated as ranked and violable constraints in OT.

**References.**


Ackroyd, Linda. 1976. Proto Northeastern Athapaskan: Stem-initial consonants and vowels. Manuscript., University of Toronto.

Ackroyd, Lynda. 1982. Dogrib Grammar. Manuscript, University of Toronto.

Anderson, Stephen. 1992. A-Morphous Morphology. Cambridge University Press.

Asudeh, Ash; Mary Dalrymple, and Ida Toivonen. 2013. Constructions with Lexical Integrity. *Journal of Language Modelling* 1 (1): 1-54.

Bresnan, Joan. 2001. Lexical Functional Syntax. Blackwell.

Cook, Eung-Do. 2004. A Grammar of Dëne Sųłıné (Chipewyan). Algonquıan & Iroquoian Linguistics, Memoir 17.

Dalrymple, Mary. 2001. Lexical Functional Grammar. Academic Press.

Dalrymple, Mary; Ronald M. Kaplan, and Tracy Holloway King. 2004. Linguistic generalizations over descriptions. *Proceedings of the LFG04 Conference*: 199-208. CSLI Publications.

Halpern, Aaron. 1992. Topics in the placement and morphology of clitics. Palo Alto: Stanford University dissertation.

Hargus, Sharon. 1988. The Lexical Phonology of Sekani. Los Angeles: UCLA dissertation.

Hargus, Sharon & Siri Tuttle. 2004. Explaining Variability in Affix Order: the Athabaskan areal and third person prefixes. *Working Papers in Athabaskan Languages* 4: 70-98. Alaska Native Language Center.

Hoijer, Harry. 1945. The Apachean Verb, part 1: verb structure and pronominal prefixes. *International Journal of American Linguistics* 11: 193-203.

Hopper, Paul & Sandra Thompson. 1980. Transitivity in Grammar and Discourse. *Language* 56 (2): 251-299.

Jaker, Alessandro. 2012. Prosodic Reversal in Dogrib (Weledeh Dialect). Palo Alto, CA: Stanford Dissertation.

Jaker, Alessandro. 2013a. In Defense of Tone Reversal: *the*-conjugation in NE Dene Languages. Manuscript, available at www.iceroadlinguist.com.

Jaker, Alessandro. 2013b. Selection and Blocking in the Northeast Dene Verb: Some Counterexamples to Level Ordering. Poster presented at American International Morphology Meeting 2, UCSD, November 2013, available at www.iceroadlinguist.com.

Jaker, Alessandro; Fred Sangris, and Mary Rose Sundberg (eds.). 2012. Wıìlıìdeh Wet'à Edàgot'į Yatıì Enįhtł'è / Weledeh Language Verb Dictionary. Goyatıkǫ̀ Laguage Society, Yellowknife, NWT.

Kari, James. 1989. Affix Positions and Zones in the Athapaskan Verb Complex: Ahtna and Navajo. *International Journal of American Linguistics* 55: 424-54.

Kiparsky, Paul. 1982. Lexical Phonology and Morphology. In I.S. Yang (ed.) *Linguistics in the Morning Calm*, Hanshin Publishers, Seoul.

Kiparsky, Paul. 1985. Some consequences of lexical phonology. *Phonology Yearbook* 2: 85-138.

Kurisu, Kazutaka. 2001. The Phonology of Morpheme Realization. Doctoral Dissertation, UC Santa Cruz.

Leer, Jeff. 1979. Proto-Athabaskan Verb Stem Variation Part One: Phonology. *Alaska Native Language Center Research Papers* no. 1. Fairbanks: ANLC Publications.

Li, Fang-Kuei. 1946. Chipewyan. In *Linguistic Structures of Native America*, Harry Hoijer et al. (eds.): 398-423. Viking Fund Publications in Anthropology, Number 6. New York: The Viking Fund.

Nordlinger, Rachel. 1997. Constructive Case: Evidence from Australian Languages. CSLI Publications, Stanford, California.

Nordlinger, Rachel. 2010. Verbal morphology in Murrinh-Patha: evidence for templates. *Morphology* 20: 321-341.

Pesetsky, David. 1979. Russian morphology and lexical theory. Manuscript, MIT.

Rice, Keren. 1982. On stems and Lexical Phonology: an Athapaskan example. Handout presented at the Canadian Linguistics Association.

Rice, Keren. 1989. A Grammar of Slave. Mouton de Gruyter.

Rice, Keren. 2000. Morpheme Order and Semantic Scope. Cambridge University Press.

Rice, Keren & Sharon Hargus. 1989. Conjugation and mode in Athapaskan languages: Evidence for two positions. In Cook & Rice (eds.) *Trends in Linguistics State-of-the-Art Reports 15: Athapaskan linguistics, current perspectives on a language family*. Berlin & New York: Mouton de Gruyter.

Sells, Peter. 1995. Korean and Japanese Morphology from a Lexical Perspective. *Linguistic Inquiry* 26 (2): 277-325.

Simpson, J. & Withgott, M. 1986. Pronominal clitic clusters and templates. In Hagit Borer (ed.) *The syntax of pronominal clitics. Syntax and semantics* 19: 149-174. New York: Academic Press.

Stump, Gregory. 2001. Inflectional Morphology: a theory of paradigm structure. Cambridge University Press.

# MAPPING OUT A CONSTRUCTION INVENTORY WITH (LEXICAL) MAPPING THEORY

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## Abstract

In this paper I propose how to model the relation between the meaning and the syntax of lexical items in a way which allows to account for all argument alternations in any language despite the absence of an adequate and complete representation of lexical knowledge for any language. The proposed model assumes an empirical, corpus-based collection of the patterns of participant-to-function mappings for classes of verbs in a given language (such as Levin 1993 and its follow-ups for English) and represents the alternative mappings without committing the grammar writer to represent the speakers' knowledge of the world. The proposed model can be interfaced with a representation of lexical knowledge when one becomes available. In the interim, the present proposal together with some earlier work on the representation of argument structure (in particular, Kibort 2007, 2008, 2013) can, for the first time, be considered a complete stand-alone tool to create an inventory of constructions involving argument alternations in a language. Since the available argument structure operations are represented in the same way across languages regardless of their realisation, the model should be useful for descriptive and typological studies. It may also be a helpful step forward for computational grammars grappling with how to capture the wide range of argument alternations systematically: although it is far from representing full lexical knowledge, it is sufficient to capture the fact that some alternations are determined by semantic factors, and formally to relate the alternating variants to one another.

## 1. Introduction

'The relation between the meaning and the syntax of lexical items is among the more frustrating issues in linguistics: on the one hand it seems clear that the meaning of a lexical item determines at least to some degree the syntactic behavior of its participant roles; on the other hand, attempts to characterize the relation explicitly tend not to be very successful' (Zaenen 1993: 129). Unfortunately, twenty years on this statement is still true and none of the major syntactic frameworks has made a breakthrough in this area.[1] Furthermore, within LFG, the issue in question has become an obstacle preventing LFG-based computational grammars from adequately representing semantic valency and from capturing the commonalities of valency-altering constructions across languages. The continuing prolific research in lexical semantics appears to suggest that the way to arrive at a satisfactory model of semantic valency is by modelling event structures. However, the disparate approaches demonstrate that there is no agreement as to which model of event structure to use – whether centered around 'location' and 'motion', 'causality', or 'aspectuality' (see Levin and Rappaport Hovav 2005: Ch. 4 for an overview of the major approaches), and no one has yet offered a comprehensive theory of event structure including a full inventory of the building blocks of event

[1] For the most recent overviev of this topic, see the collection edited by Kittilä and Zúñiga (2014a) devoted to the different conceptualisations of semantic roles and their status in theories of grammar. They add one more authoritative voice to the same conclusion, namely that 'semantic roles both vigorously resist being abandoned and persistently defy being defined in such a way that principled theories of linguistic meaning, linguistic form, and linguistic form-function correspondences can employ them without non-trivial provisos and/or significant gaps in the range of phenomena such theories successfully cover' (2014b: 458).

structures that could be used to model all classes of predicates cross-linguistically. The reason may be that this kind of knowledge representation corresponds to the linguistic component of artificial intelligence and it will not be adequate until we are able to create an artifical intelligence which mimicks a human one.

The present proposal does not deny that it would be immensely useful to have such a comprehensive representation of lexical knowledge. But I accept that, at least for now, this goal has turned out too ambitious: it appears that it is impossible to sort out all the event types and the mapping options. Therefore, I have instead focused on the question of how much semantic information the mapping mechanism needs to 'see' in order to manipulate participants and give them different syntactic status. I assume that the mapping mechanism does not need to have access to the full lexical knowledge, and I sketch out a proposal of how to represent the **minimum** of the semantic information required by the mapping mechanism.

In the present model, predicates are considered to be related to each other via simple semantic extensions (e.g. *eat*$_{\text{intr}}$ and *eat*$_{\text{tr}}$), lexical derivations (e.g. *open*$_{\text{tr}}$ and *open*$_{\text{intr}}$), 'voice' alternations (e.g. active and passive), and alternative basic mappings (e.g. *spray paint on the wall* vs *spray the wall with paint*). Argument structure as a level of representation of linguistic knowledge is conceived of as a repository of valency templates[2] which instantiate particular operations (e.g. anticausativisation, passivisation) and capture the alternative mapping options. Particular classes of verbs fit particular templates. The templates, which can be rendered in the 'attribute-value matrix' (AVM) format, provide the output which can – if one wishes to use such a model – be related to f-structure and c-structure via projections, as proposed by Butt, Dalrymple and Frank (1997) (with an important difference that the proposed model of a-structure does not involve atomic semantic roles, as these have long been considered inadequate, see e.g. Levin and Rappaport Hovav 2005).

Some alternations are morphologically marked and others unmarked. Importantly, the proposed model interfaces correctly with different types of morphological realisation as well as with morphological-and-syntactic realisation as found for example in the periphrastic passive. By allowing single- or multi-word realisations of valency templates, I concur with researchers who have argued that LMT is inadequately labelled as 'lexical' since monoclausal syntactic structures can be associated with constructions consisting of more than one potentially nonadjacent word (Butt 1996; Alsina 1996). For this reason, in the title of this paper the 'L' of the name '(L)MT' is shown in brackets, and I suggest it would be better to drop it altogether in favour of the more accurate though less familiar label 'Mapping Theory' (MT).

The present proposal builds on my earlier work on argument structure, and adds the results of new research that complements it. I will demonstrate that together these

[2] A 'valency template' is understood here as a generalisation over a set of argument structures of particular predicates. A valency template captures a specific way of mapping from semantic participants to syntactic functions which is the same for all predicates in the set. This concept of valency template can be formalised with the use of LFG's 'templates' (Asudeh, Dalrymple and Toivonen 2008) and implemented in XLE, as shown by Findlay (2014) and Asudeh, Giorgolo and Toivonen (2014). However, the novel proposal presented in this paper has not yet had an opportunity to be implemented in this way.

results can, for the first time, be considered a complete stand-alone tool to map out an inventory of constructions involving argument alternations in a language. Due to the lack of space, I give only an abbreviated example of a morphosyntactic alternation (for more of these see the previous publications), and I demonstrate a simple application of the proposed concept to a couple of common morphosemantic alternations. The fact that the model enables a straightforward creation of a construction inventory for a language, with the available a-structure operations being represented in the same way across languages regardless of their realisation, is very satisfying from the point of view of language description. Additionally, the model may constitute a helpful step forward for computational grammars grappling with how to capture the wide range of argument alternations systematically: although it is far from representing full lexical knowledge, it is sufficient to capture the fact that some alternations are determined by semantic factors, and to relate the alternating variants to one another.

## 2. Argument structure in the present proposal

In the literature on valency and valency alternations one may find reference to any of the following types of information:

| | | | | |
|---|---|---|---|---|
| referents | <ref$_1$ | ref$_2$ | ref$_3$> | |
| *instantiated roles* | *<giver* | *given* | *givee>* | SEMANTIC/THEMATIC |
| *generic roles* | *<ag* | *pat/th* | *goal/rec>* | STRUCTURE |
| dependents of the predicate | **<arg$_1$** | **arg$_2$** | **arg$_3$>** | LEXICAL VALENCY |
| grammatical relations | [SUBJ | OBJ | IOBJ] | SYNTACTIC/FUNCTIONAL |
| syntactic categories | [NP | NP | NP] | SUBCATEGORISATION |

Fig. 1. Semantic and syntactic valency

The problem outlined in the introduction concerns the representation of the semantic information in the two lines in Fig. 1 which are rendered in italics. I argue that semantic roles such as those exemplified by the 'generic roles' in Fig. 1 are not adequate units of analysis at this level of representation, despite the fact that they do capture some descriptive generalisations and are useful for human as opposed to machine readability of argument structure examples. Before discussing this in more detail in section 2.3, I will summarise the component parts of the Mapping Theory (MT) which are assumed here, based in particular on Kibort (2007, 2008 and 2013).

### 2.1. The core: subcategorisation frame and partial descriptions of grammatical functions

The core of argument structure is a universally available subcategorisation frame which represents the relative syntactic prominence of the arguments of the predicate. This valency template is fixed and the argument positions are characterised by intrinsic features:

(1) $< arg_1 \quad arg_2 \quad arg_3 \quad ... \quad arg_4 \quad ... \quad arg_n>$
$[–o/–r] \quad [–r] \quad [+o] \quad [–o] \quad [–o]$

Basic argument functions are not atomic but decomposable into features (Bresnan and Kanerva 1989; Bresnan and Zaenen 1990; see also Bresnan 2001: 308):[3]

(2)

| | [– r] | [+ r] |
|---|---|---|
| [– o] | SUBJ | $OBL_\theta$ |
| [+ o] | OBJ | $OBJ_\theta$ |

The diagram in (2) can be read as a **markedness hierarchy** of syntactic functions and has also been referred to as a partial ordering of basic argument functions (though see (5) below for a relational hierarchy of syntactic functions):

(3) [–o]/[–r] **SUBJ** > [–r]/[+o] **OBJ ,** [–o]/[+r] **$OBL_\theta$** > [+o]/[+r] **$OBJ_\theta$**

The original LFG interpretation of the features is: [+/–r] thematically (i.e. semantically) restricted; [+/–o] (non)objective. However, I have argued that the following re-interpretation of the features derives from a long tradition of linguistic description and correctly preserves a syntactic characterisation of grammatical functions (Kibort 2013):

(4) [+o] complements (‘internal arguments’ of the predicate)
[–o] non-complements (the ‘external’ argument and oblique arguments)
[–r] core arguments (subject and object only)
[+r] non-core arguments (all arguments except subject and object)

Note that at least two other linguists have proposed MT feature sets without referring to the semantic/thematic restriction: Alsina (1996), and Hemmings (2012).

The ordering of arguments in (1) corresponds to LFG’s **relational hierarchy** of syntactic functions, with adjunct being a non-argument function (Bresnan 2001:96):

(5) SUBJ > OBJ > $OBJ_\theta$ > $OBL_\theta$ > COMPL[4] > ADJUNCT

The relational hierarchy is proposed after Keenan and Comrie’s (1977) Noun Phrase Accessibility Hierachy, presumed to be universal (at least in nominative-accusative systems):

(6) SUBJ > OBJ > $OBJ_\theta$ > OBL > possessor NP > object of comparison

[3] Many accounts, and computational implementations of LFG grammars, additionally use COMP and XCOMP for clausal arguments, though other linguists analyse them as specialised types of the basic grammatical functions (e.g. Zaenen and Engdahl 1994; Alsina, Mohanan and Mohanan 1996; Alsina, Mohanan and Mohanan 2005).
[4] Here, the label COMPL stands for the whole class of various predicate complements (Bresnan 2001: 96).

Thus, the ordering of argument positions in (1) also parallels Keenan and Comrie's accessibility hierarchy, however, while LFG's relational hierarchy in (5) is based on final grammatical functions, the ordering in (1) is based on MT's atomic values [+/– r/o].

In the realisation of 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. In other words: predicates do not have to select a contiguous series of arguments. (This can be understood in the sense of the 'derived arguments' of Needham and Toivonen 2011, and is a useful generalisation bearing in mind that the distinction between arguments and adjuncts is notoriously difficult to justify, see e.g. Przepiórkowski 1999: Ch. 6-10). For example, in *Both parents cooked supper for the children*, the lexical and syntactic valency of the predicate can be illustrated as follows:[5]

| | | | | | | |
|---|---|---|---|---|---|---|
| (7) | *cook* | < | $arg_1$ | $arg_2$ | $arg_4$ | > |
| | | | [–o] | [–r] | [–o] | |

## 2.2. Argument-to-function mapping

The default mapping of arguments to grammatical functions follows the Mapping Principle in (8):

(8) MAPPING PRINCIPLE
The ordered arguments are mapped onto the highest (i.e. *least* marked) compatible function on the markedness hierarchy.

Morphosyntactic operations interfere with the 'default' argument-to-function mapping, but do not affect the lexical or semantic tiers of representation of the predicate – that is, they are meaning-preserving (see e.g. Sadler and Spencer 1998). Such results are achieved by the mechanism of increasing markedness which preserves monotonicity (Kibort 2007): a morphosyntactic operation can only restrict an argument by adding a 'marked' specification [+r] or [+o] to its syntactic pre-specification. Hence, the available morphosyntactic (i.e. restricting) operations are:

(9) a. adding the [+r] specification to a [–o] argument;
b. adding the [+o] specification to a [–r] argument; and
c. adding the [+r] specification to a [+o] argument.

Each of these operations does not only change the mapping of the grammatical function onto the affected argument, but may also have a knock-on effect on the mapping of grammatical function(s) onto other argument(s).

For example, passivisation is a morphosyntactic operation which restricts the first, unergative, argument pre-specified as [–o] by adding to it the [+r] specification (Kibort 2001: 170). As a result, the argument in the second position ($arg_2$), if there is one, may

[5] There is no scope here to discuss the argument/adjunct distinction, but in all examples that follow it is assumed that a non-core semantic participant such as a recipient, instrument, or location, is an argument if it can alternate between an oblique and a core grammatical function.

become a subject as in (10). In the absence of an argument in the second position ($arg_2$), the passive predicate is subjectless, as in (11):[6]

| (10) PREDICATE$_{passive}$ | ⟨ $arg_1$ | $arg_2$ ⟩ | (11) PREDICATE$_{passive}$ | ⟨ $arg_1$ ⟩ |
|---|---|---|---|---|
| | [–o] | [–r] | | [–o] |
| | **[+r]** | | | **[+r]** |
| | $OBL_\theta$ | SUBJ | | $OBL_\theta$ |

Sentences (12a-b) illstrate a personal and an impersonal (subjectless) passive, respectively, in Polish.

(12) a. *Firma codziennie sprzątała w pokojach.*
company(F).NOM every-day tidied.3SG.F in rooms
'The (professional) company did the cleaning in the rooms every day.'

b. *W pokojach było codziennie sprzątane (przez firmę).*
in rooms was.3SG.N every-day tidy.PART.SG.N (by company)
'[It] was cleaned every day in the rooms (by the company). /
There was cleaning in the rooms every day (by the company).'

## 2.3. Participant-to-argument mapping

### 2.3.1. The state of the field

LFG researchers agree that argument structure contains some amount of semantic information, but no agreement has yet been reached as to how much. Dalrymple (2001: Ch. 8) summarises both the development of the representation of argument structure itself within LFG, and the different proposals concerning the amount and type of semantic information argument structure contains. Looking at all LFG output until now, it appears that all proposals so far, including the most recent ones (such as Asudeh, Dalrymple and Toivonen 2008, Asudeh and Giorgolo 2012, and Asudeh, Giorgolo and Toivonen 2014), have chosen to represent the semantic component of argument structure via the concept of semantic roles, although the definitions and the content of the roles have varied between the proposals.

Levin and Rappaport Hovav (2005) give an overview of the approaches to semantic roles as used across major syntactic frameworks. The most basic approach uses atomic/unanalyzable semantic roles, usually arranged in hierarchies. Even though it is easy to demonstrate – as has been done by Levin and Rappaport Hovav and others – that this approach is highly unsatisfactory, it remains the textbook LFG approach and is used by LFG linguists who need an 'off the shelf' version of LMT to illustrate an example of argument structure. In mainstream LFG, there are two variants of a fixed hierarchy of thematic (θ) roles which determines the ordering of argument positions:

(13) agent > beneficiary > experiencer/goal > instrument > patient/theme > location
(Bresnan 2001: 307)

[6] For LFG approaches to the pseudopassive, see e.g. Lødrup (1991), Alsina (2009), and Findlay (2013).

(14) agent > patient/beneficiary > instrument > theme > path/location/reference object
(Falk 2001: 104)

In addition to the approaches developed in theoretical frameworks, there have also been several significant engineering attempts to come up with an inventory of semantic roles for English, each with its own set of problems: PropBank[7] (a small inventory of roles not conveying a clear semantics), VerbNet[8] and Sowa's Knowledge Representation[9] (medium size inventories which pose problems for assignment and mapping), and FrameNet[10] (an enormous inventory with hundreds of specific roles which are very difficult to assign). VerbNet is probably the largest online verb lexicon currently available for English which has been widely used in a multitude of NLP tasks; what is noteworthy from the theoretical point of view discussed here is that semantic role names in VerbNet may not carry the same content in their uses across different predicates.

The theoretical approaches which reject atomic roles fall into one of the following categories:

(15) a. semantic roles are decomposed into features (e.g. Reinhart 2000, 2002);

b. a single argument can be assigned more than one role, or arguments are assigned different roles at different tiers (e.g. 'thematic tier' and 'action tier'; Jackendoff 1983, 1990);

c. roles are generalized into proto-roles (Dowty 1991) or macro-roles (Role and Reference Grammar, e.g. Van Valin 1990, 1993; Van Valin and LaPolla 1997);

d. no traditional roles are proposed, but predicates are decomposed into more primitive predicates; event structures are modelled according to 'location' and 'motion', 'causality', or 'aspectuality' (CAUSE, BE, STAY, CHANGE, etc.; see Levin and Rappaport Hovav 2005: Ch. 4 for references); participants in these events fulfil the roles of arguments of the predicates.

The best known LFG models of argument structure have all used either one, or a combination of the above approaches, often with some modifications or additions. Alsina (1993, 1996) identifies the arguments via their proto-role status and orders them according to the thematic hierarchy. Similarly, Ackerman (1990, 1992), Ackerman and Moore (1999, 2001, 2013), Joshi (1993), and Markantonatou (1995) use Dowty's proto-role classification. By contrast, Butt (1996, 1998), Broadwell (1998), and others have adapted Jackendoff's (1990) two-tiered Lexical Conceptual Structures to represent argument structure.

Butt, Dalrymple and Frank (1997) revert to using atomic roles; they are also the first ones to demonstrate explicitly how argument structure is related to functional structure and constituent structure within LFG's projection architecture. Asudeh, Dalrymple and Toivonen (2008) and Asudeh and Giorgolo (2012) propose that semantic

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[7] http://verbs.colorado.edu/~mpalmer/projects/ace.html
[8] http://verbs.colorado.edu/~mpalmer/projects/verbnet.html
[9] http://www.jfsowa.com/ontology/thematic.htm
[10] https://framenet.icsi.berkeley.edu/

valency is composed flexibly in Glue Semantics, and the latter further propose to do away with argument structure as a separate level of representation by incorporating it into a 'connected' semantic structure; finally, in very recent work Findlay (2014) shows that the theory of argument-to-function mappings as captured in the MT model offered here is compatible with Asudeh and Giorgolo's (2012) proposal. This development means that LFG appears finally to have arrived at an adequate model of argument-to-function mappings backed up by proper formal semantics.

Nevertheless, the challenge of accounting for participant-to-argument mappings still remains: following Butt, Dalrymple and Frank (1997), Asudeh et al.'s lexical entries and templates still contain atomic semantic roles representing semantic participants, while my own model of MT, developed in successive papers since (2001), has so far focused on argument-to-function mappings. Despite flagging atomic roles as inadequate, distinguishing between morphosyntactic and morphosemantic operations on argument structure, and restoring the level of representation of lexical valency as distinct from semantic valency, I have so far assumed that the semantic makeup of the participants in the event could be captured with some semantic concepts akin to Dowty's proto-roles or, alternatively, via semantic features of the type proposed by Reinhart. However, I know now that proto-roles and feature decomposition are not adequate an approach to the semantic representation of arguments. The present proposal is my first attempt to tackle the challenge of accounting for participant-to-argument mappings in a different way.

### 2.3.2. The essence of the problem

In the absence of a universal thematic hierarchy governing participant-to-argument mapping, the following may represent the most general mapping principles which capture instead the relations the participants of the predication bear to one another and to the predication (Kibort 2013):

(16) RULES FOR MAPPING PARTICIPANTS TO THE ARGUMENT POSITIONS (general, informal)

a. The first argument position ($arg_1$) is associated with the participant of whom the event or state is predicated.
b. If the predicator has any other dependents, the most prominent of the remaining semantic dependents of the predicator maps on the second argument position ($arg_2$).
c. This rule is applicable only to languages with structural datives (as some languages may not use this argument position): if the predicator has another semantic dependent, it maps on the third argument position ($arg_3$).
d. If the predicator has further semantic dependents which it selects, they map onto further argument positions ($arg_{4, \dots,}$ $arg_n$).

Even the most general way of referring to the participants by their meaning, independently of the relation they bear to one another or to the predication, would need to take account of the following observations and be made specific for particular languages:

(17) a. Many languages restrict the semantics of the participant which is allowed to map onto ($arg_1$), the default argument position of the subject – this restriction would have to be specified, but it has been proven very difficult to capture (see e.g. Alexiadou and Schäfer 2006, Bruening 2010).

b. For most languages, rule (16b) regarding ($arg_2$) would probably remain as it is, stating no restrictions whatsoever, since objects are known to be the least semantically restricted (see e.g. Börjars and Vincent 2008).

c. For all nominative-accusative languages with canonical datives, rule (16c) would need to specify that the participant that maps onto ($arg_3$) has to be a beneficiary/recipient; with this specification, we achieve correct mappings for monotransitive verbs which subcategorise only for a dative (e.g. 'help', 'serve', etc.). However, languages with dative shift or applied arguments may allow a much wider range of semantic participants to map onto this position.[11]

d. Rule (16d) is for all other arguments contributing to the specification of the predication, i.e. arguments fulfilling various oblique roles selected by the predicate. However, the large number of alternations involving arguments within the verb phrase (such as those examined for English by Levin 1993: Ch. 2) demonstrates that semantic restrictions here are again too difficult to specify.

The more semantics we try to identify, the more inadequate the rules become. The reason for this is that any such rules are systematically disrupted by the fact that the same semantic participants of the event may map onto the argument positions in more than one way – e.g. in the locative alternation, swarm alternation, instrument-causer alternation, etc. When the same semantic participants have more than one option of mapping onto the argument positions, the alternative mappings are associated with (more, or less) different interpretations of the event and the roles of its participants.[12] For this reason, this type of alternation is correctly referred to as morphosemantic, or meaning-altering (e.g. Sadler and Spencer 1998). Therefore, attempts to find a consistent line-up of participant meanings and argument positions, where a particular participant meaning would always map on a particular argument position, cannot be successful.

[11] For example, in (some varieties of) English the argument position of the non-passivisable secondary object ($arg_3$) can be filled by either a theme (*Give him that book*) or a beneficiary (*Give it him*); in Kichaga, a so-called 'alternating' language with a morphological applicative, the $arg_3$ position can be filled by any of the applied participants, i.e. a theme, beneficiary, instrument, or locative. See Kibort (2008) for a detailed account.

[12] This is a principled reason why it is impossible to annotate the predicates in any one language for traditionally assumed semantic roles with consistency. It is not surprising that this problem does not disappear when we compare predicates cross-linguistically. Bickel et al. (2014) apply fuzzy cluster and NeighborNet algorithms to a sample of 141 languages with predicates annotated for cross-linguistically recurrent semantic roles such as 'the one who feels cold', 'the one who eats something', 'the thing that is being eaten', to determine whether and to what extent these roles are treated alike across languages. Non-default case assignment and alternations with a non-default case marker reveal evidence for role clusters around experiencers, undergoers of body processes, and cognizers/perceivers in one- and two-place predicates; and around sources and transmitted speech in three-place predicates. But no support is found for any other role clusters that are traditionally assumed.

If the participant-to-argument mapping rules are made inadequate when they are invested with semantic concepts, how else can they be formulated?

### 2.3.3. Insights from Zaenen (1993)

Among the earlier LFG models of argument structure, Zaenen's (1993) proposal, though also using Dowty's proto-properties – stands out for two reasons. First, Zaenen does not believe that lexical meanings of verbs should be characterised in terms of entailments, understood as in: 'an agent has the property of being volitional if the meaning of the verb entails that the activity of the agent was volitional'. Instead: '[t]he fact that the combination of a verb with an adverb expressing volition is felicitous shows that the activity is such that it makes sense to talk about it in terms of volition but not that it is in each particular instance volitional' (1993: 147). She suggests that semantically definable characteristics such as volition (or, 'controllability' in Zaenen's terms) are lexically specified semantic *dimensions* of verbs. 'The existence of a volitional dimension in the argument structure of a verb does not entail that every use of the verb denotes a volitional act; rather, the verb denotes an act that *can* be volitional' (this phrasing has been taken from Dalrymple's 2001: 199 summary of Zaenen's proposal). Furthermore, Zaenen emphasises that 'whether an activity described by a particular verb has a volitional dimension or not is not a fact about the outside world as such but is linked to conventionalized meanings of words' (1993: 147).

This part of Zaenen's approach already yields two important insights that I adopt in the present proposal: [1] lexical meanings of verbs do not model our knowledge of the world, but represent conventionalised meanings of words; [2] the lexical meaning of a verb encodes the availability of the verb to be interpreted in a certain range of ways, according to some semantically definable characteristics (which Zaenen terms *dimensions* and the present proposal terms *semantic markers*, but which are not equivalent to semantic roles).

The second reason Zaenen's proposal stands out is her explicit rejection of a fixed hierarchy of thematic roles. She argues that 'the influence of thematic roles is calculated in from the beginning in the partial assignment of intrinsic classifications' (1993: 151). Although she distinguishes between classes of Dutch verbs on the basis of semantic characteristics which she terms controllability and telicity (boundedness), and despite the fact that 'among the stative verbs there are more semantic distinctions to be made than Dowty's list of properties allows for' (1993: 150), she chooses to exemplify her mapping proposal using semantic characteristics derived from Dowty's proto-agent and proto-patient roles, as they are close enough to the semantic properties which she had identified (1993: 148). The following steps illustrate the method used by Zaenen to deduce the mapping of arguments from semantic characteristics to syntactic functions for a small set of Dutch verbs (1993: 149-151):

(18) a. identify the verb's **syntactic valency** e.g.:

- *irriteren* 'irritate' <SUBJ OBJ>
- *vrezen* 'fear' <SUBJ OBJ>
- *telefoneren* 'phone' <SUBJ>
- *aankomen* 'arrive' <SUBJ>

b. identify the semantic characteristics of the participants of the verb:

   - in *irriteren* ‘irritate’ the SUBJ participant has 2 agentive properties and 0 patientive properties, while the OBJ participant has 1 agentive property and 2 patientive properties
   - in *vrezen* ‘fear’ the SUBJ participant has 1 agentive property and 0 patientive properties, while the OBJ participant has 0 agentive properties and 0 patientive properties
   - in *telefoneren* ‘phone’ the SUBJ participant has 2 agentive properties and 0 patientive properties
   - in *aankomen* ‘arrive’ the SUBJ participant has 1 agentive property and 1 patientive property

c. on the basis of the semantic characteristics, identify the intrinsic classification of the participants of the verb (according to the features assumed in LMT), i.e. the verb’s **semantic valency**; no need to assume any particular ordering of the participants:

   - *irriteren* ‘irritate’ < -o -r >
   - *vrezen* ‘fear’ < -o -r >
   - *telefoneren* ‘phone’ < -o >
   - *aankomen* ‘arrive’ < -r >

Note that we know that the verbs *telefoneren* ‘phone’ and *aankomen* ‘arrive’ differ in their syntactic behaviour (auxiliary selection). We assume that this is due to a semantic difference, and therefore need to say that the two verbs differ in some semantic characteristic. According to Dowty’s list, *aankomen* ‘arrive’ has 1 agentive property and 1 patientive property – this combination of characteristics does not unequivocally point to its participant being a ‘patient’, but is sufficient for us to claim that there is a semantic difference between the verbs, regardless of how exactly it is labelled.

d. the mapping from participants to functions is assumed to involve the following default (1993: ex. 86), which gives us the correct mapping from the semantic characteristics to syntactic functions:

   (i) order the participants according to their intrinsic markings:
   -o < -r < + o < +r

   (ii) order the grammatical functions as follows:
   SUBJ < OBJ < $OBJ_\theta$ (< OBL )

   (iii) starting from the left, associate the leftmost participant with the left-most grammatical function it is compatible with

Although we now know that the version of the mapping scheme proposed by Zaenen is not sufficient to model a wider range of morphosyntactic and morphosemantic argument-changing operations in a language, this part of Zaenen’s proposal yields two more crucial insights: [3] the only type of information that is relevant to the system of rules which maps semantic participants to functions is the participant’s ability to map onto particular syntactic functions (this ability is captured here via LMT’s intrinsic features, and in Zaenen’s model it is these features that actually represent the verb’s semantic valency); [4] since we are not modelling our knowledge of the world, but instead modelling the observed patterns of participant-to-function mappings for classes of verbs, the method used by Zaenen to identify the syntactically relevant semantic characteristics seems appropriate and sufficient: we need to identify classes of verbs that differ in their mapping patterns and attribute the distinctions to some semantic characteristics, but it is not necessary for the mapping theory to 'understand' the semantics in order to achieve correct mappings; the mapping system needs to 'see' only the appropriate labels in the lexical entries of verbs in order to allow the verb to appear with a particular syntactic configuration of its participants.[13]

### 2.3.4. The present proposal

How do we find the semantic factors which determine what mapping options are available for the participants of a particular predicate?

- Look at a particular alternation, find verbs which participate in it (as in Levin 1993, complemented by Korhonen and Briscoe 2004, for English; Hajnicz 2011, Przepiórkowski et al. 2014, for Polish; etc.).
- The semantic factors that allow the verb to map its arguments in two different ways are often hard to identify.
- The solution proposed here is that we do not need to try to name the semantic factors. We just need to identify the pattern and the verbs that participate in it.
- We should expect some uncertainty about our classification – after all, it is semantics, so boundaries will not be as clear cut as with some syntactic phenomena (**They walks* but ?*A song sings*; however: *If you can fit it in a song, it sings well; It is as good as it is, and it sings well with the melody, but this version is too detached;* etc.). There may be uncertainty whether a particular variant is felicitous; or different speakers may allow different verbs to alternate or not; and – last but not least – we should expect the most extraordinary creative uses of alternations.
- For these reasons, our grammar should allow a wide range of options. In a computational application the options could be appropriately weighted as more or less likely and therefore more or less preferred for parsing (and generation).
- For our grammar, we need only as many semantic distinctions as are necessary to capture the alternative mappings, even though the verb meanings might be further subdivided into smaller classes.

The proposed MT model distinguishes the level of semantic participants from the level of argument positions and therefore in principle allows alternative participant-to-argument mappings: in morphosemantic (meaning-altering) alternations the same semantic participants may align with the available argument positions in two (or more) different ways, or the semantic participants may 'change order' and re-associate with different argument positions for derived (morphosemantically altered) predicates.

[13] A very similar argument to the one made here in [4] was made by van Hout (1998), even though the mapping system proposed by her had different components (in order to be compatible with a transformational syntactic framework) and was not fully comprehensive. However, she additionally undertook a study of first language acquisition of verbs and their syntactic and semantic valency frames to test and prove her hypothesis.

Any operations on argument structure that alter the meaning of the predicate – and thereby change the predicate's entailments and the interpretation of the roles of its participants – occur in the lexical semantics (Ackerman and Moore 2013: 10ff). In this way, the (L)MT algorithm that determines grammatical functions can remain monotonic and be entirely dependent on the classificatory features (Ackerman and Moore 2013: 18).

A simple implementation of the present proposal would be to identify the semantic participants of the event by their **semantic markers** instead of thematic role labels. For the purpose of this presentation, I have chosen numerals as easy labels for the semantic markers. In reading the following examples it is important to bear in mind that the proposed semantic markers do not correspond to thematic roles; there is no individual marker that corresponds to any traditionally assumed thematic role uniquely; a particular traditionally assumed thematic role is usually identified with more than one semantic marker (reflecting the ability of the different participants bearing these markers to map to the same argument position):

(19) **1** a semantic participant which can map on the ($arg_1$) position

**2** a semantic participant which can map on the ($arg_2$) position

**3** a semantic participant which can map on the ($arg_3$) position

**4** a semantic participant which can map on the ($arg_4$-$arg_n$) position

**41** a semantic participant which can map either on the ($arg_4$-$arg_n$) or the ($arg_1$) position

**42** a semantic participant which can map either on the ($arg_4$-$arg_n$) or the ($arg_2$) position

**23** a semantic participant which can map either on the ($arg_2$) or the ($arg_3$) position

and so on.[14]

The semantic participants which map on the oblique argument positions ($arg_4$-$arg_n$) can be distinguished by their indices, e.g. $4_{INST}$, $41_{INST}$, $4_{LOC}$, $41_{LOC}$, etc.

The mapping of semantic participants on the argument positions results from the following algorithm:

(20) RULES FOR MAPPING PARTICIPANTS TO THE ARGUMENT POSITIONS (general, formal)

a. The first argument position ($arg_1$) is associated with the participant of whom the event or state is predicated.
b. If the predicator has any dependents, the most prominent semantic complement of the predicator maps on the second argument position ($arg_2$).
c. This rule is applicable only to languages with structural datives (as

[14] This proposal bears some similarity to Pāṇini's account of the one-to-many correspondences between semantic roles and case marking in his grammar of Sanskrit, discussed by Butt (2006: 15-18).

some languages may not use this argument position): if the predicator has another semantic complement, it maps on the third argument position ($arg_3$).

d. If the predicator has further semantic dependents which it selects, they map onto further argument positions ($arg_{4, \ldots,}\ arg_n$).

In the next two sections I illustrate an application of this concept to a couple of common morphosemantic alternations in Polish.[15]

## 3. Example 1: The instrument-causer alternation in Polish

The verb *jeść* 'eat' (causative; the anticausative is marked morphologically in Polish and would be listed as a separate lexical item) is found with the following syntactic arguments:[16]

(21) syntactic valency frames for *jeść* 'eat':

| | | |
|---|---|---|
| <SUBJ> | *Piotr jadł.* | 'Peter ate.' |
| <SUBJ OBJ> | *Piotr jadł ciastko.* | 'Peter ate a cake.' |
| <SUBJ OBJ OBL-INST> | *Piotr jadł ciastko łyżką.* | 'Peter ate a cake with a spoon.' |
| <SUBJ OBL-INST> | *Piotr jadł łyżką.* | 'Peter ate with a spoon.' |

The verb *otworzyć* 'open' (again, the basic causative) is found with the following syntactic arguments:

(22) syntactic valency frames for *otworzyć* 'open':

| | | | |
|---|---|---|---|
| <SUBJ> | | *Piotr otworzył.* | 'Peter opened.' |
| | or: | *Klucz otworzył.* | 'Key opened.' |
| <SUBJ OBJ> | | *Piotr otworzył bramę.* | 'Peter opened the gate.' |
| | or: | *Klucz otworzył bramę.* | 'Key opened the gate.' |
| <SUBJ OBJ OBL-INST> | | *Piotr otworzył bramę kluczem.* | 'Peter opened the gate with a key.' |
| <SUBJ OBL-INST> | | *Piotr otworzył kluczem.* | 'Peter opened with a key.' |

[15] The following two examples illustrate alternations which are not marked morphologically. With morphologically marked operations on argument structure, the morphologically marked predicate is associated with its own set of valency frames. However, as it is still a form of the base verb, the interpretation of the roles of the arguments which may appear in its syntactic valency frames is achieved via the relevant valency template which captures the argument structure operation which has applied. There is no scope to discuss this further here, but see Spencer (2013) for an overview of lexical relatedness.

[16] Other arguments that could be found with this verb are spatial oblique arguments (source, path, goal) and the beneficiary. I have omitted these from this presentation for the sake of greater clarity.

It has been observed that facilitating instruments cannot be subjects, while intermediary instruments can (Levin 1993: 80 and references therein). Verbs which take one or the other instrument fall into two classes.

It is possible to investigate further the semantics of the events denoted by the verbs in these two classes and their arguments, and try to find out what kind of involvement in the event the instrument needs to have in order to qualify for an 'intermediary' one. The intermediary instruments include: tools, means, locatum/contents, and even form. Note, however, that pinning down this semantic distinction has not yet been successful (see e.g. Alexiadou and Schäfer 2006, and Bruening 2010).

However, for the purpose of constructing a successful mapping rule, it is sufficient to code the fact that the instruments with the two verbs are different. The coding does not have to be understood as a semantic role, it is sufficient that it is interpreted by the grammar as a **semantic marker**.

Recall that I have chosen numerals as labels for the semantic markers:

(23) semantic valency frame for JEŚĆ 'eat': < 1 2 3 $4_{INST}$ >

(24) semantic valency frame for OTWORZYĆ 'open': < 1 2 3 $41_{INST}$ >

Note that participant 4 has an index INST (instrument) because there may be more oblique participants which are not instruments that can map on the oblique argument positions $arg_4$ - $arg_n$.

(25) RULES FOR MAPPING PARTICIPANTS TO THE ARGUMENT POSITIONS (specific, formal):

a. $Arg_1$ position is associated with the participant bearing the semantic marker **1**. [If participant **1** is not expressed, participant **41** maps on the first argument position.[17]]

b. $Arg_2$ position is associated with the participant bearing the semantic marker **2**.

c. $Arg_3$ position is associated with the participant bearing the semantic marker **3**.[18]

d. $Arg_4$ position is associated with the participant bearing the semantic marker **4**. [This means either **4** or **41**.]

## 4. Example 2: The 'swarm' alternation in Polish

The verb classes involved in this alternation include verbs of emission of smell, sound,

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[17] This entails that for unergative predicates participant 41, the so-called intermediary instrument, may also be capable of being expressed in the passive as an oblique in a way analogous to an oblique agent.

[18] Note that participant 3, the beneficiary/dative, was not illustrated in the sentences above.

or light, verbs expressing expansion of an aggregate or a mass/abstract entity (corresponding roughly to the English SWARM verbs), and verbs expressing physical or psychological states due to a stimulus which can be interpreted as an intermediary agent. Examples include: *pachnieć* 'emit fragrance', and *roić się* 'swarm, teem' (an inherently reflexive verb).

(26) syntactic valency frames for *pachnieć* 'emit fragrance':

| | | | |
|---|---|---|---|
| <SUBJ> | | *Kawa pachnie.* | 'The coffee emits fragrance.' |
| | or: | *Dom pachnie.* | 'The house emits fragrance.' |
| <SUBJ OBL-LOC> | | *Kawa pachnie w domu.* | 'The coffee smells in the house.' |
| <SUBJ OBL-INST> | | *Dom pachnie kawą.* | 'The house smells of coffee.' |
| <SUBJ OBL-INST OBL-LOC > | | *Pachnie kawą w domu.* of coffee in the | '[$pro_{\text{INDEF}}$] smells house.' |

In other words, there are three possibilities for the mapping of the emitter and the location:

(27) a. $\text{SUBJ}_{\text{location}}$ $\text{OBL}_{\text{emitter}}$

b. $\text{SUBJ}_{\text{emitter}}$ $\text{OBL}_{\text{location}}$

c. $\text{OBL}_{\text{emitter}}$ $\text{OBL}_{\text{location}}$

The participants seem to 'swap' functions and, like in the locative alternation, it is difficult to say whether any of these variants is more basic than others. The two participants can map in two different ways (becoming a SUBJ or an OBL) because they can each fulfil two different semantic roles entailed by the predicate. Therefore, I assign to them the following semantic markers:

(28) semantic valency frame for PACHNIEĆ 'emit fragrance' and ROIĆ SIĘ 'swarm':

< 1 3 $41_{\text{INST}}$ $41_{\text{LOC}}$ >

Note that here the instrument is more specifically a means/aggregate.

(29) RULES FOR MAPPING PARTICIPANTS TO THE ARGUMENT POSITIONS (specific, formal):

a. $\text{Arg}_1$ position is associated with the participant bearing the semantic marker **1**. [If participant **1** is not expressed, either participant **41** maps on the first argument position.]

b. $\text{Arg}_3$ position is associated with the participant bearing the semantic marker **3**.[19]

[19] Note that participant 3, the beneficiary/dative, was not illustrated in the sentences above.

c. $Arg_4$ position is associated with the participant bearing the semantic marker **4**. [This means either of the **41** participants.]

d. If there is a remaining **41** participant, it maps on position $arg_5$.

If both the emitter and the location map onto oblique arguments, the causer participant which maps on the first argument position is filled with a 'dummy' subject, the indefinite pronoun *pro*$_{\text{INDEF}}$ (usually not expressed overtly; see Kibort 2009).

The *pro*$_{\text{INDEF}}$ is an independent participant, but not an independent referent, therefore it may co-refer with either of the remaining participants. At the level of referents (see Fig. 1 above), it is represented as coindexed with another participant.

Since with many predicates, such as the ones exemplified here, OBL arguments are optional, the single-argument frame can also have the following realisation:

(30) <SUBJ> *Pachnie.* "[*pro*$_{\text{INDEF}}$] emits fragrance."

## 5. Conclusions

The model presented here builds on my earlier work in which I tackled various aspects of the representation of argument structure (e.g. Kibort 2001, 2004, 2007, 2009, 2013) and adds the results of new research that complements it.

In this paper I have argued for and demonstrated a new way of modelling argument structure alternations which has two important features. First, it offers a stable and interpretation-independent handle on (the minimum of) the semantic information required by a mapping mechanism, and therefore all its building blocks and algorithms are trivially implementable in a formal grammar which can provide a basis for a computational application. And second, since the model has a comprehensive coverage of argument alternations, distinguishes between different types of alternations, and can be visualised with easy-to-read templates, it can be considered a complete stand-alone tool to map out an inventory of constructions involving argument alternations in any language. The available argument structure operations are represented in the same way across languages regardless of their realisation, and therefore provide a sound basis for typological comparisons. Although the proposed solution of handling the semantic component of argument structure is far from representing full lexical knowledge, it is sufficient to capture the fact that some alternations are determined by semantic factors, and to relate the alternating variants to one another.

## References

Ackerman, Farrell. 1991. Locative alternation vs. locative inversion. In: Halpern, Aaron L. (ed.) *The Proceedings of the Ninth West Coast Conference on Formal Linguistics 1990.* Stanford, CA: CSLI Publications. 1-13.

Ackerman, Farrell. 1992. Complex predicates and morpholexical relatedness: locative alternation in Hungarian. In: Sag, Ivan A. and Anna Szabolcsi (eds) *Lexical Matters.* Stanford, CA: CSLI Publications. 55-83.

Ackerman, Farrell and John Moore. 2013. Proto-properties in a comprehensive theory of argument realization. In: King, Tracy Holloway and Valeria de Paiva (eds) *From*

*Quirky Case to Representing Space. Papers in Honor of Annie Zaenen.* Stanford, CA: CSLI Publications. 9-20.

Alexiadou, Artemis and Florian Schäfer. 2006. Instrument subjects are agents or causers. In: Baumer, Donald, David Montero and Michael Scanlon (eds) *Proceedings of the 25th West Coast Conference on Formal Linguistics.* Somerville, MA: Cascadilla Proceedings Project. 40-48.

Alsina, Alex. 1996. *The Role of Argument Structure in Grammar: Evidence from Romance.* Stanford, CA: CSLI Publications.

Alsina, Alex. 2009. The prepositional passive as structure-sharing. In: Butt, Miriam and Tracy Holloway King (eds) *Proceedings of the LFG09 Conference, Trinity College, Cambridge*. Stanford, CA: CSLI Publications. 44-64.

Alsina, Alex, KP Mohanan and Tara Mohanan. 2005. How to get rid of the COMP. In: Butt, Miriam and Tracy Holloway King (eds) *Proceedings of the LFG05 Conference, University of Bergen*. Stanford, CA: CSLI Publications. 21 pp.

Alsina, Alex, Tara Mohanan and KP Mohanan. 1996. Untitled submission to the LFG List. 3 Sept 1996.

Asudeh, Ash, Mary Dalrymple and Ida Toivonen. 2008. Constructions with lexical integrity: templates as the lexicon-syntax interface. In: Butt, Miriam and Tracy Holloway King (eds) *Proceedings of the LFG08 Conference, University of Sydney*. Stanford, CA: CSLI Publications. 68-88.

Asudeh, Ash and Gianluca Giorgolo. 2012. Flexible composition for optional and derived arguments. In: Butt, Miriam and Tracy Holloway King (eds) *Proceedings of the LFG12 Conference, Udayana University*. Stanford, CA: CSLI Publications. 64-84.

Asudeh, Ash, Gianluca Giorgolo and Ida Toivonen. 2014. Meaning and valency: representation and specification. Paper presented at the LFG14 Conference, University of Michigan. 17 July 2014.

Bickel, Balthasar, Taras Zakharko, Lennart Bierkandt and Alena Witzlack-Makarevich. 2014. An empirical assessment of semantic role types in non-default case assignment. In: *Studies in Language* 38(3): 485-511.

Börjars, Kersti and Nigel Vincent. 2008. Objects and OBJ. In: Butt, Miriam and Tracy Holloway King (eds) *Proceedings of the LFG08 Conference, University of Sydney*. Stanford, CA: CSLI Publications. 150-168.

Bresnan, Joan. 1982. The passive in lexical theory. In: Bresnan, Joan (ed.) *The Mental Representation of Grammatical Relations.* Cambridge, MA: MIT Press. 3-86.

Bresnan, Joan. 2001. *Lexical-Functional Syntax.* Oxford: Blackwell.

Bresnan, Joan and Jonni M. Kanerva. 1989. Locative inversion in Chichewâ: a case study of factorization in grammar. *Linguistic Inquiry* 20(1): 1-50.

Bresnan, Joan and Annie Zaenen. 1990. Deep unaccusativity in LFG. In: Dziwirek, Katarzyna, Patrick Farrell and Errapel Mejías-Bikandi (eds) *Grammatical Relations. A Cross-Theoretical Perspective.* Stanford, CA: CSLI Publications. 45-57.

Bruening, Benjamin. 2010. Agent, causer and instrument subjects are not distinct. *Linguistic Commentary.* http://lingcomm.blogspot.co.uk/2010/12/ agent-causer-and-instrument-subjects.html

Butt, Miriam. 1996. *The Structure of Complex Predicates in Urdu*. PhD thesis, Stanford University. *Dissertations in Linguistics* series, CSLI, Stanford University. Revised and corrected version of 1993 Stanford University dissertation.

Butt, Miriam. 2006. *Theories of Case.* Cambridge: Cambridge University Press.

Dowty, David. 1991. Thematic roles and argument selection. *Language* 67: 547-619.

Falk, Yehuda. 2001. *Lexical-Functional Grammar: An Introduction to Parallel Constraint-Based Syntax.* Stanford, CA: CSLI Publications.

Findlay, Jamie. 2013. *The pseudopassive in LFG*. Ms. University of Oxford.

Findlay, Jamie. 2014. *Mapping Theory without Argument Structure.* Ms. University of Oxford.

Hajnicz, Elżbieta. 2011. *Automatyczne tworzenie semantycznego słownika walencyjnego. Problemy Współczesnej Nauki. Teoria i Zastosowania: Inżynieria Lingwistyczna*. Warsaw: Akademicka Oficyna Wydawnicza EXIT.

Hemmings, Charlotte. 2012. *Causatives and Applicatives: The Case for Polysemy in Javanese*. MA thesis, SOAS London.

Jackendoff, Ray. 1983. *Semantics and Cognition.* Cambridge, MA: MIT Press.

Jackendoff, Ray. 1990. *Semantic Structures.* Cambridge, MA: MIT Press.

Keenan, Edward and Bernard Comrie. 1977. Noun phrase accessibility and Universal Grammar. *Linguistic Inquiry* 8(1): 413-461.

Kibort, Anna. 2001. The Polish passive and impersonal in Lexical Mapping Theory. In: Butt, Miriam and Tracy Holloway King (eds) *Proceedings of the LFG01 Conference, University of Hong Kong.* Stanford, CA: CSLI Publications. 163-183.

Kibort, Anna. 2004. *Passive and Passive-like Constructions in English and Polish.* PhD thesis, University of Cambridge.

Kibort, Anna. 2007. Extending the applicability of Lexical Mapping Theory. In: Butt, Miriam and Tracy Holloway King (eds) *Proceedings of the LFG07 Conference, Stanford University.* Stanford, CA: CSLI Publications. 250-270.

Kibort, Anna. 2008. On the syntax of ditransitive constructions. In: Butt, Miriam and Tracy Holloway King (eds) *Proceedings of the LFG08 Conference, University of Sydney.* Stanford, CA: CSLI Publications. 312-332.

Kibort, Anna. 2009. Intermediary agents and unexpressed pronouns. In: Butt, Miriam and Tracy Holloway King (eds) *Proceedings of the LFG09 Conference, Trinity College, Cambridge.* Stanford, CA: CSLI Publications. 378-398.

Kibort, Anna. 2013. Objects and Lexical Mapping Theory. Abstract. In: Butt, Miriam and Tracy Holloway King (eds) *Proceedings of the LFG13 Conference, University of Debrecen.* Stanford, CA: CSLI Publications.

Kittilä, Seppo and Fernando Zúñiga (eds) 2014a. *Advances in Research on Semantic Roles*. [Special Issue of *Studies in Language* 38(3)]. Amsterdam: Benjamins.

Kittilä, Seppo and Fernando Zúñiga. 2014b. Recent developments and open questions in the field of semantic roles. In: *Studies in Language* 38(3): 437-462.

Korhonen, Anna and Ted Briscoe. 2004. Extended Lexical-Semantic Classification of English Verbs. *Proceedings of the HLT/NAACL Workshop on Computational Lexical Semantics*. Boston, MA.

Levin, Beth. 1993. *English Verb Classes and Alternations.* Chicago, IL: University of Chicago Press.

Levin, Beth and Malka Rappaport Hovav. 1998. Morphology and lexical semantics. In: Spencer, Andrew and Arnold M. Zwicky (eds) *The Handbook of Morphology*. Oxford: Blackwell. 248-271.

Levin, Beth and Malka Rappaport Hovav. 2005. *Argument Realization.* Cambridge: Cambridge University Press.

Lødrup, Helge. 1991. The Norwegian pseudopassive in lexical theory. *Working Papers in Scandinavian Syntax* 47: 118-129.

Needham, Stephanie and Ida Toivonen. 2011. Derived arguments. In: Butt, Miriam and Tracy Holloway King (eds) *Proceedings of the LFG11 Conference, University of Hong Kong.* Stanford, CA: CSLI Publications. 401-421.

Perlmutter, David M. 1978. Impersonal passives and the Unaccusative Hypothesis. *Berkeley Linguistics Society* 4: 157-189.

Przepiórkowski, Adam. 1999. *Case Assignment and the Complement/Adjunct Dichotomy. A Non-configurational Constraint-based Approach*. PhD thesis, University of Tübingen.

Przepiórkowski, Adam, Elżbieta Hajnicz, Agnieszka Patejuk, Marcin Woliński, Filip Skwarski, and Marek Świdziński. 2014. Walenty: Towards a comprehensive valence dictionary of Polish. In: Calzolari, Nicoletta, Khalid Choukri, Thierry Declerck, Hrafn Loftsson, Bente Maegaard, Joseph Mariani, Asuncion Moreno, Jan Odijk and Stelios Piperidis (eds) *Proceedings of the Ninth International Conference on Language Resources and Evaluation, LREC 2014*. Reykjavík, Iceland: ELRA. 2785-2792.

Reinhart, Tanya. 2000. *The Theta System: Syntactic Realization of Verbal Concepts*. OTS Working Papers in Linguistics, Utrecht Institute of Linguistics, University of Utrecht.

Reinhart, Tanya. 2002. The Theta System – an overview. *Theoretical Linguistics* 28(3): 229-290.

Rosen, Carol. 1984. The interface between semantic roles and initial grammatical relations. In: Perlmutter, David and Carol Rosen (eds) *Studies in Relational Grammar 2*. Chicago, IL: University of Chicago Press. 38-77.

Sadler, Louisa and Andrew Spencer. 1998. Morphology and argument structure. In: Spencer, Andrew and Arnold M. Zwicky (eds.) *The Handbook of Morphology*. Oxford: Blackwell. 206-236.

Sorace, Antonella. 2000. Gradients in auxiliary selection with intransitive verbs. *Language* 76(4): 859-890.

Spencer, Andrew. 2013. *Lexical Relatedness. A Paradigm-based Model.* Oxford: Oxford University Press.

van Hout, Angeliek. 1998. *Event semantics of verb frame alternations: a case study of Dutch and its acquisition.* New York: Garland.

Van Valin, Robert D., Jr. 1990. Semantic parameters of split intransitivity. *Language* 66: 221–60.

Van Valin, Robert D., Jr. 1993. A synopsis of Role and Reference Grammar. In: Van Valin, Robert D., Jr. (ed.) *Advances in Role and Reference Grammar*. John Benjamins. 1–164.

Van Valin, Robert D., Jr. and Randy J. LaPolla, 1997. *Syntax: Structure, Meaning and Function*. CUP.

Zaenen, Annie. 1993. Unaccusativity in Dutch: integrating syntax and lexical semantics. In: Pustejovsky, James (ed.) *Semantics and the Lexicon.* Dordrecht: Kluwer. 129-161.

Zaenen, Annie and Elisabet Engdahl. 1994. Descriptive and theoretical syntax in the lexicon. In: Atkins, B.T. Sue and Antonio Zampolli (eds) *Computational Approaches to the Lexicon: Automating the Lexicon II.* Oxford: Oxford University Press. 181-212.

# AN AFFECTEDNESS CONSTRAINT IN KIMARAGANG RESTRUCTURING

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**Abstract**

Many transitive verbs in Kimaragang exhibit a kind of systematic polysemy similar to that observed in the English locative alternation. For most roots, the different construals require different voice paradigms. In this paper I argue that morphological constraints on restructuring in Kimaragang can best be explained as a requirement that the construals associated with the two verbs be unifiable, supporting an analysis of restructuring as unification of Lexical Conceptual Structures in the spirit of Butt (1995, 1997).

# 1. Introduction[†]

Restructuring (or "clause reduction") involves two verbs occurring within a single clause. In this paper I discuss a morphological constraint on restructuring in Kimaragang Dusun (KQR), an endangered Philippine-type language of northeastern Borneo. The constraint I seek to explain has to do with the choice of transitivity prefix (*poN-* vs. *po-*) in the second verb of the construction, as illustrated in (1). These transitivity prefixes reflect a choice of voice-marking paradigm which in turn reflects a particular construal of the described event. (The first verb in this example is derived from the numeral root meaning 'four'.)[1]

| | | | | | |
|---|---|---|---|---|---|
| (1) | Pi-apat-on | nu | m-poN-/*po-lapak | ino | niyuw. |
| | RECP-four-OV | 2sg.GEN | AV.TR1-/TR2-split | that.NOM | coconut |
| | 'Split that coconut into four parts.' | | | | |

I will argue that restructuring in Kimaragang is best analyzed as a kind of complex predicate formation. I adopt the analysis of Butt (1995), who treats complex predicate formation in Urdu as an operation on a Jackendovian Lexical Conceptual Structure (LCS). I claim that the constraint observed in (1) is a consequence of the requirement that the construals associated with each verb individually must be unifiable to create a coherent and permissible

[†] I would like to thank Jim Johansson and Janama Lontubon for allowing me to use their draft dictionary, the source of many of the examples in this paper, and for helpful discussions of the data. Other examples come from my own field notes and transcribed texts.

[1] In addition to the Leipzig standard set, the following abbreviations are used:

| | | | |
|---|---|---|---|
| <x> | infix | IV | instrumental voice |
| ASP | aspect | LNK | linker |
| ATMP | atemporal | NVOL | non-volitive |
| AV | actor voice | OV | objective voice |
| DESID | desiderative | POT | potential |
| DUP | reduplication | PTCL | particle |
| DV | dative voice | TR1, TR2 | transitivity prefixes |
| EMPH | emphatic particle | Q | interrogative |

construal for the complex predicate as a whole. In particular, both verbs must share a single affected argument.

I begin in section 1 by discussing affectedness and briefly describing the aspects of Jackendoff's model which are relevant to what follows. In section 2 I provide a sketch of the voice system and clause structure of Kimaragang. In section 3 I describe the two types of restructuring in Kimaragang which will be the focus of this paper, and provide arguments for monoclausality. In section 4 I return to the morphological constraint described above. I show how it follows from the proposed analysis, and why it cannot be treated either as some kind of inflectional agreement, or as "argument sharing" between two syntactically independent verbs as proposed for serial verb constructions by Baker (1989).

# 1. Affectedness

The "Locative alternation" illustrated in (2) is a well-known example of how different patterns of argument realization can express different construals of the same basic event. For most speakers, the argument which appears in the direct object position is interpreted as being totally affected by the action. Rappaport & Levin (1988) and Pinker (1989) suggest that (2b) describes a motion event (*x causes y to go to z*), while (2a) describes a caused change of state (*x causes z to become <loaded> by means of (x causes y to go to z)*). In (2a) Bill is construed as doing something to the cart, while in (2b) Bill is construed as doing something to the apples.

(2) a. Bill loaded the cart with apples.
b. Bill loaded the apples onto the cart.

Similarly, in the much-studied "Dative alternation" the recipient must be interpreted as gaining possession of the theme in the double object construction, but not when the recipient is marked with a preposition. However, object alternations of this kind do not always involve a difference in semantic entailments. Sometimes they may simply reflect the current interests and purposes of the speaker. Fillmore (1977) uses the *with*/*against* alternation in English, illustrated in (3), as an example of how a speaker may adopt two different PERSPECTIVES on the same event. Sentence (3a) describes the agent doing something to the surface or thing being struck, while sentence (3b) describes the agent doing something to the instrument being used. (This perspective seems unnatural when the thing being struck is human.)

(3) a. I hit the fence/Harry with the stick.
b. I hit the stick against the fence/??Harry. (Fillmore 1977:75)

A similar alternation is reported in causative constructions in a number of languages, in which the case marking or grammatical relation of the causee serves to indicate the affected argument. The Chichewa example (4a) (from

Alsina 1992:523) answers the question, *What did the porcupine do to the pumpkins?* (affected argument = pumpkins), while (4b) answers the question, *What did the porcupine do to the owl?* (affected argument = owl).

| | | | | | |
|---|---|---|---|---|---|
| (4) | a. Nungu | i-na-phik-its-a | maungu | kwa | kadzidzi. |
| | porcupine(9) | 9.SBJ-PST-cook-CAUS-ASP | pumpkins(6) | to | owl(1a) |

‘The porcupine had the pumpkins cooked by the owl.’

| | | | | |
|---|---|---|---|---|
| b. | Nungu | i-na-phik-its-a | kadzidzi | maungu. |
| | porcupine(9) | 9.SBJ-PST-cook-CAUS-ASP | owl(1a) | pumpkins(6) |

‘The porcupine made the owl cook the pumpkins.’

Jackendoff’s (1990) model of Lexical Conceptual Structure (LCS) provides a very useful framework for analyzing the Kimaragang data discussed here. He separates information about thematic roles, encoded on the Thematic Tier, from information about affectedness, which is encoded on the Action Tier. A simplified representation of the LCS for examples (4a-b) is presented in (5a-b). Notice that the only difference between the two structures is the identity of the affected argument. Jackendoff refers to the argument which is viewed as being acted upon or whose affectedness is of primary interest, i.e., the second argument of the AFFECT predicate, as the “patient”. Since this term is often used as a label for a specific thematic role, I will instead use the term UNDERGOER (Foley and Van Valin, 1984) to refer to this argument.

(5) a. [CAUSE (x, *cook*(y,z)) —— **[Thematic Tier]** (=4a)
AFFECT (x,z)] —— **[Action Tier]**

b. [CAUSE (x, *cook*(y,z)) —— **[Thematic Tier]** (=4b)
AFFECT (x,y)] —— **[Action Tier]**

## 2. Kimaragang verb morphology and clause structure

### 2.1 Voice and case in a Philippine-type language

In Kimaragang, as in other Philippine-type languages, a wide variety of arguments may be selected as subject. The semantic role of the subject is signaled by a voice-marking affix on the verb.

In (6a), the actor voice marker (*m-*) signals that the agent is the subject, and so the agent pronoun (‘I’) appears in NOM case. In (6b), the objective voice marker (*-on*) indicates that the patient is the subject. In (6c), the instrumental voice marker (base form *i-*, with a zero-allomorph occurring before *poN-*) indicates that the instrument is the subject. In (6d), the dative voice marker (*-an*) indicates that the subject is a beneficiary.

| | | | | |
|---|---|---|---|---|
| (6) a. | Mangalapak(m-poN-lapak) | *oku* | do | niyuw. |
| | AV-TR1-split | 1sg.NOM | ACC | coconut |

‘*I* will split a coconut/some coconuts.’

b. Lapak-on ku do kapak *ilo' niyuw ku*.
split-OV 1sg.GEN ACC axe that(NOM) coconut 1sg.GEN
'I will split *my coconuts* with an axe.'

c. *Tongo* ot pangalapak(Ø-poN-lapak) nu dilo' niyuw?
what REL IV-TR1-split 2sg.GEN that.ACC coconut
'*What* will you split those coconuts with?'

d. Lapak-an ku do niyuw *it wogok*.
split-DV 1sg.GEN GEN coconut NOM pig
I will split some coconuts for *the pigs* (to eat).

Subjecthood tests include raising, control, floating quantifiers, relativization, and clefting. Any argument of the verb can in principle be selected as subject, and (as in most Philippine-type languages) the preferred choice is not the Actor but the Undergoer. Subjects are normally definite, as reflected in the translations for (6a,d). A definite Undergoer will generally be selected as subject unless some other argument of the clause is topicalized or extracted.

A characteristic feature of Philippine-type languages, and of a number of other Western Malayo-Polynesian languages, is the non-demoting or "symmetric" nature of the voice alternations. What this means is that non-subject Actors are not demoted to oblique or adjunct status, and so non-active clauses may have more than one core argument. Some authors take the non-subject Actor in ergative languages to be a primary object (OBJ). I will adopt a slightly different assumption here, namely that only Undergoers are primary objects in Kimaragang. I analyze non-subject Actors as restricted objects (OBJ$_{agt}$), and NP arguments marked with ACC case (aside from the Undergoer) as other types of restricted objects. PP arguments and NP arguments marked with DAT case are analyzed as oblique arguments (OBL$_{theta}$). The full pattern of case marking and grammatical relations for the verb *lapak* 'split' as illustrated in (6) above is summarized in (7).

(7) **Case marking and grammatical relations for *lapak* 'split'**

| VOICE / SUBJ | **Agent** | **Patient** | **Instrument** | **Beneficiary** |
|---|---|---|---|---|
| AV (ex. 6a)<br>*m-poN*-Root | **NOM:<br>SUBJ** | ACC:<br>OBJ | ACC:<br>OBJ$_{instr}$ | ACC:<br>OBJ$_{ben}$ |
| OV (ex. 6b)<br>Root-*on* | GEN:<br>OBJ$_{agt}$ | **NOM:<br>SUBJ** | ACC:<br>OBJ$_{instr}$ | ACC:<br>OBJ$_{ben}$ |
| IV (ex. 6c)<br>*Ø-poN*-Root | GEN:<br>OBJ$_{agt}$ | ACC:<br>OBJ | **NOM:<br>SUBJ** | ACC:<br>OBJ$_{ben}$ |
| DV (ex. 6d)<br>Root-*an* | GEN:<br>OBJ$_{agt}$ | ACC:<br>OBJ | ACC:<br>OBJ$_{instr}$ | **NOM:<br>SUBJ** |

One piece of evidence supporting this analysis is that adjuncts and oblique arguments (including dative NPs) can occur in the Focus Fronting position, whereas non-oblique arguments cannot.

**2.2 Voice paradigms and alternate construals**

It turns out to be quite difficult to specify the full range of semantic functions for each voice affix in a Philippine-type system; however, some clear tendencies can be observed for Kimaragang. The actor voice marker (*m-*) selects the most prominent argument on the Thematic Tier as subject. The instrumental voice marker (*i-*) typically selects an instrument or displaced theme as subject. More generally, this voice is the expected choice (apart from a few lexical exceptions) when the subject is neither the agent/most prominent argument nor the terminus or end-point of the event (i.e., not the patient, goal or recipient; Kroeger 1996). When the subject is the terminus or end-point of the event, one of the other non-active voices (OV or DV) will be used instead. The semantic correlates of the transitivity prefixes are similarly difficult to pin down. However, there is a strong correlation between transitivity prefix and voice marking, which I will discuss below.

I believe that the best way to make sense of Kimaragang voice morphology is to identify paradigms of inflected forms that correspond to a single construal of the event. The examples in (6a-c) above, and also example (1), reflect a single perspective on the event of splitting coconuts; they answer the question, "What is the agent doing to the coconuts?" (The benefactive use of the Dative Voice suffix illustrated in (6d) seems to be a special applicative-type construction, and will not be considered to belong to any specific paradigm in the following discussion.) The examples in (8a-b) reflect a different perspective on the same kind of event. The verb forms which occur in these examples would be used to answer the question, "What is the agent doing to the axe?"

(8) a.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ø-pa-lapak | oku | po | diti | kapak | nu | do | niyuw. |
| AV-TR2-split | 1sg.NOM | yet | this.ACC | axe | your | ACC | coconut |

'I will (or 'Let me') split some coconuts with your axe.'

b.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Nokuro.tu | n-i-lapak | nu | do | niyuw | it | dangol | ku? |
| why | PAST-IV-split | 2sg.GEN | ACC | coconut | NOM | bush-knife | 1sg.GEN |

'Why did you use my bush knife to split coconuts?'

The two paradigms which correspond to the construals in (6) vs. (8) are summarized in (9). Often such paradigms are shared by entire semantic classes of verbs. Kroeger (2010) shows that the Affected Patient paradigm in (9a) is shared by verbs of the *hit*, *cut* and *break* classes. (In fact, this paradigm seems to be the default pattern for agent-patient-type transitive verbs.) In contrast, the Affected Instrument paradigm in (9b) is available to all *cut* verbs, only sporadically available to *hit* verbs, and never available to *break* verbs.

(9) **Affected Patient vs. Affected Instrument paradigms**

| VOICE / SUBJECT | (a) **U = Patient** | (b) **U = Instrument** |
|---|---|---|
| AV / Actor | *m-poN*-Root (6a) | *Ø-po*-Root (8a) |
| OV / Patient | Root-*on* (6b) | (N/A??) |
| IV / Instrument | *Ø-poN*-Root (6c) | *i*-Root (8b) |

Two paradigms which are employed by a number of source-theme-goal-type verbs are summarized in (10). Examples illustrating the two construals are presented in (11a) vs. (11b) and (12a) vs. (12b). All four of those examples involve the AV form of the verb, so the choice of construal is indicated by the choice of transitivity prefix.

(10) **Affected Theme vs. Affected Goal paradigms**

| VOICE / SUBJECT | **U = THEME** | **U = GOAL** |
|---|---|---|
| AV / Actor | *Ø-po*-Root | *m-poN*-Root |
| IV / Theme | *i*-Root | *Ø-poN*-Root |
| DV / Goal | *po*-Root-*an* | Root-*an* |

(11) a. Ø-po-suwang oku diti sada sid pata'an.
AV-TR2-enter 1sg.NOM this.ACC fish DAT basket
'I will put this fish in a/the basket.'

b. Monuwang(m-poN-suwang) oku do pata'an do sada.
AV-TR1-enter 1sg.NOM ACC basket ACC fish
'I will fill a basket with fish.'

The different construals — Theme-Undergoer in (11a) vs. Goal-Undergoer in (11b) — correlate with a difference in the case marking and GF of the goal argument 'basket': dative ($\text{OBL}_{\text{goal}}$) in (11a), but accusative (OBJ) in (11b). The contrast also has semantic consequences. For talking about a single fish, only (11a) would be appropriate, and not (11b); only in (11a) is the theme potentially individuated. On the other hand, (11b) implies that the basket is completely filled, while (11a) does not carry this implication. In other words, the goal is interpreted as being totally affected in (11b) but not in (11a). (These same semantic contrasts hold true for the other voice categories within each paradigm as well.)

(12) a. Mana'ak(m-poN-ta'ak) oku dikaw do tana.
AV-TR1-give 1sg.NOM 2sg.DAT ACC earth
'I will give you some land/dirt.'

b. Ø-pa-ta'ak oku dikaw do tana.
AV-TR2-give 1sg.NOM 2sg.DAT ACC earth
'I will hand you some dirt (*land).'

The difference between these two paradigms produces a slightly different semantic contrast with the root 'give', as seen in (12). Example (12a), representing the Goal-Undergoer construal, entails change of ownership, whereas example (12b), representing the Theme-Undergoer construal, entails a transfer of physical possession. Now the noun *tana* is ambiguous between the meanings 'land' and 'dirt'. Thus example (12a) could mean either 'I will give you some land' or 'I will give you some dirt'; but the former meaning is more likely, since dirt is seldom given as a gift. However, since a piece of land cannot be physically moved (at least, not by human agency), example (12b) can only mean 'I will give/hand you some dirt'.

As the paradigms in (9)–(10) illustrate, the transitivity prefixes (of which *poN*- and *po*- are the most common) are overtly realized only when the Undergoer is not selected as subject. I do not have a completely satisfying explanation for this fact, but it is a very wide-spread pattern among Philippine-type languages. Pearson (2005) suggests that the corresponding stem prefixes in Malagasy are realized by a zero allomorph when the theme/patient is selected as subject, and Travis (2000) adopts a similar approach for both Malagasy and Tagalog.

However, a different kind of explanation might be developed based on the analysis summarized in (7) above. If only Undergoers can be primary objects, then when the Undergoer is selected as subject the clause does not contain a primary object. We might say that such a clause is not fully transitive, but (if it contains one or more restricted objects) only "semi-transitive". If the transitivity prefixes are simply markers of transitivity, it is not surprising that they would not occur in semi-transitive clauses. Kroeger (1996) shows that these prefixes also fail to occur with semi-transitive roots such as 'visit', 'follow', 'meet', etc.

Now here is the correlation between the choice of transitivity prefix and the voice marking categories: when the Undergoer is an argument that would be selected as subject by the IV prefix (*i*-), the prefix *po*- 'TR2' will occur with all other voice categories in the same paradigm. When the Undergoer is an argument that would be selected as subject by one of the other non-active voices (OV or DV), the prefix *poN*- 'TR1' will occur with all other voice categories in the same paradigm.

One consequence of this somewhat complex system is that the identity of the Undergoer is always reflected somewhere in the verb morphology: in the voice marker when the Undergoer is selected as subject, and in the transitivity prefix when the Undergoer is not selected as subject.

### 2.3 Phrase structure

As the examples above illustrate, Kimaragang is a verb-initial language. (Verbal clauses allow for a pre-verbal focus position that I will not discuss here.) Lexical verbs are inflected for tense, aspect, and mood (TAM) as well as voice. There are a few auxiliary verbs in the language which occur before the main verb and are inflected for TAM but not voice. The most common of these, *mangan ~ maan*, is illustrated in (13). This form seems to contribute very little to the meaning of the sentence, perhaps just a heightened sense of intentionality on the part of the Actor. It serves primarily as a bearer of the TAM features for the clause. The main verb which follows it must appear in the "atemporal" form (also used for imperatives and as a narrative tense) and in a non-active voice.

(13) **Auxiliary verb *mangan ~ maan***

a.

| | | | | | |
|---|---|---|---|---|---|
| Minaan | akan-o' | do | tusing | ilot | sada. |
| PST.AUX | eat-OV.ATMP | GEN | cat | that(NOM) | fish |

'That fish was eaten by a cat.'

b.

| | | | | | |
|---|---|---|---|---|---|
| Mangay | *oku* | *po* | dagang-ay | do | buduy. |
| AUX.IMP | 1sg.NOM | PTCL | buy-DV.ATMP | ACC | watermelon |

'Please buy some watermelon for me.'

Complex predicates can co-occur with an auxiliary verb, as illustrated in (14). When this happens there are two lexical verbs (shown in italics below) following the auxiliary verb. The first of these will bear the voice marker for the clause, appearing in the atemporal form of a non-active voice as described above. The second verb appears in the citation form: invariant Active Voice marking with no TAM inflection.

(14) a.

| | | | | | |
|---|---|---|---|---|---|
| Minaan | ku | *tuyuan-ay* | *momodsu* | ino | tanak. |
| PAST.AUX | 1sg.GEN | gentle-DV.ATMP | AV.TR1.bathe | that.NOM | child |

'I bathed the child gently.'

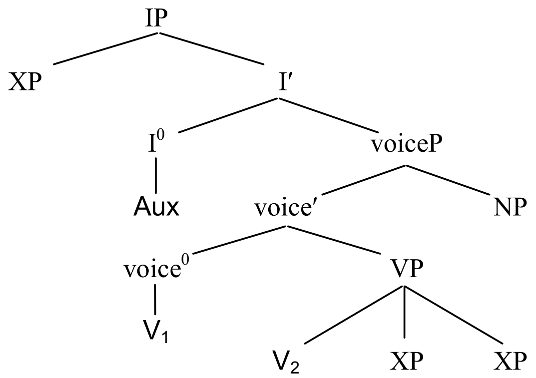
b.

| | | | | | | |
|---|---|---|---|---|---|---|
| Minaan | *owi-o'* | di | Jaiwan | *mangakan* | i | rinapa. |
| PAST.AUX | finish-OV.ATMP | GEN | Jaiwan | AV.TR1.eat | NOM | viand |

'Jaiwan (intentionally) ate up all the food.'

I am tentatively assuming the following phrase structure for examples like those in (14). This structure does not account for the full range of word-order variation for post-verbal elements, or for the kind of scrambling discussed in section 3 below. It does, however, provide a way of accounting for the order of the verbs and the distribution of inflectional features.

(15)




I assume that TAM features are always expressed in the $I^0$ position. When there is no auxiliary verb, I assume that the tensed verb occurs here. To accomplish this, I adopt the analysis of King (1995) for Russian, which assigns auxiliary verbs and finite (tensed) lexical verbs to category I, but non-finite verbs to category V.

Voice is obligatory in verbal clauses, but can only be expressed once. One way to insure uniqueness is to define VOICE as an instantiated feature.[2] The voice feature of the clause will always be marked on the highest/left-most potential voice-bearing word, which could be a lexical verb in either the $I^0$ or $voice^0$ positions, or the first element of a complex predicate. I will not propose a formal account for these restrictions here.

A tentative set of phrase structure rules is proposed in (16). These rules would make it possible for two lexical verbs to occur as co-heads within the same clause, e.g. one in the $V^0$ position and the other in either the $I^0$ or $voice^0$ positions. Since each verb would have a PRED feature to contribute, the result would be an incoherent f-structure (PRED is an instantiated feature). So, crucially, this will actually be possible only when the two lexical verbs combine to form a complex predicate, which contributes only a single joint PRED feature to the f-structure of the clause, as sketched out in section 4.

(16) Proposed phrase structure rules:

a. $\text{IP} \rightarrow \underset{(\uparrow\text{FOC})=\downarrow}{\text{XP}} \quad \underset{\uparrow=\downarrow}{\text{I}'}$

b. $\text{I}' \rightarrow \underset{\uparrow=\downarrow}{\text{I}^0} \quad \underset{\uparrow=\downarrow}{\text{voiceP}}$

c. $\text{voice}' \rightarrow \underset{\uparrow=\downarrow}{\text{voice}^0} \quad \underset{\uparrow=\downarrow}{\text{VP}}$

d. $\text{VP} \rightarrow \underset{\uparrow=\downarrow}{\text{V}} \quad \underset{(\uparrow\text{GF})=\downarrow}{\text{XP*}}$

[2] Thanks to Mary Dalrymple for this suggestion.

## 3. Restructuring in Kimaragang

In this paper I will focus primarily on two types of restructuring in Kimaragang. The first type, illustrated in (17), is similar to the "adverbial verb" construction described in many Formosan languages (see Chang 2010 and references cited there). In this construction, the first verb ($V_1$) is an adverbial or adjectival root which carries verbal inflection for voice and tense/aspect/mood (TAM). The second verb ($V_2$) is a normal verb root which appears in the citation form: invariant Active Voice marking with no TAM inflection. $V_1$ contributes adverbial meanings such as manner, frequency, etc., while $V_2$ describes the action which is being performed.

(17) **Adverbial complex predicates (ACP):**

a.

| | | | | | |
|---|---|---|---|---|---|
| Induwa-an | nopo | momoog(m-poN-wo'og) | ino | wagas | tobo. |
| twice-DV | only | AV-TR1-wash | that.NOM | rice | PTCL |

'Just wash that (uncooked) rice two times.'

b.

| | | | | |
|---|---|---|---|---|
| Basag-on | no | mongogodong(m-poN-godong) | ilo' | tali … |
| strong-OV | PTCL | AV-TR1-pull | that.NOM | rope |

'Pull hard on the rope (when you enter the tug-of-war).'

d.

| | | | | | |
|---|---|---|---|---|---|
| K<in>ondiri-Ø | dialo | mamatay(m-poN-patay) | it | tasu | yo. |
| <PST>self-OV | 3sg | AV-TR1-kill | NOM | dog | 3sg.GEN |

'He killed his dog himself.'

e.

| | | | |
|---|---|---|---|
| G<in>ibang-Ø | ku | yalo | manampar(m-poN-tampar). |
| <PST>left-OV | 1sg.GEN | 3sg.NOM | AV-TR1-punch |

'I hit him with my left hand.'

The second type of restructuring that we will consider, illustrated in (18), is a Resultative construction in which the first verb names the result state or extent of the event, while the second verb names the action that is performed. The inflectional pattern in this construction is identical to that described above for Adverbial complex predicates: $V_1$ carries the normal range of inflection for voice and TAM, while $V_2$ appears in the citation form with invariant Active Voice.

(18) **Resultative complex predicates (RCP):**

a.

| | | | | | |
|---|---|---|---|---|---|
| N-a-rasak | do | karabaw | monginum | at | weeg. |
| PST-NVOL-dry.up | GEN | buffalo | AV.TR1.drink | NOM | water |

'The stream was drunk dry by buffaloes.'

b.

| | | | | | |
|---|---|---|---|---|---|
| N-a-awi-Ø | do | kara | mangakan | it | togilay. |
| PST-NVOL-finish-OV | GEN | monkey | AV.TR1.eat | NOM | maize |

'Monkeys ate up all the maize.' ('… finished off the maize eating.')

c.

| | | |
|---|---|---|
| Adan-o' | yalo | mamasut(m-poN-pasut)! |
| faint-OV.IMP | 3sg.NOM | AV-TR1-whip |

'Whip him unconscious!'

d. Tuus-an no momo'og ino tunturu nu!
bare-DV PTCL AV.TR1.wash that.NOM finger 2sg.GEN
'Wash your fingers totally clean!'

e. P<in>i-toning-Ø ku it sapi om karabaw Ø-po-ogot.
RECP<PST>-near-OV 1sg.GEN NOM cow and buffalo AV-TR2-tie
'I tied up the cow and the buffalo near each other.'

Restructuring is also possible with "tough" predicates, some control verbs, and a few light verbs, but these constructions are not discussed in the present paper. In the Adverbial complex predicate construction, the argument structure for the clause as a whole is determined entirely by $V_2$; the "adverbial verb" ($V_1$) does not contribute to argument selection. In the Resultative complex predicate construction, however, both verbs contribute to argument selection. In the terminology of Butt (1995, 1997), the ACP construction seems to involve "event fusion" while the RCP construction seems to involve "argument fusion".

### 3.1. Evidence for monoclausality

One reason for thinking that the two verbs in a restructuring construction belong to the same clause is that they cannot be separated by a pause, conjunction, complementizer, linker, or any other marker of clause boundaries. This fact distinguishes restructuring from certain kinds of adverbial clause, which do not always require but normally do allow some overt marking of the clause boundary. Additional evidence for monoclausality comes from classic tests that have been used to argue for restructuring in a variety of languages: scrambling across (apparent) clause boundaries, long distance passive, and clitic climbing.

Kimaragang is a strongly verb-initial language: non-pronominal arguments always follow the verb which selects them, unless they are focused or extracted. (The relative ordering of these post-verbal arguments is somewhat flexible.) As (17–18) demonstrate, the subject of the restructuring clause (marked with NOM case) normally follows $V_2$. However, it may also occur before $V_2$, as illustrated in (19b); see also (18e). If there were a clause boundary between the two verbs, the boundary would fall immediately before $V_2$ and examples like (18e) and (19b) would involve scrambling across a clause boundary. But this kind of scrambling is never allowed out of any other type of subordinate clause in Kimaragang. Furthermore, examples like (18e) and (19b) cannot be analyzed as Raising, because raising the patient of a complement clause would be impossible when the complement verb is marked for Active Voice (only subjects can be raised).

(19) a. Naawi ku no Ø-po-suwang sid lampu *it tinasak*.
finish 1sg.GEN ASP AV-TR2-enter DAT lamp NOM oil
'I poured all the oil into the lamp.'

b. Naawi ku no *it* *tinasak* Ø-po-suwang sid lampu.
finish 1sg.GEN ASP NOM oil AV-TR2-enter DAT lamp
'I poured all the oil into the lamp.'

The apparent mismatch between the Active Voice marking of $V_2$ and the NOM case marking of the theme in sentences like (19a) is one of the most noticeable features of the restructuring construction. Recall from section 2.1 that the Undergoer of a verb marked for AV would normally get ACC case. This means that the case marking of the Undergoer arguments in examples (17–19) is not assigned by $V_2$, but by $V_1$. This is especially striking in the Adverbial complex predicate construction (17), where the Undergoer is not a semantic argument of $V_1$. The pattern is analogous to "long distance passivization" in languages like German, where voice morphology on the syntactically higher verb promotes an internal argument of the lower verb to become the SUBJ of the entire restructuring clause.

The subjecthood of the nominative argument in the restructuring clause is confirmed by properties such as argument topicalization (20a) and clefted wh-questions (20b), which are possible only for grammatical subjects. These examples also provide additional evidence for monoclausality, since the AV form of $V_2$ would not allow a subordinate patient to undergo long-distance extraction.

(20) a. It sapi om karabaw p<in>i-toning-Ø ku Ø-po-ogot.
NOM cow and buffalo RECP<PST>near-OV 1sg.GEN AV-TR2-tie
'The cow and the buffalo I tied up near each other.'

b. Disay do tasu ot n-a-patay dialo momobog?
whose LNK dog NOM PST-NVOL-kill-OV 3sg AV-TR1-beat
'Whose dog was it that he beat to death?'

The distribution of second-position clitics provides additional evidence that there is no internal clause boundary in the restructuring construction. Clitic pronouns and particles must follow the first constituent of their immediate clause. Normally this will be the verb, but if a negation marker or focused adverbial precedes the verb, any 2P clitics belonging to that clause will also precede the verb as illustrated in (21a). The placement of the 2P clitics provides direct evidence for clause boundaries. Sentence (21b), for example, contains an internal clause boundary, as indicated by the occurrence of 2P clitics following the second verb. In contrast, there is no medial position in a restructuring clause that can host 2P clitics; all clitics must immediately follow the first constituent of the restructuring clause as a whole, including clitic pronominal arguments of $V_2$ as seen in (21c) and (17e). This is highly reminiscent of the "clitic climbing" associated with restructuring in Romance.

(21) a. Amu *oku* *po* *dati* ko-guli…
NEG 1sg.NOM yet probably POT.AV-return
'I probably cannot return (to work here tomorrow).'

b. [Opi-o' *pogi* a tobu ong [ti-uus *ko=no*]].
cut-OV.IMPER PTCL NOM sugarcane if DESID-chew 2sg=PTCL
'Go ahead and cut down the sugarcane if you want to chew it.'

c. Amu *ku* *yalo* n-o-onong-Ø monimbak.
not 1sg.GEN 3sg.NOM PST-NVOL-hit-OV AV-shoot
'I didn't hit him when I shot.'

**3.2 Argument structure and argument selection**

As mentioned above, the argument structure for the restructuring clause as a whole is determined entirely by $V_2$ in the Adverbial complex predicate construction, but in the Resultative complex predicate construction both verbs contribute to argument selection. Many of the "adverbial verb" forms which occur as $V_1$ in the ACP cannot occur alone as clausal predicates (22–23); they are only inflected as verbs in the restructuring construction (see (36b) for one counter-example). In contrast, all of verbs which function as $V_1$ in the RCP construction can occur independently as main clause predicates.

(22) a. Basag-on no mongogodong(m-poN-godong) ilo' tali…
strong-OV FOC AV-TR1-pull that.NOM rope
'Pull hard on the rope (when you enter the tug-of-war).'

b. *Basag-on no ilo' tali.
strong-OV FOC that.NOM rope

(23) a. Induwa-an nopo momo'og ino wagas tobo.
twice-DV only AV.TR1.wash that.NOM rice PTCL
'Just wash that (uncooked) rice two times.'

b. *Induwa-an ino wagas.
twice-DV that(NOM) rice

In the Resultative complex predicate construction, the Undergoer must always be a semantic argument of $V_1$ and the Actor must always be a semantic argument of $V_2$. This implies that $V_1$ must be either transitive or (as in 24) unaccusative, while $V_2$ must be either transitive or (as in 25) unergative. Example (26) is ungrammatical, because $V_1$ is unergative.

(24) a. *N-o-rikot* ku momilay i walay nu.
PST-NVOL-arrive 1sg.GEN AV.TR1.throw NOM house 2sg.GEN
'I threw (something) all the way to your house.'

b. *N-a-rasak* do karabaw monginum a weeg.
PST-NVOL-dry.up GEN buffalo AV.TR1.drink NOM stream
'The stream was drunk dry by buffaloes.'

(25) a. Amu o-owit-Ø dit tombolog *t<um>ulud* it wulanut.
not NVOL-lift-OV GEN bird <AV>fly NOM snake
'The bird was not able to fly off carrying the snake.'

b. N-a-dansaran-an dati' *m-ogom* a takod da tanak…
PST-NVOL-sit.straight-DV likely AV-sit NOM foot GEN child
'Someone probably sat down squarely on the child's foot (that is why he started crying).'

(26) **Noko-odop* dit tidi mamayuk it tanak.
PST.NVOL-sleep GEN mother AV.TR1.swing NOM child
(intended: 'The mother swung the baby to sleep.')

A restructuring construction must contain no more than one affected argument (Undergoer). The resultative example in (27) is ungrammatical because the two verbs have distinct Undergoers: the sole of the speaker's foot is the Undergoer of 'wounded', while the nail is the Undergoer of 'stepped on'. The only way to express the intended meaning would be to use an adverbial subordinate clause, where each verb can have a distinct Undergoer.

(27) *N-o-pilat ku mongulok(m-poN-ulok) do pansang
PST-NVOL-wound 1sg.GEN AV-TR1-step.on ACC nail

itit lukap ku.
this.NOM sole 1sg.GEN
(intended: 'I wounded the sole of my foot stepping on a nail.')

Resultative complex predicates always contain an Undergoer, but Adverbial complex predicates need not. Some examples of ACPs with no Undergoer are presented in (28).

(28) a. Tanday-ay no mamanaw sid ralan dino.
careful-DV.IMP PTCL AV.TR1.walk DAT road that
'Walk carefully on that trail/road (it is not well maintained).'

b. K<um>awo yalo k<um>araja, abagos babanar.
<AV>wing 3sg.NOM <AV>work industrious very
'He works as if he had wings (i.e., his arms never stop moving); he is very industrious.'

## 4. Accounting for the affectedness constraint

The requirement that a restructuring clause contain no more than one Undergoer is related to the morphological constraint illustrated in (1). Recall that this constraint has to do with the choice of transitivity prefix in the second verb of the construction. Because the Undergoer is normally selected as subject (nominative argument) by the voice marker on $V_1$, the constraint in effect requires that the morphological form of $V_2$ be compatible with a construal in which this nominative argument is the Undergoer. Of course, if $V_2$ is unergative (as seen in 25), it will normally not contain any transitivity prefix (*mamanaw* in 28a is an exception); but if $V_2$ is a transitive verb which allows a choice of transitivity prefix, only one choice will be permitted.

For example, the root *tumpos* refers to dropping rice seed into the dibble holes when planting rice in hillside swidden gardens. It is used in two different senses, or construals: one which takes the seed to be the affected argument, associated with the transitivity prefix *po-*, and another which takes the hole to be the affected argument, associated with the transitivity prefix *poN-*. When this root occurs as $V_2$ in a complex predicate, only *po-* is possible if the seed is selected as subject (29a), and only *poN-* is possible if the hole is selected as subject (29b). Further examples illustrating the restricted choice of transitivity prefix are provided in (30–32).

(29) a. Tanday-ay no ino paray *potumpos*/**monumpos* …
careful-DV.IMPER PTCL that.NOM rice AV-TR2/*TR1-sow.seed
'Put the rice seed (into the dibble hole) carefully (lest it get scattered).'

b. Tanday-ay no *monumpos*/**potumpos* ino luwang.
careful-DV.IMP PTCL AV-TR1/*TR2-sow.seed that.NOM hole
'Fill the dibble hole (with rice seed) carefully.'

(30) a. Tuyuan-ay *posuwang*/**monuwang* inot tontolu sid bakul.
slow-DV AV-TR2/*TR1-enter that.NOM egg LOC basket
'Put those eggs into the basket gently/carefully.

b. Tuyuan-ay *monuwang*/**posuwang* do tinasak ino kasa.
slow-DV AV-TR1/*TR2-enter ACC oil that.NOM bottle
'Fill that bottle with oil carefully.'

(31) a. N-a-awi-Ø ku *pataak*/**manaak* sid tongo tanak
PST-NVOL-finish-OV 1sg.GEN AV-TR2-give DAT PL child

it siin ku.
NOM money 1sg.GEN
'I used up all my money giving it to my children.'

b. Neekid(n-o-ikid-Ø) nu=i' *manaak*/**pataak*
PST-NVOL-each.one-OV 2sg.GEN=EMPH AV-TR1-give

do gula-gula a tongo tanganak oy?
ACC candy NOM PL child Q
'Did you give each child a piece of candy?'

(32) a. N-o-rikot ku *momilay*/**popilay* i walay nu.
PST-NVOL-arrive 1sg.GEN AV-TR1-throw NOM house your
'I was able to pelt your house (with something) from a distance.'

b. N-a-awi-Ø ku *popilay*/**momilay* sid walay nu
PST-NVOL-finish-OV 1sg.GEN AV-TR2-throw DAT house your

it tongo mangga.
NOM PL mango
'I used up all the mangoes throwing them at your house.'

What kind of constraint are we dealing with here? One plausible idea is that the morphological facts reflect a kind of syntactic argument sharing like that proposed by Baker (1989) for serial verbs. Resultative complex predicates like that in (33b) are in some ways similar to resultative serial verbs like that in (33a). Baker proposed that serial verb constructions (SVCs) contain two independent verbs, each of which has its own argument structure and subcategorization (or structural Case) features. In a SVC like (33a) the two verbs appear in a configuration which requires them both to assign an internal semantic role to the same argument.

(33) a. Kofi naki Amba kiri.
Kofi hit Amba kill
'Kofi struck Amba dead.' [**Sranan,** Suriname; Baker 1989]

b. P<in>atay-Ø ku momobog(m-poN-bobog) ih wulanut.
<PST>kill-OV 1sg.GEN AV-TR1-beat NOM snake
'I beat the snake to death.'

However, the constraint under discussion here cannot be accounted for in terms of obligatory argument sharing. It applies not only to Resultative complex predicates, where the Undergoer is a semantic argument of both verbs, but also to Adverbial complex predicates where the Undergoer is a semantic argument only of $V_2$, as demonstrated in (29) and (30). In the Adverbial type, $V_1$ has no theta-role to assign to the Undergoer, so the kind of argument sharing Baker described would be impossible.

Another approach that we might consider would be to treat the constraint as a requirement for the two verbs to agree with respect to some inflectional feature. This kind of inflectional agreement is not uncommon in serial verb constructions, for example. In light of the correlation between voice marking and transitivity prefix that we noted in section 2.2, we might expect that $V_2$ would bear the prefix *po-*whenever $V_1$ is marked for IV, and the prefix *poN-*whenever $V_1$ is marked for OV or DV. However, this prediction is not borne out by the data for either Adverbial complex predicates (29a, 30a) or Resultative complex predicates (20a, 31a, 32b).

The problems with any analysis based solely on inflectional agreement are seen even more clearly in the presence of an interrogative verb. Like many other Philippine-type languages, Kimaragang has 20+ question words which are inflected as verbs and occupy verbal positions. A few of these can function as "adverbial verbs", that is, as the first verb in an Adverbial complex predicate. Some examples are provided in (34).

(34) a. *K<in>u-kuro-Ø* nu mobpupu iti kumut diti…?
<PST>DUP-what-OV 2sg.GEN AV.wash this.NOM blanket this…
'How did you wash this blanket?' (… because it has sand in it!)

b. *Kuoy-on* ku mongidu i sodom sid gula diri?
how-OV 1sg.GEN AV.TR1.remove NOM ant DAT sugar this
'How am I going to remove the ants from this sugar?'

Sometimes the verb *kuoyon* 'how' is followed by two other verbs, creating a complex predicate that contains three verbs. In this construction *kuoyon* bears the voice feature for the clause, so the other two verbs both appear in the citation (AV) form, and thus both can bear transitivity prefixes. If the constraint that we are trying to account for were purely a matter of inflectional agreement, we would expect both of these AV verbs to bear the same transitivity prefix. But this need not be the case, as illustrated in (35): *monuyuan* contains the prefix *poN-* while *powiliw* contains the prefix *po-*.

(35) *Kuoy-on* *monuyuan* *powiliw* iti lonjong…?
how-OV AV.TR1.careful AV.TR2.set.down this.NOM pot
'How can you set the pot down carefully (when it is hot)?'

I suggest that the observed restrictions on the form of $V_2$ follow from the semantic constraints on complex predicate formation together with the facts of voice morphology discussed in section 2.2. It is important to note that the constraint we are discussing applies only to restructuring clauses. The unacceptability of (36a), repeated from (29a), must be due to requirements on complex predicate formation, since its intended meaning can be expressed as a biclausal structure (note the presence of the COMP in (36b)). Crucially, in a biclausal structure each verb may have a distinct Undergoer.

(36) a. *Tanday-ay no ino paray *monumpos* …
careful-DV.IMP PRTCL that.NOM rice AV.TR1.sow.seed

b. Tanday-ay no ino paray do *monumpos*…
careful-DV.IMP PTCL that.NOM rice COMP AV.TR1.sow.seed
'Treat the rice seed carefully when you are filling (the dibble hole)…'

Following Butt (1995), I propose that complex predicate formation is accomplished by the unification of the Lexical Conceptual Structure (LCS) associated with each verb. In a RCP like (37a), repeated from (33b), each verb contributes to the Thematic Tier. I will not try to address here the constraints on unification of this tier, which presumable include limits on what can be construed or expressed as a "single event", and perhaps also some specific constraints on the resultative construction in Kimaragang.

Unification of the Action Tier requires that the two verbs do not select different arguments as Undergoer. The unified LCS in (37d) shows that the two verbs 'kill' and 'beat' can be combined in a way that identifies the Undergoer arguments of the two verbs. This unified LCS provides a single

PRED feature taking a single array of arguments in a monoclausal f-structure, as shown in (37e). The unification of the Action Tier is trivial when $V_2$ is unergative, as in (25), because unergatives do not select an Undergoer and so the two verbs cannot clash in that respect. However, when $V_2$ is transitive and allows a choice of transitivity prefixes, only one choice is possible. In the vast majority of restructuring clauses, $V_1$ bears non-active voice marking which selects the Undergoer as subject (nominative argument). (As noted above, this is the most common voice selection for simple transitive clauses as well.) In this case, $V_2$ must bear the transitivity prefix associated with a construal under which $V_2$'s Undergoer can be indentified with the argument selected as subject by $V_1$.

| | | | | |
|---|---|---|---|---|
| (37) a. P<in>atay-Ø | ku | momobog(m-poN-bobog) | i | wulanut. |
| <PST>kill-OV | 1sg.GEN | AV-TR1-beat | NOM | snake |

‘I beat the snake to death.’ (= 33b)

b. *pinatay* ‘kill’ (OV)

$$\begin{bmatrix} \text{CAUSE (x, BECOME } (\textit{dead}(\text{y}))) \\ \text{AFFECT (x,y)} \end{bmatrix}$$

c. *momobog* ‘beat’ (AV)

$$\begin{bmatrix} \textit{beat}\text{ (x,y)} \\ \text{AFFECT (x,y)} \end{bmatrix}$$

d. *pinatay … momobog*

$$\begin{bmatrix} \text{CAUSE (x, BECOME } (\textit{dead}(\text{y}))) \text{ BY } \textit{beat}(\text{x,y}) \\ \text{AFFECT (x,y)} \end{bmatrix}$$

e.

$$\begin{bmatrix} \text{PRED ‘kill-hit <OBJ}_{agt}\text{, SUBJ>’} & \\ \text{TENSE} & \text{PAST} \\ \text{VOICE} & \text{OV} \\ \text{OBJ}_{agt} & \begin{bmatrix} \text{PRED} & \text{pro} \\ \text{PERS} & 1 \\ \text{NUM} & \text{SG} \\ \text{CASE} & \text{GEN} \end{bmatrix} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{‘snake’} \\ \text{CASE} & \text{NOM} \end{bmatrix} \end{bmatrix}$$

Consider example (32b), repeated here as (38a). The LCS of *popilay* ‘throw’ can unify with that of *naawi* ‘use up’, as seen in (38e), because after something is thrown the agent no longer has possession of it; this is one way of using things up. The LCS of *momilay* ‘throw at, pelt’ cannot unify with that of *naawi*, presumably because throwing things at a target does not cause the target to be used up; there is no coherent construal under which the goal Undergoer of *momilay* can be identified with the Undergoer of *naawi*.

(38) a. Naawi ku *popilay*/**momilay* … it tongo mangga.
finished.off-OV 1sg.GEN AV-TR2/*TR1-throw NOM PL mango
'I threw all the mangoes (at your house).' (or: 'I used up the mangoes throwing.')

b. *naawi* 'use up, finish off' (OV)
CAUSE (x, BECOME (*finished*(y)))
AFFECT (x,y)

c. *popilay* 'throw' (AV)
CAUSE (*throw*(x,y), GO (y, TO z))
AFFECT (x,y)

d. *naawi … popilay*
CAUSE (x, BECOME (*finished*(y))) BY CAUSE (*throw*(x,y), GO (y, TO z))
AFFECT (x,y)

"Adverbial verbs" typically contribute only modifier meanings such as manner or frequency to the Thematic Tier, and lack any specification on the Action Tier. The LCS of the complex predicate is almost entirely determined by $V_2$, as illustrated in (39). However, once again the normal rules of subject selection require that the Undergoer of the clause be selected as subject; and the transitivity prefix on $V_2$ must be compatible with this Undergoer.

(39) a. Induwa-an nopo momoog ino wagas tobo.
twice-DV only AV.TR1.wash that.NOM rice PTCL
'Just wash that (uncooked) rice two times.' (= 17a)

b. *momoog* 'wash'
CAUSE (x, BECOME (*clean*(y))
AFFECT (x,y)

c. *induwa'an… momoog* 'wash two times' (ex. 17a)
*twice*(CAUSE (x, BECOME (*clean*(y)))
AFFECT (x,y)

It is also possible, though uncommon, for $V_1$ to be marked for active voice. Some apparent examples of this type are presented in (40). Once again, we see that the two verbs need not bear the same transitivity prefix (40b-c). What is required is that the two verb forms reflect construals which are unifiable, specifically, which can share the same argument as Undergoer.

(40) a. Monorodok yalo wagu tu'
AV.TR1.rice.seedling 3sg.NOM again because

*monginduwo mangaraja* do ranaw.
AV.TR1.twice AV.TR1.work ACC paddy.field
'He is planting rice seedlings again because he wants to plant a second crop of rice this year.'

b. *Monimuk* yalo *poboros* dilot i-suu yo.
AV.TR1.whisper 3sg.NOM AV.TR2.say that.ACC IV-request 3sg.GEN
'He spoke his request in a whisper.'

c. *Mongombuyung* dilo' koriday *Ø-po-tindal*…
AV.TR1.lift.together that.ACC barking.deer AV.TR2.put.up
'(We) all lifted the barking deer up (into the house) together.'

To summarize, we have seen in section 2 that the affixation of a transitive verb always reflects the identity of the Undergoer, either in the voice marker or the transitivity prefix. A fundamental requirement for complex predicate formation is that the two verbs must share a single coherent Lexical Conceptual Structure, which may contain at most one Undergoer. If both verbs in the complex predicate are transitive, both will reflect the same Undergoer in their affixation. We have shown that this constraint cannot be a requirement for identity of form or feature. What is needed is compatibility, or unifiability, of the construals associated with each verb form.

## References


Alsina, Alex. 1992. The argument structure of causatives. *Ling. Inquiry* 23:517-555.

Baker, Mark. 1989. Object-sharing and projection in serial verb constructions. *Linguistic Inquiry* 20:513-553.

Butt, Miriam. 1995. *The structure of complex predicates in Urdu*. CSLI Publications.

Butt, Miriam. 1997. Complex predicates in Urdu. In Alex Alsina, Joan Bresnan and Peter Sells (eds.) *Complex Predicates*, 107–149. CSLI Publications.

Chang, Henry Yungli. 2010. On the syntax of Formosan adverbial verb constructions. In R. Mercado, E Potsdam, and L. Travis (eds.), *Austronesian and theoretical linguistics*, 183–212. Amsterdam: John Benjamins.

Fillmore, Charles. 1977. The case for case reopened. In *Grammatical relations*, ed. by Peter Cole and Jerrold Sadock, 59–81. New York: Academic Press.

Foley, William A. and Robert D. VanValin. 1984. *Functional syntax and universal grammar*. New York: Cambridge University Press.

Jackendoff, Ray. 1990. *Semantic Structures*. Cambridge MA: MIT Press.

King, Tracy Holloway. 1995. *Configuring topic and focus in Russian*. CSLI Publ.

Kroeger, Paul. 1996. The morphology of affectedness in Kimaragang Dusun. In H. Steinhauer (ed.), *Papers in Austronesian Linguistics No. 3*, 33–50. Pacific Linguistics A-84.

Kroeger, Paul. 2010. The grammar of *hitting*, *breaking* and *cutting* in Kimaragang Dusun. *Oceanic Linguistics* 49.1: 1–20.

Pearson, Matt. 2005. Voice morphology, case, and argument structure in Malagasy. *Proceedings of AFLA 11*, ed. P. Law, pp. 229–243. Berlin: ZAS.

Pinker, Stephen. 1989. *Learnability and cognition*. Cambridge, MA: MIT Press.

Rappaport, M. and B. Levin. 1988. What to do with theta-roles. In W. Wilkins, ed., *Syntax and Semantics 21: Thematic Relations*, 7–36. Academic Press.

Travis, Lisa. 2000 The l-syntax/s-syntax boundary: evidence from Austronesian. In I. Paul, V. Phillips, L. Travis (eds.) *Formal Issues in Austronesian Linguistics*, 167-194. Dordrecht: Kluwer Academic Publishers.

# OUTLINES OF AN LFG-XLE ACCOUNT OF NEGATION IN HUNGARIAN SENTENCES

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**Abstract**

In this paper, partially motivated by É. Kiss (1992, 1994), I develop the core aspects of the first LFG analysis of constituent and predicate negation in Hungarian. My general framework is the approach to Hungarian finite sentences proposed in Laczkó (2014a). I concentrate on essential c-structural, functional annotational and lexical representational issues.

# 1 Introduction

In Laczkó (2014a), this volume, I present the basic ingredients of a comprehensive LFG analysis of the preverbal portion of Hungarian finite clauses (designed to be XLE-implementable). I propose a general formal apparatus for handling constituents in the topic and the quantifier fields and in the specifier position of the VP. I assume that focussed constituents, verbal modifiers (VMs) and question phrases are in complementary distribution in [Spec,VP]. In this paper, partially motivated by É. Kiss (1992, 1994), I develop the core aspects of the first LFG analysis of constituent and predicate negation in this model. I concentrate on c-structural, functional and lexical representational issues and leave semantic issues (including the treatment of negative polarity items and scope relations) to future research.

The structure of the paper is as follows. In section 2, I present the basic facts and the relevant empirical generalizations. In section 3, I give a critical overview of Payne and Chisarik's (2000) account in the framework of Optimality Theory (OT), the only relatively extensive LFG-friendly analysis of negation in Hungarian that I am aware of. In section 4, I present my analysis. I conclude in section 5.

# 2 The basic facts

In this section, I present and exemplify the basic empirical generalizations that need to be captured in a theoretically oriented approach. I capitalize on É. Kiss' (1992) overview of the relevant facts.

A) There are two types of negation: constituent negation and predicate (sentence) negation.

B) When an ordinary constituent is negated, it must obligatorily occupy the preverbal focus position. Such a constituent cannot occur anywhere else in the sentence.

C) When a universal quantifier (UQ) is negated, there are two scenarios.

   a. When there is no (other) focussed constituent in the sentence, the negated quantifier constituent must occupy the [Spec,VP] position (just like any ordinary negated constituent).

b. When there is a focussed constituent in the sentence, the negated quantifier constituent has to be left-adjoined to the VP, just like ordinary non-negated quantifiers.

D) Sentence (predicate) negation has two varieties.

a. The negative particle (NMR)[1] immediately precedes the verb, and the particle may or may not be preceded by a focussed constituent. If it is preceded by a focussed constituent, that constituent may or may not be negated.

b. The NMR precedes a focussed constituent.

E) Double or even treble negation is also possible.

Consider the following examples, illustrating these construction types. The sentences contain a particle (= preverb) to demonstrate the fact that when a negated constituent immediately precedes the verb, it (at least in descriptive terms) occupies the customary focus position (because foci and particles are in complementary distribution preverbally).[2]

(1) ***neutral affirmative sentence***

| | | | | |
|---|---|---|---|---|
| *Péter* | *fel* | *hívta* | *a* | *barátjá-t.* |
| Peter.NOM | up | called | the | friend.his-ACC |

‘Peter called up his friend.’

(2) ***non-neutral affirmative sentence (with focus)***

| | | | |
|---|---|---|---|
| *Péter* | *A BARÁTJÁ-T* | *hívta* | *fel.* |
| Peter.NOM | the friend.his-ACC | called | up |

‘It was his friend that Peter called up.’

(3) ***ordinary constituent negation***

| | | | | | |
|---|---|---|---|---|---|
| *Péter* | *NEM* | *A* | *BARÁTJÁ-T* | *hívta* | *fel.* |
| Peter.NOM | not | the | friend.his-ACC | called | up |

‘It wasn’t his friend that Peter called up.’

(4) ***UQ negation without focus (= ordinary constituent negation)***

| | | | | |
|---|---|---|---|---|
| *Péter* | *NEM* | *MINDENKI-T* | *hívott* | *fel.* |
| Peter.NOM | not | everybody-ACC | called | up |

‘It wasn’t everybody that Peter called up.’

(5) ***UQ negation with focus***

| | | | | |
|---|---|---|---|---|
| *Nem* | *mindenki-t* | *PÉTER* | *hívott* | *fel.* |
| not | everybody-ACC | Peter.NOM | called | up |

‘It is not true for everybody that it was Peter that called them up.’

[1] In Hungarian the negative particle is *nem* ‘not’. In order to avoid confusion with verbal particles (= preverbs), following Payne & Chisarik’s (2000) terminology (see below), I refer to it as *negative marker*, abbreviated as NMR.

[2] FOCUSSED constituents are in SMALLCAPS.

(6) ***predicate negation, without focus, the NMR precedes the verb***
*Péter* *nem* *hívta* *fel* *a* *barátjá-t.*
Peter.NOM not called up the friend.his-ACC
'Peter didn't call up his friend.'

(7) ***predicate negation, with focus, the NMR precedes the verb***
*PÉTER* *nem* *hívta* *fel* *a* *barátjá-t.*
Peter.NOM not called up the friend.his-ACC
'It was Peter who didn't call up his friend.'

(8) ***predicate negation, with focus, the NMR precedes the focus***[3]
*Péter* *nem* *A* *BARÁTJÁ-T* *hívta* *fel.*
Peter.NOM not the friend.his-ACC called up
'It is not true that it was his friend that Peter called up.'

(9) ***double negation: constituent & predicate***
*Péter* *NEM* *A* *BARÁTJÁ-T* *nem* *hívta* *fel.*
Peter.NOM not the friend.his-ACC not called up
'It wasn't his friend that Peter didn't call up.'

(10) ***treble negation: UQ, constituent & predicate***
*Nem* *mindenki-t* *NEM* *PÉTER* *nem* *hívott* *fel.*
not everybody-ACC not Peter.NOM not called up
'It is not true for everybody that it wasn't Peter that didn't call them up.'

On the basis of (3) and (8), certain sentences can be ambiguous between ordinary constituent negation and (VP-type) predicate negation, respectively. This ambiguity is typically resolved prosodically (and/or contextually). In VP-type predicate negation, the NMR is unstressed, as a rule. In the case of constituent negation in focus, the default prosodic pattern is that the NMR carries the main stress of the constituent, but this is not necessarily so. However, when the NMR is unstressed and ambiguity arises, the context usually disambiguates.

[3] As É. Kiss (1992) demonstrates, this is a very special construction type: two VPs with their respective foci are contrasted, and the first VP is negated. For instance, (8) would sound natural if it was continued by (i).

(i) *... hanem* *AZ* *APJÁ-NAK* *küldött* *email-t.*
but the father.his-DAT sent email-ACC
'but sent an email TO HIS FATHER.'

## 3 On Payne & Chisarik (2000)

In Laczkó (2014a) and in Laczkó (2014b), both in this volume, I summarize the most important aspects of previous LFG(-friendly) assumptions and proposals about the syntax of Hungarian finite clauses: Börjars et al. (1999), Mycock (2006), Gazdik (2012), Laczkó & Rákosi (2008-2014) and Laczkó & Rákosi (2011). The two overviews are in complementary distribution in the sense that only one of them discusses a particular approach at greater length. Both those papers point out that this paper offers a detailed discussion of Payne & Chisarik's (2000) analysis, because, in addition to verbal modifiers and focussed constituents, it also deals with negation phenomena. Thus, below I only offer an overview of this account, and for a discussion of the approaches mentioned above, the reader is referred to my other two papers in this volume. This critical overview is relatively detailed for the following reasons. *(i)* As far as I am aware, Payne & Chisarik's (2000) account is the only analysis of Hungarian negation phenomena in an LFG-compatible framework to date, so its empirical coverage, generalizations and solutions need to be discussed as a point of departure.[4] *(ii)* Given that their proposed analysis is concerned with negation, focus, verbal modifiers and 'wh'-phrases, it is highly relevant for my other two papers in this volume. Its relatively detailed discussion then adds a further aspect to the complementarity of the overview of the relevant literature across these three papers.

Adopting the basic representational assumptions and ideas of Börjars et al. (1999), in their OT framework,[5] Payne & Chisarik (2000) develop an analysis of Hungarian preverbal syntactic phenomena: the complementarity of constituent question expressions, focussed constituents, NMR and verbal modifiers. They use the following abbreviations: FOC = positive or negative focussed phrase, INT = interrogative phrase, NEG = negative phrase, NMR = negative marker, PART = (aspectual) particle (representing the entire class generally referred to as verbal modifiers (VMs)). NEG subsumes the following four types:[6] INQ = inherently negative quantifier (e.g. *kevés* 'few'),

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[4] In section 4.1, I point out that Laczkó & Rákosi's (2008-2014) XLE grammar cannot appropriately handle even the most basic negation facts.

[5] Although OT is compatible with a variety of generative frameworks, including LFG and GB/MP, the authors claim that their preferred model is LFG (2000: 206, fn. 10). This makes the discussion of their analysis here all the more important and at the relevant points I will compare their account with my approach from this perspective.

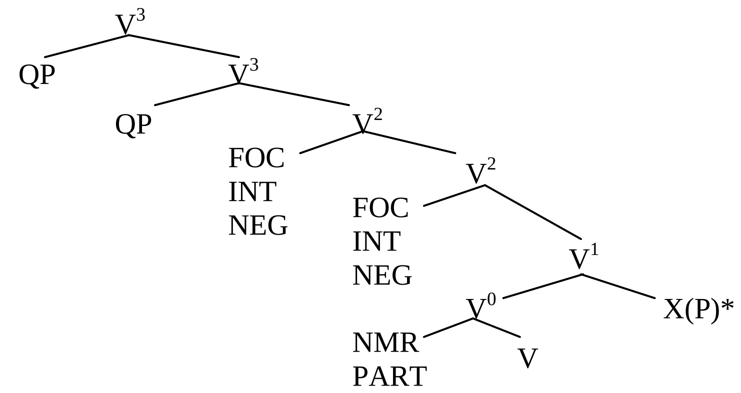
[6] Notice that for Payne & Chisarik (2000) NEG does not subsume ordinary constituent negation. They simply assume that FOC can have affirmative and negative (negated) variants. Nor does the NEG symbol stand for the negative particle, because they represent it as NMR, and they assume that it is associated with the verbal head (even when the [Spec,VP] position is not filled) as in É. Kiss' (1994) analysis. When I present my analysis, I will claim that it is an intuitively more

INA = inherently negative adverb (e.g. *ritkán* ‘seldom’), NUQ = negated universal quantifier (e.g. *nem mindenki* ‘not everyone’), NCI = negative concord item (e.g. *senki* ‘nobody/anybody’).[7]

After presenting the basic empirical facts, they give a critical overview of three major types of approaches in the GB/MP tradition: (A) a VP analysis without functional projections like F(oc)P, see É. Kiss (1992, 1994), for instance; (B) unarticulated FP analysis, with a single functional projection, see Brody (1990, 1995), for instance; (C) articulated FP analysis, with multiple functional projections, see Puskás (1994, 1998), for instance.

The essence of Payne & Chisarik’s (2000) analysis is as follows. They assume the overall structure in (11) for the relevant portion of a Hungarian sentence.

(11)




They do not postulate an ordinary VP constituent; instead, following Börjars et al. (1999), they employ a multilevel projection of the verb. In agreement with É. Kiss (1994), among others, they assume free word order in the postverbal domain (regulated, to a considerable extent, by semantic, prosodic and information structure factors in the form of tendencies). They write: “The assumption we shall make in this paper is that, from a purely syntactic point of view, the order of postverbal constituents is essentially free. This then entails an alternative account of the preverbal INT > FOC > NEG hierarchy” (2000: 200).

They propose the following ranking of OT constraints with respect to the preverbal position.

(12) ALIGN INT > ALIGN FOC > ALIGN NEG > {ALIGN NCI, IN SITU}[8]

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plausible option, at least from an LFG perspective, to assume that the negative marker can also fill [Spec,VP].

[7] NCIs are also frequently called n-words.

[8] The {ALIGN NCI, IN SITU} part of the ranking is intended to capture the generalization that, among the NEG types, NCIs only optionally compete for the verb-adjacent position.

This analysis captures several basic Hungarian syntactic facts.

*(i)* If there is a question phrase in the sentence then it will occupy the designated preverbal position, and not a focussed constituent or a negative phrase.[9] Compare the examples in (13) and (14).

| | | | | | | |
|---|---|---|---|---|---|---|
| (13) | *Melyik könyv-et* | *olvasta* | *el* | *CSAK JÁNOS?* | | **INT-FOC** |
| | which book-ACC | read.PAST | VM | only John.NOM | | |
| | **CSAK JÁNOS* | *olvasta* | *el* | *melyik könyv-et?* | | **FOC-INT** |
| | only John.NOM | read.PAST | VM | which book-ACC | | |

‘Which book did ONLY JOHN read?’

| | | | | | |
|---|---|---|---|---|---|
| (14) | *Melyik könyv-et* | *nem olvasta* | *el* | *senki?* | **INT-NCI** |
| | which book-ACC | not read.PAST | VM | nobody.NOM | |
| | **Senki* | *nem olvasta* | *el* | *melyik könyv-et?* | **NCI-INT** |
| | nobody.NOM | not read.PAST | VM | which book-ACC | |

‘Which book did nobody read?’

*(ii)* If a focussed constituent and a negative phrase compete, the former wins out, cf.:

| | | | | | |
|---|---|---|---|---|---|
| (15) | *CSAK EZT KÖNYV-ET* | *nem olvasta* | *el* | *senki.* | **FOC-NCI** |
| | only this book-ACC | not read.PAST | VM | nobody.NOM | |
| | **Senki* | *nem olvasta* | *el* | *CSAK EZT KÖNYV-ET.* | **NCI-FOC** |
| | nobody.NOM | not read.PAST | VM | only this book-ACC | |

‘Nobody read ONLY THIS BOOK.’

The alignment ranking in (12) is proposed to capture the complementarity of INT, FOC and NEG below $V^2$ in Payne & Chisarik’s (2000) structure in (11). They treat the NMR *nem* ‘not’ and verbal modifiers separately in the following way.

1. They assume that both NMR and VMs are morphologically incorporated into the verb when they precede it. The authors take preverbs (particles) to be the prototypical representatives of this categorially heterogeneous class,[10] and they use the PART label for them.
2. NMR and PART are also in complementary distribution in a position dominated by $V^0$, see (11), and the former is stronger in the competition.

[9] A reminder: in their analysis, a negative phrase (NEG) has four types: INQ, INA, NUQ and NCI. In these examples an NCI is used.

[10] On the basis of É. Kiss (1994), they mention the following additional VM types: postpositions, bare non-referential nouns, bare resultative adjectives and bare infinitives.

3. In order to capture the word order facts also involving the $V^0$ domain, Payne & Chisarik (2000) augment the constraint hierarchy in (12) in the following way.

(16) ALIGN INT > ALIGN FOC > ALIGN NEG > {ALIGN NCI, IN SITU} > ALIGN $V^0$ > ALIGN NMR >ALIGN INCORP > {ALIGN V | *INCORP}

The extension aligns $V^0$ first if there are not stronger candidates in the preceding portion of the hierarchy, and the priority of the negative marker over the VM is encoded by the ALIGN NMR >ALIGN INCORP order.[11]

My remarks on Payne & Chisarik's (2000) analysis are as follows.

1. Agreeing with both Börjars et al. (1999) and Payne & Chisarik (2000), I share the LFG-style rejection of functional categories like F(oc)P and TopP, for details, see Laczkó (2014a).
2. On the basis of the argumentation and considerations in Laczkó (2014a), I maintain that the postulation of a VP constituent with a single specifier position is tenable (and useful), and the relevant phenomena can be captured in a fully LFG framework, see Laczkó (2014a, 2014b), and it could also be captured in an OT (or OT-LFG) approach.
3. The NEG label very strongly invokes the notion of genuine (syntactic and/or morphological) negation. However, Payne & Chisarik's (2000) NEG basically subsumes "semantic negation": INQ, INA and negative concord elements (NCIs), which themselves do not encode negation. In this group, NUQs are formally (and semantically) really negated elements (and they are substantially different from all the other elements in this group in their distributional properties). Thus, this NEG label is rather misleading here. Moreover, if morpho-syntactic negation is taken seriously, the authors' INT > FOC > NEG hierarchy calls for some clarification and explanation. The reason for this is that an ordinary negated constituent has priority over an ordinary focussed constituent, cf.:

(17)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *NEM* | *A* | *KÖNYV-ET* | *olvasta* | *el* | *CSAK* | *JÁNOS.* | |
| not | the | book-ACC | read.PAST | VM | only | John.NOM | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **CSAK* | *JÁNOS* | | *olvasta* | *el* | *NEM* | *A* | *KÖNYV-ET.* |
| only | John.NOM | | read.PAST | VM | not | the | book-ACC |

cca. 'It wasn't the book such that it was only John that read it.'

Naturally, NEG in this OT hierarchy can be used in the way the authors do (with appropriate remarks); however, the contrast in (17) has to be captured in this framework as well.[12]

[11] INCORP stands for the preverbal morphological incorporation of VMs.

[12] In the authors' approach, both *nem a könyvet* 'not the book' and *csak János* 'only John' in (17) are treated as FOC elements, and this ±neg dimension in this domain is not at all addressed.

4. I think the most serious problem with Payne & Chisarik's (2000) analysis is their treatment of VMs (and, to a smaller extent, the treatment of NMR) for the following reasons.
   a) Referring to É. Kiss (1994), they assume that both VMs and NMR are morphologically incorporated into the verb optionally.[13] First of all, É. Kiss (1994) only assumes semantic incorporation of VMs even when they are preverbal, and she claims that even preverbally they are syntactically separate elements (occupying the [Spec,VP] position in her system). Secondly, É. Kiss (1994) does not incorporate the negative marker morphologically, either. Instead, she adjoins it to the verbal head.[14]
   b) Of course, morphological incorporation could be an alternative solution, but this would require argumentation and supporting evidence. In Laczkó (2014b), I argue in a detailed fashion against the incorporation analysis of VMs in general.[15]
   c) Even if we accept the morphological incorporation treatment, it raises a conceptual problem: Payne & Chisarik's (2000) alignment rules mix two dimensions, a syntactic level and a morphological level. This is a rather marked solution the nature of which would call for some independent support, on the one hand, and it would be an appealing alternative if no other (less marked) solution was available. And this latter requirement does not seem to be satisfied, see the next point.
   d) Even if we disregard the syntax-morphology-mix issue and accept the analysis, it is important to see that Payne & Chisarik (2000) do assume two distinct positions for VMs and FOC et al. From this it follows that there is no radical conceptual difference between their idea and the (un)articulated GB/MP style FP analyses they criticize. They explicitly state that their alignment hierarchy has been designed to capture the preverbal complementarity of INT, FOC, NEG ***and*** VMs in such a way that VMs are the weakest candidates. Then it is rather questionable why VMs are assumed to occupy a different position at a distinct level of representation.
5. Payne & Chisarik (2000) subscribe to a popular view of the distribution (and complementarity) of focussed constituents and question expressions, on the one hand, and VMs, on the other hand. They assume that *(i)* the two types occupy two distinct preverbal syntactic positions and *(ii)* VMs are head-adjoined to the simplex verb and incorporation takes place, and, as a consequence *(iii)* the complementarity of the two types has to be

[13] When they are left-adjacent to the verb, they are incorporated, and elsewhere they are independent syntactic elements.
[14] By contrast, É. Kiss (1992) left-adjoins her NEG to V'. Obviously, É. Kiss' (1994) solution is an instance of head-adjunction, and É. Kiss' (1992) treatment is phrasal adjunction.
[15] See point 5 below.

captured by special means. As I argue in a detailed fashion in Laczkó (2014b), the treatment of all types of VMs along the head-adjunction and incorporation lines is counterintuitive and untenable, because *(a)* some types are clearly maximal projections (so the postulation of head-adjunction is unavailable) and *(b)* some types clearly defy the assumption of any notion of incorporation. This is a general problem for any approach along these lines. However, as far as I can see, OT, Payne and Chisarik's (2000) chosen framework, would naturally provide the appropriate principles and devices to capture this famous complementarity in an intuitively more plausible way. It would be worth considering developing an OT analysis by postulating a single designated preverbal position and assuming that all the relevant constituents compete for this position and various violable constraints regulate their complementarity in that position. In Laczkó (2014b), I present an LFG analysis along the single designated position lines (with a system of various disjunctions of functional annotations), and it seems to me that this approach could also be translated into OT terms.

# 4 Towards an LFG-XLE analysis of negation

In subsection 4.1, I point out to what extent Laczkó & Rákosi's (2008-2014) XLE grammar can handle negation. In subsection 4.2, I briefly present the relevant details of the general sentence structural approach I propose in Laczkó (2014a), and in subsection 4.3, I outline my analysis of negation in this model.

## 4.1 On Laczkó & Rákosi (2008-2014)

In our XLE grammar, we have not yet implemented the analysis of negation to a satisfactory extent at all: basically, we only have a rudimentary treatment for testing purposes. The current state of affairs is as follows.

(A) Negation is neither uniformly nor consistently treated in various ParGram grammars. One of the central (and controversial) issues is the contribution of the negative marker (whether a bound or a free morpheme) to the f-structure of a sentence. The two basic options are as follows: *(i)* the marker is treated as an adjunct encoding negation *(ii)* the negative marker contributes a feature value: NEG +.[16] In our grammar, we employ the first option (just like the English grammar, among others). We have the following lexical form for the negative marker *nem* 'not'.

[16] For details and discussion, see the following web page and the documents there: http://typo.uni-konstanz.de/redmine/projects/pargram/wiki/Negation/9.

(18) *nem* ADV XLE @(PRED %stem)
(^ ADJUNCT-TYPE)= neg.

The relevant portion of the f-structure of the sentence containing the negative marker looks like this.

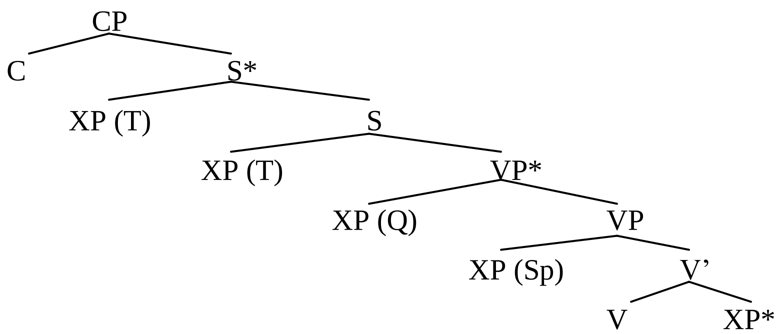
(19) ADJUNCT $\left\{ \begin{bmatrix} \text{PRED} & \text{`nem'} \\ \text{ADJUNCT-TYPE} & \text{neg} \end{bmatrix} \right\}$

(B) Given the preliminary nature of our treatment of negation, the grammar gives a good parse for only one of the seven types of negative constructions presented in section 2: predicate negation, without focus, the NMR precedes the verb, see the example in (6). Even in this case, however, the system yields 13 parses (most of them being due to independent unconstrained aspects of the grammar), and only two are appropriate.

(C) It seems that one of the problems causing “overgeneration in parsing” is that we assume that the category of *nem* ‘not’ is ADV, see (18), and its use is not constrained enough in the current version of the implemented grammar. For instance, in one of the parses it treats the negative marker as an OBL.

### 4.2 On sentence structure in Laczkó (2014a)

In the spirit of Laczkó & Rákosi (2008-2014) and also partially inspired by É. Kiss (1992), in Laczkó (2014a) I assume the following skeletal sentence structure.[17]

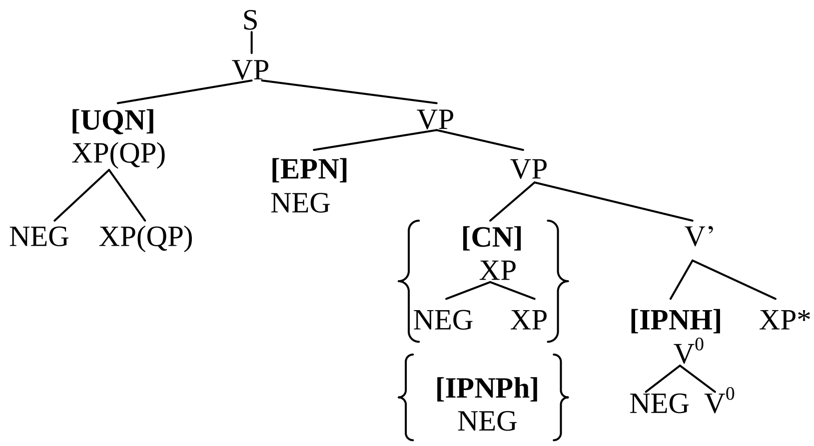
(20)



### 4.3 Outlines of an account of negation

In my analysis, I basically adopt É. Kiss’ (1994) structural approach to negation (in her GB framework), see the schematic representation in (21).

[17] S* and VP* encode the possibility of multiple left-adjunction. The abbreviations are as follows: T = topic field, Q = quantifier field, Sp = [Spec,VP] position.

(21)




A) The abbreviations in square brackets indicate the types of negation: [UQN] = universal quantifier negation, [EPN] = (VP)external predicate negation, [CN] = constituent negation, [IPNPh] = (VP)internal predicate negation, phrasal adjunction, [IPNH] = (VP)internal predicate negation, head-adjunction. The curly brackets signal the complementarity of **[CN]** and **IPNPh]**.

B) The four negation positions are empirically justified; however, all the four cannot be simultaneously filled. Double negation is quite frequent, treble negation is very rare, quadruple negation is non-existent.[18]

C) As I pointed out above, É. Kiss' (1992) analysis is different in one significant respect: it assumes that in the case of [IPN], a NegP is adjoined to V'. This approach is more uniform in the sense that it posits a phrasal status for the negative marker in all the positions it occurs in. It does not seem to be possible to choose between the two adjunction strategies in the [IPN] type on an empirical basis. Below I discuss some LFG-specific considerations that favour the head-adjunction analysis in the spirit of É. Kiss (1994), which allows the use of the negative marker as either a Neg or a NegP, see the next point.

D) LFG's flexible assumptions about categories and their potential phrasal vs. non-phrasal status allow for the following three scenarios in the analysis of the negative marker in Hungarian. *(i)* It uniformly projects an

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[18] The main reason for these facts has to do with the increasing difficulty of processing multiple negation. Given that the adjunction of the negative marker to a VP with an obligatory focus is relatively rare, the combination of this construction type with a (preceding) VP-adjoined negated universal quantifier would be even more marked. So far, I have not come across any attested example of this kind. For this reason, I have simplified the phrase structure rules of my implemented grammar in such a way that the two VP-adjoined negative constituents are in complementary distribution. However, the efficient implementation of their non-complementary relation would not cause any technical problems, either.

XP (= NegP). This would be in accordance with É. Kiss' (1992) account. *(ii)* It can be used in the syntax as either an $X^0$ or an XP category; and, thus, it can be either head-adjoined or phrase-adjoined. This would be in the spirit of É. Kiss (1994) in GB and Toivonen (2001) in her treatment of particles in LFG. *(iii)* It can be assumed to be a uniformly non-projecting word (capable of occurring in both $X^0$ and XP positions), cf. the treatment of particles in English, German and Hungarian in Forst et al. (2010). Given the fact that this Hungarian negative marker does not exhibit any phrasal behaviour in its own right, i.e. it can never be modified, I adopt the third treatment here (and this is what I implemented when I tested my analysis, for details, see below). I hasten to add that nothing crucial hinges on this particular aspect of my account, and both of the other solutions are fully tenable both (LFG-)theoretically and implementationally (I have also tested their implementability). My choice of option *(iii)* was simply motivated by economy considerations: there is no empirical evidence for a phrasal projection of the negative marker. In future work, I plan to develop an LFG analysis of several Hungarian "small categories" that are arguably best treated as non-projecting words along these lines: verbal particles (aka verbal prefixes or coverbs), *csak* 'only', *ne* 'not' in prohibitions, *nem* 'not', *is* 'also', *sem* 'also not', *volna* (the marker of irrealis mood), *-e* (the yes-no question marker), etc.

E) In my implemented rules, I use the NEG category label (as opposed to Laczkó & Rákosi's (2008-2014) ADV), which contributes greatly to parsing parsimony.

F) As (21) shows, in my analysis NEG can occupy three major types of syntactic positions: it can be in [Spec,VP] and it can also be either head-adjoined or phrase-adjoined.

G) In all the three cases, it has the ADJUNCT annotation.

H) My lexical form for the negative marker is as follows. Compare this with (18).[19]

(22) *nem* NEG * @(PRED %stem)
(^ ADJUNCT-TYPE)= neg.

I) The special NEG category, the specific phrase structure rules and the functional annotations in this analysis jointly ensure full parsing

[19] In (18) the lexical form contains XLE after the category specification. This prompts Laczkó & Rákosi's (2008-2014) implemented grammar to use the information provided by the (fst) morphological analyzer. In this case it will utilize the +Adv tag for *nem* coming from the fst. By contrast, the * symbol in (22) blocks the fst, and the grammar only uses the information included in the lexical form of the given word. This is the simplest way of introducing a special category. The fact that the fst cannot "see" it is no problem at all, given that this word has only a single morphological form.

efficiency. The implemented grammar only produces the expected parses in the case of all the negated constructions under investigation.

Let us now see the details of the analysis of each construction type. For convenience, below I repeat the relevant examples from section 2.

### 4.2.1 Constituent negation

As has been demonstrated in section 2, standard constituent negation targets the preverbal position ([Spec,VP] in É. Kiss' (1992, 1994) and my analysis), see [CN] in (21) and the relevant example in (3). If an ordinary constituent is negated, this is the only syntactic position available for it.

(3) ***ordinary constituent negation***

| | | | | | |
|---|---|---|---|---|---|
| *Péter* | *NEM* | *A* | *BARÁTJÁ-T* | *hívta* | *fel.* |
| Peter.NOM | not | the | friend.his-ACC | called | up |

'It wasn't his friend that Peter called up.'

In my analysis of this construction type, I use the following c-structure rules. I augment the { XP | PRT } disjunction with the following disjunct for the [Spec,VP] position.

(23) XPneg: (^ GF)=! (^ FOCUS)=!

In addition, I have the following rule for negated constituents.

(24) XPneg --> NEG: @ADJUNCT;
XP.

Consider the XLE c-structure and f-structure of (3) in Figures 1 and 2 (next page). As Figure 2 shows, only the negated OBJ DP is in the scope of the negative marker: the marker is represented as the negative adjunct of the OBJ. The negated constituent has the FOCUS DF, which is an empirically correct generalization. As (4) demonstrates, a negated universal quantifier can also occur in this position.

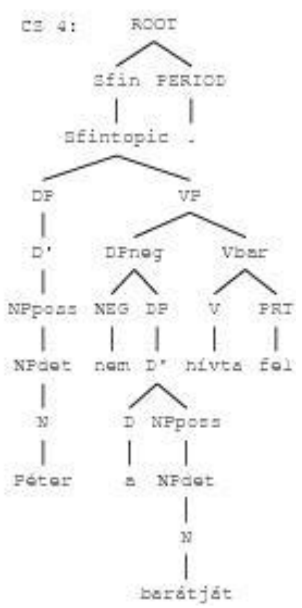
(4) ***UQ negation without focus (= ordinary constituent negation)***

| | | | | |
|---|---|---|---|---|
| *Péter* | *NEM* | *MINDENKI-T* | *hívott* | *fel.* |
| Peter.NOM | not | everybody-ACC | called | up |

'It wasn't everybody that Peter called up.'

The analysis is the same.[20]

[20] It has to be constrained, though, that non-negated universal quantifiers are banned from this position.



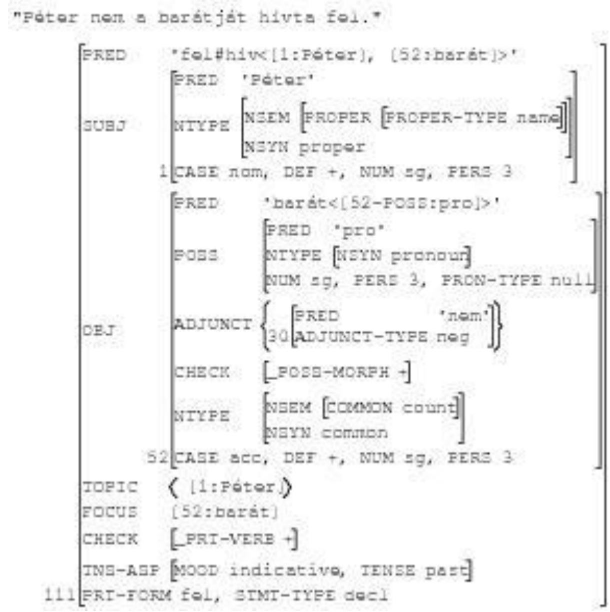



**Figure 1: c-str. of (3)** **Figure 2: f-str. of (3)**

When there is an ordinary focussed constituent present (which obligatorily fills the [Spec,VP] position), the negated universal quantifier can (or, rather, must) occupy a VP-adjoined position in the "quantifier zone", see [UQN] in (21) and the example in (5).

(5) ***UQ negation with focus***

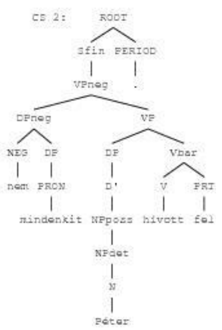
| | | | | |
|---|---|---|---|---|
| *Nem* | *mindenki-t* | *PÉTER* | *hívott* | *fel.* |
| not | everybody-ACC | Peter.NOM | called | up |

'It is not true for everybody that it was Peter that called them up.'

I employ the following VP-adjunction rule.

(25) VPneg --> XPneg: (^ GF)=!
(^ FOCUS)
(! QUANT-TYPE) =c universal;
VP.

The annotations associated with XPneg capture the relevant empirical generalizations. Only negated universal quantifiers can be adjoined to the VP, and the VP has to contain a focus. Consider the c-structure and f-structure of (5) in Figures 3 and 4 (next page).



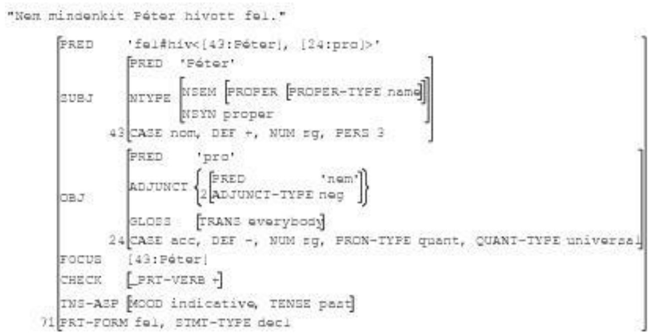




**Figure 3: c-str. of (5)** **Figure 4: f-str. of (5)**

## 2 Predicate negation

As I demonstrated in section 2, when there is a focussed constituent in a sentence, there are two varieties of negation: *(i)* the negative marker precedes the focussed constituent *(ii)* the negative marker follows the focussed constituent.

Structurally, I treat *(i)* as É. Kiss (1992, 1994): I assume that NEG is adjoined to VP, see the [EPN] constituent in (21) and the example in (8).

(8) ***predicate negation, with focus, the NMR precedes the focus***

| | | | | | |
|---|---|---|---|---|---|
| *Péter* | *nem* | *A* | *BARÁTJÁ-T* | *hívta* | *fel.* |
| Peter.NOM | not | the | friend.his-ACC | called | up |

'It is not true that it was his friend that Peter called up.'

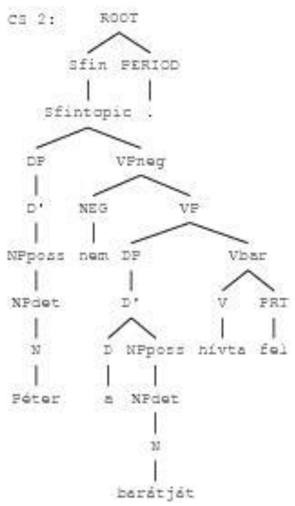
I use the following phrase structure rule in this case.[21]

(26) VPneg --> NEG: @ADJUNCT (^ FOCUS);
VP.

Consider the c-structure and f-structure of (8) in Figures 5 and 6 (next page).

[21] As I pointed out above, although it is possible, in principle, to have the combination of VP-adjoined universal quantifier negation and VP-adjoined predicate negation, no real examples have been attested; therefore, in the current version of my implemented grammar I use the two VP-adjunction rules in complementary distribution by collapsing (25) and (26) disjunctively:

(i) VPneg --> { NEG: @ADJUNCT (^ FOCUS)
| DPneg: @DP-GF (^ FOCUS) (! QUANT-TYPE) =c universal }
VP.



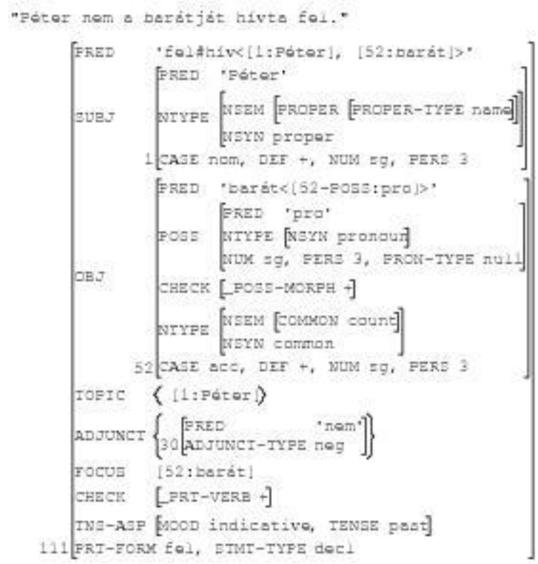




**Figure 5: c-str. of (8)** **Figure 6: f-str. of (8)**

Notice that in the f-structure representation the sentence is in the scope of the negative marker (neg ADJUNCT).[22]

I handle the *(ii)* predicate negation type illustrated in (7) as É. Kiss (1994), contra É. Kiss (1992).

(7) ***predicate negation, with focus, the NMR precedes the verb***

| | | | | | |
|---|---|---|---|---|---|
| *PÉTER* | *nem* | *hívta* | *fel* | *a* | *barátjá-t.* |
| Peter.NOM | not | called | up | the | friend.his-ACC |

‘It was Peter who didn’t call up his friend.’

É. Kiss (1994) head-adjoins $Neg^0$ to $V^0$, and here I make the same assumption, see the [IPNH] constituent in (21). Let me add that the adjunction of NegP to V’ would also be an absolutely legitimate solution;[23] moreover, it can even be someone’s preferred solution in LFG if, in cases

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[22] As I pointed out in section 2, a sentence can be ambiguous between ordinary constituent negation and the VP-adjunction type of predicate negation, cf. (3) and (8).

[23] It is noteworthy that in the GB/MP tradition the status of the two solutions in É. Kiss (1992) and É. Kiss (1994) has kept changing. Originally both were legitimate in their respective GB contexts. Later adjunction was only acceptable as either head ($X^0$) adjunction or maximal projection (XP) adjunction. In this new light É. Kiss’ (1992) solution would have been out. In the MP paradigm of functional projections, both adjunction treatments are outdated. The current standard approach is the postulation of a NegP whose Neg head takes the constituent to be negated as its complement, see É. Kiss (2002), for instance.

like this, they reject the idea of head-adjunction in general and the notion of non-projecting words in particular.

My head-adjunction rule is as follows.

(27) Vneg --> NEG: @ADJUNCT
(^ FOCUS);
V.

Consider the structures for (7) in Figures 7 and 8.

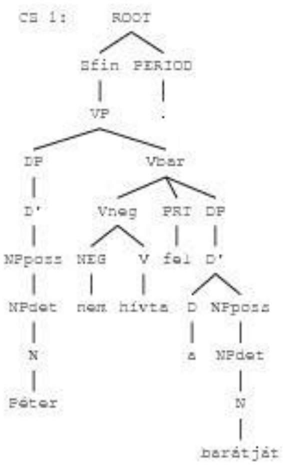




**Figure 7: c-str. of (7)** **Figure 8: f-str. of (7)**

The third type of predicate negation is when (at least in descriptive terms) the negative marker seems to be in complementary distribution with VMs and other [Spec,VP] elements (i.e. focussed and 'wh'-phrases): there is no focussed constituent or 'wh'-phrase in the sentence, the negative marker precedes the verb and the VM must occur postverbally, see the example in (6).

(6) ***predicate negation, without focus, the NMR precedes the verb***

| | | | | | |
|---|---|---|---|---|---|
| *Péter* | *nem* | *hívta* | *fel* | *a* | *barátjá-t.* |
| Peter.NOM | not | called | up | the | friend.his-ACC |

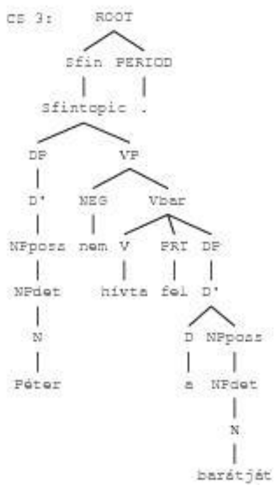
'Peter didn't call up his friend.'

For É. Kiss (1992, 1994) this is the same case as *(ii)* above: the [Spec,VP] position is not filled (by either a focussed constituent or a 'wh'-phrase), and NegP/Neg is adjoined to V'/$V^0$. É. Kiss claims that the reason why a VM occurs (i.e. remains) in its base-generated postverbal position is that it has to be in the scope of negation. Although this solution could be accommodated in my LFG account, here I propose that in these constructions the NegP occupies the [Spec,VP] position. My main motivation for this treatment is that it most straightforwardly captures the complementarity of all the four major types of preverbal constituents, which is in full accord with LFG's what-you-see-is-what-you-get principle.

The relevant rule is very simple. I augment the [Spec,VP] disjunction with the following disjunct: NEG: @ADJUNCT (^ FOCUS)=!. The resulting disjunction (simplified for our present purposes) is as follows.

(28) { PRT
| XP (^ GF)=! (^ FOCUS)=!
| XPneg: (^ GF)=! (^ FOCUS)=!
| NEG: @ADJUNCT (^ FOCUS)=!}

Consider the structures for (6) in Figures 9 and 10.



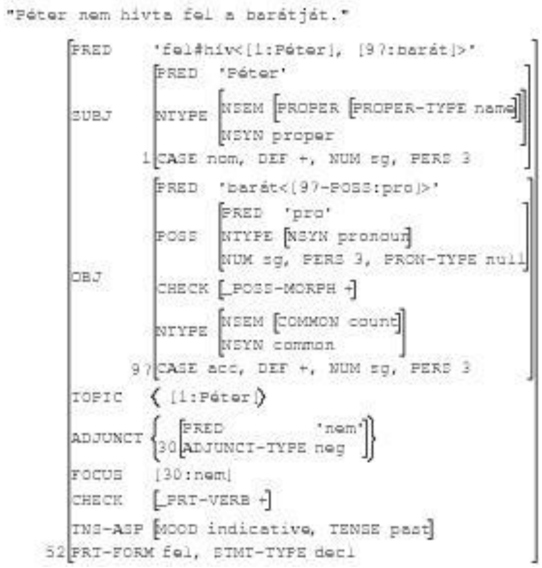




**Figure 9: c-str. of (6)** **Figure 10: f-str. of (6)**

Notice that in this case I assume that NEG in [Spec,VP] is focussed. On the one hand, I think this is plausible intuitively (NEG very often gets heavy stress), and, on the other hand, I need this specification for the proper treatment of the postverbal occurrence of VMs.

# 5 Concluding remarks

In this paper, I have presented an LFG-XLE analysis of basic negation phenomena in Hungarian finite clauses in the framework of my general approach proposed in Laczkó (2014a). The account has been successfully implemented and tested.

The following (further) details of the analysis are yet to be developed:

- the behaviour of NCIs – with particular attention to the issues discussed in my overview of Payne & Chisarik's (2000) analysis;
- the dual function of *sem* 'also not', which, in combination with ordinary constituents and NCIs, can *(i)* express 'also' in an NCI environment and *(ii)* perform the role of the negative marker *nem* 'not' (with an additional element of meaning: 'also');
- scope relationships in general and in multiple negation in particular;
- the XLE implementation of these further aspects of the account on Laczkó & Rákosi's (2008-2014) HunGram platform.


## Acknowledgements

I thank the participants of the LFG14 conference for useful remarks and Louise Mycock for a very useful discussion. I am especially grateful to my anonymous reviewers, because their comments motivated my developing and implementing an alternative analysis presented in this final version of the paper. Any errors that remain are solely mine.

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## References


Börjars, Kersti, Payne, John & Chisarik, Erika. 1999. On the justification for functional categories in LFG. In: Butt, Miriam. & King, Tracy. H. eds. *Proceedings of the LFG99 Conference*. University of Manchester. Stanford: CSLI Publications.

Brody, Michael. 1990. Remarks on the order of elements in the Hungarian focus field. In: Kenesei, István. ed. *Approaches to Hungarian. Volume 3. Structures and Arguments*. Szeged: JATE, 95-122.

Brody, Michael. 1995. Focus and checking theory. In: Kenesei, István. ed. *Approaches to Hungarian. Volume 5. Levels and Structures*. Szeged: JATE, 29-43.

É. Kiss, Katalin. 1992. Az egyszerű mondat szerkezete [The structure of the simple sentence]. In: Kiefer, Ferenc. ed. *Strukturális magyar nyelvtan 1. Mondattan.* [Structural Hungarian grammar 1. Syntax]. Budapest: Akadémiai Kiadó, 79-177.

É. Kiss, Katalin. 1994. Sentence structure and word order. In: Kiefer, Ferenc & É. Kiss, Katalin. eds. *The Syntactic Structure of Hungarian*. New York: Academic Press, 1-90.

É. Kiss, Katalin. 2002. *The Syntax of Hungarian. Cambridge Syntax Guides*. Cambridge: Cambridge University Press.

Forst, Martin; King, Tracy H. & Laczkó, Tibor. 2010. Particle verbs in computational LFGs: Issues from English, German, and Hungarian. In Butt, Miriam & King, Tracy H. eds. *Proceedings of the LFG '10 Conference*. On-line publication. Stanford: CSLI Publications, 228-248.

Gazdik, Anna. 2012. Towards an LFG analysis of discourse functions in Hungarian. In: Kiefer, Ferenc. & Bánréti, Zoltán. eds. *Twenty Years of Theoretical Linguistics in Budapest*. Budapest: RIL HAS & Tinta Könyvkiadó, 59-92.

Laczkó, Tibor. 2014a. Essentials of an LFG analysis of Hungarian finite sentences. *This volume.*

Laczkó, Tibor. 2014b. An LFG analysis of verbal modifiers in Hungarian. *This volume.*

Laczkó, Tibor & Rákosi, György. 2008-2014. *HunGram. An XLE Implementation.* University of Debrecen.

Laczkó, Tibor & Rákosi, György. 2011. On particularly predicative particles in Hungarian. In Butt, Miriam & King, Tracy H. eds. *Proceedings of the LFG '11Conference*. Stanford: CSLI Publications, 299-319.

Mycock, Louise. 2006. *A New Typology of Wh-Questions*. Ph.D. dissertation, University of Manchester.

Payne, John & Chisarik, Erika. 2000. Negation and focus in Hungarian: An Optimality Theory account. In: *Transactions of the Philological Society* 98: 185-230.

Puskás, Genovéva. 1994. Sentential negation in Hungarian. *Rivista di Linguistica* 6, 5-38.

Puskás, Genovéva. 1998. On the neg-criterion in Hungarian. *Acta Linguistica Hungarica* 45, 167-213.

Toivonen, Ida. 2001. *The Phrase Structure of Non-Projecting Words*. Ph.D. dissertation, Stanford University.

# ESSENTIALS OF AN LFG ANALYSIS OF HUNGARIAN FINITE SENTENCES

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**Abstract**

In this paper I present an LFG (and XLE-implementable) analysis of the preverbal portion of Hungarian finite clauses. The structural representation is largely motivated by É. Kiss (1992) and Laczkó & Rákosi (2008-2014). I argue for S and against IP (and I also postulate CP). I employ a hierarchical, binary branching, adjunction structure for the topic field, in addition to a similar setup in the quantifier field. I handle all the question phrases other than the question phrase immediately adjacent to the verb in multiple constituent questions as occupying VP-adjoined positions in the quantifier field. I assume that focussed constituents, verbal modifiers and the (verb-adjacent) question phrase are in complementary distribution in [Spec,VP]. On the basis of the analysis proposed in this paper, I suggest that LFG's parametric space that is potentially available to c-structure—function associations should be augmented along the following lines. (i) The [Spec,VP] position should be allowed to host the FOCUS discourse function. (ii) The XP in [$_S$ XP VP] can also be a topic, in addition to a subject. (iii) A VP constituent can also contain a subject.

# 1 Introduction

So far relatively few works have discussed (relatively few aspects of) Hungarian syntax from an LFG perspective. The aim of this paper is twofold. (A) I will present the essential ingredients of the first most comprehensive LFG analysis of Hungarian finite clauses[1] (designed to be XLE-implementable). (B) I will discuss what certain aspects of my approach can contribute to augmenting LFG's parametric space potentially available to c-structure—grammatical-or-discourse-function associations.

The structure of the paper is as follows. In section 2, I briefly discuss É. Kiss' (1992) GB approach (2.1) and some aspects of salient LFG accounts of certain relevant phenomena (2.2.). In section 3, first I argue for assuming an S (as opposed to IP) constituent (3.1), then I develop my analysis (3.2), and finally I point out the significance of some traits of this analysis for standard LFG assumptions about c-structure—function correspondences (3.3). In section 4, I make some concluding remarks.

# 2 On some previous approaches

Consider the sentences in (1)-(3), illustrating the most salient word order properties of Hungarian finite clauses, schematically presented in Table 1.[2]

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[1] For details of the treatment of constituents in [Spec,VP], see Laczkó (2014b). For an analysis of negation, see Laczkó (2014c). The details of an account of quantifiers and constituent questions are left for future work.

[2] Focussed constituents are indicated by SMALLCAPS in the examples, see (2) and (3). VM stands for verbal modifier. This is a standardly used cover term for a range of

| | | | | | |
|---|---|---|---|---|---|
| (1) | *János* | *szerencsére* | *minden* | *könyv-et* | *oda* | *adott* |
| | John.NOM | luckily | every | book-ACC | VM | gave |

| | | | |
|---|---|---|---|
| | *Mari-nak* | *a* | *könyvtár-ban.* |
| | Mary-DAT | the | library-in |

‘Luckily, John gave every book to Mary in the library.’

| | | | | | | |
|---|---|---|---|---|---|---|
| (2) | *Szerencsére* | *János* | *minden* | *könyv-et* | *MARI-NAK* | *adott* |
| | luckily | John.NOM | every | book-ACC | Mary-DAT | gave |

| | | | | |
|---|---|---|---|---|
| | *(oda)* | *a* | *könyvtár-ban* | *(oda).* |
| | VM | the | library-in | VM |

‘Luckily, it was to Mary that John gave every book in the library.’

| | | | | | | |
|---|---|---|---|---|---|---|
| (3) | **Szerencsére* | *János* | *minden* | *könyv-et* | *(oda)* | *MARI-NAK* |
| | luckily | John.NOM | every | book-ACC | VM | Mary-DAT |

| | | | | |
|---|---|---|---|---|
| | *(oda)* | *adott* | *a* | *könyvtár-ban.* |
| | VM | gave | the | library-in |

‘Luckily, it was to Mary that John gave every book in the library.’

<table>
<tr><td>TOPIC</td><td colspan="5">PREDICATE</td></tr>
<tr><td rowspan="2">(A)<br>(contrastive) topic,<br>sentence adverb</td><td rowspan="2">(B)<br>quantifier</td><td colspan="2">(C)<br>focus/VM</td><td rowspan="2">(D)<br>verb</td><td rowspan="2">(E)<br>postverbal<br>constituents</td></tr>
<tr><td>(Ca)<br>focus</td><td>(Cb)<br>VM</td></tr>
</table>

**Table 1**

The examples in (1)-(3) and Table 1 illustrate the following well-known facts and basic empirical generalizations about Hungarian sentence structure.

(i) The fundamental sentence articulation is topic-predicate, see Table 1.
(ii) In the topic field, the ordering of topics and sentence adverbs is free, see (1) and (2).[3]

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radically different categories sharing the syntactic property of occupying the immediately preverbal position in neutral sentences. The standard description of a neutral sentence is that it does not contain negation or focus, it is not a ‘wh’ question, and it has level prosody. Particles (aka preverbs or coverbs), bare nouns, designated XP arguments, etc. are assumed to be VMs. In (1)-(3) the VM is a particle: *oda* ‘there’. In (2) and (3), it must occupy one of the two positions in which it is in parentheses.

[3] For the purposes of this paper, I use the terms *topic* and *focus* in the following way. In general, I consider both of them discourse functional categories to be consistently represented at the level of LFG’s d-structure (discourse functional structure) or i-structure (information structure), depending on the actual LFG architecture. In the case of topics (and contrastive topics), in my analysis there are no (exclusively)

(iii) Basically, the word order of postverbal elements is also free, see (2).[4]
(iv) If a preverbal quantifier is present in the sentence, it follows the topic field and it is the initial constituent in the predicate domain, see (1)-(3).[5]
(v) The VM and the focus are in complementary distribution preverbally, see (3).

As regards capturing the complementarity of the focus and the VM, the two salient solutions are illustrated in the split (C) sections. The intuitively more appealing solution, shown in the upper row in the (C) column, is to assume a single preverbal syntactic position for which the focus and the VM compete, the former being the stronger element. In other words, the VM only has a chance to occupy this designated position if there is no focussed constituent in the sentence. Such an account is proposed, for instance, in É. Kiss (1992, 1994). In her GB framework, the designated position is [Spec,VP]. The other logical possibility is to assume two different positions in two distinct projections (see the lower row in the (C) column). A classic example of this approach was proposed by Bródy (1990). The essence of the solution is that in a focussed sentence, a functional projection (FP) is generated above the VP, the projection dominating the VM + V sequence. The VM occupies its customary position within the VP, then the V head is moved into the F head position, and the focussed constituent lands in Spec,FP. Thus, the preverbal complementarity effect is captured by postulating two designated positions and V-to-F head movement, which also takes care of the postverbal occurrence of the VM in the presence of a focussed constituent.[6] In the

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designated syntactic positions for them, because they intermingle with sentence adverbs in the "topic field". In the case of foci, here I only concentrate on the encoding of the famous preverbal focus, which is generally assumed to belong to the contrastive and exhaustive type.

There can be several topics in a sentence, and they can have a whole range of grammatical functions. It is also noteworthy that in some highly influential earlier GB analyses contrastive topics (with a special intonation pattern and a distinctive (narrow) scope interpretation) were treated as left-dislocated constituents separated from the rest of sentence structure, see É. Kiss (1992), for instance. The current general view (with strong empirical support) is that ordinary topics and contrastive topics freely intermingle; thus, they and sentence adverbs populate the same topic field.

[4] Although constituents that typically have reduced stress (e.g. particles and pronouns) tend to occur closer to the verb than other constituents.

[5] There can be several constituents in the quantifier field as well, and the order of the three basic quantifier types is strictly constrained. For details, see Kálmán (2001).

[6] Although the fact that in non-neutral sentences the VM does not necessarily follow the verb immediately is a challenge for this approach.

GB/MP tradition, it is now the standard view that focussed constituents and VMs occupy distinct syntactic positions in distinct (functional) projections.[7]

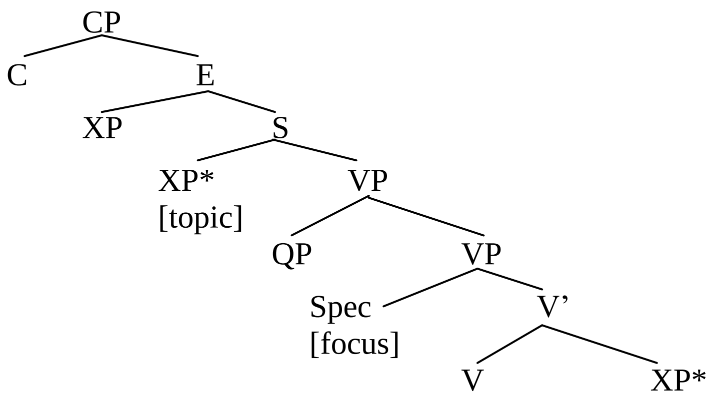
In this section, first I summarize the relevant traits of É. Kiss' (1992, 1994) unorthodox GB account, on which my LFG treatment capitalizes to a great extent (subsection 2.1), and then I briefly discuss a few aspects of some LFG(-friendly) analyses of Hungarian sentence structure (subsection 2.2).

## 2.1 On É. Kiss (1992, 1994, 2002)

In her influential GB approach, É. Kiss (1992, 1994) treats (preverbal) quantifiers as constituents adjoined to VP, which is, basically, a Hungarian style, overt manifestation of GB's famous Q-Raising operation. (If there is more than one preverbal quantifier in the sentence, they are iteratively adjoined to VP.) Later on, more in the spirit of MP, it was generally assumed that quantifiers, too, have their own functional projections, see, for instance Szabolcsi (1997) and Bródy & Szabolcsi (2000). É. Kiss (2002) also subscribes to this view, and, motivated by Szabolcsi (1997), she assumes that quantifiers sit in the specifier position of the DistP functional projection (Dist is short for 'distributive', and the rationale behind this label is that quantifiers occurring in this position obligatorily have a distributive interpretation).

As regards the treatment of topics, contrastive topics and sentence adverbials, É. Kiss (1992) assumes that topics and sentence adverbials are in a flat structural field dominated by an S node, while contrastive topics are left-dislocated elements outside the S domain, dominated by an E(xpression) node (and they are base-generated there), and this entire E constituent is, in turn, dominated by CP.

(4)




[7] For a special "in-between" solution, which is also claimed to be able to cope with the challenge mentioned in footnote 6, see É. Kiss (2002).

Fundamentally, É. Kiss (1994) adopts this approach with two significant modifications that are relevant from our present perspective. (A) She replaces the exocentric S node with TP (Tense Phrase). (B) She assumes that if the sentence contains only one topic then this constituent occupies the Spec,TP position, and if there is more than one topic, the additional topics are iteratively adjoined to TP. É. Kiss (2002), in accordance with the mainstream MP view, assumes that both topics and sentence adverbials have their own functional projections: TopP and EvalP, respectively. In addition, despite their differential prosodic, categorial and scopal properties, É. Kiss claims that what are called "contrastive topics" simply belong to the general class of ordinary topics.

The reason why I have discussed the most crucial aspects of É. Kiss' (1992) seminal GB account here to this extent is that it strongly motivated important parts of our implemented Hungarian grammar, Laczkó & Rákosi (2008-2014), on which my approach presented here heavily relies. It is noteworthy that É. Kiss' (1992) analysis has the following important unorthodox aspects to it from the standard GB perspective.

a) It postulates an exocentric sentence structure, dominated by S.[8,9]
b) There are flat (non-binary-branching) parts of the structure, dominated by S and V'.
c) It does not employ an FP projection (focus or functional phrase).

Needless to say, all these marked features can be accommodated in an LFG framework in a natural and principled fashion.

There is, an insurmountable problem with É. Kiss' (1992) approach (insufficiently and incompletely addressed in that work): she is forced by her system to assume that *all* constituents moved into [Spec,VP] are focussed constituents, because their movement from their postverbal base-generated positions below V' is triggered by their need (either inherently or driven by discourse requirements) to acquire the focus [+F] feature from the verb in [Spec,VP]. It is easy to see that this makes the treatment of ordinary VMs in neutral sentences empirically and intuitively implausible.[10] In this context it is noteworthy that É. Kiss (2002), on MP's solid cartographic grounds, argues against collapsing focussed and VM constituents,[11] because this would make it impossible to associate an invariant interpretation with a single syntactic position (2002:83). Again, needless to say, it is one of the strengths

[8] The postulation of an additional exocentric E node is unorthodox even in generative frameworks outside the Chomskyan mainstream.
[9] É. Kiss (1994) is one degree less unorthodox in that instead of S it uses the endocentric TP projection.
[10] In Laczkó (2014b) I discuss various types of VMs which can unquestionably occur in neutral sentences without any focus stress and interpretation.
[11] Thus, she also argues against her previous analysis in É. Kiss (1992) implicitly.

of LFG's architecture and assumptions that this can be carried out in a principled manner.

## 2.2 On some previous LFG(-compatible) analyses

In this paper, in Laczkó (2014b) and in Laczkó (2014c), both in this volume, I give an overview of various aspects of previous LFG analyses in complementary distribution as much as possible.

**(A)** Börjars et al. (1999) offer some programmatic considerations against functional projections like TopP and FocP (à la GB/MP) for languages like Hungarian and some hints at a possible LFG alternative with an extended verbal projection in which word order regularities are capturable by dint of Optimality Theory (OT) style constraints. They claim that the assumption that discourse functions are not necessarily associated with the specifier positions of functional projections allows an analysis of Hungarian in which quantifier phrases and topics are positioned within an extended verbal projection, avoiding the postulation of functional projections without heads.

**(B)** Capitalizing on the basic representational assumptions and claims of Börjars et al. (1999), but entirely on the grounds of Optimality Theory, Payne & Chisarik (2000) outline an analysis of constituents in the preverbal domain of Hungarian finite clauses: in particular, they concentrate on the complementarity of constituent question expressions, focussed phrases, the negative particle and verbal modifiers. Since their account also addresses negation phenomena, I discuss it in Laczkó (2014c), this volume.

**(C)** Mycock (2006) develops a detailed and comprehensive typological analysis of constituent questions (CQs) in her LFG framework. She analyzes Hungarian as a representative of the multiple syntactic focusing type. She only postulates those aspects of an LFG style syntax of Hungarian which are directly relevant to her account of 'wh'-questions in this language. Below I discuss her basic hypotheses that are important from our syntactic perspective.

(i) She adopts some central ingredients of É. Kiss' (1981, 2002) empirical generalizations. For instance, the topic-predicate articulation of sentences, the quantifier field in the left periphery of the predicate phrase.

(ii) Relying on É. Kiss (1981), she also assumes that a VM and the verb make up a word both morphologically and phonologically, and they also constitute a single unit semantically. She does not go into any details about VMs. In Laczkó (2014b), I argue against this view of VMs, including the preverb.

(iii) In the spirit of É. Kiss (1981), and also in accordance with É. Kiss (1992, 1994), and contrary to É. Kiss (2002), Mycock assumes that a preverbal focussed constituent occupies the [Spec,VP] position, and she does not adopt a F(oc)P view, which is also in line with general LFG assumptions about functional projections, see the discussion of Börjars et al. (1999) above.

(iv) She points out that several GB/MP analyses of Hungarian assume that only the question phrase adjacent to the verb is in [Spec,VP], and all the other question phrases function as universal quantifiers adjoined to VP, see É. Kiss (1994, 2002), Horvath (1998), Lipták (2001) and Puskás (2000). However, by referring to Surányi (2006), Mycock claims that this universal quantifier analysis is to be rejected, and she proposes that *all* 'wh'-phrases should be assumed to occupy the [Spec,VP] position (on a multiple specifier view). It is also noteworthy in this connection that Gazdik (2012) claims that non-verb-adjacent 'wh'-phrases need to be treated as topics.

Let me make the following remarks on this multiple CQ issue.

- In the account I am outlining in this paper, I subscribe to (and model) the single-CQ-in-[Spec,VP] view.
- I will investigate the empirical, theory-neutral and theory-specific (as well as analysis-specific) aspects of the behaviour of multiple questions in Hungarian in future work. I will compare the VP-adjunction analysis with both Mycock's (2006) multiple [Spec,VP] account and Gazdik's (2012) topic approach.
- Given the architecture and the fundamental assumptions of LFG, if there are stronger arguments in favour of the multiple-specifier analysis or the topic analysis, that can be easily accommodated in my model.

**(D)** Gazdik (2012), capitalizing on Gazdik & Komlósy (2011), outlines an LFG analysis of Hungarian finite sentence structure, fundamentally motivated by discourse functional assumptions and considerations. Given that its crucial syntactic aspects involve the treatment of VMs and focussed constituents, I discuss it in a detailed fashion in Laczkó (2014b), this volume.

**(E)** In Laczkó & Rákosi (2008-2014), our implemented grammar, we employ a modified version of É. Kiss' (1992) sentence structure. The most important features of this grammar implementation from the perspective of the present paper are as follows.

- Not only quantifiers but also sentence adverbs, ordinary topics and contrastive topics follow the adjunction pattern, and the adjunctions of these three different categories in the topic field can freely intermingle.
- As regards the treatment of the [Spec,VP] position, the current version of our grammar is rather limited. As is well-known and as has also been pointed out above, this position can be occupied by a whole range of different types of VMs (see the discussion above) and, at least in several approaches (including É. Kiss (1992, 1994) and ours), by focussed constituents, and by 'wh'-expressions (in complementary distribution); however, our grammar posits only a focussed constituent or a particle belonging to VMs (no question expressions and no other types of VMs). We assume that the preverb (having the syntactic category PRT) is a non-projecting word (in the sense of Toivonen (2001)). From the

complementarity of the two categories it also follows that a PRT can never be focussed in our approach.

- The current version of our implemented grammar is far from being complete for several reasons, one of them is that it does not systematically cover some crucial aspects of simple finite clauses (e.g. (multiple) wh-questions, various VM types, etc.). My fundamental aim in this paper, in combination with Laczkó (2014b) and Laczkó (2014c), is to develop a much more comprehensive LFG-theoretical analysis of finite clauses in Hungarian. Hopefully, this will have two significant contributions to our XLE grammar as well. On the one hand, it will establish solid LFG theoretical foundations for the implemented grammar, and, on the other hand, it will contribute to improving and advancing this implemented grammar by proposing important XLE-specific details of the analysis.

# 3 Towards an LFG analysis

In subsection 3.1, I present arguments, from an LFG perspective, for assuming S and against assuming IP in Hungarian. In subsection 3.2, I outline the most important aspects of an analysis of the preverbal domain of Hungarian finite clauses. In subsection 3.3, I discuss the cross-linguistic and parametric relevance of the account to LFG's space for structure-function associations.

## 3.1 Against IP in Hungarian

Let me begin by pointing out that the postulation of a CP in Hungarian is well justified. On the one hand, there are complementizers in Hungarian, too, (e.g. *hogy* 'that'), and, on the other hand, it is reasonable to assume that relative clauses are CPs and relative pronouns occupy the [Spec,CP] position, see Kenesei (1992), for instance, and the S is the complement of the C head. Thus, all the three positions are empirically and theoretically motivated even from an LFG perspective. As regards the postulation of an IP, the situation is radically different.

In Laczkó (2014a), I discuss the traits of elements that can be assumed to belong to the category of auxiliaries in Hungarian. My main claim is that despite the fact that LFG uses the functional category I for auxiliaries in languages like English and Russian, for example, and the fact that there are verbal elements in Hungarian that unquestionably meet all the basic requirements of auxiliarihood, they should not be taken to be Is, instead, they should be treated as Vs. This proposal is motivated by the following considerations. Although the relevant elements could, even according to the principles of LFG, provide justification for the postulation of I (as in English or Russian), the fact that these elements and other (clearly) lexical verbs exhibit uniform syntactic behaviour with respect to designated positions in Hungarian sentence structure seriously undermines the tenability of introducing the category I(P).[12] Thus, genuine Hungarian auxiliaries and other (more or less) auxiliary-like elements, as well as certain ordinary lexical verbs, are best treated as belonging to special subclasses of verbs. Their special properties need to be encoded in their lexical representations. This is in line with Kenesei's (2000) proposal from a GB/MP perspective.

Kenesei (2000) convincingly argues that there are at least three verbal elements in Hungarian that spectacularly satisfy all criteria of auxiliarihood: *fog* 'will', *szokott* (literally: 'was accustomed (to)', meaning: general present habituality despite the past tense morphology), and *talál* (literally: 'find' meaning: 'happen to').[13] Consider (5), containing *fog* 'will'.[14]

| | | | | | |
|---|---|---|---|---|---|
| (5) | *Éva* | *el* | *fog* | *me-nni* | *mozi-ba.* |
| | Eve.NOM | PV | will | go-INF | cinema-into |
| | 'Eve will go to the cinema.' | | | | |

Thus, even in LFG, the "headedness" criterion for postulating an IP would be sufficiently justified; however, its specifier position would pose serious problems. For instance, in English, [Spec,IP] encodes the subject (grammatical) function, see Bresnan (2001), and in Russian, it hosts a constituent with a (topic or focus) discourse function, see King (1995). Now, it is widely assumed that there is no empirical evidence for a designated subject position in Hungarian. By contrast, the Russian discourse functional pattern could be taken to lend rather strong support to employing an IP as the LFG counterpart of Brody's (1990) FP (Functional Projection) and more recent accounts' F(oc)P (Focus Phrase), see, for instance, É. Kiss (2002). However, in Laczkó (2014a) I argue that even this discourse-functionally based use of the IP has no empirical support, and, therefore, it has to be rejected. The essence of the argumentation is this. The IP approach to Hungarian sentence structure, if it followed the Russian pattern, could, in theory, assume that [Spec,IP] hosts focussed constituents, and only focussed constituents, barring ordinary (non-focussed) VMs. In addition, it would have to be assumed that (finite) auxiliaries and finite verbs can occupy the I head position, just like in Russian. In Laczkó (2014a), I point out that there would be at least three serious problems with this scenario. Here I can briefly mention two.

(A) There is empirical evidence that a whole range of clearly unfocussed VMs can also immediately precede an auxiliary (on this account: they can

[12] The postulation of C(P) in Hungarian is fully justified, see the discussion above.
[13] Kenesei (2008) adds two more auxiliaries.
[14] In the gloss in (5), PV stands for "preverb" and INF stands for "infinitival suffix". In this example the auxiliary intervenes between the infinitival verb and its preverb.

also occupy the [Spec,IP] position). Obviously, these elements are the VMs of the infinitival complements of the auxiliary. Consider the examples in (6), containing an idiom chunk VM. In these examples the idiom chunk is a special use of the hyperchoristic form (*Pali*) of the last name *Pál* 'Paul'.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (6) | a. | *János* | *pali-ra* | *ve-tte* | | *Évá-t.* |
| | | John.NOM | Paul-onto | take-PAST.3SG | | Eve-ACC |
| | | 'John made a dupe of Eve.' | | | | |
| | b. | *János* | *pali-ra* | *fog-ja* | *ve-nni* | *Évá-t.* |
| | | John.NOM | Paul-onto | will-3SG | take-INF | Eve-ACC |
| | | 'John will make a dupe of Eve.' | | | | |

Needless to say, an idiom chunk cannot receive focus stress and focus interpretation in its own right. Still it can occupy the alleged [Spec,IP] position.[15]

(B) There are several finite lexical verbs, taking infinitival complements, that share the above behaviour with auxiliaries, i.e. in neutral sentences they must be preceded by the VM of their infinitival complement. However, a great number of other finite verbs, also taking infinitival complements, reject this pattern, and they require their infinitival complements to be preceded by their own VMs. Compare the following (idiom chunk) examples.

| | | | | | |
|---|---|---|---|---|---|
| (7) | *János* | *pali-ra* | *akar-ja* | *ve-nni* | *Évá-t.* |
| | John.NOM | Paul-onto | want-PRES.3SG | take-INF | Eve-ACC |
| | 'John wants to make a dupe of Eve.' | | | | |

| | | | | | |
|---|---|---|---|---|---|
| (8) a. | **János* | *pali-ra* | *imád-ja* | *ve-nni* | *Évá-t.* |
| | John.NOM | Paul-onto | love-PRES.3SG | take-INF | Eve-ACC |
| | 'John loves to make a dupe of Eve.' | | | | |
| b. | *János* | *imád-ja* | *pali-ra* | *ve-nni* | *Évá-t.* |
| | John.NOM | love-PRES.3SG | Paul-onto | take-INF | Eve-ACC |
| | 'John loves to make a dupe of Eve.' | | | | |

Thus, the problem is that there is a split between two groups of finite verbs. One of them patterns with the auxiliaries, while the other does not. This is

[15] Occasionally the idiom chunk in both (6a) and (6b) can receive heavy focus stress; however, this can only encode verum focus: 'John DID/WILL make a dupe of Eve.' It is to be noted in this connection that if there is no VM-like preverbal element in a sentence, the verb itself can receive heavy stress to encode verum focus. This lends independent support to assuming that stressing an idiom chunk serves the purpose of expressing verum focus: if there is no VM the verb is stressed; otherwise a VM of any kind (which constitutes a phonological word with the verb) has to receive this heavy stress (because the verb, as the second element of this phonological word is, by definition, unstressed).

rather strange, because we do not find such a split either in English or in Russian: all auxiliaries and all finite verb forms share the same general properties as heads of IPs. In English [Spec,IP] is the designated position for SUBJ (which is the only discourse-oriented GF), in Russian [Spec,VP] is the designated SUBJ position and [Spec,IP] is reserved for DFs. By contrast, in Hungarian, both [Spec,VP] and the hypothesized [Spec,IP] can host exactly the same (varied) range of constituents: FOC and all kinds of VMs (including elements without any relevant semantic content: idiom chunks and non-compositional particles). From the perspective of [Spec,IP], hosting non-discourse (what is more, semantically "empty") constituents is rather unexpected. This contradicts Bresnan's (2001) standardly accepted generalization about the nature of SPEC in functional projections. Consequently, on the one hand, the postulation of I(P) would not contribute anything meaningful to capturing (additional) empirical facts that an I(P)-less V(P)-only approach cannot capture, and, on the other hand, it would require seriously weakening Bresnan's (2001) [Spec,FunctionalP] generalization.

It is also to be noted that the [Spec,VP] position in my VP-only approach is equally problematic for a different reason: from the perspective of [Spec,VP], the FOCUS (DF) option is marked in the light of the standard LFG assumptions, see, again, Bresnan (2001). That is why I propose in section 3.3 that the classical assumptions about [Spec,VP] should be modified. The crucial point here is that some modification of the standard assumptions is definitely needed, and I claim that the I(P)-less solution is more economical in this respect, because otherwise both the [Spec,IP] and the [Spec,VP] generalizations would have to be touched, and nothing would be gained either empirically or in any other relevant respect.

## 3.2 The fundamental aspects of the analysis

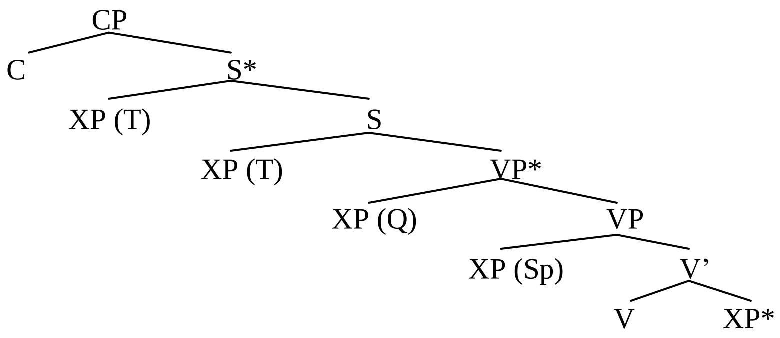
In the spirit of our implementational grammar, Laczkó & Rákosi (2008-2014), partially inspired by É. Kiss (1992), I assume the skeletal sentence structure in (9). This follows É. Kiss' (1992) GB structure, shown in (4) in subsection 2.1, with some differences.

a) I do not assume an E (=expression) node for hosting left-dislocated contrastive topics.[16]
b) Instead of a flat topic/sentence field, I assume a binary branching left-adjoined structure, which É. Kiss (1992) also does in the quantifier field.[17]

[16] As I pointed out in subsection 2.1, more recent empirical evidence testifies that contrastive topics, ordinary topics and sentence adverbs can intermingle; thus, the structural separation of contrastive topics is no longer tenable.
[17] In (9), S* and VP* encode this binary branching, left adjoined structural organization of the topic and quantifier domains.

c) Naturally, in my structure, the nodes are associated with customary LFG functional annotations. In (9), I schematically represent the most crucial ones to be discussed in a detailed fashion below (T, Q, Sp).

(9)




This overall structure is fully in the spirit of the fundamental aspects of the structural approach in Laczkó & Rákosi's (2008-2014) HunGram, except that in that implemented grammar, following the standard XLE practice in order to enhance parsing and generation efficiency, we employ a whole range of specific c-structure node labels.[18]

Table 2 gives an overview of the essential features of the disjunctive annotations associated with the topic field, the quantifier zone and the [Spec,VP] position, schematically represented in (9).[19]

| **T:**<br>**{ (c-)topic \| sent.adv. }** | **Q:**<br>**{ quantifier \| WH }** | **Sp:**<br>**{ focus \| WH \| VM }** |
|---|---|---|
| { (↑GF)= ↓<br>{↓ ∈ (↑ TOPIC)<br>\| ↓ ∈ (↑ CONTR-TOPIC)}<br>\| ↓ ∈ (↑ ADJUNCT)<br>(↓ADV-TYPE)=c SENT } | (↑GF)= ↓<br>{ (↓CHECK _QP)=c +<br>\| (↑CHECK _VM-INTER)=c +<br>(↓CHECK _QP-INTER)=c +<br>(↓SPECIFIC)=c + } | { (↑GF)= ↓<br>(↑FOCUS)= ↓<br>\| (↑GF)= ↓<br>(↓CHECK _VM-INTER)=c +<br>((↑CHECK _VM-INTER)= +)<br>\| { (↑GF)= ↓<br>\| ↑=↓ }<br>(↓CHECK _VM)=c + } |

**Table 2**

Let me now discuss the most crucial details of the analysis.

(A) As I have mentioned above, I assume a binary branching, left-adjoined structure in the topic field as well, contrary to É. Kiss' (1992) flat structure. My main motivation for this is that in this way we can capture instances of coordination with shared topic and/or sentence adverbial

---

[18] Here are some examples: Sfinctopic = a finite sentential node dominating a contrastive topic, Sfintopic = a finite sentential node dominating an ordinary topic, CPembed = a finite clausal argument, CPcond = a finite conditional clause.

[19] The annotations associated with the quantifier field and the [Spec,VP] position are part of my new proposal, and it is left for future research to test their implementability in our HunGram grammar and to efficiently implement them.

constituents, illustrated in (10), in a more intuitive and a much more implementable way. The first (right-most) topic or sentence adverb occurs in the clause-initial position dominated by S, and all the others are iteratively left-adjoined to S, see (9). This is similar to King's (1995) treatment of multiple topics in Russian: the first topic is in [Spec,IP], and all the others are left-adjoined to IP.[20]

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (10) | *Pali* | *tegnap* | | *a könyvet* | *oda* | *adta* | *Évának,* |
| | Paul.NOM | yesterday | | the book.ACC | VM | gave | Eve.to |
| | | | *és* | *a fotót* | *el* | *küldte* | *Katinak.* |
| | | | and | the photo.ACC | VM | sent | Kate.to |

'Yesterday Paul gave the book to Eve and sent the photo to Kate.'

The annotations in the topic field are rather straightforward. The first main disjunct encodes the following: the relevant constituent bears a particular grammatical function, and, in addition, it has one of the two topic functions. The second main disjunct is for sentence adverbs. The first line states that it always has an adjunct function, and the constraining equation in the second line only admits adverbs of the sentential type (so specified in their lexical forms).

Let me now comment on the annotations I propose for the quantifier field.

- As I pointed out in subsection 2.2, there are two major ways of treating multiple constituent questions. The wider-spread view is that it is always a single question phrase (the one closest to the verb) that occupies the [Spec,VP] position, and all other question phrases are VP-adjoined in the quantifier field. The alternative stance is that all question phrases are in [Spec,VP].[21] In the analysis I propose here, I subscribe to the former view.
- A constituent in this field bears a grammatical function, and (following from the previous point) it is either a quantifier or a question phrase. This is encoded by the disjunction.
- In the two disjuncts, I use the XLE-style CHECK featural device. Its essence is that these CHECK features come in pairs: there is a defining equation and it has a constraining equation counterpart. These CHECK feature pairs can ensure that two elements will occur together in a

[20] É. Kiss (1992: 89-91) points out that either the iteratively binary branching solution or her flat structure can capture the relevant coordination phenomena. She does not particularly argue for choosing the latter, and she only mentions that in that approach the shared (non-repeated) topics or sentence adverbs have to be assumed to be gapped. Interestingly, É. Kiss (1994) uses the other strategy. One of the motivations for this could be the fact that in this work she postulates a TP (TenseP) instead of S. Thus, her TP based solution is similar in spirit to King's (1995) IP treatment.

[21] For a discussion and references, see subsection 2.2.

particular configuration,[22] or that a particular element will occur in a designated position. It is this latter property that I utilize here.

- In the first disjunct, the constraining CHECK feature equation requires a constituent containing an element that is (inherently) specified as a quantifier.[23] The defining CHECK feature equation counterpart is included in the lexical entries of the quantifier elements involved, see the generalized lexical form representation in (11).

(11) L (quantifier) …
(CHECK _QP (GF*↑))= +

- The reason why this CHECK feature is expressed in an inside-out functional uncertainty relation is that a quantifier can be (multiply) embedded in a constituent, and it will still turn the entire constituent into a quantified phrase which is required to occupy the designated quantifier position.[24]
- The second disjunct regulates the occurrence of additional question phrases in multiple constituent questions. The combination of the (↑CHECK _VM-INTER)=c + and the (↓CHECK _QP-INTER)=c + constraining equations guarantees that this position can be occupied by an interrogative expression (second equation) iff the [Spec,VP] position is already occupied by another interrogative expression (first equation).[25] I have included the (↓ SPECIFIC)=c + constraining equation to capture É. Kiss' (1992) empirical generalization to the effect that in multiple constituent questions specific interrogative expressions target the quantifier field. Question words are assumed to have the generalized lexical form shown in (12). The annotations encode the following properties respectively.

  - These elements are interrogative pronouns.
  - They occur in constituent questions.

[22] For an example of this, see Laczkó & Rákosi's (2011) treatment of Hungarian particle verb constructions, in which the simplex verb and the particle are marked by corresponding CHECK features in their respective lexical forms.
[23] _QP is mnemonic of this category.
[24] It is for the very same general reason that in the generalized lexical form of question words in (12) the inside-out functional uncertainty notation is employed.
[25] The defining equation counterpart of the first equation is associated with the [Spec,VP] position, see below, while the defining counterpart of the second equation is included in the lexical forms of question words, see (12).

- They occur in sentences that do not contain a focussed constituent.[26,27]
- They are constrained to occur in the [Spec,VP] or the (VP-adjoined) quantifier positions.

(12) L (wh-word) …[28]
(↑ PRON-TYPE)= interrogative
(STMT-TYPE (GF* ↑))= wh-interrogative
~(FOCUS (GF* ↑))
**{** (CHECK _VM-INTER (GF* ↑))= +
**|** (CHECK _QP-INTER (GF* ↑))= + **}**

And now I turn to the annotations I associate with the [Spec,VP] position.

- The three main disjuncts encode the complementary distribution of focussed constituents, question phrases and VMs, respectively.
- The first disjunct is straightforward.[29]
- In the second disjunct, the first (constraining) CHECK feature equation requires the presence of a question phrase in this designated position. Its defining counterpart is included in the lexical forms of question words, see (12).
- In the second disjunct, the second, optional, defining CHECK feature equation serves as the licensor of the occurrence of question phrases in the quantifier field.[30] When it is not present in the structure, no question

[26] This captures the fact that, on the one hand, question phrases and ordinary focussed constituents are in complementary distribution, aspiring to the same [Spec,VP] position, and, on the other hand, even when one or several of them do not occur in [Spec,VP] that position has to be occupied by another question expression (and not a focussed constituent).
[27] It is a widely discussed exception that the question word *miért* 'why' behaves differently: it can occur in a VP-adjoined position when [Spec,VP] is occupied by a focussed constituent. This calls for a special treatment which I will include in my detailed analysis of (multiple) constituent questions in future work. However, it is obvious already that the ~(FOCUS (GF* ↑)) negative existential constraint will have to be removed from the lexical form of this particular question word, and in the annotations associated with the VP-adjoined position the simultaneous presence of an ordinary focussed constituent will have to be optionally encoded, but all this will have to be appropriately constrained to questions containing *miért* 'why'.
[28] (GF* ↑) in these annotations has to refer to the same path, so a local variable needs to be used to anchor it.
[29] However, a reminder is in order. Although I subscribe to the very strong recent view in LFG that discourse functions are to be uniformly represented in i-structure, for a useful discussion of the relevant literature, see Gazdik (2012), for the sake of simplicity of exposition here I apply the classical LFG representation of TOPIC and FOCUS in f-structure.
[30] Its constraining counterpart is associated with the VP-adjoined position.

phrase can occur in the quantifier position. When it is present, it requires the presence of one or more question phrases. From the perspective of question phrases in the quantifier position: they can only occur there if the [Spec,VP] position is filled by a question phrase.

- The third disjunct handles VMs. The defining counterpart of its constraining CHECK feature equation is included in the lexical forms of the elements that can occupy this position in neutral sentences (in non-focussed sentences and non-constituent-question sentences). The functional head annotation (↑=↓) in the disjunction is for particles, while the (↑GF)= ↓ annotation is for all the other types of VMs.
- In Laczkó (2014b), I present a detailed analysis of various types of VMs.

## 3.3 On c-structure positions and functional annotations

My proposed analysis of Hungarian finite clauses poses three problems for standard LFG assumptions about c-structure—function associations. However, in this subsection, I claim that the relevant Hungarian phenomena and my analysis can be seen as providing evidence for augmenting the cross-linguistic, parametric space for these structure-function correspondences.

(A) Consider the following quotes.

- "Functional categories are specialized subclasses of lexical categories which have a syncategorematic role in the grammar (such as marking subordination, clause type, or **finiteness**)" (Bresnan 2001: 101).
- "Specifiers of functional categories (IP or CP) play special roles, mapping to the syntacticized discourse functions SUBJ, TOPIC or FOCUS" (Bresnan 2001: 102).
- "Modifier phrases fill the specifier of a lexical category" (Dalrymple 2001: 71).

In subsection 3.1, I argued extensively against postulating I(P) in Hungarian. However, there is evidence for a designated preverbal position which can be occupied by a focussed constituent (in complementary distribution with other constituent types), and this position is best analyzed as [Spec,VP]. On the one hand, it is clearly a highly distinguished position, and, on the other hand, the postulation of a VP (and a specifier within it) makes the treatment of quantifiers as VP-adjoined constituents feasible. In addition, coordination facts can also be straightforwardly captured by dint of the [Spec,VP] analysis.[31] The problem then is that the designated focus position is not in the specifier of either a CP or an IP (cf. the second quote from Bresnan 2001); moreover, the assumption that it is in [Spec,VP] goes against the generalization expressed in the quote from Dalrymple (2001) above.

[31] The entire "post-focus" portion of a sentence can be conjoined. This can be neatly treated by assuming that the relevant portion of the sentence is a V' constituent, and we are dealing with V'-coordination.

I think this problem can be solved in the following way. Both CP and IP are regarded as extended functional projections of the verb. We can assume that it is fundamentally the specifier positions of the projections of the verb (whether lexical: VP or functional: CP, IP) that can (optionally) host constituents with discourse functions. For a discussion of extended heads from an LFG perspective (as compared to the GB view), see section 10.3 of King (1995).

It is noteworthy in this respect that this is not the first instance in which a basic structure-function generalization needs to be augmented. Bresnan (2001: 109) discusses a similar case. The original assumption was this. "Complements of lexical categories are the nondiscourse argument functions." However, for the appropriate treatment of English examples like *Mary will not be running*, the following needed to be added: "… or f-structure coheads". This made it possible to assume that progressive *be* and the *-ing* VP it subcategorizes for (i.e. its complement) can be made functional coheads. My claim is that if a generalization about the complements of lexical categories can be augmented on solid empirical grounds, then this, in principle, can be an option in the case of the specifiers of lexical categories – under similar circumstances.[32]

(B) Consider the following quote. "The daughters of S may be subject and predicate" (Bresnan 2001: 112). I propose, on the basis of my analysis, that this generalization should be modified in the following way.

(13) The daughters of S may be subject/topic and predicate.

This modification receives independent support from the following rule from Bresnan & Mchombo (1987).[33]

(14) $$\mathrm{S} \quad \rightarrow \quad \left(\begin{array}{c}\mathrm{NP}\\ (\uparrow\mathrm{SUBJ}){=}\downarrow\end{array}\right), \quad \left(\begin{array}{c}\mathrm{NP}\\ (\uparrow\mathrm{TOPIC}){=}\downarrow\end{array}\right), \quad \left(\begin{array}{c}\mathrm{VP}\\ \uparrow{=}\downarrow\end{array}\right)$$

(C) Gazdik (2012) rejects the postulation of a VP in Hungarian by referring to Dalrymple's (2001) generalization: a VP is justified if it does not contain the subject. In the light of point (B) above, I think it is reasonable to modify this generalization. The modified version could run as follows: a VP can contain a subject if the XP in [$_S$ XP VP] is a topic. This would require all other occurrences of VP to be subjectless.[34]

[32] Eventually, it may turn out that it is only verbs (VPs) that call for, or admit, this augmentation cross-linguistically.

[33] On the basis of (14), *subject and/or topic* seems even more appropriate than *subject/topic* in (13).

[34] On this scenario, the following three parametric options seem to emerge across languages: (i) strictly VP-external subject (English) (ii) VP-internal subject in a

## 4 Conclusion

1) In this paper I have presented the crucial aspects of an LFG (and XLE-implementable) analysis of the preverbal portion of Hungarian finite clauses.
2) The structural representation was largely motivated by É. Kiss (1992) and Laczkó & Rákosi (2008-2014).
3) I argued for S and against IP (and also postulated CP).
4) I employ a hierarchical, binary branching, adjunction structure for the topic field, in addition to a similar setup in the quantifier field.
5) In this analysis I handle all the question phrases other than the question phrase immediately adjacent to the verb in multiple constituent questions as occupying VP-adjoined positions in the quantifier field, and I leave comparing this treatment to alternative approaches.
6) It is also a future research task to develop a detailed analysis of the three major quantifier types when they occur in the preverbal quantifier zone.
7) I assume that focussed constituents, verbal modifiers and the (verb-adjacent) question phrase are in complementary distribution in [Spec,VP].
8) On the basis of the analysis proposed in this paper, I suggest that LFG's parametric space that is potentially available to c-structure—function associations should be augmented along the following lines.
   a) The [Spec,VP] position should be allowed to host the FOCUS discourse function. In general terms, this amounts to assuming that the specifier of a lexical category can be either a modifier or a DF.
   b) The XP in [$_S$ XP VP] can also be a topic, in addition to a subject.
   c) In cases like b), the VP can also contain a subject.

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designated position (Russian) (iii) VP-internal subject without a designated position (Hungarian).

## References


Bresnan, Joan. 2001. *Lexical-Functional Syntax*. Oxford: Blackwell.

Bresnan, Joan & Mchombo, Sam A. 1987. Topic, pronoun, and agreement in Chichewa. *Language* 63 (4), 741-782.

Brody, Michael. 1990. Remarks on the order of elements in the Hungarian focus field. In: Kenesei, István. ed. *Approaches to Hungarian. Volume 3. Structures and Arguments*. Szeged: JATE, 95-122.

Bródy, Michael & Szabolcsi, Anna. 2003. Overt scope in Hungarian. *Syntax* 6: 19-51.

Börjars, Kersti, Payne, John & Chisarik, Erika. 1999. On the justification for functional categories in LFG. In: Butt, Miriam & King, Tracy. H. eds. *Proceedings of the LFG99 Conference*. University of Manchester. Stanford: CSLI Publications.

Dalrymple, Mary. 2001. *Lexical Functional Grammar. Syntax and Semantics 34.* New York: Academic Press.

É. Kiss, Katalin. 1981. Structural relations in Hungarian, a "free" word order language. *Linguistic Inquiry* 12: 185-213.

É. Kiss, Katalin. 1987. *Configurationality in Hungarian*. Dordrecht: Reidel.

É. Kiss, Katalin. 1992. Az egyszerű mondat szerkezete [The structure of the simple sentence]. In: Kiefer, Ferenc. ed. *Strukturális magyar nyelvtan 1. Mondattan.* [Structural Hungarian grammar 1. Syntax]. Budapest: Akadémiai Kiadó, 79-177.

É. Kiss, Katalin. 1994. Sentence structure and word order. In: Kiefer, Ferenc & É. Kiss, Katalin. eds. *The Syntactic Structure of Hungarian*. New York: Academic Press, 1-90.

É. Kiss, Katalin. 2002. *The Syntax of Hungarian. Cambridge Syntax Guides*. Cambridge: Cambridge University Press.

Gazdik, Anna. 2012. Towards an LFG analysis of discourse functions in Hungarian. In: Kiefer, Ferenc & Bánréti, Zoltán. eds. *Twenty Years of Theoretical Linguistics in Budapest*. Budapest: RIL HAS & Tinta Könyvkiadó, 59-92.

Gazdik, Anna. & Komlósy, András. 2011. On the syntax-discourse interface in Hungarian. In: Butt, Miriam & King, Tracy. H. eds. *Proceedings of the LFG11 Conference*. Hong Kong: Hong Kong University. Stanford: CSLI Publications, 215-235.

Horvath, Julia. 1998. Multiple *wh*-phrases and the *wh*-scope-marker strategy in Hungarian interrogatives. *Acta Linguistica Hungarica* 45: 31-60.

Kálmán, László. 1985. Word order in neutral sentences. In Kenesei, István. ed. *Approaches to Hungarian. Vol. 1. Data and Descriptions*. Szeged: JATE. 13-23.

Kálmán, László. 2001. ed. *Magyar leíró nyelvtan. Mondattan 1* [Hungarian descriptive grammar. Syntax 1]. Budapest: Tinta Könyvkiadó.

Kenesei, István. 2000. Szavak, szófajok, toldalékok [Words, parts of speech, suffixes]. In: Kiefer, Ferenc. ed. *Strukturális magyar nyelvtan 3. Morfológia* [Structural Hungarian grammar 3. Morphology]. Budapest: Akadémiai Kiadó, 75-136.

Kenesei, István. 1992. Az alárendelt mondatok szerkezete [The structure of subordinate clauses]. In: Kiefer, Ferenc. ed. *Strukturális magyar nyelvtan 1. Mondattan.* [Structural Hungarian grammar 1. Syntax]. Budapest: Akadémiai Kiadó, 529-713.

Kenesei, István. 2008. Funkcionális kategóriák [Functional categories]. In: Kiefer, Ferenc. ed. *Strukturális magyar nyelvtan 4. A szótár szerkezete* [Structural Hungarian grammar 4. The structure of the lexicon]. Budapest: Akadémiai Kiadó, 601-637.

King, Tracy H. 1995. *Configuring Topic and Focus in Russian*. Stanford: CSLI Publications.

Komlósy, András. 1985. Predicate complementation. In Kenesei, István. ed. *Approaches to Hungarian. Vol. 1. Data and Descriptions*. Szeged: JATE. 53-78.

Laczkó, Tibor. 2014a. On verbs, auxiliaries and Hungarian sentence structure in LFG. *Argumentum* 10. Debreceni Egyetemi Kiadó, 421-438.

Laczkó, Tibor. 2014b. An LFG analysis of verbal modifiers in Hungarian. *This volume.*

Laczkó, Tibor. 2014c. Outlines of an LFG-XLE account of negation in Hungarian sentences. *This volume.*

Laczkó, Tibor & Rákosi, György. 2008-2014. *HunGram. An XLE Implementation*. University of Debrecen.

Laczkó, Tibor & Rákosi, György. 2011. On particularly predicative particles in Hungarian. In Butt, Miriam & King, Tracy H. eds. *Proceedings of the LFG '11Conference*. Stanford: CSLI Publications, 299-319.

Lipták, Anikó. 2001. *On the Syntax of Wh-items in Hungarian*. Utrecht: LOT.

Mycock, Louise. 2006. *A New Typology of Wh-Questions*. Ph.D. dissertation, University of Manchester.

Payne, John & Chisarik, Erika. 2000. Negation and focus in Hungarian: An Optimality Theory account. In: *Transactions of the Philological Society* 98: 185-230.

Puskás, Genoveva. 2000. *Word Order in Hungarian: The Syntax of Ā-Positions*. Amsterdam: John Benjamins.

Surányi, Balázs. 2006. Mechanisms of *wh*-saturation and interpretation in multiple *wh*-movement. In: Cheng, Lisa et al. eds. *Wh-movement: Moving On*. Cambridge MA: MIT Press, 289-318.

Szabolcsi, Anna. 1997. Strategies for scope taking. In: Szabolcsi, Anna. ed. *Ways of Scope Taking*. Dordrecht: Kluwer, 109-154.

Toivonen, Ida. 2001. *The Phrase Structure of Non-Projecting Words*. Ph.D. dissertation, Stanford University.

# AN LFG ANALYSIS OF VERBAL MODIFIERS IN HUNGARIAN

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**Abstract**

In this paper I present the crucial aspects of an LFG (and XLE-implementable) analysis of the major types of Hungarian verbal modifiers (VMs). In accordance with the general approach outlined in Laczkó (2014a), I assume that focussed constituents, VMs and the (verb-adjacent) question phrase are in complementary distribution in [Spec,VP]. I distinguish two major types of VMs: particles (a.k.a. preverbs) belong to the first type, and the rest of VMs to the other type. On the basis of Laczkó's (2013) analysis, I treat both compositional and non-compositional PVCs lexically, with both the verb and particle having their respective lexical forms with appropriate functional annotations and cross-referencing (including the use of CHECK features). The particle and the verb are analyzed as functional coheads in both PVC types. All the other VMs, with their own grammatical functions, are lexically selected by their verbs in these verbs' lexical forms. Depending on the nature of the VM involved, the verb can impose various constraints on it.

# 1 Introduction

In Laczkó (2014a), this volume, I develop the essential aspects of a comprehensive LFG analysis of the preverbal portion of Hungarian finite clauses (designed to be XLE-implementable), and I also discuss what certain aspects of my approach can contribute to augmenting LFG's parametric space potentially available to c-structure—function associations. I propose a general formal apparatus for treating constituents in the topic field, in the quantifier zone and in the specifier position of the VP. It is one of my central assumptions that focussed constituents, verbal modifiers (VMs) and question phrases are in complementary distribution in [Spec,VP]. In this paper, I develop a detailed analysis of a range of VMs and their complementarity with focussed constituents.

The structure of the paper is as follows. In this section, I present the major VM types. In section 2, I discuss the relevant aspects of previous LFG (or LFG-compatible) accounts. In section 3, I develop my analysis of VMs. In section 4, I make several concluding remarks.

Below I exemplify the most important types of VMs, which I analyze in this paper,[1] and I also point out their relationship to focussing. Consider the examples in (1)-(6).

(1) ***verbal particle (= coverb/preverb)***

| | | | | |
|---|---|---|---|---|
| *Ma* | *Péter* | *fel* | ***hívta*** | *János-t.* |
| today | Peter.NOM | up | called | John-ACC |

'Today Peter called up John.'

[1] For a comprehensive overview with empirical generalizations, see Komlósy (1985).

(2) ***focussed constituent***

| | | | | |
|---|---|---|---|---|
| *Ma* | *Péter* | *JÁNOS-T* | ***hívta*** | *fel.* |
| today | Peter.NOM | John-ACC | called | up |

'Today Peter called up JOHN (and not Joe, for instance).'

(3) ***unfocussed bare/reduced (object) argument***

| | | | |
|---|---|---|---|
| *Ma* | *Péter* | *újság-ot*[2] | ***olvasott.*** |
| today | Peter.NOM | newspaper-ACC | read.PAST |

'Today Peter read a newspaper / newspapers
(= did newspaper-reading).'

(4) ***focussed bare/reduced (object) argument***

| | | | |
|---|---|---|---|
| *Ma* | *Péter* | *ÚJSÁG-OT* | ***olvasott.*** |
| today | Peter.NOM | newspaper-ACC | read.PAST |

'Today Peter read A NEWSPAPER / NEWSPAPERS (= did NEWSPAPER-reading, as opposed to book-reading, for example.)'

(5) ***unfocussed designated (oblique) XP argument***

| | | | |
|---|---|---|---|
| *Ma* | *Péter* | *a városunk-ba* | ***érkezett.*** |
| today | Peter.NOM | the city.our-into | arrived |

'Today Peter arrived in our city.'

(6) ***focussed designated (oblique) XP argument***

| | | | |
|---|---|---|---|
| *Ma* | *Péter* | *A VÁROSUNK-BA* | ***érkezett.*** |
| today | Peter.NOM | the city.our-into | arrived |

'Today Peter arrived IN OUR CITY (and not in Pécs, for instance).'

(7 ***unfocussed small clause XCOMP argument***

| | | | | |
|---|---|---|---|---|
| *Ma* | *Péter* | *piros-ra* | ***festette*** | *a kapu-t.* |
| today | Peter.NOM | red-onto | painted | the gate-ACC |

'Today Peter painted the gate red.'

(8) ***idiom chunk*** (*pali* 'Paul' = dupe)

| | | | | |
|---|---|---|---|---|
| *Ma* | *Péter* | *pali-ra* | ***vette*** | *János-t.* |
| today | Peter.NOM | Paul-onto | took | John-ACC |

'Today Peter made a dupe of John.'

[2] The plural form of this bare noun would also be acceptable with this verb.

A) The verbs in these examples are in bold, and the vertical lines help to identify the constituents immediately preceding the verb (and also the constituents following the verb).

B) (1) and (2) demonstrate the most famous preverbal complementarity in Hungarian: the particle of particle verb constructions (PVCs) and a focussed constituent are in complementary distribution. Practically, any argument or adjunct can be focussed.

C) Various groups of verbs require one of their designated arguments to precede them in a reduced ("bare") form in neutral sentences. These bare nouns are typically singular in form, and they are underspecified (or, rather, unspecified) for number. In (3), the verb *olvas* 'read' takes a bare object argument as its VM. Certain other verbs take their bare subject, and yet others take their bare oblique argument as their VM.[3]

D) There are also a great number of verbs like *érkezik* 'arrive' in (5) that require a clearly fully-fledged XP as their oblique VM.[4] This fact questions all analyses of any theoretical persuasions which assume that VM + verb combinations are uniformly complex predicates with a lexical unit status. For a detailed discussion, see sections 2 and 3. In an important sense, particle VMs in particle verb constructions and fully-projected oblique XP VMs represent the two extreme points on a scale of various types of VMs. For details, see section 3.

E) (7) exemplifies a small clause XCOMP VM.

F) As (8) demonstrates, the predicate of an idiomatic expression can also require its idiom chunk to function as a VM.

G) As point B) states, practically any constituent can be focussed, in which case it prevents a VM from occurring preverbally. It is important to note, however, that preverbal VMs themselves can receive focus stress and interpretation. Two such cases are exemplified in (4) and (6). In the

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[3] Consider the following examples.

| | | | | |
|---|---|---|---|---|
| (i) | *Víz* | ***ment*** | *a* | *szemembe.* |
| | water.NOM | went | the | eye.1SG.into |
| | 'Water got into my eyes.' | | | |
| (ii) | *János* | *moziba* | ***ment.*** | |
| | John.NOM | cinema.into | went | |
| | 'John went to the cinema.' | | | |

In subsection 3.2.2, I will point out that all verbs requiring a bare noun VM can be treated in a uniform manner, the only difference being that they specify different grammatical functions for their VM.

[4] Verbs with different argument structures can belong here. In (5) there is an intransitive verb, while in (i) below there is a transitive one, and both require an oblique XP VM.

| | | | | | | |
|---|---|---|---|---|---|---|
| (i) | *János* | *az* | *asztalra* | ***tette*** | *az* | *üveget.* |
| | John.NOM | the | table.onto | put | the | bottle.ACC |
| | 'John put the bottle on the table.' | | | | | |

former, a bare object noun VM is focussed, and in the latter an oblique XP VM is the focussed constituent. As the extended translations show, ordinary focussing, as in (2), and VM focussing, as in (4) and (6), can express what is generally called identificational focus (i.e., exhaustive identification with exclusion). However, a VM can only function as an identificational focus if it is meaningful enough, for obvious reasons: if it is not meaningful, nothing can be identified (and other entities or properties excluded). For instance, the particle in (1) is used in a non-compositional particle verb construction; therefore, it cannot function as an identificational focus. However, it can receive the usual focus stress. Compare (1) and (9). As the English translation shows, here we are dealing with a different kind of focus, standardly called *verum focus*: the truth value of the entire statement is emphatically verified. The very same holds for the focussed counterpart of (8), see (10).

| | | | | | |
|---|---|---|---|---|---|
| (9) | *Ma* | *Péter* | *FEL* | ***hívta*** | *János*-*t.* |
| | today | Peter.NOM | up | called | John-ACC |

‘Today Peter DID call up John.’

| | | | | | |
|---|---|---|---|---|---|
| (10) | *Ma* | *Péter* | *PALI*-*RA* | ***vette*** | *János*-*t.* |
| | today | Peter.NOM | Paul-onto | took | John-ACC |

‘Today Peter DID make a dupe of John.’

H) It is to be noted that if a sentence does not contain either a VM or a focussed constituent, the verb itself can receive focus stress. In this case, an ambiguity may arise: (i) the meaning of the verb can be interpreted as being “identificationally focussed” or (ii) the sentence expresses verum focus. Consider (11). This potential ambiguity extends to all other cases of identificationally focussed VMs.

| | | | |
|---|---|---|---|
| (11) | *Péter* | ***IMÁDJA*** | *János*-*t.* |
| | Peter.NOM | adores | John-ACC |

(i) ‘Peter ADORES John (does not only like him)’.
(ii) ‘Peter DOES adore John.’

## 2 On some previous LFG(-compatible) analyses

In Laczkó (2014a), in Laczkó (2014b), both in this volume, and in this paper, I give an overview of various aspects of previous LFG analyses in complementary distribution as much as possible.

Börjars et al. (1999) offer some programmatic considerations against functional projections like TopP and FocP (a la GB/MP) for languages like Hungarian and some hints at a possible LFG alternative with an extended verbal projection in which word order regularities are capturable by dint of

Optimality Theory (OT) style constraints. For further details, see Laczkó (2014a).

Adopting the basic representational assumptions and ideas of Börjars et al. (1999) but in an entirely Optimality Theoretic framework, Payne and Chisarik (2000) outline an analysis of Hungarian preverbal syntactic phenomena: the complementarity of constituent question expressions, focussed constituents, the negative particle and verbal modifiers. Given that their account also addresses negation phenomena, I discuss it in Laczkó (2014b), this volume.

Mycock (2006) develops a detailed and comprehensive typological analysis of constituent questions in her LFG framework. Below I discuss her basic assumptions that are immediately important from our [Spec,VP] perspective. For additional remarks, see Laczkó (2014a).

(A) Following a wide-spread view, Mycock also assumes that a VM and the verb make up a word both morphologically and phonologically, and they also constitute a single unit semantically. She does not go into any details about VMs. In this paper, I argue against this view of VMs, including the preverb.

(B) She assumes that a preverbal focussed constituent occupies the [Spec,VP] position and she does not adopt a F(oc)P view, which is also in line with general LFG assumptions about functional projections, see the brief discussion of Börjars et al. (1999) above. This contrasts with GB's/MP's solid cartographic architecture and principles.[5]

Gazdik (2012), capitalizing on Gazdik & Komlósy (2011), outlines an LFG analysis of Hungarian finite sentence structure, predominantly driven by discourse functional assumptions and considerations. Below is a summary of the most important ingredients of her approach.

1. Following (and somewhat extending) recent approaches to discourse functions (DFs), she breaks them down into feature values, see Table 1.[6]

[5] It is interesting in this context that É. Kiss (2002), for instance, on the basis of cartographic considerations, argues against positionally collapsing focussed constituents and VMs, which is (partially inherently) characteristic of É. Kiss (1992, 1994).

[6] Hocus is a special notion, see Kálmán (1985) and Kálmán (2001). Gazdik gives the following description (2012: 66-67). Hocus is assumed to be the counterpart in neutral sentences of ordinary focus in non-neutral sentences (the two sentence types have radically different intonation patterns). Both hocus and focus strictly occur immediately preverbally, and they constitute a phonological word with the verb (which loses even its word-initial stress). Both express identification; however, focus expresses the exhaustive/exclusive type of identification. Therefore, focus needs a special context, for instance, a question-answer or a correction situation, while hocus can be used without any special context, in "out-of-the-blue" sentences. For further details and examples, see Gazdik (2012).

| **+ prominent** | | **– prominent** | |
|---|---|---|---|
| ***+ discourse-linked*** | ***– discourse-linked*** | ***+ discourse-linked*** | ***– discourse-linked*** |
| thematic shifter, contrastive topic, question word (Q) | focus, hocus, question word (Q) | completive information | background information |

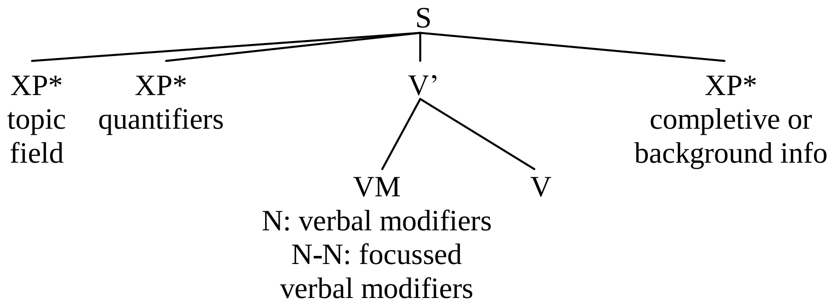
**Table 1. Gazdik's (2012) classification of DFs**

2. She claims that Hungarian sentences do not even have a VP constituent, i.e. they are flat (except that she does admit a V' constituent in one of the two major sentence structure types she distinguishes, see points 3 and 4 below).
3. As regards the immediately preverbal position, which Gazdik calls prominent preverbal position (PPP), she writes: "The question is now how to accommodate the PPP and the elements immediately preceding the verb into the structure. One option is to assume one PPP, which accounts for the complementary distribution of the hocus, the focus, question words and verbal modifiers. The other way is to assume two positions, the PPP for the focus, the hocus and question words, and another for verbal modifiers, which would account for the prosodic and lexical unit of verbal modifiers and the verb (for instance, verbs undergo nominalization together with verbal modifiers). In this case, the verbal modifier and the verb constitute a complex predicate under the V' node. However, this necessitates the introduction of additional rules that exclude the co-occurrence of the PPP and V' projection. In this paper I opt for the second possibility, keeping in mind, [sic!] that the first cannot be excluded, either" (2012: 81-82).
4. Relying heavily on Kálmán's (2001) descriptive characterization of word order in Hungarian sentences, and on the basis of the previous point, Gazdik distinguishes two sentence structure types, and she assumes that both structures are available to both neutral (N) and non-neutral (NN) sentences, and N and NN sentences are distinguished by their different prosodic behaviours.

(12)

| S | | | | |
|---|---|---|---|---|
| XP* topic field | XP* quantifiers | XP N: hocus N-N: focus, Q, negated constituents | V | XP* completive or background info |

(13)




My remarks on Gazdik's approach are as follows.

- Basically, I sympathize with Gazdik's general treatment of DFs, see point 1. I agree that all these functions need to be handled at a distinct representational level (in information or discourse structure). However, for simplicity of exposition, as the DF details are not relevant to the main thrust of this paper, I simply follow the classical LFG convention of representing TOP and FOC in f-structure. DF issues are at the forefront of current LFG investigations (see, for instance, Mycock 2013, Mycock & Lowe 2014, and Lowe & Mycock 2014), and in this light the notion of hocus, which Gazdik adopts from Kálmán (2001), has to be carefully studied, and it has to be explored how it can be accommodated in the newly emerging DF-system.[7]
- As far as Gazdik's rejection of the VP constituent in Hungarian sentence structure is concerned, see point 2 above, I do not share her view, and in Laczkó (2014a) I defend the postulation of VP and I posit it in a general parametric context from an LFG perspective.
- In my opinion, points 3 and 4 pose some crucial and rather insurmountable problems for the strictly syntactic ingredients of Gazdik's approach. While it has to be appreciated that Gazdik basically concentrates on the discourse functional dimension of Hungarian sentences (as the title of her paper also indicates) and the truly syntactic aspects are only programmatic at most, these aspects are rather problematic, and, therefore, I think they seriously weaken the overall approach.
  a) Gazdik does not give any justification for choosing the PPP vs. V' duality of structure.
  b) This duality account is tantamount to subscribing to the split focus—VM view, fundamentally assuming distinct syntactic positions for these two major constituent types.

[7] My preliminary impression is that its treatment could be channelled into the treatment of information (as opposed to identificational) focus. I intend to explore this dimension in future work; see my remarks in section 4.

c) Gazdik herself admits that special additional rules need to be introduced for ensuring the preverbal complementarity of the two constituent types. She does not even offer a hint as to how this could be carried out in her system (and, as far as I can see, this would be far from being a trivial task, especially in the light of the next point).
d) Gazdik practically multiplies Hungarian sentence structure variants by assuming that both the PPP version and the V' version are available in both neutral and non-neutral sentences. This gives us 4 variants altogether, which makes the entire setup somewhat suspicious, allowing for redundancy on the one hand,[8] and making the task of capturing basic instances of complementarity rather challenging, on the other hand.
e) Following the general descriptive tradition, Gazdik uses the umbrella term VM rather loosely and vaguely. On the one hand, in an appropriate LFG (or other generative theoretical) representation, the VM symbol is more than questionable (it is not an appropriate syntactic category to begin with), and, on the other hand, the real categories it subsumes in Gazdik's rather informal presentation are so diverse that they themselves call for a careful, detailed and differential (i.e. "individualized") treatment: preverbs, (obligatorily) bare nouns and fully fledged XPs are lumped together.
f) As the quote in point 3 above testifies, Gazdik also subscribes to the widely spread, and definitely untenable, sweeping generalization that a (preverbal) VM and a verb always make up a complex predicate and form a lexical unit. On the one hand, the notion of complex predicate is typically not satisfactorily defined (if at all) in various approaches, and, on the other hand, it is more than questionable whether in Gazdik's "goal secondary predicate" example in (14) *Szegedre* 'to Szeged' and the verb are analyzable as a lexical unit in any (generative) linguistically meaningful sense.[9]

(14) *'János* ***'Szegedre*** *utazott.*
John Szeged.SUBL travel.PST
'John travelled to Szeged.'

[8] For instance, the preverbal PPP in a V'-less structure can be focussed (as opposed to a hocus constituent sitting in that position), and a VM below V' can also be optionally focussed, which yields two distinct preverbal syntactic focus positions.
[9] This is example (6) in Gazdik (2012: 62). I have left everything (including the apostrophes, bolding, which simply identifies the VM constituent, and the glosses) in (14) above intact. The apostrophes indicate ordinary word-initial stress. The absence of an apostrophe in front of the verb shows that *Szegedre* and *utazott* constitute a single phonological word. However, it would be highly implausible to assume that they also make up a lexical unit.

In Laczkó (2014a), I discuss several aspects of Laczkó & Rákosi (2008-2014), our implemented grammar. Here I only repeat my comment on our treatment of the [Spec,VP] position. The current version of our grammar is rather limited in this respect. It posits only a focussed constituent or a particle belonging to VMs (no question expressions and no other types of VMs). We assume that the preverb (having the syntactic category PRT, short for particle) is a non-projecting word (in the sense of Toivonen (2001)). From the complementarity of the two categories it also follows that a PRT can never be focussed in our approach.

# 3 Towards a comprehensive LFG analysis of VMs

In subsection 3.1, I briefly present the relevant details of the general approach I propose in Laczkó (2014a), and in subsection 3.2, I develop my analysis of Hungarian VMs.

## 3.1. On Laczkó (2014a)

In the spirit of Laczkó & Rákosi (2008-2014) and also partially inspired by É. Kiss (1992), in Laczkó (2014a) I assume the following skeletal sentence structure.[10]

(15)

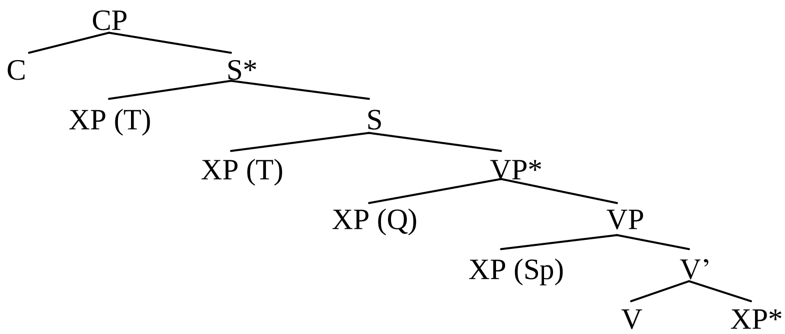



Table 2 (next page) gives an overview of the essential features of the disjunctive annotations associated with the topic field (T), the quantifier zone (Q) and the [Spec,VP] position (Sp), schematically represented in (15).[11]

[10] S* and VP* encode the possibility of multiple left-adjunction.
[11] As I point out in Laczkó (2014a), the annotations associated with the quantifier field and the [Spec,VP] position are part of my new proposal, and it is one of the future tasks for our HunGram grammar to test their implementability.

| T:<br>{ (c-)topic \| sent.adv. } | Q:<br>{ quantifier \| WH } | Sp:<br>{ focus \| WH \| VM } |
|---|---|---|
| { (↑GF)= ↓<br>{↓ ∈ (↑ TOPIC)<br>\| ↓ ∈ (↑ CONTR-TOPIC)}<br>\| ↓ ∈ (↑ ADJUNCT)<br>(↓ADV-TYPE)=c SENT } | (↑GF)= ↓<br>{ (↓CHECK _QP)=c +<br>\| (↑CHECK _VM-INTER)=c +<br>(↓CHECK _QP-INTER)=c +<br>(↓SPECIFIC)=c + } | { (↑GF)= ↓<br>(↑FOCUS)= ↓<br>\| (↑GF)= ↓<br>(↓CHECK _VM-INTER)=c +<br>((↑CHECK _VM-INTER)= +)<br>\| { (↑GF)= ↓<br>\| ↑=↓ }<br>(↓CHECK _VM)=c + } |

**Table 2. Overview of functional annotations**

Let me make some comments on the annotations I associate with the [Spec,VP] position in Table 2. I take these points from Laczkó (2014a).

- The three main disjuncts encode the complementary distribution of focussed constituents, question phrases and VMs, respectively.
- The first disjunct is straightforward.[12]
- In the second disjunct, the first XLE-style (constraining) CHECK feature equation[13] requires the presence of a question phrase in this designated position. Its defining counterpart is included in the lexical forms of question words.
- In the second disjunct, the second, optional, defining CHECK feature equation serves as the licensor of the occurrence of question phrases in the quantifier field.[14] When it is not present in the structure, no question phrase can occur in the quantifier position. When it is present, it requires the presence of one or more question phrases. From the perspective of question phrases in the quantifier position: they can only occur there if the [Spec,VP] position is filled by a question phrase. Given the main topic of this paper: the complementarity and the interaction of VMs and

[12] However, a reminder is in order. Although I subscribe to the very strong recent view in LFG that discourse functions are to be uniformly represented in i-structure (for a useful discussion of the relevant literature, see Gazdik 2012), for the sake of simplicity of exposition here I apply the classical LFG representation of TOPIC and FOCUS in f-structure.

[13] The essence of XLE's CHECK featural device is that these CHECK features come in pairs: there is a defining equation member and there is a constraining equation counterpart. These pairs can be applied to ensure that two elements should occur together in a particular configuration (i.e. this is an LFG-XLE way of encoding genuine instances of context sensitivity), or that a particular element should occur in a designated position. It is this latter property that is utilized here. The former property is made use of, for instance, in the treatment of particle verb constructions: verbs and particles are specified by these feature pairs in their lexical forms in such a way that they need to co-occur in syntax. For further details, see subsection 3.2.1.

[14] Its constraining counterpart is associated with the VP-adjoined position, see the (↑CHECK _VM-INTER)=c + annotation in the middle column of Table 2.

focus, in the formal analysis I will only model these two categories and leave out the "interrogative dimension".

- The third disjunct handles VMs. The defining counterpart of its constraining CHECK feature equation is included in the lexical forms of the elements that can occupy this position in neutral sentences (in non-focussed sentences and non-constituent-question sentences). The functional head annotation (↑=↓) in the disjunction is for particles, while the (↑GF)= ↓ annotation is for all the other types of VMs.

## 3.2 An analysis of the major VM types

The presentation of my account below follows the order in which these VM types were introduced and exemplified in subsection 1.2.

### 3.2.1. Particles

In Laczkó & Rákosi (2011) we analyze certain types of Hungarian spatial particle verb constructions (PVCs). Consider the examples we use in that paper in (16) and (17).

| | | | | | |
|---|---|---|---|---|---|
| (16) | *A rák* | *ki* | *mász-ott* | *a* | *folyó-ból.* |
| | the crab.NOM | out | crawl-PAST.3SG | the | river-out.of |
| | 'The crab crawled out of the river.' | | | | |

| | | | | |
|---|---|---|---|---|
| (17) | *Az elnök* | *ki* | *fej-ez-te* | *együttérzés-é-t.* |
| | the president. NOM | out | head-Vsuf-PAST.3SG | sympathy-his-ACC |
| | 'The president expressed his sympathy.' | | | |

The sentence in (16) illustrates the compositional use of the preverb *ki* 'out', while (17) shows a truly non-compositional use (given that the simplex verb form *fejezte* does not even exist on its own). In the vein of Forst et al.'s (2010) proposal for the LFG analysis of particle verb constructions in English, German and Hungarian and its XLE implementation we develop an analysis and its implementation along the following lines. We assume that preverbs are non-projecting words in the sense of Toivonen (2001), and their syntactic category is PRT.[15] We analyze non-compositional PVCs lexically and compositional PVCs syntactically. In the latter case, we make use of XLE's restriction operator in our functional annotations in c-structure. As a result: syntactic argument structure composition (i.e. syntactic complex predicate formation) is assumed and implemented. One of the main motivations for this approach is that XLE can handle compositional, productive (and also novel) PVCs without having recourse to specific and

[15] In using this PRT category, we also follow the practice of the English and German implementational grammars.

individual lexical form representations. An obvious drawback is that LFG's subscription to the derivational dimension of the Strong Lexicalist Hypothesis is thereby violated.

In Laczkó (2013), I revisit this PVC analysis, and on the basis of evidence from (morphological) causativization, nominalization and particle reduplication I argue for a uniform lexicalist treatment of both non-compositional and compositional PVCs.

I propose the following lexical form for the preverb.

(18) *ki* PRT
(↑PRT-FORM)= ki
(↑CHECK _PRT-VERB) =c +
{ (↑ FOCUS)
| ~(↑ FOCUS)
(↑CHECK _VM) =c + }
((↑DIR) = out).

It is a "shared" lexical form for its use in both non-compositional and compositional PVCs. Its crucial property is that even in the compositional use it has no PRED feature,[16] it only has a PRT-FORM feature, just like in the non-compositional use. The other uniform trait of the preverb in both uses is that it is constrained to a PVC configuration, see the _PRT-VERB CHECK feature in the second line. The disjunction between the focus annotation and the _VM CHECK feature in the third and fourth lines encodes that in neutral (i.e. non-focussed) sentences the particle has to occupy the customary preverbal VM position. It is the optional (↑DIR)=out equation that differentiates between the compositional and non-compositional uses of the preverb in this approach. The idea is that in the compositional use, it carries this spatial-directional feature,[17] and it explicitly contributes this feature to the entire PVC, and in the non-compositional use it does not.

In the spirit of my analysis in Laczkó (2013), but in a simplified, less XLE-specific way, for the purposes of this exposition I assume the lexical forms in (19) and (20) for the two relevant simplex verbs. Notice that in this approach we do not need a special set of functional annotations in c-structure for encoding restriction (complex predicate formation) in the syntax in the

[16] In our analysis in Laczkó & Rákosi (2011), in the compositional use the particle is treated as the main predicate, and it takes the verb as one of its semantic arguments (without any grammatical function): complex predicate formation takes place in the syntax.

[17] Note that on this lexical account the preverb itself cannot have a PRED feature, because in the syntax there is no restriction operator: both the preverb and the verb have the functional head annotation, i.e. they are functional co-heads. In this respect, they are treated in the same way as non-compositional PVCs, and only one of them can have a PRED feature (which is a general LFG constraint on functional co-heads).

case of compositional PVCs. Instead, in both PVC types, both the verb and the particle get the usual and uniform functional (co-)head annotation.

(19) *fejez* V
(↑PRED) = ‘express < (↑SUBJ) (↑OBJ) >’
(↑CHECK _PRT-VERB) = +
(↑PRT-FORM) =c ki
~(↑DIR).

(20) *mászik* V
(↑PRED) = ‘crawl-out < (↑SUBJ) (↑OBL) >’
(↑CHECK _PRT-VERB) = +
(↑PRT-FORM)=c ki
(↑DIR) =c out.

.

### 3.2.2. Reduced arguments

Consider (3), repeated here as (21) for convenience.

| | | | | |
|---|---|---|---|---|
| (21) | *Ma* | *Péter* | *újság-ot* | ***olvasott.*** |
| | today | Peter.NOM | newspaper-ACC | read.PAST |

‘Today Peter read a newspaper / newspapers
(= did newspaper-reading).’

Recall from section 1 that (i) certain verbs (e.g. *olvas* ‘read’ in (21)) also permit the plural form of the bare noun and (ii) a verb may select other (subject or oblique) arguments to be expressed as a bare noun VM than the object argument, as in (21).

The analysis runs as follows. A verb like *olvas* ‘read’ optionally allows (or, rather, requires) its object to be expressed by a bare noun in neutral sentences. This has to be encoded in the lexical form of such a predicate by means of a set of optional annotations, as in (22).

(22) *olvas*, V (↑PRED)= ‘read <(↑SUBJ) (↑OBJ)>’
((↑OBJ NUMBER)= SG
~(↑OBJ INDEX)
{ (↑FOCUS)
| (↑OBJ CHECK _VM)= + }).

This set of optional annotations encodes the following. The predicate allows for a “reduced” (= bare nominal) object argument. The morphological form of its object is singular obligatorily: (↑OBJ NUMBER)= SG and it is unspecified for “semantic” number; and, therefore, it is non-referential (see the English translation of (21)). This is captured by the following (negative) existential constraint: ~(↑OBJ INDEX). This reduced argument must occur in the [Spec,VP] position: (↑OBJ CHECK _VM)= +, unless the sentence contains a focussed constituent, which can be any phrase (including the reduced argument itself). The reason why the (additional alternative) lexical specification is needed is twofold. (A) It is only (a definable) set of verbs that can have this option. (B) The reduced argument can occur anywhere in a non-neutral sentence, so its special form and interpretation cannot be appropriately captured solely by c-structural (positional and annotational) means.[18] These two crucial observations hold for the analysis of all the other VM types to be presented below.

### 3.2.3. Oblique arguments

Consider (5), repeated here as (23), and the simplified lexical form of the verb *érkezik* 'arrive' in (24).

| (23) | *Ma* | *Péter* | *a városunk-ba* | ***érkezett.*** |
|---|---|---|---|---|
| | today | Peter.NOM | the city.our-into | arrived |
| | 'Today Peter arrived in our city.' | | | |

(24) *érkezik,* V (↑PRED)= 'arrive <(↑SUBJ) (↑OBL)>'
{ (↑FOCUS)
| ~(↑FOCUS)
(↑OBL CHECK _VM)= + }.

The analysis of this VM type is similar to that of the reduced argument VM type with the following differences. (i) In this case, the VM requirement is obligatory in neutral sentences. (ii) Following from (i), there are no (additional) constraints on the designated oblique argument (because in neutral sentences it must occupy the preverbal VM position). As I mentioned in section 1, this type seriously questions any analysis of VMs assuming that a VM and the verb make up a lexical unit (along some vaguely defined complex predicate and/or incorporation lines). In section 1, I also pointed out that a verb taking this VM type can be either intransitive (as in (23)) or transitive, see example (i) in Footnote 4 repeated here as (25), and the lexical form of the verb *tesz* 'put' in (26).

| (25) | *János* | *az asztal-ra* | ***tette*** | *az üveg-et.* |
|---|---|---|---|---|
| | John.NOM | the table-onto | put | the bottle-ACC |
| | 'John put the bottle on the table.' | | | |

[18] If a verb also admits bare plural nouns then the following alternative pair of annotations can be applied: (↑OBJ NUMBER)= PL, (↑OBJ SPECIFIC)= –. This ensures that these plural nouns are interpreted non-specifically.

(26) *tesz,* V (↑PRED)= ‘put <(↑SUBJ) (↑OBJ) (↑OBL) >’
{ (↑FOCUS)
| (↑OBL CHECK _VM)= + }.

### 3.2.4. Small clause XCOMPs

Consider (7), repeated here as (27).

| (27) | | | | | |
|---|---|---|---|---|---|
| | *Ma* | *Péter* | *piros-ra* | ***festette*** | *a kapu-t.* |
| | today | Peter.NOM | red-onto | painted | the gate-ACC |

‘Today Peter painted the gate red.’

In this example, the verb requires a (case-marked AP) XCOMP to have the VM status in neutral sentences. Its lexical form is the same in nature as that of *tesz* ‘put’ in the previous type (except for the OBL vs. XCOMP GF contrast). Compare (26) and (28).

(28) *fest,* V (↑PRED)= ‘paint <(↑SUBJ) (↑OBJ) (↑XCOMP) >’
(↑OBJ)= (↑XCOMP SUBJ)
{ (↑FOCUS)
| ~(↑FOCUS)
(↑XCOMP CHECK _VM)= + }.

### 3.2.5. Idiom chunks

Consider (8), repeated here as (29) and the lexical form of the verb *vesz* ‘take’ as used in this idiomatic expression in (30).

| (29) | | | | | |
|---|---|---|---|---|---|
| | *Ma* | *Péter* | *pali-ra* | ***vette*** | *János-t.* |
| | today | Peter.NOM | Paul-onto | took | John-ACC |

‘Today Peter made a dupe of John.’

(30) *vesz,* V (↑PRED)= ‘take <(↑SUBJ) (↑OBJ) > (↑OBL)’
(↑OBL FORM)= PALIRA
{ (↑FOCUS)
| ~(↑FOCUS)
(↑XCOMP CHECK _VM)= + }.

Note that the oblique VM type transitive predicate *tesz* ‘put’ in (30) and the oblique idiom chunk VM type transitive predicate *vesz* ‘take’ follow the same pattern, except that in the case of the former the oblique VM is a semantic argument, whereas in the case of the latter it is just a formal (non-semantic) oblique constituent.[19]

[19] Note that idioms like this make it necessary to assume that occasionally even the semantically restricted OBL function can be assigned to a non-semantic constituent.

## 4 Concluding remarks

1) In this paper I have presented the crucial aspects of an LFG (and XLE-implementable) analysis of the major types of Hungarian verbal modifiers.
2) In accordance with the general approach outlined in Laczkó (2014a), I assume that focussed constituents, verbal modifiers and the (verb-adjacent) question phrase are in complementary distribution in [Spec,VP]. Following from the main topic of the paper and for simplicity of exposition, here I only formally modelled the complementarity (and interaction) of VMs and focussing.
3) I have shown that VMs can also be focussed, and, depending on their nature, they can be used to express two types of focus: identificational focus and verum focus.
4) I distinguish two major types of VMs: particles (= preverbs) belong to the first type, and the rest of VMs to the other type. On the basis of Laczkó's (2013) analysis, I treat both compositional and non-compositional PVCs lexically, with both the verb and particle having their respective lexical forms with appropriate functional annotations and cross-referencing (including the use of CHECK features). The particle and the verb are analyzed as functional coheads in both PVC types. All the other VMs, with their own grammatical functions, are lexically selected by their verbs in these verbs' lexical forms. Depending on the nature of the VM involved, the verb can impose various constraints on it.
5) I argue against assuming that all VM + verb pairs are lexical units or combinations, and when the VM immediately precedes the verb, (obligatory) syntactic incorporation takes place in some (theory-dependent) form. Three comments are in order here.
   a) Some VM + verb pair types must really be treated as lexical combinations, because they have a shared meaning and argument structure. In my approach, PVCs (of both major types) and idioms belong here. However, even in these cases "lexical combination" means separate, appropriately annotated and cross-referenced lexical items which occupy distinct syntactic positions even when the VM immediately precedes the verb. This means that I reject the idea of syntactic incorporation in these instances as well.
   b) In the case of all the other VMs, the relationship between the VM and its verb is fundamentally syntactic, except that *(i)* the verb requires its designated VM argument to occupy the [Spec,VP] position in neutral sentences and *(ii)* the verb may, in general, specify the features the VM needs to exhibit, see 4) above. Notice, however, that *(i)* already calls for a lexical encoding, in the verb's lexical form, of this VM requirement, because the VM—verb syntactic dependency is very often verb-specific (although there are also certain verb types, with

particular semantics and/or argument structure, that typically behave similarly in this respect).

c) The LFG-style encoding of the VM—verb relationship in the verb's lexical form, as proposed in this paper, makes it possible to capture the appropriate co-occurrence of the two elements (and the required properties of the VM) in both neutral and focussed sentences without employing any syntactic movement operation.

6) Question phrases apart, VMs and focussed constituents aspire to the [Spec,VP] position. The widely assumed, basic generalization is that in the non-neutral vs. neutral sentence binary distinction, focussed constituents occupy this designated position in the former setup and VMs occupy it in the latter. In the case of neutral sentences, the extremely strong tendency is that if the verb is combined with a particle then the particle has the VM status. There are, however, some exceptions. Consider the examples in (31) and (32).

| (31) | *A város* | *a folyó* | *két* | *partján* | ***terül*** | *el.* |
|---|---|---|---|---|---|---|
| | the city.NOM | the river.NOM | two | bank.3SG.on | spreads | VM |

‘The city lies on both banks of the river.’

| (32) | *A férfi* | *gyógyszert* | ***vett*** | *be.* |
|---|---|---|---|---|
| | the man.NOM | medicine.ACC | took | VM |

‘The man took medication.’

In both these examples, there is a PVC; however, it requires an argument (and not the particle) to occupy the [Spec,VP] position in neutral sentences. In (31), the VM is a designated oblique XP argument, and in (32), it is a bare noun object. Such examples underline a favourable aspect of the lexical treatment of VMs along the lines proposed in this paper: the special behaviour of predicates is best captured by lexical means.

7) In future work, I plan to explore, in a detailed fashion, what motivates (or triggers) the occurrence of a constituent in the immediately preverbal position from the perspective of focussing. My initial hypothesis is as follows (naturally, it is based on several crucial aspects of a variety of approaches).

a) Obviously, the “common denominator” is that the preverbal constituent and the verb make up a phonological word (unit) with the verb losing its ordinary word-initial stress completely or to a considerable extent.[20]

[20] It is an issue belonging to a subordinate dimension whether the intonation of the rest of the sentence after the verb follows the focus (i.e. non-neutral), “eradicating” stress pattern, with all the phrases losing their customary stress entirely or to a large extent or it follows the neutral stress pattern.

b) This syntactic adjacency and phonological pattern of the two elements can serve two distinct purposes. On the one hand, the preverbal constituent receives a remarkable degree of prosodic salience, which enables it to encode a designated type of discourse salience (= focussing, for details, see point c) below). On the other hand, when the verb definitely makes up a lexical unit with a syntactically separable element (an obviously marked but not at all uncommon option across languages) as in the case of PVCs and idioms, this lexical unity can be naturally encoded by this configuration in neutral sentences. Given that there is always only one finite verb in a clause, and, therefore, only one prosodically salient position, the two purposes cannot be simultaneously satisfied under normal circumstances. This is the cause of the famous preverbal complementarity.[21] Naturally, discourse salience enjoys priority.
c) Capitalizing on Kálmán's (2001) important empirical generalizations, and by developing them further, my basic idea is that four types of focus should be distinguished in [Spec,VP]: (i) ordinary focus ("everybody's focus"): exhaustive/exclusive identification (ii) Kálmán's (2001) hocus: identification (iii) presentational focus (iv) verum focus. The differences between them are as follows. (i) cannot be used in an out-of-the-blue sentence: it has to be used as an answer to a constituent question or as a corrective sentence. (ii) can be used in an out-of-the-blue sentence, but certain "shared knowledge" or a shared presupposition is necessary for identification to be possible. (iii) can be used in an out-of-the-blue sentence, and it does not require any "shared knowledge" or any shared presupposition. (iv) emphatically verifies the truth value of a statement.
d) I claim that a generalization assuming that the motivation for the occurrence of a constituent in [Spec,VP] is complex predicate formation in general (which is often rather vaguely defined) is untenable. And a partially related issue: I also claim that a general (uniform) syntactic incorporation analysis in the case of VMs is not feasible either. Of course, there are VM types in which the VM and the verb clearly make up a lexical unit (a complex predicate in this sense), see PVCs and idioms, for instance; however, even in these cases the VM should not be analyzed as incorporated into the verb in the syntax.
e) The generalization I intend to explore is that the "common denominator" of the behaviour of all VMs is that they are lexically specified. At one end of the scale we have PVCs and idioms (lexical

[21] And, I think, it is for this reason that approaches postulating a single designated syntactic position (in combination with the what-you-see-is what-you-get principle) can be considered more feasible intuitively.

but not syntactic complex predicates), and at the other end we find verbs that require one of their designated XP arguments to occupy the preverbal position in neutral sentences, for instance *érkezik* 'arrive'. In this case, only this requirement is encoded in the verb's lexical form. It stands to reason to assume that such verbs create a special "presentational focus" configuration for their designated argument in a neutral sentence.[22]

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## References

Brody, Michael. 1990. Remarks on the order of elements in the Hungarian focus field. In: Kenesei, István. ed. *Approaches to Hungarian. Volume 3. Structures and Arguments*. Szeged: JATE, 95-122.

Börjars, Kersti, Payne, John & Chisarik, Erika. 1999. On the justification for functional categories in LFG. In: Butt, Miriam. & King, Tracy. H. eds. *Proceedings of the LFG99 Conference*. University of Manchester. Stanford: CSLI Publications.

É. Kiss, Katalin. 1992. Az egyszerű mondat szerkezete [The structure of the simple sentence]. In: Kiefer, Ferenc. ed. *Strukturális magyar nyelvtan 1. Mondattan.* [Structural Hungarian grammar 1. Syntax]. Budapest: Akadémiai Kiadó, 79-177.

É. Kiss, Katalin. 1994. Sentence structure and word order. In: Kiefer, Ferenc & É. Kiss, Katalin. eds. *The Syntactic Structure of Hungarian*. New York: Academic Press, 1-90.

É. Kiss, Katalin. 2002. *The Syntax of Hungarian. Cambridge Syntax Guides*. Cambridge: Cambridge University Press.

[22] In an important sense, the properties of this VM type yield an additional motivation for assuming that focussed constituents and VMs occupy the very same syntactic position in complementary distribution: an ordinary VM (in a neutral sentence) exhibits presentational focus behaviour, a borderline case between the two domains.

Forst, Martin; King, Tracy H. & Laczkó, Tibor. 2010. Particle verbs in computational LFGs: Issues from English, German, and Hungarian. In Butt, Miriam & King, Tracy H. eds. *Proceedings of the LFG '10 Conference*. On-line publication. Stanford: CSLI Publications, 228-248.
Gazdik, Anna. 2012. Towards an LFG analysis of discourse functions in Hungarian. In: Kiefer, Ferenc. & Bánréti, Zoltán. eds. *Twenty Years of Theoretical Linguistics in Budapest*. Budapest: RIL HAS & Tinta Könyvkiadó, 59-92.
Gazdik, Anna & Komlósy, András. 2011. On the syntax-discourse interface in Hungarian. In: Butt, Miriam. & King, Tracy. H. eds. *Proceedings of the LFG11 Conference*. Hong Kong: Hong Kong University. Stanford: CSLI Publications, 215-235.
Kálmán, László. 1985. Word order in neutral sentences. In Kenesei, István. ed. *Approaches to Hungarian. Vol. 1. Data and Descriptions*. Szeged: JATE. 13-23.
Kálmán, László. 2001. ed. *Magyar leíró nyelvtan. Mondattan 1* [Hungarian descriptive grammar. Syntax 1]. Budapest: Tinta Könyvkiadó.
Komlósy, András. 1985. Predicate complementation. In Kenesei, István. ed. *Approaches to Hungarian. Vol. 1. Data and Descriptions*. Szeged: JATE. 53-78.
Laczkó, Tibor. 2014a. Essentials of an LFG analysis of Hungarian finite sentences. *This volume.*
Laczkó, Tibor. 2014b. Outlines of an LFG-XLE account of negation in Hungarian sentences. *This volume.*
Laczkó, Tibor & Rákosi, György. 2008-2014. *HunGram. An XLE Implementation.* University of Debrecen.
Laczkó, Tibor & Rákosi, György. 2011. On particularly predicative particles in Hungarian. In Butt, Miriam & King, Tracy H. eds. *Proceedings of the LFG '11Conference*. Stanford: CSLI Publications, 299-319.
Lowe, John. J. & Mycock, Louise. 2014. Representing information structure. Presentation at the workshop *The Syntax and Semantics of Unbounded Dependencies at LFG14*.
Mycock, Louise. 2006. *A New Typology of Wh-Questions*. Ph.D. dissertation, University of Manchester.
Mycock, Louise. 2013. Discourse functions of question words. In Butt, M. & King, T. H. eds. *The Proceedings of the LFG13 Conference*. Debrecen: University of Debrecen, 419-439.
Mycock, Louise & Lowe, John. J. 2014. S-structure features for Information Structure analysis. Talk at *LFG14*.
Payne, John & Chisarik, Erika. 2000. Negation and focus in Hungarian: An Optimality Theory account. In: *Transactions of the Philological Society* 98: 185-230.
Toivonen, Ida. 2001. *The Phrase Structure of Non-Projecting Words*. Ph.D. dissertation, Stanford University.

# HOW CAN A VERB AGREE WITH A VERB? REANALYSIS AND PSEUDOCOORDINATION IN NORWEGIAN

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## Abstract

Anward (1988) and Wiklund (2007) argue that there is verbal feature agreement in Swedish, and that this phenomenon can be found in (at least) two groups of sentences, pseudocoordinations and reanalysis sentences. Norwegian is close to Swedish regarding the relevant data, and this paper is based on Norwegian. It will be shown that when relevant data are considered, there are two different kinds of verbal feature agreement, which require different grammatical treatment.


## 1. Some basic facts [1]

Verbal features have not been important in discussions of agreement (Corbett 2006:138-141). However, Anward (1988) and Wiklund (2007) argue that there is verbal feature agreement in Swedish. Norwegian is close to Swedish regarding the relevant data, and this paper is based on Norwegian.

There are two main groups of sentences assumed to show verbal feature agreement in Wiklund (2007), illustrated in (1)-(2). Agreeing verbs are underlined in all example sentences, (also ungrammatical agreement).[2] All example sentences are Norwegian, with obvious exceptions.

(1) Sitt og les! ['type 1']
sit.IMPER and read.IMPER
'Sit and read!'

(2) Forsøk å les! ['type 2']
try.IMPER to read.IMPER
'Try to read!'

The type 1 agreement occurs with a small number of verbs that take so-called pseudocoordination. A pseudocoordination, such as (1), looks like a coordination of two verbs or verb phrases. The first verb belongs to a small


[1] I have discussed pseudocoordinations with more people than I can mention here, and reanalysis with about twice as many. Thanks for input to audiences at Lund University (May 2014), LFG14 (Ann Arbor, MI, 2014) and Agreement 2014 (York, 2014). Thanks are also due to the proceedings editors and the anonymous reviewer for their thorough and constructive comments.


[2] The coordinating conjunction *og* 'and' is usually pronounced /o/ in Norwegian, just like the infinitival marker *å* (Endresen 1995). The analysis in section 4 assumes that the grammatical word written 'og' in (1) is not the coordinating conjunction, but rather an element which is identified with the infinitival marker (as in Wiklund 2007). This means that 'og' in (1) and 'å' in (2) are considered the same grammatical element.

group that includes posture verbs (see e.g. Lødrup 2002, 2014a). Another example is (3).

(3) John sitter og leser en bok.
John sit.PRES and read.PRES a book
'John is sitting and reading a book.'

The grammatical properties of pseudocoordinations are different from those of regular coordinations. For example, it is possible to move a constituent out of a pseudocoordination, violating the Coordinate Structure Constraint (Ross 1967:89-114); an example is (4).

(4) Den boken sitter han og leser.
that book.DEF sit.PRES he and read.PRES
'He is sitting and reading that book.'

The set of first verbs that allow pseudocoordinations in Norwegian is rather heterogeneous, including posture verbs (*sitte* 'sit', *ligge* 'lie', *stå* 'stand'), verbs of assuming a position (e.g. *sette seg* 'sit down'), movement verbs (e.g. *gå* 'walk'), verbs denoting a channel of communication (e.g. *ringe* 'phone'), purely aspectual verbs (e.g *drive* 'carry on') and the verbs *være* 'be (at a place)' and *ta* 'take'. Pseudocoordinations show different grammatical behavior, depending on their first verb. Lødrup (2002, 2014a) argues that most pseudocoordinations are control sentences, while some are raising sentences or complex predicates. In this paper, the focus will be on the central type of pseudocoordinations with posture verbs as first verbs.

The two verbs in a pseudocoordination must always have the same form, cf. (5). (This generalization will be made more precise in section 2.)

(5) John sitter og leser/*leste en bok.
John sit.PRES and read.PRES/read.PST a book
'John is sitting and reading a book.'

The type 2 agreement occurs with a group of verbs that can take reanalysis (or restructuring) in the sense that they can combine with a subordinate verb to form a complex predicate in a monoclausal structure (see e.g. Alsina 1996, Butt 1995). In Norwegian, as in many other languages, an important reanalysis phenomenon is the long passive (Lødrup 2014b, see also Wurmbrand 2001, Cinque 2006), in which the passive rule operates on the complex predicate as a whole. An example is (6).[3]

[3] Some of the example sentences are from web texts; they are marked 'from the www'. They were found by searching the www, or through the Norwegian NoWaC-corpus, which consists of 700 million words from web texts.

(6) Har mye som må huskes å gjøre.
have.PRES much that must.PRES remember.INF.PASS to do.INF
'(I) have many things that I have to remember doing.' [from the www]

Central types of reanalysis verbs are aspectual verbs (e.g. *fortsette* 'continue'), irrealis verbs (e.g. *forsøke* 'try') and strong implicative verbs (e.g. *glemme* 'forget'). Reanalysis is an optional rule for all verbs discussed here.

With pseudocoordinations, verbal feature agreement is obligatory. With reanalysis verbs, on the other hand, it is optional in Norwegian (as far as I know). The factors influencing the choice are not known, but it is clear that the linguistic and sociolinguistic distribution of agreement with reanalysis verbs is complicated. Imperative agreement seems to be the most common type, followed by participle agreement, as in (7),[4] while present and preterit agreement, as in (8), is possible for some speakers only.

(7) Det har jeg glemt å fortalt!
that have.PRES I forget.PART to tell.PART
'I forgot to say that!' [from the www]

(8) jeg prøvde å leste det lure smilet hennes.
I try.PST to read.PST the sly grin.DEF her
'I tried to read her sly grin.' [from the www]

## 2. Voice agreement

Lødrup (2014a, 2014b) discusses how passive verbs behave with respect to verbal feature agreement in the types 1 and 2. Norwegian has two ways of realizing the passive: the suffix *–s* (the morphological passive) and auxiliary plus participle (the periphrastic passive). The morphological passive can only be used in the infinitive and the present (some marginal preterits aside).[5] The competition between these passive realizations is not well understood (but see Engdahl 2006, Lundquist 2013, Laanemets 2013). In some cases, the choice of passive realization seems to be rather arbitrary. For example, the two passive realizations can be coordinated in regular coordinations, as in (9).

[4] Using a perfect participle instead of an expected infinitive is not a unitary phenomenon in Norwegian (or Swedish). There is also a different case, which is related to counterfactuality (see Eide 2011 and references there). This case is not agreement, and it is not relevant here.

[5] Swedish is different from Norwegian in this respect, having the whole paradigm of morphological passive forms. (This seems to be the most important difference between Norwegian and Swedish relevant to the phenomena discussed in this paper.)

(9) publikum underholdes og blir revet med ..
audience entertain.PRES.PASS and become.PRES carry.PART with
'The audience is entertained and carried away.' [from the www]

A traditional generalization is that the periphrastic passive is used of completed actions, while the morphological passive is used of states, unfinished actions, repeated actions and what usually happens (see e.g. Western 1921:159). This generalization makes it natural to expect that the morphological passive is used in pseudocoordinations with posture verbs, for two reasons: First, the posture verbs in pseudocoordinations are traditionally assumed to express progressive aspect (see the discussion in Tonne 2001:74-82). Second, the verb following the posture verb is usually atelic (Tonne 2001:69-101). The general rule is, however, that the passive following an active posture verb is the periphrastic passive, cf. (10)[6].

(10) Der står bilen og blir lakkert / *lakkeres.
there stand.PRES car.DEF and become.PRES paint.PART / paint.PRES.PASS
'The car is standing there being painted.'

Most first verbs in pseudocoordinations can be passivized; they then usually take an expletive subject. When the first verb takes the periphrastic passive, it is realized as a passive participle, and the second verb must also have this form, cf. (11)-(12). When the first verb takes the morphological passive, the second verb must also have this form, cf. (13)-(14).

(11) Men det blir sittet og produsert.
but there become.PRES sit.PART and produce.PART
'One sits and produces.'
(12) *Men det blir sittet og produseres.
but there become.PRES sit.PART and produce.PRES.PASS
(13) Men det sittes og produseres ..
but there sit.PRES.PASS and produce.PRES.PASS
'One sits producing.' [from the www]
(14) *Men det sittes og blir produsert.
but there sit.PRES.PASS and become.PRES produce.PART

It is a standard observation that the two verbs in a pseudocoordination must have the same form. However, it is usually not stated clearly what this means. The clearest formulations can be found in Anward (1988) and Wiklund (2007), who say that the relevant properties (with both pseudocoordinations and other cases of verbal feature agreement) are tense, mood and aspect. These terms are then given an interpretation which in

[6] It is possible to find counterexamples in texts, but they do not sound good to me.

practice means that the two verbs must have the same inflectional form — only the passive suffix -*s* does not count. Wiklund (2007:26) says explicitly that passive morphology does not take part in agreement. It could be argued that this passive suffix is not inflectional, but Anward (1988) and Wiklund (2007) assume that it is, and this is also the assumption here for Norwegian (see the discussion in Enger 2000).

What is needed is a simple extension of the generalization in Anward (1988) and Wiklund (2007): the pseudocoordination verb and the first verb following the grammatical word *og* must have the same inflectional form. The inflectional forms assumed for Norwegian verbs are as in Figure 1.

Figure 1: A verb paradigm for Norwegian: *lese* 'read'

| | |
|---|---|
| imperative | *les* |
| infinitive | *lese* |
| present | *leser* |
| preterit | *leste* |
| participle | *lest* |
| infinitive passive | *leses* |
| present passive | *leses* |

Comments on the paradigm:
-There is no formal distinction between active and passive participles, as in English.
-Norwegian has (what is called) a present participle, but it has been argued to be an adjective (Faarlund et al. 1997:119), and it never triggers agreement.
-The morphological passive only has infinitive and present forms (some marginal preterits aside) which are are always identical. Lundquist (2013) suggests that there is really one tenseless form.

The reason example (10) above is ungrammatical with the morphological passive is that the present active and the present passive are two different inflectional forms. The reason the periphrastic passive in (10) is grammatical, is that both the first verb and the passive auxiliary are present actives.

It is important that the agreement target in a pseudocoordination is not necessarily the main verb; it can also be a passive or future or perfect auxiliary as in (10) and (15)-(16).

(15) sitter og skal holde kurs de neste tre timene
sit.PRES and shall.PRES hold.INF course the next three hours.DEF
'(I) am going to give a course the next three hours.' [from the www]

(16) Jeg sitter og har brukt opp datakvoten min
I sit.PRES and have.PRES use.PART up data.quota.DEF my
'I have filled my quota of data.' [from the www]

Long passives of reanalysis verbs often show voice agreement in Norwegian, but this agreement works in a different way than in pseudocoordinations. Voice agreement on the second verb is common, cf. (17), but not obligatory, cf. (18) (Lødrup 2014b).[7]

(17) det må huskes å gjøres ..
it must.PRES remember.INF.PASS to do.INF.PASS
'One must remember doing it.' [from the www]

(18) Har mye som må huskes å gjøre.
have.PRES much that must.PRES remember.INF.PASS to do.INF
'(I) have many things that I have to remember doing.' [from the www]

An important difference to pseudocoordinations is that with reanalysis verbs, voice agreement is not only a question of inflectional form. Agreeing long passives sometimes have the periphrastic passive with one verb, or more seldom with both. This means that the agreement is not on the level of inflectional forms, but rather on a level of grammatical features. Cf. (19)-(21).

(19) Viktige stridsspørsmål blir unnlatt å presiseres
important issues become.PRES neglect.PART to clarify.INF.PASS
'They neglect clarifying important issues.' [from the www]

(20) Deponiet foreslås å bli lagt til et område ...
depot.DEF suggest.PRES.PASS to become.INF place.PART to an area
'They suggest that the depot be placed in an area ...' [from the www]

(21) Verket ble forsøkt å bli stoppet.
publication.DEF become.PST try.PART to become.INF stop.PART
'They tried to stop the publication.' [from the www]

The acceptability of (19)-(21) might be a bit uncertain to some speakers. However, in the Norwegian NoWaC-corpus, with 700 million words from web texts, about 30% of the sentences with voice agreement had (at least) one periphrastic passive. The contrast to pseudocoordinations is clear. Voice

[7] Note that long passives are different from what is usually called 'complex passives' in Scandinavian grammar (see e.g. Christensen 1991, Engh 1994, Ørsnes 2006). An example of a complex passive is (i).

(i) Forsøket aktes utført i Bergen
experiment.DEF intend.PRES.PASS carry.out.PART in Bergen
'They intend to carry out the experiment in Bergen.' [from the www]

The complex passive construction has a passive participle (with no auxiliary) as its second verb, while long passives have an infinitive. Complex passives have properties that are different from long passives (Lødrup 2014b). I assume that complex passives are raising sentences (Christensen 1991, Ørsnes 2006), and that they do not involve reanalysis.

agreement with one periphrastic and one morphological passive is impossible in pseudocoordinations, as shown in examples (12) and (14) above, repeated here as (22)-(23).

(22) *Men det blir sittet og produseres.
but there become.PRES sit.PART and produce.PRES.PASS

(23) *Men det sittes og blir produsert.
but there sit.PRES.PASS and become.PRES produce.PART

English and French may also be argued to have voice agreeing long passives, even if they are not often discussed in the literature. Whitman (2013) gives several English text examples, e.g. (24).

(24) .. others were attempted to be killed.

Grevisse and Goosse (2008:986) give some French examples of long passives with feature agreement. Other examples can easily be found on the French web, such as (25).

(25) le problème a été tenté d'être résolu ..
the problem have.3SG.PRES be.PART try.PART to be.INF solve.PART
'They have tried to solve the problem.' [from the www]

Voice agreeing long passives can also be found in Turkish (Kornfilt 1996, 1999) and in some Austronesian languages (Wurmbrand 2013 and references therein).

## 3. The account for the reanalysis case

Reanalysis and complex predicates have been important research topics in LFG (se e.g. Butt 1995, Alsina 1996, Andrews and Manning 1999, Sells 2004). The technicalities are not in focus here. As is often the case in LFG, the distinction between c-structure and f-structure is crucial to the analysis. Reanalysis is not reflected directly at c-structure, which is assumed to be a standard biclausal structure with subordination. Example (26) is assumed to have the c-structure (27).[8]

(26) Dette forsøkes å gjøres.
this try.PRES.PASS to do.INF.PASS
'They try to do this.'

[8] The structure of the Norwegian infinitive raises some questions that cannot be discussed here. See e.g. Åfarli and Eide (2003:164-168).

```
(27)        IP
           /  \
        DP     I'
     dette   / \
            I    VP
     forsøkes |
                 IP
                /  \
              I      VP
              å       |
                      V
                   gjøres
```

What is important is that a reanalysis verb such as *forsøke* 'try' has the option of combining with its embedded verb to form a complex predicate. Example (26) is assumed to have a monoclausal f-structure such as (28) (simplified).

(28)

$$\begin{bmatrix} \text{PRED 'try-do <(}\uparrow\text{SUBJ)>'} \\ \text{SUBJ [PRED 'this']} \\ \text{PASSIVE +} \\ \text{VFORM PRESENT} \end{bmatrix}$$

An important insight, which can be found within both LFG (Niño 1997, Sells 2004) and Minimalism (Wiklund 2001, 2007) is that verbal feature agreement occurs in sentences with reanalysis. This follows without any extra rules or stipulations in LFG, as shown by Niño (1997) and Sells (2004). In the monoclausal f-structure of a sentence with reanalysis, both verbs can contribute verbal features at the top level. Two instances of a grammatical feature such as PASSIVE unify. This means that there can be two of them with the same value, or just one. In the long passive (29), both verbs have the passive suffix -*s*.[9]

(29) Dette forsøkes å gjøres.
this try.PRES.PASS to do.INF.PASS
'They try to do this.'

[9] Note that the feature agreement with reanalysis is different from the case of 'distributed exponence' in Wambaya which is discussed in Nordlinger and Bresnan (1996), Bresnan (2001:134-41) and other places. In Wambaya, tense markers can appear in two places in the clause, and it is their combination that determines the tense value of the sentence as a whole.

When the f-structure is monoclausal, both passive verbs contribute [PASSIVE +] to the top level of the f-structure, and these features unify. The infinitive is traditionally seen as the unmarked form of the verb, and it is assumed here that an active infinitive does not have any features — which means that it does not contribute [PASSIVE -]. A sentence such as (30), similar to (29), but without feature agreement, then also gets the f-structure (28) above.

(30) Dette forsøkes å gjøre.
this try.PRES.PASS to do.INF
'They try to do this.'

Sells (2004) accounts for a case of voice agreement in Scandinavian which is somewhat different from the one discussed here. In a sentence such as (31), a raising verb governing a passive verb agrees with its dependent in passivity. This is assumed to be a reanalysis sentence (see also Julien and Lødrup 2013), and it is accounted for in the same way as the passives discussed here.

(31) Dette behøves ikke å gjøres.
this need.PRES.PASS not to do.INF.PASS
'This does not have to be done.'

The next issue is how to account for agreement in sentences with one or two periphrastic passives such as (19)-(21). This raises the question of the treatment of auxiliaries, which is a classic topic both in LFG and other theories. Auxiliaries have been treated both as verbs and as functional heads (e.g. Butt et al. 1996, Dyvik 1999, Frank and Zaenen 2004, Sells 2004, Falk 2008). To account for voice agreement, it is necessary to assume that the passive auxiliary is a functional head without a PRED, which only contributes grammatical features to f-structure (Butt et al. 1996, Frank and Zaenen 2004, Falk 2008). I assume the same analysis for the perfect auxiliary.

With the functional head analysis, the relevant auxiliaries do not head an f-structure, they only contribute grammatical features at the same level as the main verb (Butt et al. 1996, Frank and Zaenen 2004). This analysis gives a morphological passive and a periphrastic passive basically the same f-structure (with the option of using a feature to distinguish them). Both the passive suffix and the passive auxiliary contribute a passive feature, which unifies with another passive feature when there is agreement. This means that sentences with voice agreement such as (32)-(34), corresponding to (26), but with one or two periphrastic passives, also have the f-structure (28).

(32) Dette forsøkes å bli gjort.
this try.PRES.PASS to become.INF do.PART

(33) Dette blir forsøkt å gjøres.
this become.PRES try.PART to do.INF.PASS

(34) Dette blir forsøkt å bli gjort.
this become.PRES try.PART to become.INF do.PART

This account of voice agreement works without any special rules or stipulations in LFG. There are, however, problems with overgeneration. The account given predicts that feature agreement should be possible with all verbal features in all reanalysis sentences; there is no place for economy.

For some varietes of Norwegian, the account given could be a good approximation of the real situation (see section 1). There is, however, both linguistic and sociolinguistic variation, and the account would overgenerate for most speakers. An unfortunate prediction is that a long passive can realize passivity with the second verb only (which is actually possible with sentences such as (31) above). This is impossible with long passives — either the first verb or both verbs must be passive. Overgeneration can be avoided with optimality restrictions, as in Sells (2004).

## 4. The account for pseudocoordinations

Pseudocoordinations require a different account. Agreement in pseudocoordinations concerns the inflectional form only. Treating pseudo-coordinations as complex predicates the same way as long passives would not give the correct results. It would predict the ungrammatical examples (12) and (14) above, repeated here as (35)-(36), to be grammatical, because the morphological and periphrastic passive realizations would agree in the monoclausal f-structure.

(35) *Men det blir sittet og produseres.
but there become.PRES sit.PART and produce.PRES.PASS

(36) *Men det sittes og blir produsert.
but there sit.PRES.PASS and become.PRES produce.PART

Wiklund (2007) gives an account of verbal feature agreement in pseudocoordinations which is based upon the assumption that they are reanalysis sentences.[10] However, she does not consider voice agreement.

[10] Wiklund (2007:89-91) assumes a version of reanalysis which does not necessarily result in a complex predicate in a monoclausal structure; the subordinate clause is then reduced in some way (see also Wurmbrand 2001:10-15).

The differences between agreement in pseudocoordinations and reanalysis sentences make different accounts necessary. Treating pseudocoordinations as reanalysis sentences would not give the correct results concerning voice agreement. It is necessary to take a critical look at the assumption that pseudocoordinations are reanalysis sentences. This assumption is common in the literature on Scandinavian pseudo-coordinations, with somewhat different implementations (see e.g. Bodomo 1997:260-70, Cardinaletti and Giusti 2001, Wiklund 2001, 2007, Hesse 2009:33-89, Kjeldahl 2010, Hansen and Heltoft 2011:980). Arguments against this view can be found in Lødrup (2002, and especially 2014a).

I assume that all pseudocoordinations have the same c-structure. The tree in (37) is the c-structure for *Han sitter og leser* 'he sits and reads'.[11] The grammatical word *og* (literally 'and') is assumed to be in the position of the infinitival marker (as in Wiklund 2007). (But see note 8.)

```
(37)      IP
         /  \
       DP    I'
      han   /  \
           I    VP
        sitter   |
                 IP
                /  \
               I    VP
              og     |
                     V
                   leser
```

My position is that different groups of pseudocoordinations have different grammatical properties. I assume that some pseudocoordinations are reanalysis sentences; a good example is the type with *ta* 'take' as a first verb

[11] A problem for this analysis, which seems to have no simple solution, is the following: It predicts the sentence adverb to precede the second verb, which is impossible with a finite verb in a main clause, such as (i).

(i)*Han sitter og ikke leser.
he sit.PRES and not read.PRES

On the other hand, a sentence adverb can precede the second verb in all other cases, cf. (ii), with non-finite verbs, and (iii), with a subordinate clause.

(ii) Han vil sitte og ikke lese.
he will.PRES sit.INF and not read.INF
'He will sit without reading.'

(iii) Hvis han sitter og ikke leser ..
if he sit.PRES and not read.PRES
'If he sits without reading ..'

(Lødrup 2002, 2014, Vannebo 2003). An example is (38), with the simplified f-structure (39).

(38) Hun tok og kysset ham.
she take.PST and kiss.PST him
'She suddenly kissed him.'

(39)

$$\left[\begin{array}{l} \text{PRED 'take-kiss <(}\uparrow\text{SUBJ) (}\uparrow\text{OBJ)>'} \\ \text{SUBJ [PRED PRO ]} \\ \text{OBJ [PRED PRO ]} \\ \text{VFORM PRETERIT} \end{array}\right]$$

With other verbs, pseudocoordinations can occasionally be found that show evidence for reanalysis (Lødrup 2014a). However, most pseudo-coordinations are assumed to be biclausal subordination constructions, with a simplified f-structure such as (40).

(40)

$$\left[\begin{array}{ll} \text{PRED} & \text{'sit <(}\uparrow\text{SUBJ) (}\uparrow\text{XCOMP)>'} \\ \text{SUBJ} & \text{[PRED PRO ]} \\ \text{XCOMP} & \left[\begin{array}{l} \text{SUBJ} \\ \text{PRED 'read <(}\uparrow\text{SUBJ)>'} \end{array}\right] \\ \text{VFORM} & \text{PRETERIT} \end{array}\right]$$

For simplicity, the focus is here on the common type of pseudocoordinations with posture verbs as first verbs. There are several arguments against reanalysis for these pseudocoordinations, including the following.

Argument 1: A general condition on reanalysis is that the two verbs do not have independent time reference (see e.g. Wurmbrand 2001:79-99). Pseudocoordinations allow independent time reference. Examples are (15)-(16) above, reproduced as (41)-(42), in which the first part of the pseudocoordination is in the present, and the second part in the future and the perfect, respectively. (This option has been claimed not to exist, see Cardinaletti and Giusti 2001:386, Wiklund 2007:121, Kjeldahl 2010:74-75.)

(41) sitter og skal holde kurs de neste tre timene
sit.PRES and shall.PRES hold.INF course the next three hours.DEF
'(I) am going to give a course the next three hours.' [from the www]

(42) Jeg sitter og har brukt opp datakvoten min
I sit.PRES and have.PRES use.PART up data.quota.DEF my
'I have filled my quota of data.' [from the www]

Argument 2: In reanalysis sentences, an adjunct modifies the whole complex predicate, and not just one of the verbs involved. In pseudocoordinations, an adjunct can modify one of the parts only, e.g. the time adverbial in (41) above, and the negation in (43). (This option has been claimed not to exist, see e.g. Anward 1988:6, Wiklund 2007:110, Kjeldahl 2010:46-48.)

(43) Da er det alltid en som sitter og ikke har det bra.
then be.PRES there always one that sit.PRES and not have.PRES it well
'Then there is always somebody who is not having a good time.'
[from the www]

Argument 3: In reanalysis sentences, the two verbs behave as a unit with respect to rules that operate on predicates. Pseudocoordinations, on the other hand, allow these rules to apply to one of the verbs, without affecting the other verb. A good example is the passive rule, as in (44). Another example is the rule for the presentational focus construction, in which the verb takes an expletive subject, and realizes its argument as an object (see e.g. Lødrup 1999).[12] An example is (45).

(44) Lillebror sitter i stolen og blir matet.
little.brother sit.PRES in chair.DEF and become.PRES feed.PART
'Little brother is fed sitting in the chair.'
(45) Det sitter en mann her og leser en bok.
there sit.PRES a man here and read.PRES a book
'A man is sitting here, reading a book.'

Argument 4: In reanalysis sentences, the two verbs constitute one predicate that takes one set of syntactic arguments. It can never be the case that e.g. the first verb takes one subject, while the second verb takes a different subject. Pseudocoordinations allow this situation. In (45) above, the expletive subject *det* 'there' is the subject of the first verb, but not of the second verb, which has *en mann* 'a man' as its understood subject (via functional control, see the f-structure (40)).

We see then that pseudocoordinations with posture verbs are not reanalysis sentences. (The same argumentation applies to most other pseudo-coordinations.)

[12] A different analysis of the presentational focus construction is proposed in Börjars and Vincent (2005). I am not sure if the argument based on (45) would work with their analysis.

Another difference between reanalysis sentences and pseudocoordinations is that the agreeing forms keep their regular morphosyntactic content in pseudocoordinations, but not in reanalysis sentences. Examples of reanalysis sentences are (46)-(47), with imperative and preterit agreement, respectively.

(46) Slutt å les!
stop.IMPER to read.IMPER
'Stop reading!'

(47) jeg prøvde å leste det lure smilet hennes.
I try.PST to read.PST the sly grin.DEF her
'I tried to read her sly grin.' [from the www]

The imperative/preterit morphology on the first verb is 'real', in that it has the regular content of imperative/preterit morphology. However, the morphology on the second verb is 'fake', its regular content is not active. The same phenomenon can be seen with voice agreement, the two passive suffixes in (48) only reflect one passivization.

(48) Dette forsøkes å gjøres.
this try.PRES.PASS to do.INF.PASS
'One tried to do this'

In pseudocoordinations, on the other hand, the forms in the second part keep their regular morphosyntactic content, as in (49)-(51).

(49) Sitt og les!
sit. IMPER and read.IMPER
'Sit and read!'

(50) John satt og leste en bok
John sit.PST and read.PST a book
'John sat reading a book'

(51) Men det sittes og produseres ..
but there sit.PRES.PASS and produce.PRES.PASS
'One sits and produces.' [from the www]

The requirement for agreement in pseudocoordinations can be stated at the level of f-structure or m-structure (Butt et al. 1996). What is needed is an annotation with each verb that takes pseudocoordinations saying that its dependent verb should have the same inflectional form as itself.

## 5. Discussion

It was shown that there are two different ways that verbs might be said to agree. Verbal features are usually not focused upon in discussions of agreement. Corbett (2006:138-141), a monograph on agreement, mentions tense, aspect, mood and polarity in a section entitled "Unusual agreement features". Agreement in passivity is not mentioned at all.

One difference between the two cases discussed is that the reanalysis type can involve periphrastic forms, while the pseudocoordination type only involves word forms. Corbett (2006:13-14) writes that agreement is expressed canonically through inflectional morphology, but he does not rule out other options (Corbett 2006:13-14, 75-76, 268). The periphrastic passive is of course not inflectional, but it must be considered that it alternates with the morphological passive — which is inflectional. (However, this alternation is not present in all languages with agreeing periphrastic passives, cf. the English and French examples (24) and (25) above.)

An intuition concerning agreement is that different agreement forms of a lexeme (e.g. English present tense *walk* and *walks*) do not have different content — apart from the differing restrictions on the argument they agree with. The forms of the agreeing verbs discussed in this paper are not primarily agreement forms in that sense. They all have a primary use with a regular morphosyntactic content (tense, mood, diathesis). A striking difference between the two cases discussed here was discussed on the previous page: The regular morphosyntactic content of the agreements target is not active in reanalysis sentences, while it is active in pseudocoordinations. This fact contributes to making agreement in pseudocoordinations more different from regular agreement.

Another difference between the two types, which must be related to the absence or presence of regular morphosyntactic content, concerns optionality. Verbal feature agreement with reanalysis is optional in Norwegian, and varies between speakers. In pseudocoordinations, on the other hand, agreement is always obligatory.

The mechanisms behind the agreement are very different for the two cases. With the reanalysis type, the agreement 'comes from below', in that the verbal feature specifications unify in a monoclausal f-structure. With the pseudocoordination type, on the other hand, the agreement 'comes from above', in that there is an agreement requirement associated with the verbal head of the pseudocoordination.

Agreement in pseudocoordinations gives the impression of being something special. It does not follow from other grammatical properties. Lødrup (2002) argues that pseudocoordinations can be control sentences, raising sentences, or complex predicates. It is not easy to see what these subconstructions have in common other than the requirement for identical verb forms. This requirement seems to be a stipulation for a construction that is not well understood, and it is not clear that it should be considered agreement. Verbal feature agreement in sentences with reanalysis is very different. It follows by itself in an LFG approach to reanalysis, and the results here only strengthen the insights from Niño (1997) and Sells (2004).

## Corpus

NoWaC (Norwegian Web as Corpus)
http://www.hf.uio.no/iln/om/organisasjon/tekstlab/prosjekter/nowac/index.html
When searching in the NoWaC corpus, I went through the Glossa page:
http://hf-tekstlab.uio.no/glossa2/front

## References


Åfarli, Tor A. and Kristin Melum Eide. 2003. *Norsk generativ syntaks*. Oslo: Novus.

Alsina, Alex. 1996. *The Role of Argument Structure in Grammar: Evidence from Romance*. Stanford, CA: CSLI Publications.

Andrews, Avery D. and Christopher D. Manning. 1999. *Complex Predicates and Information Spreading in LFG*. Stanford, CA: CSLI Publications.

Anward, Jan. 1988. Verb-verb agreement in Swedish. *McGill Working Papers in Linguistics. Special Issue on Comparative Germanic Syntax*, 123-55.

Bodomo, Adams B. 1997. *Paths and Pathfinders: Exploring the Syntax and Semantics of Complex Verbal Predicates in Dagaare and Other Languages*. Dissertation. The Norwegian University of Science and Technology.

Börjars, Kersti and Nigel Vincent. 2005. Position versus function in Scandinavian presentational construction. In Miriam Butt and Tracy Holloway King (eds.) *Proceedings of the LFG05 Conference*, 54-72. Stanford CA: CSLI Publications.

Bresnan, Joan. 2001. *Lexical-Functional Syntax*. Oxford: Blackwell, 2001.

Butt, Miriam. 1995. *The Structure of Complex Predicates in Urdu*. Stanford, CA: CSLI Publications.

Butt, Miriam, Maria-Eugenia Niño and Frédérique Segond. 1996. Multilingual processing of auxiliaries in LFG. In Dafydd Gibbon (ed.) *Natural Languages Processing and Speech Technology*, 111-122. Berlin: Mouton de Gruyter. (Reprinted in Louisa Sadler and Andrew Spencer (eds.) *Projecting Morphology*, 11-22. Stanford, CA: CSLI Publications.)

Cardinaletti, Anna and Giuliana Giusti. 2001. "Semi-lexical" motion verbs in Romance and Germanic. In *Semi-lexical Categories*, Norbert Corver and Henk van Riemsdijk (eds.), 371-414. Berlin: Mouton de Gruyter.

Christensen, Kirsti Koch. 1991. Complex passives reanalysed. *Working Papers in Scandinavian Syntax* 48, 45 - 75.

Cinque, Guglielmo. 2006. *Restructuring and Functional Heads*. Oxford: Oxford University Press.

Corbett, Greville G. 2006. *Agreement*. Cambridge University Press.

Dyvik, Helge. 1999. The universality of f-structure: discovery or stipulation? The case of modals. In Miriam Butt and Tracy Holloway King (eds.) *Proceedings of the LFG99 Conference*. Stanford, CA: CSLI Publications.

Eide, Kristin Melum. 2011. The ghost of the Old Norse subjunctive: The Norwegian subjunctive participle. *Groninger Arbeiten zur germanistischen Linguistik* 53(2): 1-28. http://gagl.eldoc.ub.rug.nl

Endresen, Rolf Theil. 1995. Norwegian *og* and *å* - a cognitive view. *Nordic Journal of Linguistics* 18(2): 201-18.

Engdahl, Elisabet. 2006. Semantic and syntactic patterns in Swedish passives. In *Demoting the Agent*, Benjamin Lyngfelt and Torgrim Solstad (eds.), 21–45. Amsterdam: John Benjamins.

Enger, Hans-Olav. 2000. Verbendelsen -s i norsk bokmål: Bøying eller avledning? *Norsk Lingvistisk Tidsskrift* 18(1): 9–36.

Engh, Jan. 1994. *Verb i passiv fulgt av perfektum partisipp: Bruk og historie*. Oslo: Novus.

Faarlund, Jan Terje, Svein Lie and Kjell Ivar Vannebo. 1997. *Norsk referansegrammatikk*. Oslo: Universitetsforlaget.

Falk, Yehuda. 2008. Functional relations in the English auxiliary system. *Linguistics* 46(5): 861-889.

Frank, Anette and Annie Zaenen. 2004. Tense in LFG: Syntax and morphology. In Louisa Sadler and Andrew Spencer (eds.) *Projecting Morphology*, 23-65. Stanford, CA: CSLI Publications.

Grevisse, Maurice and André Goosse. 2008. *Le bon usage: Grammaire française*. Paris: De Boeck.

Hansen, Erik and Lars Heltoft. 2011. *Grammatik over det danske sprog. Volume II: Syntaktiske og semantiske helheder*. København: Det Danske Sprog- og Litteraturselskab.

Hesse, Andrea. 2009. *Zur Grammatikalisierung der Pseudokoordination im Norwegischen und in den anderen skandinavischen Sprachen*. Tübingen: Francke.

Julien, Marit and Helge Lødrup. 2013. Dobbel passiv og beslektede konstruksjoner i skandinavisk. *Norsk lingvistisk tidsskrift* 31(2): 221-46.

Kjeldahl, Anne. 2010. *The Syntax of Quirky Verbal Morphology*. Dissertation. Department of English, University of Aarhus.

Kornfilt, Jaklin. 1996. NP-Movement and 'Restructuring'. In Robert Freidin (ed.) *Current Issues in Comparative Grammar*, 121-147. Dordrecht: Kluwer Academic Publishers.

Kornfilt, Jaklin. 1999. Das Fernpassiv im Türkischen und im Deutschen. In Lars Johanson and Jochen Rehbein (eds.) *Türkisch und Deutsch im Vergleich*, 153-170. Wiesbaden: Harossowitz.

Laanemets, Anu. 2013. The passive voice in spoken and written Danish, Norwegian and Swedish: A comparative corpus-based study. *Languages in Contrast* 13(1): 67–89.

Lødrup, Helge. 1999. Linking and optimality in the Norwegian presentational focus construction. *Nordic Journal of Linguistics* 22(2): 205-229.

Lødrup, Helge. 2002. The syntactic structures of Norwegian pseudocoordinations. *Studia Linguistica* 56(2): 121-143.

Lødrup, Helge. 2014a. There is no reanalysis in Norwegian pseudocoordinations (except when there is). In Hans Petter Helland and Christine Meklenborg Salvesen (eds.) *Affaire(s) de grammaire: Mélanges offerts à Marianne Hobæk Haff à l'occasion de ses soixante-cinq ans*, 43-65. Oslo: Novus.

Lødrup, Helge. 2014b. Long passives in Norwegian: Evidence for complex predicates. *Nordic Journal of Linguistics* 37(3): 367-391.

Lundquist, Björn. 2013. The role of tense-copying and syncretism in the licensing of morphological passives in the Nordic languages. http://ling.auf.net/lingbuzz/001902

Niño, Maria-Eugenia. 1997. The multiple expression of inflectional information and grammatical architecture. In Francis Corblin, Danièle Godard and Jean-Marie Marandin (eds.) *Empirical Issues in Formal Syntax and Semantics*, 127-47. Bern: Peter Lang.

Nordlinger, Rachel and Bresnan, Joan. 1996. Nonconfigurational tense in Wambaya. In Miriam Butt and Tracy Holloway King (eds.) *Proceedings of the LFG'96 Conference*, Stanford, CA: CSLI Publications.

Ørsnes, Bjarne. 2006. Creating raising verbs: An LFG-analysis of the complex passive in Danish. In Miriam Butt and Tracy Holloway King (eds.) *Proceedings of the LFG06 Conference*, 386-405. Stanford, CA: CSLI Publications.

Ross, John R. 1967. *Constraints on Variables in Syntax*. Dissertation. MIT.

Sells, Peter. 2004. Syntactic information and its morphological expression. In Louisa Sadler and Andrew Spencer (eds.) *Projecting Morphology*, 187–225. Stanford, CA: CSLI Publications.

Teleman, Ulf, Staffan Hellberg and Erik Andersson. 1999. *Svenska akademiens grammatik. Volume 4*. Stockholm: Svenska Akademien.

Tonne, Ingebjørg. 2001. *Progressives in Norwegian and the Theory of Aspectuality*. Dissertation, Faculty of Arts, University of Oslo.

Vannebo, Kjell Ivar. 2003. *Ta og ro deg ned noen hakk*: on pseudocoordination with the verb *ta* 'take' in a grammaticalization perspective. *Nordic Journal of Linguistics* 26(2): 165-193.
Western, August. 1921. *Norsk riksmåls-grammatikk*. Kristiania: Aschehoug.
Whitman, Neal. 2013. Double passives. Unpublished paper, Ohio State University.
Wiklund, Anna-Lena. 2001. Dressing up for vocabulary insertion: the parasitic supine. *Natural Language and Linguistic Theory* 19(1): 199-228.
Wiklund, Anna-Lena. 2007. *The Syntax of Tenselessness*. Berlin: Mouton de Gruyter.
Wurmbrand, Susanne. 2001. *Infinitives: Restructuring and Clause Structure*. Berlin: Mouton de Gruyter.
Wurmbrand, Susi. 2013. Complex predicate formation via voice incorporation. http://ling.auf.net/lingbuzz/001968

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# GLUING MEANINGS AND SEMANTIC STRUCTURES

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**Abstract**

This paper explores the role of semantic structures in glue in the light of recent proposals regarding the internal content of these structures. I propose to 'split' meaning constructors into two, enabling a proper account of the dual role of semantic structures within glue expressions. This effects a solution to the granularity problem, which has long plagued treatments of information structure within LFG.

# 1 Introduction

The development of the 'glue' language as a means for resource-sensitive semantic composition can be counted the single most important development within LFG since the formulation of the theory by Kaplan and Bresnan (1982). Since the original proposals by Dalrymple et al. (1993), glue has become the established means of mediating the syntax-semantics interface within LFG, and thus of integrating a developed semantic representation into the LFG architecture; it has also been successfully applied to other grammatical frameworks (e.g. to LTAG by Frank and van Genabith 2001, and to HPSG by Asudeh and Crouch 2002).

The intuitions underlying glue have remain unchanged since its development, but the formal system itself has changed. The original form of glue as proposed by Dalrymple et al. (1993) was replaced by a formally simpler system (Dalrymple et al. 1996), which was the first glue system to gain wide currency. A 'new' glue notation was introduced by Dalrymple et al. (1999a), and this is now the standard form of glue met with in recent literature, not least due to its use in Dalrymple (2001). Only a few authors, such as Andrews (2004, 2008, 2010) and Kokkonidis (2008), have proposed significant changes to the standard glue approach, but no such proposals have been widely adopted.

In this paper I explore the role of semantic structures in glue in the light of recent proposals regarding the internal content of these structures and their use in relation to i(nformation)-structure. I propose to 'split' meaning constructors into two, in order to properly account for the dual role of semantic structures within glue expressions. This also results in a solution to the long-standing problem with analyses of i-structure in LFG, the so-called 'granularity problem'. I also explore the possibility of integrating my proposals with the structureless First-Order glue of Kokkonidis (2008).

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## 2 Associating meanings with s-structures

In glue, semantic composition is achieved by the pairing of meanings with instructions for combining those meanings. These pairings are represented as meaning constructors; most meaning constructors are associated with lexical items, but some can be introduced outside the lexicon, e.g. in c-structure (Dalrymple 2001: 240). So, the meaning constructors in (2) are associated with the lexical entries of the words in (1); (2a) with *Henry*, and (2b) with *slept*, of course. Both meaning constructors consist of two 'sides': the meaning side, to the left of the colon, and the glue side, to the right. The composition of these meanings, $henry$ and $\lambda x.sleep(x)$, is determined by the glue expressions paired with these meanings. The glue expression paired with the meaning of the verb requires that this meaning be combined with a meaning for the subject of the verb in order to produce a coherent meaning for the clause. Meaning composition such as this is specified by reference to f-structure; on the basis of an f-structure such as (3) the meaning of the verb can be applied to the meaning $henry$, to produce the meaning $sleep(henry)$.

(1) Henry slept.

(2) a. $henry : \uparrow_\sigma$

b. $\lambda x.sleep(x)$ :
$(\uparrow \textsc{subj})_\sigma \multimap \uparrow_\sigma$

(3)
$$s{:}\begin{bmatrix} \textsc{pred} & \text{`sleep}\langle\textsc{subj}\rangle\text{'} \\ \textsc{subj} & h{:}\begin{bmatrix} \textsc{pred} & \text{`Henry'} \end{bmatrix} \end{bmatrix}$$

Used in this way, the glue expressions that appear on the right-hand side of meaning constructors are essentially a means of constraining semantic composition by reference to f-structure. They therefore reflect Montague's (1974) original intuition that the order of semantic composition is based on syntax (albeit not the sort of syntax Montague had in mind).

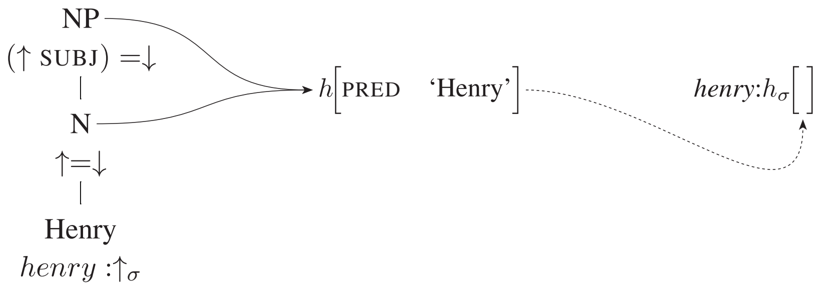
It is possible to use glue successfully, and in very detailed and complex ways, without considering glue expressions in any other way than that just described, i.e. as the means of constraining and determining semantic composition. However, this is not the whole story. The basic elements of glue expressions are formulae like $\uparrow_\sigma$ or $(\uparrow \textsc{subj})_\sigma$; these formulae refer to *semantic structures*. These s(emantic)-structures are projected from f-structures via the projection function $\sigma$ (Kaplan 1987, 1989), and thus provide the means by which semantics is integrated into the projection architecture.

A meaning constructor such as that in (2a) associates a meaning with an s-structure, via the glue expression with which the meaning is paired.[1] So $\uparrow_\sigma$ in the meaning constructor in (2a), for example, refers to an s-structure projected from the f-structure $\uparrow$, i.e. the f-structure projected from the preterminal node of the

[1]In 'old' style glue, meanings were directly associated with s-structures, as described by Dalrymple et al. (1997, 1999b), and as explicitly represented in the symbolism ($\uparrow_\sigma \rightsquigarrow meaning$). In the 'new' glue format, this association is indirect, via the pairing of meanings with glue expressions that refer to s-structures, but this difference is not entirely clear from the presentations in e.g. Dalrymple (2001) or Dalrymple and Nikolaeva (2011: 72).

c-structure which dominates the word concerned. Example (4) provides a partial configuration for (1), showing the c-structure and f-structure for the subject noun phrase *Henry*; the s-structure $h_\sigma$ is projected from the f-structure $h$, and it is this s-structure with which the meaning $henry$ is associated by the meaning constructor $henry : \uparrow_\sigma$.

(4)




It is a moot point whether s-structures are inherently typed; typing of s-structures is in some sense irrelevant, since it is always directly inferrable from the meaning side of a meaning constructor, and since type alone never serves to distinguish one s-structure from another. Either way, in the current formulation of glue all s-structures are of, or correspond to meanings of, type $e$ or type $t$. Only meanings of type $e$ or $t$, then, can be associated with a *single* structure. More complex meanings are not associated with a single semantic structure, but with a relation, usually involving linear implication, between two or more structures. So the meaning $\lambda x.sleep(x)$ in (2b) is of type $\langle e \to t \rangle$, and accordingly the glue expression with which it is paired expresses a linear implication from an s-structure of type $e$ (i.e. $h_\sigma$ in 4) to an s-structure of type $t$, which is the semantic structure for the clause.

## 3 Features in s-structure

Glue expressions therefore have two related but distinct functions: they specify how meanings can be combined, and they do this by associating meanings with semantic structures. While the former function is naturally of considerable importance in any glue work, the latter function has been somewhat overlooked.

The association of meanings with s-structures has perhaps been ignored because very little information generally appears in s-structures. The initial motivation for s-structures was the need for more information in the semantic projection than simply the meanings projected from f-structure. In the original glue system of Dalrymple et al. (1993) meanings were directly projected from f-structures via $\sigma$, but semantic structures were introduced as a point of mediation between f-structure and meaning by Dalrymple et al. (1996), "because in general semantic projections carry more information than just the association to the meaning for the corresponding f-structure." For Dalrymple et al. (1996) this involved internally complex s-structures for nouns, with further s-structures embedded under the attributes VAR and RESTR. Another long-standing s-structure feature is ANTECEDENT, used in anaphoric binding equations (Asudeh 2012: 69–71). Other phenomena also require s-structures to be embedded within other s-structures, including e.g. treatments of tense and aspect in glue (e.g. Fry 2005, Haug 2008, Lowe 2015), and the proposals of Asudeh and Giorgolo (2012) that argument structure relations be captured in semantic structure. Besides this embedding, however, no other features are traditionally assumed to appear in s-structure, meaning that any semantic derivation will necessarily involve a number of empty s-structures.[2] In comparison with f-structures, then, s-structures seem distinctly less purposeful. Some authors, such as Andrews (2007, 2008, 2010) and Kokkonidis (2008: discussed in §7), have proposed alternative models of glue which lack semantic structures.

A more significant role for s-structures is envisaged by Dalrymple and Nikolaeva (2011), in their proposals regarding i-structure in LFG. They propose that semantic structures are the locus for expressing i-structural and discourse-relevant properties of the elements of meaning in a sentence. For example, Dalrymple and Nikolaeva (2011: 79) rewrite the meaning constructor *john*:$\uparrow_\sigma$, appearing in a particular linguistic context where it is identifiable and topical, as follows:

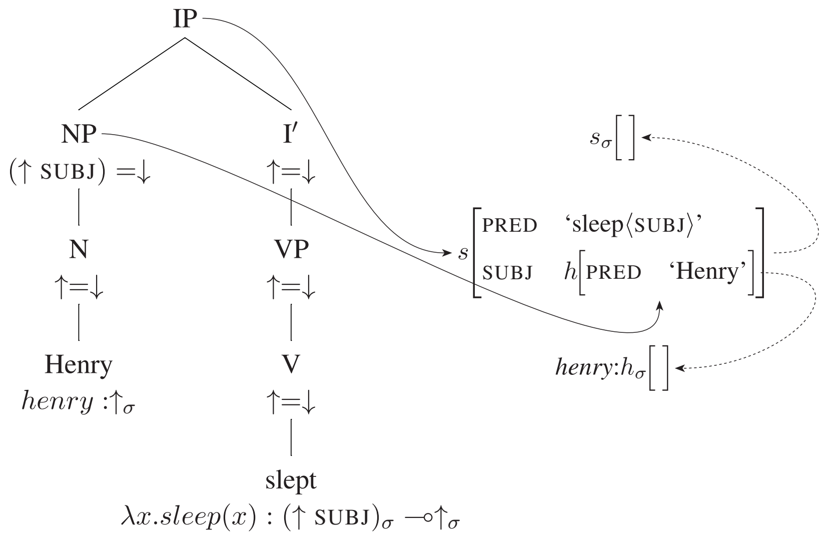
(5) $$john: \begin{bmatrix} \text{ANIMATE} & + \\ \text{HUMAN} & + \\ \text{STATUS} & \text{IDENTIFIABLE} \\ \text{ACTV} & \text{ACTIVE} \\ \text{DF} & \text{TOPIC} \end{bmatrix}$$

The meaning $john$ is associated with an s-structure, just like the meaning $henry$ in (4) above. This structure is not empty, however, but contains a variety of features relating to the discourse status of the meaning. The meaning $john$ in the context they assume has animate, human reference, is identifiable and active in the discourse, and is a topic at i-structure. These features relate to the meaning, not the corresponding syntactic unit, and are relevant not at the level of syntax but at the level of the discourse; they are therefore most appropriately represented at semantic structure and not, for example, at f-structure.

Using s-structures to represent discourse-relevant features such as these potentially opens up new avenues for the analysis of semantic and discourse phenomena in LFG. However, there are limitations to the use of s-structures in this way. A simple $e$ type meaning such as a proper name is, as discussed above, associated with a single s-structure. But more complex meanings are not directly associated with a single structure. Consider again the sentence in (1); we can assume the simplified c-structure, f-structure and s-structure for this sentence provided in (6).

[2] As observed by Dalrymple apud Kokkonidis (2008: 63), this is formally problematic since empty structures would ordinarily be considered indistinguishable.

(6)




There are two s-structures involved in the analysis of this clause: $h_\sigma$, projected from the f-structure for the subject (as in 4), and $s_\sigma$, projected from the f-structure for the clause and verb. The semantic composition proceeds by reference to only these two structures: instantiating the variables in the glue expressions, the premises are $h_\sigma$ and $h_\sigma \multimap s_\sigma$, from which we can conclude $s_\sigma$. The meaning associated with $h_\sigma$ is $henry$, and the meaning associated with $s_\sigma$ is the meaning that we conclude: $sleep(henry)$. But this means that we can only express discourse-relevant properties of these two meanings; there is no corresponding structure for the meaning of the verb: it is not directly associated with either structure, but with a relation between the two structures.

The same problem will of course apply to any meaning that is more complicated than a simple $e$ or $t$ type. As we will see, there are many complex meanings to which discourse-relevant properties can be attributed, such that some strategy is needed for circumventing the lack of appropriate s-structures. Before proposing such a strategy, I will discuss how Dalrymple and Nikolaeva (2011) license the application of s-structure features to complex meanings, albeit in a limited way.

# 4 I-structure features and the verb

In exemplifying their model of i-structure, Dalrymple and Nikolaeva (2011: 91) categorize a complex meaning, specifically a verbal meaning of similar form to that in (2b), at i-structure on the basis of their s-structure DF feature. The way in which they achieve this is limited in its potential application, however. I illustrate their analysis using the sentence in (1), taking the subject *Henry* to be topical and the verb to be in focus. The meaning constructors in (7) are taken to produce the i-structure in (8); the f-structure labels are the same as in (6).

(7) a. *henry* : $h_\sigma$[DF TOPIC]

b. $\lambda x.sleep(x) : h_\sigma \multimap s_\sigma[\text{DF FOCUS}]$

(8) $\begin{bmatrix} \text{TOPIC} & \Big\{ henry : h_\sigma \Big\} \\ \text{FOCUS} & \Big\{ \lambda x.sleep(x) : h_\sigma \multimap s_\sigma \Big\} \end{bmatrix}$

The critical line is (7b). The meaning constructor $\lambda x.sleep(x) : h_\sigma \multimap s_\sigma$, and by implication the meaning $\lambda x.sleep(x)$, is categorized in the focus set at i-structure by virtue of the feature DF FOCUS appearing in the s-structure $s_\sigma$. The rule that achieves this is the rule of i-structure categorization associated with all meanings in the lexicon:

(9) **meaning-constructor** $\in (\uparrow_{\sigma\iota}\ (\uparrow_\sigma\ \text{DF}))$

In the sentence under discussion, $s$ is the f-structure for the clause, with PRED 'sleep⟨SUBJ⟩'. The s-structure $\uparrow_\sigma$ for the verb is therefore $s_\sigma$, and so the feature DF FOCUS in $s_\sigma$ means that, by (9), the verbal meaning constructor is correctly categorized in the FOCUS set at i-structure.

While this is formally unproblematic, certain problems can be raised. Firstly, as stated, Dalrymple and Nikolaeva (2011) categorize the meaning constructor for *sleep* (7b) as part of the FOCUS set at i-structure by virtue of the feature DF FOCUS appearing in the s-structure $s_\sigma$. But, as should now be clear, the meaning $\lambda x.sleep(x)$ itself is not the meaning that is associated with $s_\sigma$. $s_\sigma$ is (associated with a meaning) of type $t$, while $\lambda x.sleep(x)$ is of type $\langle e \rightarrow t \rangle$. The meaning associated with the s-structure $s_\sigma$ is the meaning that results from applying $\lambda x.sleep(x)$ to the meaning of the subject, i.e. $sleep(henry)$. For Dalrymple and Nikolaeva (2011) this does not matter, because they are not concerned with categorizing the meaning $sleep(henry)$, nor the meaning constructor $sleep(henry) : s_\sigma$, at i-structure: they are categorizing only the lexically introduced meaning constructors in (7), and since $\uparrow_\sigma$ for the verb is $s_\sigma$, everything works out.

Looking back to (5), the appearance of discourse-relevant features in an s-structure was taken to represent features of the meaning associated with that structure. But this is not how Dalrymple and Nikolaeva (2011) use the DF feature that appears in $s_\sigma$: it is not used to express that the full clausal meaning $sleep(henry)$ has discourse function FOCUS at i-structure, only that the verb does. So the feature DF FOCUS in $s_\sigma$ does not express any property of $s_\sigma$, but is used to categorize a different meaning (albeit a meaning that constitutes a part of $s_\sigma$) at i-structure. Although, as stated, this works perfectly well for their purposes, the analysis given by Dalrymple and Nikolaeva (2011: 91) implies the following meaning constructor:

(10) *sleep(henry)*:$\begin{bmatrix} \text{DF} & \text{FOCUS} \end{bmatrix}$

But while the feature DF TOPIC in (5) implies that the meaning *john* is in the TOPIC set at i-structure, the equivalent feature in (10) does not have the same implication for the meaning $sleep(henry)$. For Dalrymple and Nikolaeva (2011), then, the feature DF is of a different order from other s-structure features such as appear in (5). While features like ANIMATE $+$ and ACTV ACTIVE are semantically contentful and represent specific discourse features of the associated meaning, the DF feature is simply a label that is used to categorize lexically introduced meanings at i-structure, a label that has no semantic content and does not necessarily represent a discourse-relevant feature of the meaning with which it is associated.

It is a less elegant model that admits two types of s-structure feature, one contentful and applicable to the meaning associated with the s-structure in which it appears, the other not contentful and not applicable to the associated meaning. More seriously, however, Dalrymple and Nikolaeva's use of DF implies that there can be only one i-structure categorization for all meanings (or meaning constructors) projected from a single f-structure. Since $\sigma$ is a function, an f-structure can be associated with at most one s-structure, and since there can be only a single DF feature in any one s-structure, all meanings associated with an f-structure must share the same i-structure categorization. This causes no problem when dealing with simplified verbal meanings like $\lambda x.sleep(x)$ and with proper name meanings like $henry$. But problems do arise under attempts to treat more complex semantic analyses.

Under an event semantic approach to verbal meanings, for example, a word like *slept* would have not the single meaning constructor in (2b), but could have the four in (11): (11a) represents the basic verbal meaning; (11b) represents perfective aspect; (11c) represents past tense; and (11d) represents finiteness, functioning to close off the open temporal variable.[3]

(11) a. $\lambda x.\lambda e.sleep(e) \wedge theme(e,x) : (\uparrow \text{SUBJ})_\sigma \multimap (\uparrow_\sigma \text{EV}) \multimap \uparrow_\sigma$
b. $\lambda P.\lambda t.\exists e.P(e) \wedge \tau(e) \prec t : ((\uparrow_\sigma \text{EV}) \multimap \uparrow_\sigma) \multimap (\uparrow_\sigma \text{RT}) \multimap \uparrow_\sigma$
c. $\lambda P.\lambda t'.\exists t.P(t) \wedge t \subseteq t' : ((\uparrow_\sigma \text{RT}) \multimap \uparrow_\sigma) \multimap (\uparrow_\sigma \text{PT}) \multimap \uparrow_\sigma$
d. $\lambda P.\exists t.P(t) : ((\uparrow_\sigma \text{PT}) \multimap \uparrow_\sigma) \multimap \uparrow_\sigma$

Since all these meanings are part of the lexical meaning of the verb, they must be introduced in the lexical entry of the verb. As such, they will all be projected from the same f-structure, i.e. the f-structure for which the verb provides the PRED. The same is true of periphrastic verb forms, at least those that are best analysed using a monoclausal rather than multiclausal f-structure. According to Falk (2003, 2008), supportive *do*, perfective *have*, and the modals *will*, *shall* and *would* are feature-carriers that do not head their own f-structure, while progressive *be* and the other modals are argument-taking predicates that do head their own f-structures.[4] This means that the f-structures for all the sentences in (12) will be structurally parallel to that in (3): there is only the outer f-structure, corresponding to the verb/clause, and one embedded f-structure, corresponding to the subject. This is exemplified in (13) for (12d).

[3]This assumes, for the sake of argument, that the English simple past is a past perfective category. The meanings constructors here are based on Haug (2008) and Lowe (2012, 2015).

[4]Dyvik (1999) argues for a similarly varied approach to Norwegian auxiliaries and modals.

(12) a. Henry did sleep.
b. Henry has slept.
c. Henry will sleep.
d. Henry will have slept.

(13) $$\left[\begin{array}{ll} \textsc{pred} & \text{`sleep}\langle\textsc{subj}\rangle\text{'} \\ \textsc{tense} & \textsc{future} \\ \textsc{aspect} & \textsc{perfective} \\ \textsc{subj} & \left[\begin{array}{ll}\textsc{pred} & \text{`Henry'}\end{array}\right] \end{array}\right]$$

The problem with Dalrymple and Nikolaeva's (2011) use of DF for i-structure categorization is that, since there is only a single f-structure corresponding to a periphrastic verb form like *will have slept*, all elements of the verb's meaning, including the basic verbal meaning and tense and aspect, must be categorized in the same set at i-structure. But it is perfectly possible for an auxiliary like *have*, or a modal like *will*, to be focused while the lexical verbal meaning is topical or backgrounded.

(14) Q. Have you found it?
A. I *had* found it (but I lost it again).

(15) Q. Have you read my paper?
A. No, but I *will* read it soon.

An i-structure analysis of (14), for example, should be able to categorize the meaning of past tense as 'in focus', but the other elements of the verbal meaning, including the basic lexical meaning, as backgrounded.[5]

Even on a more simple model that ignores tense and aspect, it is necessary to be able to distinguish the part of a verb's meaning that expresses the occurrence of an event from the part that expresses the event type (the basic verbal meaning). The answer in (16) is about Anna doing something; the fact that Anna did something is therefore not part of the focused material in the clause. What is focused is the nature, the kind, of the event that Anna undertook.[6] This can be analysed under a simplified event semantics, ignoring tense and aspect and assuming only two separate meaning constructors for the verb form *hit*, as in (17). The meaning constructor labelled **hit** will be categorized as 'in focus' at i-structure, whereas that labelled **event** will not. But under Dalrymple and Nikolaeva's model, there is no way to distinguish these meanings at i-structure, since both will be associated with the same f-structure and by implication with the same s-structure.

(16) Q. What did Anna do?
A. Anna hit Norman.

[5] I pass over here the problematic question of the tense and aspect properties of the English 'perfect', which have been widely discussed, e.g. by Bauer (1970), McCawley (1981), Klein (1992), Michaelis (1994), Kiparsky (2002), Katz (2003), Mittwoch (2008), and Meyer-Viol and Jones (2011).

[6] This intuition comes originally from Mycock (2009).

(17) a. **hit**: $\lambda y.\lambda x.\lambda e.hit(e) \wedge agent(e,x) \wedge patient(e,y)$ : $(\uparrow \text{OBJ})_\sigma \multimap (\uparrow \text{SUBJ})_\sigma \multimap (\uparrow_\sigma \text{EV}) \multimap \uparrow_\sigma$

b. **event**: $\lambda P.\exists e.P(e)$ : $((\uparrow_\sigma \text{EV}) \multimap \uparrow_\sigma) \multimap \uparrow_\sigma$

Similarly, simple verbal negation does not usually involve a separate structure at f-structure, merely a feature such as POLARITY $-$, but it is incontestable that English *not*, for example, can be focused in separation from the verbal meaning it negates.

The problem may also extend to the categorization of non-verbal meanings. In (18), the answer is about the fact that some person or set of people ruined the economy, and the focused meaning, which supplies the information requested in the question, is who that person or set of people is.

(18) Q. Who ruined the economy?

A. Socialists ruined the economy.

It is therefore necessary to distinguish the part of the meaning of *Socialists* that refers to the existence of an entity from the part that refers to what kind of entity we are dealing with.[7] But there is only a single f-structure corresponding to *Socialists*, and only a single s-structure projected from that f-structure, which means that under Dalrymple and Nikolaeva's (2011) proposals all meaning constructors associated with this word must be categorized in the same way at i-structure, despite the information structural differences between the entity and entity-kind parts of the word's meaning.[8]

These problems are a manifestation of the long-standing problem of i-structure analysis is LFG, the so-called 'granularity problem'. Originally, this term referred to the fact that f-structure does not have sufficient granularity to be used as a basis for i-structure distinctions (King 1997). Most obviously, there is no f-structure that contains the verb and not also all of its arguments and adjuncts, so any model of i-structure that is based on f-structure is unable to represent phenomena such as narrow verb focus, or even the focusing of a verb and one, but not all, of its arguments.

Dalrymple and Nikolaeva's (2011) model of i-structure uses s-structure as the basis of i-structure categorization. Since it is a projection of f-structure, s-structure is (under normal assumptions) no more fine-grained. As described above, however,

[7]The distinction between the part of a noun's meaning that refers to the existence of an entity, and the part that refers to the kind of entity, was captured by the original use of the s-structure attributes VAR and RESTR in the 'old-style' glue formulation of Dalrymple et al. (1997: 236): "The value of VAR will play the role of *restr-arg*, supplying an entity-type variable, and the value of RESTR will play the role of *restr* in the meaning constructor of the determiner [≈ a common noun meaning]." In 'new-style' glue, however, while VAR and RESTR remain, they no longer formally capture this distinction, since no lexically introduced meanings are directly associated with them.

[8]In the case of nouns with a determiner in English, it may be possible to make such a distinction by associating the reference to the existence of an entity with the determiner rather than with the noun itself, as long as SPEC is assumed to take an f-structure, not an atomic label, as its value.

Dalrymple and Nikolaeva set up their formalism in such a way as to permit the distinction of a verb from its arguments, by using the clausal s-structure to categorize the verbal meaning constructor and not the clausal meaning. But their model is unable to make finer information structural distinctions; in particular, it is unable to distinguish different parts of the meaning of a single word.

The other major model of i-structure in LFG is that of King (1997) and Butt and King (1997). As a way to avoid the granularity problem, they propose that i-structure be projected from c-structure, since c-structure does have sufficient granularity to distinguish a verb from its dependents. However, c-structure is also insufficiently fine-grained to permit different parts of a single word to be distinguished, since the granularity of c-structure is by definition restricted to the word level.[9]

To summarize the points made in this section, Dalrymple and Nikolaeva (2011) use the s-structure DF feature as a label to categorize both simple $e$ or $t$ type meanings, and more complex meanings, at i-structure. However, the means by which this is achieved has limitations: all meaning constructors projected from a single f-structure must necessarily be categorized in the same way at i-structure, which does not permit finer information structural distinctions to be made between different elements of verbal or nominal meanings. Their model therefore succumbs to a form of the granularity problem (which also equally affects the other major approach to i-structure in LFG).[10] Furthermore, all s-structures are of type $e$ or $t$, so there are no s-structures in which *contentful* discourse features (as opposed to mere labels, like DF) of more complex meanings can be represented.

## 5 Complex-typed structures

Both these problems would disappear if every lexically introduced meaning, including those of complex type, were directly associated with a single semantic structure in the same way as the meaning $john$ is associated with a single s-structure in (5). As discussed above, however, under common assumptions (e.g. in Dalrymple 2001) all s-structures are (or are associated with) simple types, that is $e$ or $t$, and complex meanings like $\lambda x.sleep(x)$ are not associated with a single s-structure but with a relation between multiple s-structures.

One way to look at this problem is that it derives from the dual function of glue expressions: glue expressions state constraints on semantic composition, but they do this by associating meanings with semantic structures or with relations between semantic structures. If the association with structures is treated merely as a feature of the architecture, and structures themselves as largely empty and little more than book-keeping devices, this dual functionality is unproblematic. But when, as proposed by Dalrymple and Nikolaeva (2011), the association with

[9]Moreover, the projection of i-structure from c-structure does not reflect the fact that i-structure is closely related to semantic structure and meaning (Mycock 2009).

[10]An approach to i-structure that incorporates the insights made here and consequently avoids the graularity problem altogether is proposed by Lowe and Mycock (2014).

semantic structures is used to provide a means for representing discourse-relevant features of meanings, a conflict arises with their other function: where a meaning is complex, the constraints on its composition with other meanings will involve reference to more than one s-structure, with the result that the glue expression cannot associate the meaning itself with a single s-structure, and there is nowhere for discourse-relevant features to be represented.

This conflict can be resolved by decomposing glue expressions of the traditional sort into two expressions, one of which functions to associate a meaning with a single semantic structure and the other of which states the necessary constraints on semantic composition.[11] I therefore propose that instead of a meaning constructor like (19), we in fact have two meaning constructors, as in (20).

(19) $\lambda x.sleep(x) : (\uparrow \textsc{subj}) \multimap \uparrow_\sigma$

(20) a. $\lambda x.sleep(x) : (\uparrow_\sigma \text{ REL})$

b. $\lambda P.P : (\uparrow_\sigma \text{ REL}) \multimap (\uparrow \textsc{subj})_\sigma \multimap \uparrow_\sigma$

In (20a), the meaning $\lambda x.sleep(x)$ is associated with a single, uniquely labelled, s-structure.[12] This structure can then be used in whatever way required to specify the i-structure categorization of the verbal meaning. A meaning constructor like this does not, however, include the necessary information for constraining semantic composition. It must therefore be composed with a meaning constructor that does contain the necessary information, as in (20b). This meaning constructor has an identity function on the meaning side, so it effectively makes no contribution to the meaning. Its glue expression, on the other hand, takes as input the same uniquely labelled structure as in (20a), and outputs a glue expression of the 'usual' sort, complete with the necessary information for correct semantic composition. The meaning constructor in (19) is the product of the application of (20b) to (20a); meaning constructors of the 'usual' sort can therefore be treated as compositions of two more basic meaning constructors.

[11] The decomposition of meaning constructors in the context of functional conflicts similar to this has a good pedigree in glue; cf. in particular the decomposition of adjectival meanings to permit recursive modification, as described by Dalrymple (2001: 264–269).

[12] Insofar as s-structures are typed (or at least associated with types), the uniquely labelled s-structures proposed here can be of complex type (when paired with a complex meaning on the meaning side of the glue expression). The s-structure $(\uparrow_\sigma \text{ REL})$ in (20), for example, represents (or is) type $\langle e \to t\rangle$, since the meaning $\lambda x.sleep(x)$ is of this type. That is, to repeat (20) with types explicitly indicated:

(i) a. $\lambda x.sleep(x) : (\uparrow_\sigma \text{ REL})_{\langle e\to t\rangle}$

b. $\lambda P.P : (\uparrow_\sigma \text{ REL})_{\langle e\to t\rangle} \multimap (\uparrow \textsc{subj})_{\sigma\langle e\rangle} \multimap \uparrow_{\sigma\langle t\rangle}$

In the case of a transitive verb, the uniquely labelled structure paired with it would be of (or would represent) type $\langle e \to \langle e \to t\rangle\rangle$, and so on. Ordinarily, s-structures are assumed to represent only simple types, but there is nothing to prevent the assumption of complex-typed structures. In the following, I do not explicitly represent or discuss the typing; the interested reader can easily infer types from the meaning side.

We cannot treat $\uparrow_\sigma$ as the uniquely labelled structure for any word, since in the case of a verb $\uparrow_\sigma$ is associated with a meaning of type $t$, while in the case of a noun it may be associated with a meaning of type $e$. I therefore make use of the s-structure attribute REL, using $(\uparrow_\sigma \text{ REL})$ as the uniquely labelled structure for verbal meanings. This differs somewhat from the use of the s-structure attribute REL by e.g. Asudeh et al. (2008, 2013), but shares the same intuition that $(\uparrow_\sigma \text{ REL})$ refers to the basic verbal meaning, specifying the kind of event referred to by the verb. We likewise require an embedded s-structure (i.e. not $\uparrow_\sigma$) to use as the uniquely labelled structure for the basic meanings of other kinds of words, such as nouns and adjectives. For consistency, I propose $(\uparrow_\sigma \text{ REL})$ be used for the basic meaning of all words.[13] For example, the basic meaning of a noun like *student* is composed of the two meaning constructors in (21). Similarly, for the basic lexical meaning of an adjective like *old*, I assume the two meaning constructors in (22).[14] Meaning constructors for the determiner *the* are given in (23).[15]

(21) a. $\lambda x.student(x) : (\uparrow_\sigma \text{ REL})$
b. $\lambda P.P : (\uparrow_\sigma \text{ REL}) \multimap (\uparrow_\sigma \text{ VAR}) \multimap (\uparrow_\sigma \text{ RESTR})$

(22) a. $\lambda x.old(x, P) : (\uparrow_\sigma \text{ REL})$
b. $\lambda P.P : (\uparrow_\sigma \text{ REL}) \multimap (\uparrow_\sigma \text{ VAR}) \multimap \uparrow_\sigma$

(23) a. $\lambda P.\lambda Q.\iota x.P(x) \wedge Q(x) : (\uparrow_\sigma \text{ REL})$
b. $\lambda P.P : \forall\alpha.(\uparrow_\sigma \text{ REL}) \multimap (((\text{SPEC} \uparrow)_\sigma \text{VAR}) \multimap ((\text{SPEC} \uparrow)_\sigma \text{RESTR})) \multimap ((\text{SPEC} \uparrow)_\sigma \multimap \alpha) \multimap \alpha$

[13] An alternative, which would avoid positing an embedded s-structure, would be for the basic lexical meaning of all words to be associated with $(\uparrow \text{ PRED})_\sigma$ (which would, satisfyingly, restore some value to the label 'semantic form'). I avoid this, however, since embedded s-structures are required for words with more than one component to their meaning, as discussed in the next section; assuming an embedded structure $(\uparrow_\sigma \text{ REL})$ here too results in a more consistent model.

[14] A consequence of the proposals made here is that the use of $(\uparrow_\sigma \text{ VAR})$ and $(\uparrow_\sigma \text{ RESTR})$ in the meaning constructors for nouns and adjectives is no longer necessary. That is, $(\uparrow_\sigma \text{ REL})$ in (21) and (22) alone represents the complexity of the noun and adjective meanings (which is the only thing VAR and RESTR do in 'new' glue: cf. fn. 12). The meaning constructors in (21b) and (22b), then, are strictly speaking unnecessary, but I retain them for consistency with more traditional glue analyses, so that glue expressions of the 'usual' sort can always be derived by composition of the lexical meaning with the identity function. Furthermore, as discussed in Lowe (2013), the basic lexical meanings of adjectives, and possibly also nouns, need to be combined with other meaning constructors in particular syntactic contexts in order to compose correctly with other meanings. For example, a meaning constructor like $\lambda x.old(x, P) : (\uparrow_\sigma \text{ VAR}) \multimap \uparrow_\sigma$, which is the composition of (22a) and (22b), must be combined with one meaning constructor in order to function as a modifier, and with another in order to function as the main predication in a nominal sentence. Since they are dependent on syntactic context, these additional meaning constructors must be introduced in the syntax, i.e. we are dealing with constructional meanings (Lowe 2013: 407). Therefore the function of the meaning constructors in (21b) and (22b) can alternatively be covered by the constructionally introduced meaning constructors, confirming their superfluity.

[15] It is not clear that *all* meaning constructors of the 'standard' sort need to be split: constructional meanings, for example, do not participate in discourse relations in the same way as lexical meanings, so it may be unnecessary to assume single structures with which to associate them.

The s-structure referred to by the glue term $(\uparrow_\sigma\ \text{REL})$ will be unique to each lexical element in a clause; $(\uparrow_\sigma\ \text{REL})$ appears in both the (a) and (b) meaning constructors for any word, ensuring that each identity meaning combines with the correct lexical meaning.

As a simple example, I analyse the sentence in (24). The f-structure and s-structures are provided in (25); the important point here is the presence of the s-structures embedded under the REL attributes. The glue proof for the sentence is given in Fig. (1), based on the meaning constructors provided above and instantiating the metavariables according to the labels in (25). It proceeds in entirely parallel manner to a ‘regular’ glue derivation of this sentence, since the two meaning constructors assumed for each word compose into a single meaning constructor of the ‘usual’ form.

(24) The student read.

(25)

$$r\begin{bmatrix} \text{PRED} & \text{‘sleep}\langle\text{SUBJ}\rangle\text{’} \\ \text{SUBJ} & s\begin{bmatrix}\text{PRED} & \text{‘student’}\\ \text{SPEC} & t\begin{bmatrix}\text{PRED} & \text{‘the’}\end{bmatrix}\end{bmatrix}\end{bmatrix} \qquad r_\sigma\begin{bmatrix}\text{REL} & [\ ]\end{bmatrix}$$

$$t_\sigma\begin{bmatrix}\text{REL} & [\ ]\end{bmatrix} \qquad s_\sigma\begin{bmatrix}\text{REL} & [\ ]\\ \text{VAR} & [\ ]\\ \text{RESTR} & [\ ]\end{bmatrix}$$

## 6 Multiple meanings per word

The proposal thus far solves the problem that complex meanings are not associated with a single s-structure, by introducing uniquely labelled structures with which they can be associated. The examples given in the previous section treat all words as contributing only one meaning, which in each case is associated with an s-structure $(\uparrow_\sigma\ \text{REL})$ of appropriate type. As discussed above, however, it is sometimes necessary to distinguish different parts of the meaning of a single word (including periphrastic verb forms), such as the tense and aspect meanings of a verb, or the entity and entity-kind meanings of a noun.

Essentially, we can assume as many uniquely labelled structures as necessary for a particular word, i.e. as many as the number of meaning constructors assumed. The inventory of meaning constructors, and therefore uniquely labelled structures, required for any particular word or word type may vary according to the level of semantic detail required and possibly the semantic representation used, but the principle remains the same. These structures will be embedded within the s-structure projected from the f-structure associated with the word concerned, just like the

Figure 1: Glue proof for (24)

$$
\dfrac{
\dfrac{
\dfrac{\lambda x.student(x) : (s_\sigma\ \textsc{rel}) \qquad \lambda P.P : (s_\sigma\ \textsc{rel}) \multimap (s_\sigma\ \textsc{var}) \multimap (s_\sigma\ \textsc{restr})}{\lambda x.student(x) : (s_\sigma\ \textsc{var}) \multimap (s_\sigma\ \textsc{restr})}
\qquad
\dfrac{\lambda P.\lambda Q.\iota x.P(x) \wedge Q(x) : (t_\sigma\ \textsc{rel}) \qquad \lambda P.P : (t_\sigma\ \textsc{rel}) \multimap ((s_\sigma\ \textsc{var}) \multimap (s_\sigma\ \textsc{restr})) \multimap (s_\sigma \multimap r_\sigma) \multimap r_\sigma}{\lambda P.\lambda Q.\iota x.P(x) \wedge Q(x) : ((s_\sigma\ \textsc{var}) \multimap (s_\sigma\ \textsc{restr})) \multimap (s_\sigma \multimap r_\sigma) \multimap r_\sigma}
}{\lambda Q.\iota x.student(x) \wedge Q(x) : (s_\sigma \multimap r_\sigma) \multimap r_\sigma}
\qquad
\dfrac{\lambda x.read(x) : (r_\sigma\ \textsc{rel}) \qquad \lambda P.P : (r_\sigma\ \textsc{rel}) \multimap s_\sigma \multimap r_\sigma}{\lambda x.read(x) : s_\sigma \multimap r_\sigma}
}{\iota x.student(x) \wedge read(x) : r_\sigma}
$$

value of ($\uparrow_\sigma$ REL), but must of course be values of different attributes. For example, if we assume a four-way division of verbal meaning into event-kind (i.e. the basic lexical meaning), aspect, tense and finiteness, as in (11), the four meanings concerned can be associated with the structures ($\uparrow_\sigma$ REL), ($\uparrow_\sigma$ ASP), ($\uparrow_\sigma$ TNS) and ($\uparrow_\sigma$ FIN) respectively.[16] The four meaning constructors in (11) can then be treated as compositions of the eight meaning constructors in (26).

(26) a. i. $\lambda x.\lambda e.sleep(e) \wedge theme(e,x) : (\uparrow_\sigma \text{REL})$
ii. $\lambda P.P : (\uparrow_\sigma \text{REL}) \multimap (\uparrow \text{SUBJ})_\sigma \multimap (\uparrow_\sigma \text{EV}) \multimap \uparrow_\sigma$
b. i. $\lambda P.\lambda t.\exists e.P(e) \wedge \tau(e) \prec t : (\uparrow_\sigma \text{ASP})$
ii. $\lambda P.P : (\uparrow_\sigma \text{ASP}) \multimap ((\uparrow_\sigma \text{EV}) \multimap \uparrow_\sigma) \multimap (\uparrow_\sigma \text{RT}) \multimap \uparrow_\sigma$
c. i. $\lambda P.\lambda t'.\exists t.P(t) \wedge t \subseteq t' : (\uparrow_\sigma \text{TNS})$
ii. $\lambda P.P : (\uparrow_\sigma \text{TNS}) \multimap ((\uparrow_\sigma \text{RT}) \multimap \uparrow_\sigma) \multimap (\uparrow_\sigma \text{PT}) \multimap \uparrow_\sigma$
d. i. $\lambda P.\exists t.P(t) : (\uparrow_\sigma \text{FIN})$
ii. $\lambda P.P : (\uparrow_\sigma \text{FIN}) \multimap ((\uparrow_\sigma \text{PT}) \multimap \uparrow_\sigma) \multimap \uparrow_\sigma$

Example (27) shows the embedding of s-structures that is implied by this in the analysis of (12d):

(27)

$$s\begin{bmatrix} \text{PRED} & \text{'sleep}\langle\text{SUBJ}\rangle\text{'} \\ \text{TENSE} & \text{FUTURE} \\ \text{ASPECT} & \text{PERFECTIVE} \\ \text{SUBJ} & h\begin{bmatrix}\text{PRED} & \text{'Henry'}\end{bmatrix} \end{bmatrix} \quad s_\sigma\begin{bmatrix} \text{REL} & \begin{bmatrix}\ \end{bmatrix} \\ \text{ASP} & \begin{bmatrix}\ \end{bmatrix} \\ \text{TNS} & \begin{bmatrix}\ \end{bmatrix} \\ \text{FIN} & \begin{bmatrix}\ \end{bmatrix} \end{bmatrix} \quad h_\sigma\begin{bmatrix}\text{REL} & \begin{bmatrix}\ \end{bmatrix}\end{bmatrix}$$

If we assume only a two-way division of verbal meaning into event and event-kind, as in (17), we require only two uniquely labelled structures; insofar as it provides existential closure for the verbal meaning(s) in the same way that finiteness does in the four-way division, we can treat the event meaning as associated with ($\uparrow_\sigma$ FIN). Negatives like English *not* can be associated with a structure ($\uparrow_\sigma$ NEG). Similarly, in order to capture the two parts of meaning of an indefinite plural like *Socialists* in (18b), we require reference to two distinct embedded structures, ($\uparrow_\sigma$ REL) for the basic lexical meaning, and ($\uparrow_\sigma$ ENT) for the existence of one or more entities. This can be achieved by assuming four meaning constructors in (28) for *Socialists*.[17]

(28) a. i. $\lambda x.Socialist(x) : (\uparrow_\sigma \text{REL})$

[16]These are alongside and in addition to the embedded stuctures usually assumed in treatments of event semantics, such as ($\uparrow_\sigma$ EV)/($\uparrow_\sigma$ EVENT) etc. (Fry 2005, Haug 2008, Lowe 2012, 2015, Asudeh 2012: 341–342); but see also §7.

[17]I ignore here the representation of plurality in the semantics.

ii. $\lambda P.P : (\uparrow_\sigma \text{ REL}) \multimap (\uparrow_\sigma \text{ VAR}) \multimap (\uparrow_\sigma \text{ RESTR})$

b. i. $\lambda P.\lambda Q.\exists x.P(x) \wedge Q(x) : (\uparrow_\sigma \text{ ENT})$

ii. $\lambda P.P : \forall \alpha.(\uparrow_\sigma \text{ ENT}) \multimap ((\uparrow_\sigma \text{ VAR}) \multimap (\uparrow_\sigma \text{ RESTR})) \multimap (\uparrow_\sigma \multimap \alpha) \multimap \alpha$

## 7 A first-order alternative

Kokkonidis (2008) discusses the development of glue and the place of s-structures within its different formulations. He argues that the assumption of a set of largely empty s-structures is questionable in the current glue formulation, and proposes a 'first-order' alternative that eliminates the need for s-structures. This structureless glue formulation is adopted by Bary and Haug (2011). In Kokkonidis' first-order glue, the terms of glue expressions are not semantic structures projected from f-structures, but the types $E$ and $T$, treated as base type constructors taking f-structure labels as arguments.[18] So in 'first-order' glue, the meaning constructor in (2b), repeated as (29), is replaced by the meaning constructor in (30). $E_{(\uparrow \text{SUBJ})}$ and $T_\uparrow$ are base types, and composition is constrained by the types in the glue expressions without any need for semantic structures as a mediation between syntax and meaning.

(29) $\lambda x.sleep(x) : (\uparrow \text{ SUBJ})_\sigma \multimap \uparrow_\sigma$

(30) $\lambda x.sleep(x) : E_{(\uparrow \text{SUBJ})} \multimap T_\uparrow$

Under the proposals of Dalrymple and Nikolaeva (2011), as discussed above, there are good reasons to retain s-structures, since they are the locus for representing discourse-relevant features of meanings. However, the 'splitting' of meaning constructors proposed in this paper leads to a functional split between different sorts of semantic structures. The proposed uniquely labelled s-structures, i.e. the embedded structures with which a meaning is associated in the lexicon, are the structures in which discourse-relevant features are represented. On the other hand most or all of the embedded s-structures previously assumed in glue, such as $(\uparrow_\sigma \text{ VAR})$, $(\uparrow_\sigma \text{ RESTR})$ etc., do not contain such features, since no meaning is directly associated with them.

It may therefore be possible under the present proposals to combine the more traditional projection of s-structures, and Dalrymple and Nikolaeva's (2011) use of s-structures for the representation of discourse features, with Kokkonidis' (2008) structureless first-order glue. This would involve retaining the meaning constructors proposed above that associate meanings with uniquely labelled structures such as $(\uparrow_\sigma \text{ REL})$, but altering the identity constructors so that they convert glue expressions referring to s-structures into first-order glue expressions. For example, in place of (20) above, we would have:

[18] Bary and Haug (2011) propose that base type constructors should not be limited to $E$ and $T$ but can include, for example, constructors referring to events, times, etc.

(31) a. $\lambda x.sleep(x) : (\uparrow_\sigma \text{ REL})$

b. $\lambda P.P : (\uparrow_\sigma \text{ REL}) \multimap E_{(\uparrow\text{SUBJ})} \multimap T_\uparrow$

Under such an approach, the only s-structures required in the semantic analysis would be those that can host discourse-relevant features and that are relevant for i-structure categorization, and also the s-structures in which those are embedded. Crucially, there would be no necessarily empty s-structures; this approach would therefore preserve this major advantage of Kokkonidis' model, while also permitting the use of s-structures to host discourse relevant features.

## 8 Conclusion

Semantic structures have been as it were the poor relation in LFG's projection architecture, their existence implied by all standard glue expressions but rarely considered to have any independent significance outside their function within those expressions. The use of s-structures to represent the discourse-relevant features of meanings, however, is an important step forward in the task of tackling discourse-level phenomena within LFG. In this paper I have demonstrated the need for a set of uniquely labelled, embedded semantic structures, in which the discourse-relevant features of complex meanings can be represented. I have proposed that meaning constructors of the 'standard' form be split, and be considered compositions of two separate meaning constructors, one of which associates the lexical meaning with an s-structure of the appropriate type, and another which converts the glue expression of the former into a glue expression of the 'standard' form. Furthermore, the proposal made here effects a solution to the so-called 'granularity problem' of i-structure analysis in LFG, by enabling semantic distinctions of any granularity to be made in s-structure.[19]

It could be asked what it really means to assume two meaning constructors for every lexically introduced meaning. In fact the 'split' proposed correlates neatly with the two components required for semantic composition: meaning and realization. One sort of meaning constructor introduces lexical meaning, while the other introduces the information necessary for composition of lexical meaning. Glue expressions of the 'standard' form have a dual function, to both associate meanings with semantic structures (and thereby introduce meaning into the grammar) and to express constraints on composition. But this dual functionality is problematic when it comes to representing discourse-relevant features in s-structure. By 'splitting' meaning constructors in the way proposed, these two functions are separated, and the problem is resolved.

[19]It is a separate question how i-structure analysis is formalized, as well as other discourse processes for which s-structures and s-structure features may be relevant, given the proposals made here. Specific proposals in this respect are made by Lowe and Mycock (2014).

## References

Andrews, Avery D. 2004. Glue logic versus Spreading Architecture in LFG. In Christo Mostovsky (ed.), *Proceedings of the 2003 Conference of the Australian Linguistics Society*, http://www.als.asn.au.

Andrews, Avery D. 2007. Input and Glue in OT-LFG. In Annie Zaenen, Jane Simpson, Tracy Holloway King, Jane Grimshaw, Joan Maling and Chris Manning (eds.), *Architectures, Rules and Preferences: Variations on Themes by Joan Bresnan*, pages 319–340, Stanford, CA: CSLI Publications.

Andrews, Avery D. 2008. The Role of PRED in LFG+Glue. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG08 Conference*, pages 47–67, Stanford, CA: CSLI Publications.

Andrews, Avery D. 2010. Propositional Glue and the Projection Architecture of LFG. *Linguistics and Philosophy* 33(3), 141–170.

Asudeh, Ash. 2012. *The Logic of Pronominal Resumption*. Oxford: Oxford University Press.

Asudeh, Ash and Crouch, Richard. 2002. Glue semantics for HPSG. In Frank van Eynde, Lars Hellan and Dorothee Beermann (eds.), *Proceedings of the 8th International HPSG Conference, Norwegian University of Science and Technology (3–5 August 2001)*, pages 1–19, Stanford, CA: CSLI Publications.

Asudeh, Ash, Dalrymple, Mary and Toivonen, Ida. 2008. Constructions with Lexical Integrity: Templates as the Lexicon-Syntax Interface. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG08 Conference*, pages 68–88, Stanford, CA: CSLI Publications.

Asudeh, Ash, Dalrymple, Mary and Toivonen, Ida. 2013. Constructions with Lexical Integrity. *Journal of Language Modelling* 1(1), 1–54.

Asudeh, Ash and Giorgolo, Gianluca. 2012. Flexible Composition for Optional and Derived Arguments. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG12 Conference*, pages 64–84, Stanford, CA: CSLI Publications.

Bary, Corien and Haug, Dag. 2011. Temporal anaphora across and inside sentences: the function of participles. *Semantics and Pragmatics* 4, *article 8*, 1–56.

Bauer, Gero. 1970. The English 'Perfect' reconsidered. *Journal of Linguistics* 6(2), 189–198.

Butt, Miriam and King, Tracy Holloway. 1997. Null Elements in Discourse Structure. MS, University of Konstanz.

Dalrymple, Mary. 2001. *Lexical Functional Grammar*. San Diego, CA: Academic Press.

Dalrymple, Mary, Gupta, Vineet, Lamping, John and Saraswat, Vijay. 1999a. Relating Resource-based Semantics to Categorial Semantics. In Mary Dalrymple (ed.), *Semantics and Syntax in Lexical Functional Grammar*, pages 261–280, Cambridge, Mass.: MIT Press, also in *Proceedings of the Fifth Meeting on Mathematics of Language* (MOL5), Schloss Dagstuhl, Saarbrücken, Germany, August 1997.

Dalrymple, Mary, Lamping, John, Pereira, Fernando and Saraswat, Vijay. 1996. A Deductive Account of Quantification in LFG. In Makoto Kanazawa, Christopher J. Piñón and Henriette de Swart (eds.), *Quantifiers, Deduction and Context*, pages 33–57, Stanford, CA: CSLI Publications.

Dalrymple, Mary, Lamping, John, Pereira, Fernando and Saraswat, Vijay. 1997. Quantifiers, Anaphora and Intensionality. *Journal of Logic, Language and Information* 6, 219–273.

Dalrymple, Mary, Lamping, John, Pereira, Fernando and Saraswat, Vijay. 1999b. Overview and Introduction. In Mary Dalrymple (ed.), *Semantics and Syntax in Lexical Functional Grammar*, pages 1–37, Cambridge, Mass.: MIT Press.

Dalrymple, Mary, Lamping, John and Saraswat, Vijay. 1993. LFG Semantics via Constraints. In *Proceedings of the Sixth Conference of the European Chapter of the Association for Computational Linguistics*, pages 97–105, Association for Computational Linguistics.

Dalrymple, Mary and Nikolaeva, Irina. 2011. *Objects and Information Structure*. Cambridge: Cambridge University Press.

Dyvik, Helge J. J. 1999. The universality of f-structure: discovery or stipulation? The case of modals. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG99 Conference*, Stanford, CA: CSLI Publications.

Falk, Yehuda N. 2003. The English Auxiliary System Revisited. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG03 Conference*, pages 184–204, Stanford, CA: CSLI Publications.

Falk, Yehuda N. 2008. Functional Relations in the English Auxiliary System. *Linguistics* 46(5), 861–889.

Frank, Annette and van Genabith, Josef. 2001. GlueTag Linear Logic based Semantics for LTAG — and what it teaches us about LFG and LTAG —. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG01 Conference*, Stanford, CA: CSLI Publications.

Fry, John. 2005. Resource-logical Event Semantics for LFG. Draft MS, based on a paper originally presented at LFG99, University of Manchester.

Haug, Dag T. T. 2008. Tense and Aspect for Glue Semantics: The Case of Participial XADJ's. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG08 Conference*, pages 291–311, Stanford, CA: CSLI Publications.

Kaplan, Ronald M. 1987. Three Seductions of Computational Psycholinguistics. In P. Whitelock, M. M. Wood, H. L. Somers, R. Johnson and P. Bennett (eds.), *Linguistic Theory and Computer Applications*, pages 149–181, London: Academic Press.

Kaplan, Ronald M. 1989. The Formal Architecture of Lexical-Functional Grammar. In Chu-Ren Huang and Keh-Jiann Chen (eds.), *ROCLING II: Proceedings of the Computational Linguistics Conference*, pages 3–18, Tapei: The Association for Computational Linguistics and Chinese Language Processing.

Kaplan, Ronald M. and Bresnan, Joan. 1982. Lexical-Functional Grammar: A Formal System for Grammatical Representation. In Joan Bresnan (ed.), *The Mental Representation of Grammatical Relations*, pages 173–281, Cambridge, MA: MIT Press.

Katz, Graham. 2003. A Modal Account of the English Present Perfect Puzzle. In Robert B. Young and Yuping Zhou (eds.), *Proceedings of SALT XIII*, pages 145–161, Ithaca: CLC Publications.

King, Tracy Holloway. 1997. Focus Domains and Information-Structure. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG97 Conference*, Stanford, CA: CSLI Publications.

Kiparsky, Paul. 2002. Event Structure and the Perfect. In David I. Beaver, Luis D. Casillas Martínez, Brady Z. Clark and Stefan Kaufmann (eds.), *The Construction of Meaning*, pages 113–136, Stanford, CA: CSLI Publications.

Klein, Wolfgang. 1992. The Present Perfect Puzzle. *Language* 68(3), 525–552.

Kokkonidis, Miltiadis. 2008. First-Order Glue. *Journal of Logic, Language and Information* 17, 43–68.

Lowe, John J. 2012. The Syntax and Semantics of Tense-Aspect Stem Participles in Early R̥gvedic Sanskrit. D.Phil. thesis, University of Oxford.

Lowe, John J. 2013. (De)selecting Arguments for Transitive and Predicated Nominals. In Miriam Butt and Tracy Holloway King (eds.), *Proceedings of the LFG13 Conference*, pages 398–418, Stanford, CA: CSLI Publications.

Lowe, John J. 2015. *Participles in Rigvedic Sanskrit: The Syntax and Semantics of Adjectival Verb Forms*. Oxford: Oxford University Press.

Lowe, John J. and Mycock, Louise. 2014. Issues in the Representation of Information Structure. MS, University of Oxford.

McCawley, James D. 1981. Notes on the English Present Perfect. *Australian Journal of Linguistics* 1(1), 81–90.

Meyer-Viol, Wilfried P. M. and Jones, Howard S. 2011. Reference time and the English past tenses. *Linguistics and Philosophy* 34, 223–256.

Michaelis, Laura A. 1994. The ambiguity of the English present perfect. *Journal of Linguistics* 30(1), 111–157.

Mittwoch, Anita. 2008. The English Resultative perfect and its relationship to the Experiential perfect and the simple past tense. *Linguistics and Philosophy* 31, 323–351.

Montague, Richard. 1974. *Formal Philosophy: Selected Papers of Richard Montague*. New Haven: Yale University Press, edited by Richmond H. Thomason.

Mycock, Louise. 2009. “What Do You Do?”: Variation in Interrogative Predicates. Paper presented at the workshop “Blurring Component Boundaries: Levels of Analysis or Growth of Information?”, LFG09, Cambridge, July 2009.

# SYNTACTIC CATEGORIES IN THE CORRESPONDENCE ARCHITECTURE

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**Abstract**

Existing approaches to the notion of syntactic category in Lexical-Functional Grammar are either formally explicit but theoretically inadequate (Kaplan, 1987), or detailed but ill-integrated in the correspondence architecture (Bresnan, 2001; Toivonen, 2003). This paper develops a third approach, excising syntactic categories from the c-structure, modeling them as sets of privative features, and situating them in a corresponding x-structure. This allows for the elimination of X′ levels as theoretical primitives, while maintaining straightforward definitions of the notion of syntactic projection, of non-projecting words (Toivonen, 2003), and of endocentric structure–function mappings (Bresnan, 2001). An application of the system in the domain of paradigmatic morphology (Stump, 2001) is also suggested.

# 1 What's in a syntactic category

The internal structure of syntactic categories in Lexical-Functional Grammar is a topic which has received some attention in the literature. We find hints about the nature of this internal structure in Kaplan (1987: 351), writing about levels of representation:

> There's the constituent phrase structure, which varies across languages, where you have traditional surface structure [. . . ] and parts of speech labeling categories, *perhaps a feature system on those categories* (although in the case of LFG *if there is one it's a very weak one*). [emphasis added — JPM]

Kaplan does not exploit the possibility he alludes to in the quote above: in §2, following a short presentation of his formal model of LFG, I review his expositionally expedient adoption of atomic categorial symbols, and conclude that it is inadequate because it lacks the properties needed to define the notion of syntactic projection as currently understood. In this paper, after reviewing previous LFG models of syntactic categories, I take up Kaplan's idea by formulating a weak feature system for them, and exploring its consequences.

There are at least two distinct LFG-specific kinds of attempts at giving syntactic categories an internal structure: complex categories (Butt et al., 1999; Crouch et al., 2008) and the X′ theory of Bresnan (2001) and Toivonen (2003). In §3, I argue that complex categories are more a solution to an engineering problem than a theoretically interesting model. In §4, I point out that the X′-theoretic categories defined by Bresnan and Toivonen are both somewhat baroque and ill-integrated in the correspondence architecture.

In §5 I introduce the level of x-structure, from which X′-type relations can be derived, and infuse it with three privative categorial features. These features serve to define lexical and functional syntactic categories, and restate Bresnan and Toivonen's X′ theory:

c-structure rules, category types, combinatorial constraints on these categories, and universal endocentric structure–function mapping principles. However some problems remain, in particular an inability to distinguish between the functional categories I and C.

I demonstrate in §6 that a tweak of the formal properties of x-structure, with a slightly different assortment of categorial features, allows this deficiency to be remedied, with the ability to specify distinctions between inflectional categories as a side-effect; I offer speculation that this is a beneficial outcome.

## 2 The correspondence architecture of Lexical-Functional Grammar

This section recapitulates some foundational design principles of Lexical-Functional Grammar, setting up an apparatus for subsequent formal gymnastics.

In his exposition of the formal underpinnings of the LFG architecture, Kaplan (1987) proposes to model the grammatical mapping between sound and meaning as a function $\Gamma$ from a form to a meaning:

(1) $$\text{form} \bullet \xrightarrow{\Gamma} \bullet \text{ meaning}$$

The mapping is obviously complex, and stating it explicitly requires making generalizations of various types, which are best modeled in structural levels with congenial formal properties. Formally, we can assume that $\Gamma$ is the composition of functions which state correspondences between intermediate structural levels, for example:

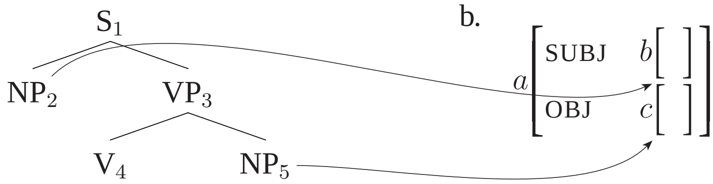
(2) $$\begin{tikzcd} \text{form} \bullet \arrow[r, "\pi"'] \arrow[rrr, bend left, "\Gamma = \psi \circ \phi \circ \pi"] & \bullet \arrow[r, "\phi"'] & \bullet \arrow[r, "\psi"'] & \bullet \text{ meaning} \end{tikzcd}$$

The precise assortment of correspondence functions and the structural levels they mediate is to be determined based on careful linguistic argumentation over relevant generalization types. As such we need a c-structure tree for modeling generalizations about constituency, linear order, and syntactic category; we need an f-structure for modeling generalizations about grammatical function, agreement, long-distance dependencies, binding, control, raising, etc.; and we need correspondence functions to serve as interfaces between these structural levels. Essentially, we factor generalizations out of $\Gamma$ and allocate them to structural levels according to their formal type and relationship to other generalizations.

## 2.1 Structural description

Trees and attribute–value matrices are merely visually perspicuous ways of displaying consistent STRUCTURAL DESCRIPTIONS. Thus the c- and f-structures in (3) are perspicuous visualizations the structural descriptions in (4).

(3) a. b.




In (4) $\mathcal{M}$ is a function from nodes to (their mother) nodes; $\mathcal{L}$ is a function from nodes to their category labels;[1] $\prec$ is a precedence relation between nodes with the same mother.

(4) a. $\mathcal{M}(n_2) = n_1 \quad \mathcal{L}(n_1) = \mathrm{S}$
$\mathcal{M}(n_3) = n_1 \quad \mathcal{L}(n_2) = \mathrm{NP}$
$n_2 \prec n_3 \quad \mathcal{L}(n_3) = \mathrm{VP}$

b. $\mathcal{M}(n_4) = n_3 \quad \mathcal{L}(n_3) = \mathrm{VP}$
$\mathcal{M}(n_5) = n_3 \quad \mathcal{L}(n_4) = \mathrm{V}$
$n_4 \prec n_5 \quad \mathcal{L}(n_5) = \mathrm{NP}$

c. $(a \text{ SUBJ}) = b$
$(a \text{ OBJ}) = c$

Notice that (4a) and (4b) are respectively S → NP VP and VP → V NP. Consequently we can use standard phrase structure grammar notation to abbreviate structural descriptions.

An f-structure is a recursive function from attributes to values, where values can themselves be such functions. In (4c), the structural description of (3b), $a$ is an f-structure (that of the sentence), as are $b$ and $c$ (the f-structures of the SUBJ and OBJ, formally the values of those attributes).

## 2.2 Structural correspondence

The correspondence between the c- and f-structure is specified in terms of the immediate dominance (motherhood) relation native to c-descriptions.

Let the symbol $*$ stand as a variable for a node, and let $\phi$ be a correspondence function from nodes into f-structures. Then $\phi(*)$ is the f-structure of $*$; $\mathcal{M}(*)$ is $*$'s mother, and $\phi(\mathcal{M}(*))$ is $*$'s mother's f-structure.

[1] Kaplan (1987) uses $\lambda$ to notate this function; I have changed the notation to eliminate the potential for confusing it with the $\lambda$ correspondence function from the a-structure to the f-structure, widely-accepted since Butt et al. (1997).

For notational perspicuity, Kaplan (1987) defines ↓ to stand for $\phi(*)$, and ↑ to stand for $\phi(\mathcal{M}(*))$. A grammar can then be formulated as follows:

(5) a. $\mathrm{S} \rightarrow \underset{(\uparrow \textsc{subj}) = \downarrow}{\mathrm{NP}} \quad \underset{\uparrow=\downarrow}{\mathrm{VP}}$ b. $\mathrm{VP} \rightarrow \underset{\uparrow=\downarrow}{\mathrm{V}} \quad \underset{(\uparrow \textsc{obj}) = \downarrow}{\mathrm{NP}}$

The functional schema annotations in (5a) read as: S's f-structure is (i) a function from the attribute SUBJ to the f-structure of NP, (ii) equal to the f-structure of VP.

## 2.3 Co-description

Now let $\phi(n_i) = f_i$ for every node $n_i$. Then (5) co-specifies the c- and f-descriptions in (6), which are equivalent to (4) given the following substitions: $a$ for $f_1 = f_3 = f_4$, $b$ for $f_2$, and $c$ for $f_5$.

(6) a.

| | | |
|---|---|---|
| $\mathcal{M}(n_2) = n_1$ | $\mathcal{L}(n_1) = \mathrm{S}$ | $(f_1 \textsc{ subj}) = f_2$ |
| $\mathcal{M}(n_3) = n_1$ | $\mathcal{L}(n_2) = \mathrm{NP}$ | $f_1 = f_3$ |
| $n_2 \prec n_3$ | $\mathcal{L}(n_3) = \mathrm{VP}$ | |

b.

| | | |
|---|---|---|
| $\mathcal{M}(n_4) = n_3$ | $\mathcal{L}(n_3) = \mathrm{VP}$ | $f_3 = f_4$ |
| $\mathcal{M}(n_5) = n_3$ | $\mathcal{L}(n_4) = \mathrm{V}$ | $(f_3 \textsc{ obj}) = f_5$ |
| $n_4 \prec n_5$ | $\mathcal{L}(n_5) = \mathrm{NP}$ | |

A partial lexical entry for the verb *yawns* might be something like:

(7) *yawns*

| | |
|---|---|
| $\mathcal{L}(\mathcal{M}(*)) = \mathrm{V}$ | 'My mother's category label is V' |
| $(\uparrow \textsc{ tense}) = \text{present}$ | 'My mother's f-structure's is present tense' |
| $(\uparrow \textsc{ subj pers}) = 3$ | 'My mother's subject's f-structure is 3rd person' |
| $(\uparrow \textsc{ subj num}) = \text{sg}$ | 'My mother's subject's f-structure is singular' |

Both this lexical entry and the c-structure rules in (5) co-describe the c-structure and the f-structure: statements about the c-structure and the f-structure appear in the context of each other.

Every rule or lexical entry is a set of statements about one or more structural levels; the grammar is the disjunction of all such sets; a sentence is grammatical only if this grammar is true of every single one of its parts.

## 2.4 Atomic syntactic categories

The relative simplicity of this formal model is appealing. However, the atomic approach to syntactic categories in Kaplan (1987), illustrated in (4) and (6), is obsolete and inadequate.

Taking a specific instance: the categories of $n_3$ and its daughter $n_4$ are respectively VP and V. These are displayed with a shared character 'V', and are implied to be a phrase or not by the presence or absence of a character 'P'. But these typographical conventions are just that, and in no way represent a formal assertion of relation (same category) and differentiation (distinct levels) within a syntactic PROJECTION.

To be exact: looking back at the tree in (3) and its structural description in either (4) or (6), there is no sense in which $\mathrm{V}_4$ is formally represented as the categorial head of $\mathrm{VP}_3$, or as projecting $\mathrm{VP}_3$. Nor does the specific formal model in Kaplan (1987) contain an implicit theory precluding a tree in which VP is the daughter and categorial head of V, or N the daughter and categorial head of VP.

In this treatment, no mechanism is specified for the sharing of categorial information between mother and daughter nodes, and consequently the notion of syntactic projection is left completely undefined.

# 3 Complex categories

Another take on syntactic categories in LFG is the concept of COMPLEX CATEGORY, as documented for XLE in Crouch et al. (2008). Complex categories are intended not as a theoretically interesting formal device, but rather as an efficiency-maximizing engineering solution to the problem of near-duplicate c-structure rules in industrial grammars. Because they do this by allowing a degree of information-sharing between mother and daughter nodes, and thus appear to have properties required to model the notion of projection, it is worth considering here whether this is in fact the case.

Complex categories are justified for ParGram grammars in Butt et al. (1999: 192) with the following examples and text, in which the phrase structure rule for `NP[_type]` is intended to generalize over standard, interrogative, and relative noun phrase subtypes (respectively `NP[std]`, `NP[int]`, `NP[rel]`):

(8) NP[_type] ⟶ { (D[_type]: _type = std )
| D[_type]: { _type = int | _type = rel } }
NPap.

(9) a. NP[std] ⟶ (D[std]) NPap.
b. NP[int] ⟶ D[int] NPap.

⋮

> The advantages of such parameterization over rules via the use of complex categories is that again large parts of rules can be shared across types of constructions that differ systematically in one respect, but which work in essentially the same way in other respects.

To explicate further: the upper rule expands `NP[_type]` to a determiner `D[_type]` followed by `NPap`, a noun phrase level within which adjective phrases attach. There is a disjunction over the determiner `D[_type]` in the upper rule, within each disjunct of which the variable `_type` is instantiated to one of the values `std`, `int`, and `rel`. This value is passed between `D[_type]` and `NP[_type]`. Thus when `_type` is instantiated to `std`, `D[_type]` is instantiated to `D[std]` (a node which specified as optional in the disjunction) and `NP[_type]` to `NP[std]`; this fully-instantiated rule is shown in the quoted passage above for illustrative purposes, but does not need to be separately stated in the grammar since it is implied by the `NP[_type]` rule. The complex category `NP[std]` can now be called by some other rule in the grammar; when it is used it will expand via the `NP[_type]` rule to and `D[std]` followed by `NPap`.

Observe that the information-passing here involves not the passing of categorial information, but the passing of morphosyntactic information, which is likely to occur independently in the f-structure. This is intentional: computing over c-structures is more efficient than unifying f-structures, and complex categories are designed to shift the computational burden towards the former.[2] Nevertheless, as a formal device complex categories afford the possibility of specifying just the sort of mother-to-daughter information-passing which must be part of any model of the syntactic category and projection concepts. It is therefore worthwhile to contemplate briefly whether complex categories can be used to provide a satisfactory account.

In this spirit, I point out that the information-passing within the `NP[_type]` rule above takes place between a mother node and its non-head daughter, and so represents an example of communication between different projections, not between levels of the same projection. It follows that complex categories impose no restrictions against categorial information-passing between projections.[3] Nothing about this formal device prevents a restatement of the above as DP rules, in which the information-passing would be from a head D to a mother DP, preserving within a categorial projection the intuition of distinct determiners setting the type paramater of their mother node; however nothing about complex categories forces the latter formulation.

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[2] I thank an anonymous reviewer for reminding me of this fact.

[3] In fact, it is possible to specify rules in which the mother is parameterized for two or more variables, whose instantiation can be distributed indiscriminately between the daughters. I myself have written such rules into the French ParGram grammar, at some point between 2000 and 2005.

Notice also that this device is not used above to specify different levels within a projection: instead within the noun phrase projection we have `NP[_type]` for broad noun phrase type and `NPap` for the daughter level. Shared categorial nomenclature is at the forbearance of the grammar writer, as is the ordering of the levels: the formal device imposes no substantive constraints.

But suppose that one did try to use complex categories to specify differences in level within a projection. One would now be faced with a fundamental problem: variables allow the passing of information that mothers and daughters share, not information which differentiates them. In short, the formal device of complex categories allows the passing of information to be shared between categorially distinct nodes, but not information that distinguishes otherwise categorially identical nodes.

To summarize: complex categories are not intended to model syntactic projection; at first glance they appear to have attractive information-passing properties that one could repurpose towards such modeling, but in fact they do not.

## 4 X′ theory in Lexical-Functional Grammar

The X′ theory of Bresnan (2001), revised and extended somewhat in Toivonen (2001, 2003), is the LFG literature's third type of syntactic category model. It uses the assortment of categorial features in Table 1.

| | 'predicative' | 'transitive' |
|---|---|---|
| verbal | + | + |
| adjectival | + | – |
| adpositional | – | + |
| nominal | – | – |

Table 1: Categorial features in the X′ theory of Bresnan (2001: 120)

To these, Bresnan adds functionality features (F0–F2) and bar-level features (B0–B2).[4] Syntactic categories can be exhaustively defined as in the following examples:

(8) V : ⟨[+Pr,+Tr],F0,B0⟩  IP : ⟨[+Pr,+Tr],F1,B2⟩
VP : ⟨[+Pr,+Tr],F0,B2⟩  C′ : ⟨[+Pr,+Tr],F2,B1⟩

The nodes within a projection, like N–N′–NP, have the same features for category and functionality; nodes across projections may share category features, as for V–I–C and

[4]Bresnan does not use the prefix B for these; I add it for notational transparency.

D–N, but differ in functionality. The system owes much to Grimshaw (2000). Toivonen (2001, 2003) adds the notion of NON-PROJECTING WORD.

For Bresnan (2001: 120), " 'Predicative' categories are those which cannot stand alone as arguments, but require an external subject of predication. [...] 'Transitive' categories are those which may take an object or direct complement function".[5] This establishes the idea of contraints on possible c- to f-structure mappings: for example, that a [−Tr] projection cannot accommodate a node annotated with $(\uparrow \text{OBJ}) = \downarrow$.

Following through on this idea, both Bresnan (2001) and Toivonen (2003) state several UNIVERSAL PRINCIPLES OF ENDOCENTRIC STRUCTURE–FUNCTION ASSOCIATION: constraints on which kinds of f-structure annotations a node can bear, given its own properties and those of its c-structure context.

The Bresnan–Toivonen feature system has the virtue of being explicit, but neither researcher formalizes it: it remains unclear where they intend these feature sets to dwell in the correspondence achitecture.

A related wrinkle is that the universal phrase structure rules from Bresnan (2001: 99) seem to be the only mechanism for enforcing the immediate dominance of B2 over B1 over B0 categories:

(9) a. $\mathrm{X}' \rightarrow \mathrm{X}\ ,\ \mathrm{YP}$ b. $\mathrm{XP} \rightarrow \mathrm{YP}\ ,\ \mathrm{X}'$

This dominance sequence is implied by the use of integers in the feature nomenclature, but does not constitute a formal requirement. A similar point holds for the nesting of projections which differ in their value for F: the nesting of VP inside IP inside CP is implied by their respective features F0, F1 and F2, but is not enforced formally.

## 4.1 A note on mixed categories

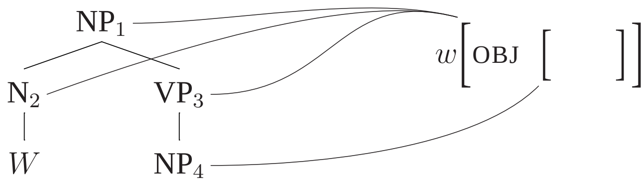
In an analysis of Gĩkũyũ constituents which are categorially NPs but internally have some properties of VPs, Bresnan and Mugane (2006), rather than deploying the X′ theory just presented, return to the atomic-category view of Kaplan (1987) discussed in §2 and criticized in §2.4.

Their treatment is as follows: for a lexeme $W$, take the f-structure $w$ containing its PRED, obtain via $\phi^{-1}$ the functional domain of $f$ (the set of c-structure nodes which corresponds to $w$ via $\phi$), and for each node in the functional domain obtain its atomic syntactic category via $\mathcal{L}$ (see §2.1). The lexical category of $W$ is a requirement for a maximal

[5] With regards to the cross-classification of syntactic categories, these features correspond to those of Chomsky (1981: 48) as follows: ±Predicative corresponds directly to ±V (also called 'predicative' by Chomsky)), and ±Transitive is ±N ('substantive') with the polarity reversed.

projection label (VP, NP, etc) be part of the set of syntactic categories thus achieved. A mixed-category verbal noun requires that both VP and NP be part of that category set: thus $W$ in (10), while it occurs in $\mathrm{N}_2$, has a functional domain which also includes $\mathrm{NP}_1$ and $\mathrm{VP}_3$, and is able to take both nominal and verbal dependents, the latter exemplified by the OBJ corresponding to $\mathrm{NP}_4$.

(10)



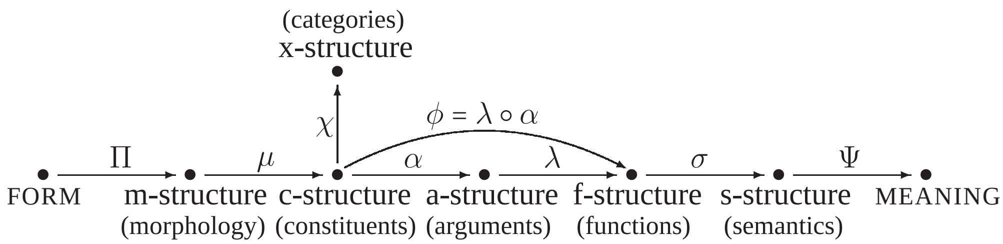

This account of mixed categories is far more formally explicit than the X′ theory above. Precisely because the formal status of the category feature bundles in (8) is unclear, the possibility of its integration into this particular treatment of mixed categories remains unsettled. Presumably, a requirement for a functional domain to include a node with atomic category label VP would become a requirement for this functional domain to include a node with feature bundle ⟨[+Pr,+Tr],F0,B2⟩. If this is the case, then an X′-theoretic account of this phenomenon follows straightforwardly.

# 5 Bare phrase structure for Lexical-Functional Grammar

Although some of the issues above can be resolved by formally integrating the Bresnan–Toivonen X′ theory into the correspondence architecture without further modifications, what I propose in this section is a reformulation that will be reminiscent of the BARE PHRASE STRUCTURE of Chomsky (1995).

One version of the correspondence architecture is shown in (11). This version inspired by but not identical to that in Asudeh (2012) — in particular it is truncated at the extremities, with phonological and information-structural levels telescoped into Π and Ψ respectively, for horizontal spacing reasons. I have added a structural level of x-structure, in direct correspondence with the c-structure, as the locus of a formalization of syntactic category information.

(11)



I will provide more details on the correspondence function $\chi$ in §5.2; for the moment, imagine simply that it takes a c-structure node into its x-structure.

## 5.1 Projection

The native c-structural notion of immediate dominance (see §2.1) can serve to specify relationships between the x-structure of any node and that of its mother. Derived notions like (12a) and (12b) can now be defined as below, with the complementary notion in (12c):

(12) a. PROJECTING NODE
A node projects iff its x-structure is identical with its mother's x-structure:
$Proj(*) \iff \chi(*) = \chi(\mathcal{M}(*))$

b. MAXIMAL PROJECTION
A node it a maximal projection iff it is not a projecting node:
$Max(*) \iff \neg Proj(*)$

c. TERMINAL
A node is a terminal iff it node has it as a mother:
$Term(*) \iff \neg\exists n.\mathcal{M}(n) = *$

Note that (12c) is mutually exclusive with neither (12a) nor (12b). As such, it is technically possible to define the equivalent of a bar-level node as a projecting non-terminal; however, I leave this gap as a theoretical claim that the notion is not a universal.

A non-projecting word (Toivonen, 2001, 2003) can now be straightforwardly defined as a word whose lexical entry simultaneously contains both $Max(*)$ and $Term(*)$. In addition, the projection of any particular node $n$ can be obtained via the inverse of $\chi$, as the set of nodes $\chi^{-1}(\chi(n))$.

Finally, the two universal endocentric phrase structure rules in (9) can be replaced with the one in (13), which states that one (optional) projecting node can be shuffled[6] among its potentially multiple (and optional) maximal projection sisters.

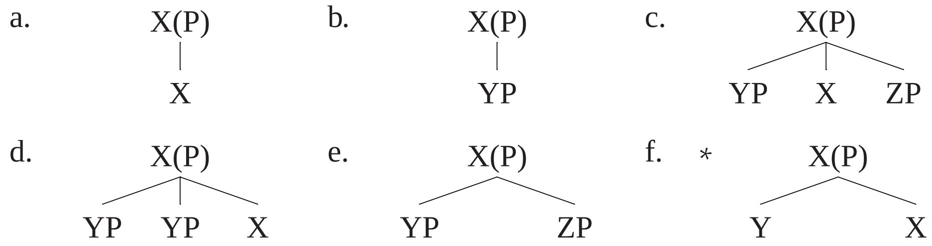
(13) $$n_i \rightarrow \left( \begin{array}{c} n_j \\ Proj(*) \end{array} \right) , \left( \begin{array}{c} n_{k\ldots}{}^{+} \\ Max(*) \end{array} \right)$$

Thus branching in this theory is potentially n-ary, with node ordering relegated to separate rule statements (in the style of Gazdar et al., 1985). Some sample configurations

[6]The comma in this rule is intended as the shuffle operator, as presented in Dalrymple (2001: 99), where its function is to shuffle the two lists that serve as its arguments.

are shown in (14), where X means a projecting node (not necessarily a terminal), XP means a maximal node, and X(P) means a node which can either be maximal or projecting. Note that (14a-e) are licensed by (13) but (14f), having two projecting daughters, is not:

(14)




Recall one of the problems with the Bresnan–Toivonen X′ theory: it is the rules in (9) which enforce the dominance of phrasal nodes over heads, while the integer values of the features B0–B2 merely imply this dominance. In the current framework the problem does not arise: nodes are phrasal or terminal not by virtue of their feature specifications, but because of their position in the c-structure.

## 5.2 Syntactic category features

Let $\chi$ now be a function from nodes to sets of the symbols $Pr$, $Tr$, $f$ in any combinations. Let these symbols serve as privative features such that $Pr$ is equivalent to a positive value for 'predicative' in Table 1 and its absence to a negative value for that feature, and let $Tr$ do the same for 'transitive'. Let the presence and absence of $f$ in an x-structure signify the distinction between functional and lexical categories, respectively.

| CATEGORY TYPE | |
|---|---|
| Lexical | Functional |
| V:$\{Pr, Tr\}$ | I:$\{Pr, Tr, f\}$ |
| A:$\{Pr\}$ | ?:$\{Pr, f\}$ |
| P:$\{Tr\}$ | ?:$\{Tr, f\}$ |
| N:$\{\}$ | D:$\{f\}$ |

Table 2: Possible x-structure feature combinations

Table 2 shows the possible x-structure sets alongside the category labels they can be taken to define. Functional adjectival and adpositional feature sets are implied, although they define no standard category labels. Furthermore there is no way of distinguishing the category C from I; on this issue see §6.

The lexical entry in (7) is now as in (15), with the atomic category V replaced by the appropriate x-structure equation:

(15) *yawns* $\chi(*) = \{Pr, Tr\}$ $(\downarrow \text{ SUBJ PERS}) = 3$
$(\downarrow \text{ TENSE}) = \text{present}$ $(\downarrow \text{ SUBJ NUM}) = \text{sg}$

This lexical entry also upends the arrow metavariable, to go along with the statement in (12c) that heads/terminals have phonological content: words *are* terminals instead of merely being *under* terminals.

## 5.3 Endocentric c- to f-structure mappings

The x-structure features asserted by (13) to be shared or not between nodes are supplied by heads. As in the Bresnan–Toivonen X′ theory, all f-structure annotation in endocentric languages is handled by universal principles of endocentric structure–function association:

(16) a. A projecting node shares the f-structure of its mother:
$$Proj(*) \implies \uparrow=\downarrow$$

b. A SUBJ is a DP daughter of IP:
$$(\uparrow \text{SUBJ})=\downarrow \implies \begin{array}{ll} Max(*) & Max(\mathcal{M}(*)) \\ \chi(*) = \{f\} & \chi(\mathcal{M}(*)) = \{Pr, Tr, f\} \end{array}$$

c. An OBJ is a DP with a V(P) or P(P) mother:
$$(\uparrow \text{OBJ})=\downarrow \implies \begin{array}{ll} Max(*) & \{f\} \not\sqsubset \chi(\mathcal{M}(*)) \\ \chi(*) = \{f\} & \{Tr\} \sqsubset \chi(\mathcal{M}(*)) \end{array}$$

d. An OBL is a non-verbal/adjectival XP with a non-functional mother:
$$(\uparrow \text{OBL})=\downarrow \implies Max(*) \quad \{Pr\} \not\sqsubset \chi(*) \quad \{f\} \not\sqsubset \chi(\mathcal{M}(*))$$

e. A POSS is a DP daughter of DP:
$$(\uparrow \text{POSS})=\downarrow \implies \begin{array}{ll} Max(*) & Max(\mathcal{M}(*)) \\ \chi(*) = \{f\} & \chi(\mathcal{M}(*)) = \{f\} \end{array}$$

f. A node that shares its f-structure with a functional mother must be such that $\{f\}$ is the restriction of its mother's x-structure by its own x-structure:
$$\begin{array}{c} \uparrow=\downarrow \\ \{f\} \sqsubset \chi(\mathcal{M}(*)) \end{array} \implies \chi(\mathcal{M}(*)) - \chi(*) = \{f\}$$

These association principles are stricter than those of Bresnan (2001: 120), in which no categorial restrictions beyond lexicality or functionality are imposed on the nodes; indeed they may be too strict, if it is correct that that CPs can be bear the SUBJ and OBJ functions (about which see respectively Bresnan, 1994 and Alsina et al., 2005). In this case, the constraints can be relaxed by using $\{f\} \sqsubset \chi(*)$ to designate all functional categories and $\{f\} \not\sqsubset \chi(*)$ to designate all lexical ones.

The joint effect of (16a) and (16f) ensure that, within an EXTENDED PROJECTION like I–V, the functional projection dominates the lexical projection (for a different version of this idea, see Grimshaw, 2000). Recall from the end of §4 that the Bresnan–Toivonen X′ theory merely implies this dominance with integers as the values of its F0–2 feature.

The notion of extended projection can at this point be given an exact definition in terms of the inverse of $\phi$, as implied by the definition of EXTENDED HEAD in Bresnan (2001: 132): $\phi^{-1}(\phi(*))$.[7] This is exactly analogous to the definition of projection in §5.1.

The respective configurations licensed by the principles in (16) are in (17), with category symbols as for (14); L in (17d) stands for any lexical category:[8]

(17)

a. $\begin{array}{c} \text{X(P)} \\ | \\ \uparrow=\downarrow \\ \text{X} \end{array}$ b. $\begin{array}{c} \text{IP} \\ | \\ (\uparrow \textsc{subj}) = \downarrow \\ \text{DP} \end{array}$ c. $\begin{array}{c} \text{V(P)/P(P)} \\ | \\ (\uparrow \textsc{obj}) = \downarrow \\ \text{DP} \end{array}$

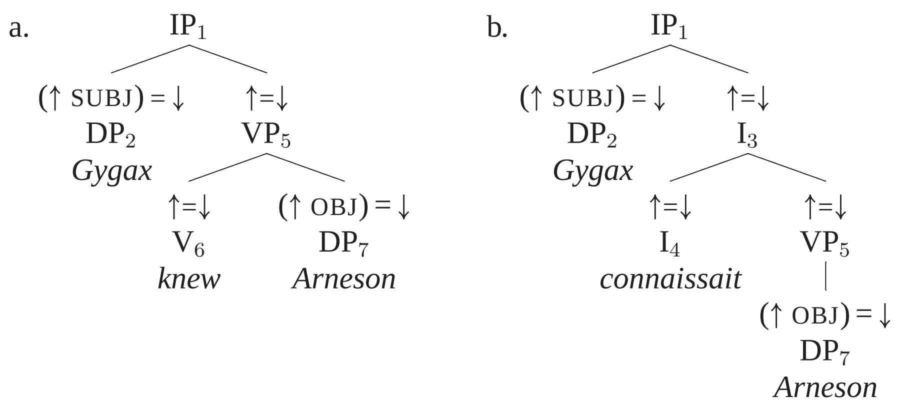
d. $\begin{array}{c} \text{L(P)} \\ | \\ (\uparrow \textsc{obl}) = \downarrow \\ \text{DP/NP/PP} \end{array}$ e. $\begin{array}{c} \text{DP} \\ | \\ (\uparrow \textsc{poss}) = \downarrow \\ \text{DP} \end{array}$ f. $\begin{array}{ccc} \text{I(P)} & \text{D(P)} & \text{D(P)} \\ | & | & | \\ \uparrow=\downarrow & \uparrow=\downarrow & \uparrow=\downarrow \\ \text{VP} & \text{NP} & \text{VP} \end{array}$

Taken together, (13) and (16) minimally require the tree in (18a) for an English sentence with a finite verb form taking a SUBJ and and OBJ, and the tree in (18b) for its French translation, assuming an analysis of verb placement along the lines of Pollock (1989), implemented via head mobility within extended projections (Bresnan, 2001: chapter 7).

[7] With regards to this definition, it should be noted that Grimshaw (2000) considers P to be within the extended projection of D–N; for Bresnan (2001) this is not the case, as the c-structure complement NPs of prepositions are their f-structure OBJs. See §6.3 for more on Grimshaw's idea.

[8] A reviewer points out that set theory's Axiom of Extension — see Dalrymple (2001: 32) for an application to f-structure — prevents any configuration in which $a$ is the mother of $b$ and $c$, and all three are categorially identical. Nodes $b$ and $c$ cannot belong to separate functional domains: by Extension their x-structures, having the same membership, are identical, so by (16a) they share a functional structure. Among other things this makes Falk's (1984) raising-verb analysis of English auxiliary verb sequences impossible; I do not take this to be an invalidating consequence, but rather a challenging prediction. Moreover, $b$ and $c$ cannot belong to the same functional domain, as they would be projecting sisters, which is impossible by (13). This would seem to prevent *any* categorially plausible analysis of English auxiliary sequences. The way out is to alter (13) to allow projecting sisters, and use other constraints to rein in the resulting overgeneration.

(18)




Applying the notational convention that $\chi(n_i) = x_i$ we find that the nodes in (18a,b) are in correspondence with the x-structures in (19a,b) respectively:

(19) a. $x_1 = \{Pr, Tr, f\}$ $\quad x_2 = \{f\}$ $\quad x_5 = x_6 = \{Pr, Tr\}$ $\quad x_7 = \{f\}$
b. $x_1 = x_3 = x_4 = \{Pr, Tr, f\}$ $\quad x_2 = \{f\}$ $\quad x_5 = \{Pr, Tr\}$ $\quad x_7 = \{f\}$

## 5.4 Summary

The x-structure model of syntactic categories altogether eliminates the Bresnan–Toivonen bar-level features, and reduces to privative features both the formerly binary ±Predicative and ±Transitive, and the formerly ternary F. It also reduces the number of universal phrase structure rules: Bresnan (2001) needs the two rules in (9); this system needs only (13).[9]

The added complication of a level of x-structure to house these privative features in fact fills a lacuna of the X′ model, which does not formally accommodate information-passing between nodes, and leaves integer-valued features to imply dominance relations across projections, and among the bar levels of a projection. In the current model, information is explicit, dominance relations across projections are stipulated by a universal principle, and bar levels are derived from dominance relations.

However, in contrast with these improvements, the current model lacks sufficient resources to define a category C distinct from I. This issue is addressed in the next section.

Finally, in regards to mixed categories, it seems plausible to assume the following: the model of Bresnan and Mugane (2006) summarized in §4.1 can be revised such that

[9]The proper analysis of conjoined structures may require additional phrase structure rules. The topic of conjunction is not addressed in the X′ theory of Bresnan (2001) or Toivonen (2001, 2003). Since I am concerned here with restating their treatments, I follow them in leaving the topic of conjunction aside.

the correspondence function $\chi$ replaces the labeling function $\mathcal{L}$, letting mixed category contraints be imposed on the set of x-structures thus obtained.

# 6 Syntactic categories and inflectional categories

In this section I propose a revision of the model just presented, which enables the statement of a C–I distinction, but otherwise downgrades the intention of hewing to the Bresnan–Toivonen line. A byproduct will be the possibility of using the syntactic category feature system to specify inflectional category distinctions.

The primary changes are as follows: a substitution of the feature assortment in Table 3 instead of those in Table 2, and the use of multisets instead of sets in the formalization of x-structure. Assume that the universal association principles of (16) are restated to accord with this new feature inventory.[10]

| CATEGORY TYPE | |
|---|---|
| Lexical | Functional |
| A:$\{v, n\}$ | ?:$\{v, n, f\}$ |
| V:$\{v\}$ | I:$\{v, f\}$ |
| N:$\{n\}$ | D:$\{n, f\}$ |
| P:$\{\}$ | ?:$\{f\}$ |

Table 3: Revised x-structure feature combinations

The feature assortment in Table 3 is a return to the X′ features of Chomsky (1981), ±V 'predicative' and ±N 'substantive', in the sense that a positive value for those corresponds here to the presence of $v$ and $n$ in an x-structure, and a negative value corresponds to their absence.[11] The feature $f$ is as before.

Table 3 does not exhaust possible feature combinations in multiset x-structure, which allow elements to occur more than once: the x-structures $\{n\}$ and $\{n, n\}$ are distinct, as are $\{v, f\}$ and $\{v, f, f\}$. Iterations of $f$ and iterations of $v$ or $n$ can be put to use as follows.

[10]The changes required are as follows: for statements of equality, the new feature sets can be substituted for the old with no further changes; for statements of set inclusion, $v$ can be substituted for $Pr$ without further changes, but where $n$ is substituted for $Tr$ a statement of inclusion must be converted to a statement of non-inclusion, and vice-versa.

[11]See also footnote 5.

## 6.1 Iteration of $f$

The iteration of the feature $f$ within x-structure is a syntactic device that serves to distinguish an unbounded number of functional projections for classifiers, determiners, case, negation, tense, complementizers, and so on, to the extent that these are found to be necessary. Because of (16f), these will be strictly hierarchically ordered by $f$ cardinality, with one-$f$ decrements: there will always be a projection $\{n, f\}$ between $\{n, f, f\}$ and $\{n\}$.

Is this too strict? I propose that it is not: it constitutes an argument for an alternative conception of syntactic categories, to be implemented not with $x = \{\ldots\}$ equality statements but with $\{\ldots\} \sqsubset x$ subset statements. A word lexically specified for $\{v\} \sqsubset x$ could in certain situations be additionally constrained by $\{f\} \sqsubset x$ and thus only be licensed in a $\{v, f\}$ projection. For instance, a French verb will minimally bear the constraint $\{v\} \sqsubset x$, but the further requirement $\{f\} \sqsubset x$ is imposed on a finite verb. Absent further constraints, a nonfinite French verb thus has x-structure $\{v\}$ (=V), and a finite verb has x-structure $\{v, f\}$ (=I); by (16f) and (16b) it follows that the latter but not the former will head the projection which licenses the SUBJ, which is the correct result, shown in (18b).

This reconception also has the benefit of not implying a supernumerary lexical inventory of category types, as found in the Cartography literature (Cinque, 2002): a projection is there when needed, with its $f$-ness jacked up contextually by additional constraints, based on a small number of lexically specified x-structure types.

## 6.2 Iteration of $v$ or $n$

Iteration of $f$ does some useful synatctic work; what about iterations of the features $n$ and $v$? I proposed that they are ignored in syntax, but serve within the morphology to distinguish inflectional classes of verbs, nouns, and adjectives — but not adpositions, since they have no features to iterate. So the x-structures $\{v\}$, $\{v, v\}$ and $\{v, v, v\}$ can serve to distinguish between Vs of three distinct conjugation classes; $\{v, f\}$, $\{v, v, f\}$ and $\{v, v, v, f\}$ will then be the x-structures of their respective IPs.

Suppose that a language does have these three conjugation classes, and furthermore that verbs of classes $\{v\}$ and $\{v, v\}$ truncate in some instances, while verbs of classes $\{v, v\}$ and $\{v, v, v\}$ epenthesize in some other instances. Then realization rules for conjugation can take the form: epenthesize only if $\{v, v\} \sqsubset x$, and truncate only if $\{v, v, v\} \not\sqsubset x$. A verbal form with either x-structure $\{v, v\}$ or $\{v, v, f\}$ will both epenthesize and truncate.

This is compatible with a Paradigm Function Morphology take on the morphological component of grammar: in Stump (2001),[12] inflectional class features are distinct from

[12] A finite-state implementation is given in Karttunen (2003), which seems to me to be lacking Panini's Principle, a central component of Stump (2001); Malouf (2005) supplies the necessary addendum.

morphosyntactic features, and constrain the application of realization rules at the same point as lexical categories do. In the revised x-structure approach, the features used to distinguish inflectional classes *are* the lexical category features, namely those whose iteration has no syntactic usage but is part of the model because of a need to distinguish C from I.

Of course, if the x-structure is going to have categorial import for both m- and f-structural concerns, then by the logic of the correspondence architecture it should be removed from its placement in (11) and interpolated between the m- and the c-structure. That would require more significant changes to the model in §5 than the tweaks I have applied in this section.

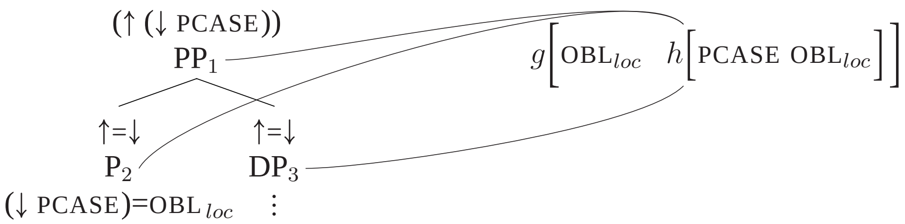
## 6.3 Minding the Ps

Lacking categorial features in the revised system of Figure 3, adpositions are distinct from the other categories in feature specification, and per §6.2 in their inflectional inertness.

Suppose now a variant of the system, which treats adpositions per Grimshaw (2000), as part of an extended projection P–D–N. In this system, an adposition will have the x-structure $\{n, f, f\}$, and will thus lack both featural distinctness (as $n$ is shared by N and D) and inflectional inertness (since $n$ can be iterated). There are other consequences.

First, by (13a,f) an adposition with the x-structure $\{n, f, f\}$ will share a functional domain with its complement DP. This forces a turn away from a common analysis of adpositional phrases, in which the complement DP is an OBJ selected by the adposition. But it provides a theory-internal motivation for the (↑ (↓ PCASE)) analysis of obliques, going back to Kaplan and Bresnan (1982): in (20), the adposition lacks a PRED feature but has a PCASE attribute whose value sets the PP's grammatical function.[13]

(20)




Second, the Grimshavian amendment leaves a gap in the category typology, as no categories obviously fit x-structures like $\{\ \}$, or $\{f\}$, or $\{f, f\}$, etc. If such categories exist, then their f-structures are allowed to be OBJ-taking, per (16c). However, it may

[13]An alternative analysis path would be to generalize beyond case-marking the inside-out designators of Nordlinger (1998): a PP would be annotated (↑ GF)=↓, and individual Ps would set GF with inside-out designators like ($\text{OBL}_{loc}$ ↓).

be possible to motivate stipulations that x-structures cannot be empty, and that the feature $f$ can only be present when $n$ or $v$ is. To enforce the latter restriction in grammars with a Paradigm Function Morphology, that framework's property cooccurrence restriction mechanism (Stump, 2001: 41) could be recruited.

# 7 Conclusion and prospect

The x-structure model of syntactic categories implements a feature system on part of speech labeling categories, although one perhaps not quite as weak as envisioned by Kaplan (1987: 351). Unlike Kaplan's atomic category approach, in a manner to which the complex categories of Crouch et al. (2008) are unsuited and for which they were not designed, the system as a whole elegantly models both the notions of projection and extended projection. The treatment I have proposed improves on the X′ theory of Bresnan (2001) and Toivonen (2003): by allowing a reformulation of its insights with a reduced number of theoretical primitives, and by being formally integrated in the correspondence architecture.

The model can potentially be altered to simultaneously give an account of syntactic and inflectional categories, as discussed in §6, concretizing a possibility alluded to in Marcotte and Kent (2010).

That same paper assumed a realizational Paradigm Function Morphology in line with Sadler and Nordlinger (2004), but suggested eliminating a distinction of that treatment, in which morphosyntactic features are transduced into f-structure equations. Marcotte and Kent (2010) proposed letting the morphological system handle f-structure equations directly: the equations *are* morphosyntactic features.

I perceive the x-structure model presented here as part of a generalization of that idea, in which the morphology accesses structural description equations for all levels of structure: f-structure, x-structure, a-structure, s-structure, i-structure, etc. Such a morphology, if implemented as realizational in the PFM mould, would contain: a specification of possible structural description equations for each level of representation, a paradigm space defined by cooccurrence restrictions within equation sets, a list of lexemes each with one or more underlying stems, and rules associating a phonological form with every licensed combination of lexeme and equation set. This project I set aside for another day.

# References

Alsina, Alex, Mohanan, Tara and Mohanan, KP. 2005. How to Get Rid of the COMP. In Miriam Butt and Tracy Holloway King (eds.), *The Proceedings of the LFG '05 Conference*, University of Bergen, Norway.

Asudeh, Ash. 2012. *The Logic of Pronominal Resumption*. Oxford: Oxford University Press.

Bresnan, Joan. 1994. Locative inversion and the architecture of universal grammar. *Language* 70(1), 2–131.

Bresnan, Joan. 2001. *Lexical-Functional Syntax*. Oxford: Blackwell Publishers.

Bresnan, Joan W. and Mugane, John. 2006. Agentive nominalizations in Gĩkũyũ and the theory of mixed categories. In Miriam Butt, Mary Dalrymple and Tracy Holloway King (eds.), *Intelligent Linguistic Architectures: Variations on Themes by Ronald M. Kaplan*, Stanford, CA: CSLI Publications.

Butt, Miriam, Dalrymple, Mary and Frank, Anette. 1997. An architecture for linking theory in LFG. In Miriam Butt and Tracy Holloway King (eds.), *The Proceedings of the LFG '97 Conference*, University of California, San Diego.

Butt, Miriam, King, Tracy Holloway, Niño, María-Eugenia and Segond, Frédérique. 1999. *A grammar writer's cookbook*. Stanford, CA: CSLI Publications.

Chomsky, Noam. 1981. *Lectures on Government and Binding*. Berlin: Mouton de Gruyter.

Chomsky, Noam. 1995. Bare phrase structure. In Hector Cambos and Paula Kempchinsky (eds.), *Evolution and Revolution in Linguistic Theory: Essays in Honor of Carlos Otero*, pages 51–109, Washington, DC: Georgetown University Press.

Cinque, Guglielmo (ed.). 2002. *Functional Structure in DP and IP: The Cartography of Syntactic Structures, Vol. 1.*. Oxford: Oxford University Press.

Crouch, Dick, Dalrymple, Mary, Kaplan, Ron, King, Tracy Holloway, Maxwell, John and Newman, Paula. 2008. XLE documentation, Palo Alto Research Center.

Dalrymple, Mary. 2001. *Lexical Functional Grammar*, volume 34 of *Syntax and Semantics*. New York: Academic Press.

Falk, Yehuda N. 1984. The English auxiliary system: A Lexical-Functional analysis. *Language* 60(3), 483–509.

Gazdar, Gerald, Klein, Ewan, Pullum, Geoffrey and Sag, Ivan. 1985. *Generalized Phrase Structure Grammar*. Cambridge, MA: Harvard University Press.

Grimshaw, Jane. 2000. Locality and extended projection. In Peter Coopmans, Martin Everaert and Jane Grimshaw (eds.), *Lexical Specification and Insertion*, pages 115–134, Amsterdam: John Benjamins.

Kaplan, Ronald M. 1987. Three seductions of computational psycholinguistics. In P. Whitelock, M. M. Wood, H. L. Somers, R. Johnson and P. Bennett (eds.), *Linguistic Theory and Computer Applications*, pages 149–188, New York: Academic Press, also published in Dalrymple et al. (1995).

Kaplan, Ronald M. and Bresnan, Joan. 1982. Lexical-Functional Grammar: a formal system for grammatical representation. In Joan Bresnan (ed.), *The mental representation of grammatical relations*, pages 173–281, Cambridge, MA: The MIT Press.

Karttunen, Lauri. 2003. Computing with Realizational Morphology. In Alexander Gelbukh (ed.), *Computational Linguistics and Intelligent Text Processing, Lecture Notes in Computer Science*, volume 2588, pages 205–216, Heidelberg: Springer Verlag.

Malouf, Robert. 2005. Disjunctive Rule Ordering in Finite State Morphology, presented at *41st Meeting of the Chicago Linguistics Society*, http://bulba.sdsu.edu/ malouf/papers/cls05-slides.pdf .

Marcotte, Jean-Philippe and Kent, Kateryna. 2010. Russian verbal affixes in the projection architecture. In *Proceedings of the LFG 2010 Conference*, pages 353–373.

Nordlinger, Rachel. 1998. *Constructive Case: Dependent Marking Nonconfigurationality in Australia*. Stanford, CA: CSLI Publications.

Pollock, Jean-Yves. 1989. Verb movement, Universal Grammar, and the structure of IP. *Linguistic Inquiry* 20, 365–424.

Sadler, Louisa and Nordlinger, Rachel. 2004. Relating morphology to syntax. In Louisa Sadler and Andrew Spencer (ed.), *Projecting Morphology*, pages 159–186, Stanford, CA: CSLI Publications.

Stump, Gregory T. 2001. *Inflectional Morphology: a Theory of Paradigm Structure*. Cambridge, UK: Cambridge University Press.

Toivonen, Ida. 2001. *The Phrase Structure of Non-projecting Words*. Ph. D.thesis, Stanford University.

Toivonen, Ida. 2003. *Non-Projecting Words. A Case Study of Swedish Particles*. Dordrecht: Kluwer.

# STRUCTURAL CASE ASSIGNMENT TO OBJECTS IN POLISH

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**Abstract**

The aim of this paper is to present the details of an analysis of structural case assignment to Polish objects. While the analysis is implemented in the XLE system, its technical details are explained here using the easier vocabulary of theoretical LFG. A comparison to two earlier accounts of the same phenomenon demonstrates that the current analysis is conceptually and representationally simpler than either.

# 1 Introduction

This paper presents an analysis of structural case assignment[1] to objects implemented in an XLE (Crouch et al. 2011) grammar of Polish, *POLFIE* (Patejuk and Przepiórkowski 2012b). While the basic generalisations are well-known (Przepiórkowski 1999, 2000), there are various ways of encoding them, and the account presented below is leaner than our previous attempts (Przepiórkowski 1999, Patejuk and Przepiórkowski 2011).

The current analysis of the basic facts is presented in §2, while §3 extends the analysis so as to account for long-distance Genitive of Negation. The following sections discuss extensions aimed at covering various other phenomena, including multiple objects requiring structural case marking (§4), so-called *feature indeterminacy* (§5) and structural case assignment to selected conjuncts under unlike category coordination (§6). Then, §7 compares this analysis to our previous accounts. Finally, §8 concludes the paper.

# 2 Basics

In Polish, as in various other languages, the case of some arguments is stable and does not depend on the syntactic environment or the form of the verb, while the case of other arguments is not stable in this sense. This difference, widely discussed in generative linguistics since the early 1980s (Rouveret and Vergnaud 1980, Vergnaud 1982), also in the context of Slavic (Babby 1980a,b), is often referred to as *lexical* (or *inherent*) versus *structural* case assignment (cf. Przepiórkowski 1999 and numerous references therein).

A typical illustration of lexically assigned case is the dative case of an argument of POMAGAĆ – the argument is marked for the dative regardless of the presence of

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[1]Note that, while we use the usual term “case assignment”, the analysis is formalised in terms of case checking, i.e., using constraining equations such as $(\uparrow \textsc{obj case}) =_c \textsc{acc}$, and not defining equations such as $(\uparrow \textsc{obj case}) = \textsc{acc}$. However, it could probably be formalised equivalently using defining constraints (with appropriate disjunctions).

negation (no negation in (1), negation present in (2)) and regardless of the form of the head (gerund in (3)):[2]

(1) Oni pomagają ludziom.
they help people.DAT
'They help people.' (NKJP)

(2) Nie pomagają ludziom będącym w potrzebie.
NEG help people.DAT being in need
'They don't help people in need.' (NKJP)

(3) Chodzi o pomaganie ludziom.
walks about helping people.DAT
'It is about helping people.' (NKJP)

By contrast, the value of case assigned to Polish objects requiring structural case depends on factors such as the presence of negation and the form of the head which assigns case:

(4) Poczytam książkę.
read.1.SG book.ACC
'I'll read a book.' (NKJP)

(5) Nie poczytają książki czy gazety.
NEG read.3.PL book.GEN or newspaper.GEN
'They won't read a book or a newspaper.' (NKJP)

(6) Proponuję też poczytanie książki.
suggest.1.SG also reading book.GEN
'I also suggest reading a book.' (NKJP)

Taking into consideration only uncontroversially verbal forms (gerunds uniformly assign genitive case to their structurally-cased objects, see (6)), here is the first approximation of the basic rules of structural case assignment to objects in Polish:

- If the verb is not negated, as in (4), whose f-structure is provided in (7), its structurally-cased object must bear the accusative case (here: *książkę*).
- If the verb is negated, as in (5), whose f-structure is presented in (8), i.e., contains the attribute NEG whose value is +, its structurally-cased object bears the genitive case (both conjuncts in *książki czy gazety* are in the genitive); this phenomenon is known in Slavic linguistics as genitive of negation (GoN).[3]

[2]Almost all examples in this paper are attested, mostly extracted from the National Corpus of Polish (NKJP; `http://nkjp.pl/`; Przepiórkowski et al. 2010, 2012).

[3]See Neidle 1982, 1988 for early LFG work on Russian case, but note that Russian GoN facts differ from Polish considerably.

(7)
$$\begin{bmatrix} \textsc{pred} & \text{‘}\textsc{read}\langle\boxed{1},\boxed{2}\rangle\text{’} \\ \textsc{subj} & \boxed{1}\begin{bmatrix} \textsc{pred} & \text{‘}\textsc{pro}\text{’} \end{bmatrix} \\ \textsc{obj} & \boxed{2}\begin{bmatrix} \textsc{pred} & \text{‘}\textsc{book}\text{’} \\ \textsc{case} & \textsc{acc} \end{bmatrix} \end{bmatrix}$$

(8)
$$\begin{bmatrix} \textsc{pred} & \text{‘}\textsc{read}\langle\boxed{1},\boxed{2}\rangle\text{’} \\ \textsc{subj} & \boxed{1}\begin{bmatrix} \textsc{pred} & \text{‘}\textsc{pro}\text{’} \end{bmatrix} \\ \textsc{obj} & \boxed{2}\left[\left\{\begin{bmatrix} \textsc{pred} & \text{‘}\textsc{book}\text{’} \\ \textsc{case} & \textsc{gen} \end{bmatrix}, \begin{bmatrix} \textsc{pred} & \text{‘}\textsc{newspaper}\text{’} \\ \textsc{case} & \textsc{gen} \end{bmatrix}\right\}\right] \\ \textsc{neg} & + \end{bmatrix}$$

Such structural case assignment generalisations could be formalised using the constraint in (9), which should be placed in lexical entries of verbs with structurally-cased objects. This is a disjunctive constraint, with disjuncts AFFIRMATIVE and NEGATIVE defined in (10) and (11), respectively.

(9) $\textsc{strcase} \equiv [\textsc{affirmative} \vee \textsc{negative}]$

(10) $\textsc{affirmative} \equiv [\neg(\uparrow \textsc{neg}) \wedge (\uparrow \textsc{obj case}) =_c \textsc{acc}]$

(11) $\textsc{negative} \equiv [(\uparrow \textsc{neg}) =_c + \wedge (\uparrow \textsc{obj case}) =_c \textsc{gen}]$

The negated existential constraint ($\neg(\uparrow \textsc{neg})$) in (10) ensures that there is no negation in the f-structure of the head, while the second conjunct in (10) requires the object to be marked for accusative case; this corresponds to examples such as (4) with f-structure in (7). By contrast, (11) checks that the verb is negated ($(\uparrow \textsc{neg}) =_c +$) and checks that its object bears genitive case; these requirements are satisfied by sentences such as (5), whose f-structure is given in (8).

## 3 GoN in Verb Chains

The previous section dealt with the simplest cases of genitive of negation; the following examples illustrate some additional complexity:

(12) Nie chcesz poczytać Kodeksu.
NEG want.2.SG read.INF Code.GEN
‘You don’t want to read the Code.’ (NKJP)

(13) Mama nie chce iść poczytać książkę.
mum NEG want.3.SG go.INF read.INF book.ACC
‘Mum doesn’t want to go and read a book.’ (NKJP)

These examples show that the generalisations discussed in the previous section, formalised in (9)–(11), need some refinement in the context of verb chains, i.e., constructions with control or raising verbs combining with (open) infinitival arguments. In particular, the case assignment constraints defined in (9)–(11) are too simple because – since negation is not local to the predicate subcategorising for the object in (12) – they would reject the genitive object (*Kodeksu*) there. As discussed at length in Przepiórkowski 2000, it is not the case, however, that genitive is always obligatory in such environments: in (13), the object is marked for accusative case (*książkę* 'book'), even though there is verbal negation present higher in the structure of the sentence (at the main verb *chce* 'wants'). Rather, the generalisation seems to be that local negation on the verb results in the obligatory genitive on structurally-cased objects, while higher negation in such verb chains leaves some optionality as to whether the lower object should occur in the accusative or in the genitive, with semantic and — structural or linear – distance factors perhaps weighing for one or the other.

The f-structures provided below show where exactly negation is present in the verb chain (it is marked as the NEG attribute with value '+'): (14) corresponds to (12), (15) provides a representation of (13).

(14)
$$\begin{bmatrix} \text{PRED} & \text{`WANT}\langle\boxed{1},\boxed{2}\rangle\text{'} \\ \text{SUBJ} & \boxed{1}\begin{bmatrix}\text{PRED} & \text{`PRO'}\end{bmatrix} \\ \text{XCOMP} & \boxed{2}\begin{bmatrix} \text{PRED} & \text{`READ}\langle\boxed{1},\boxed{3}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \\ \text{OBJ} & \boxed{3}\begin{bmatrix}\text{PRED} & \text{`CODE'} \\ \text{CASE} & \text{GEN}\end{bmatrix} \end{bmatrix} \\ \text{NEG} & + \end{bmatrix}$$

(15)
$$\begin{bmatrix} \text{PRED} & \text{`WANT}\langle\boxed{1},\boxed{2}\rangle\text{'} \\ \text{SUBJ} & \boxed{1}\begin{bmatrix}\text{PRED} & \text{`MUM'}\end{bmatrix} \\ \text{XCOMP} & \boxed{2}\begin{bmatrix} \text{PRED} & \text{`GO}\langle\boxed{1},\boxed{3}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \\ \text{XCOMP} & \boxed{3}\begin{bmatrix} \text{PRED} & \text{`READ}\langle\boxed{1},\boxed{4}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \\ \text{OBJ} & \boxed{4}\begin{bmatrix}\text{PRED} & \text{`BOOK'} \\ \text{CASE} & \text{ACC}\end{bmatrix} \end{bmatrix} \end{bmatrix} \\ \text{NEG} & + \end{bmatrix}$$

While example (12) shows that verbal negation may work at a distance in Polish, this long-distance impact in not unconstrained:

(16) (Wcale) nie powiedziałeś, że poczytasz Kodeks/*Kodeksu.
not at all NEG said.2.SG that read.2.SG code.ACC/GEN

‘You did not say that you will read the Code.’

The above example shows that verbal negation may not be “transferred” to lower sentential (closed) clauses. In LFG there is a convenient way of distinguishing between the two embedded clause types, infinitival (open) and sentential (closed): the former correspond to the XCOMP grammatical function, while the latter are represented in f-structure as COMP; this is the main difference between (17), the f-structure representation of the grammatical version of (16), where the object must be marked for accusative case, and (14), which corresponds to (12), where genitive is possible.

(17) $$\left[\begin{array}{lll} \textsc{pred} & & \text{‘}\textsc{say}\langle\boxed{1},\boxed{2}\rangle\text{’} \\ \textsc{subj} & \boxed{1} & \left[\begin{array}{ll}\textsc{pred} & \text{‘}\textsc{pro}\text{’}\end{array}\right] \\ \textsc{comp} & \boxed{2} & \left[\begin{array}{lll} \textsc{pred} & & \text{‘}\textsc{read}\langle\boxed{3},\boxed{4}\rangle\text{’} \\ \textsc{subj} & \boxed{3} & \left[\begin{array}{ll}\textsc{pred} & \text{‘}\textsc{pro}\text{’}\end{array}\right] \\ \textsc{obj} & \boxed{4} & \left[\begin{array}{ll}\textsc{pred} & \text{‘}\textsc{code}\text{’} \\ \textsc{case} & \textsc{acc}\end{array}\right] \\ \textsc{comp-form} & & \dot{\textsc{z}}\textsc{e} \end{array}\right] \\ \textsc{neg} & + & \end{array}\right]$$

These observations are formalised via constraints in (18)–(24):

(18) $\textsc{strcase} \equiv [\textsc{affirmative} \;\vee\; \textsc{negative}]$

(19) $\textsc{affirmative} \equiv [\neg((\textsc{xcomp}^{*}\uparrow)\ \textsc{neg}) \;\wedge\; (\uparrow \textsc{obj case}) =_c \textsc{acc}]$

(20) $\textsc{negative} \equiv [\textsc{anyneg} \;\wedge\; \textsc{negtype}]$

(21) $\textsc{anyneg} \equiv ((\textsc{xcomp}^{*}\uparrow)\ \textsc{neg}) =_c +$

(22) $\textsc{negtype} \equiv [\textsc{locneg} \;\vee\; \textsc{nonlocneg}]$

(23) $\textsc{locneg} \equiv [(\uparrow \textsc{neg}) =_c + \;\wedge\; (\uparrow \textsc{obj case}) =_c \textsc{gen}]$

(24) $\textsc{nonlocneg} \equiv [\neg(\uparrow \textsc{neg}) \;\wedge\; (\uparrow \textsc{obj case}) \in_c \{\textsc{acc}, \textsc{gen}\}]$

First of all, (18) is the top-level case assignment rule STRCASE, repeated from (9), to be placed in lexical entries of verbs with structurally-cased objects. Its disjuncts are, however, redefined as in (19) and (20) in order to take long-distance GoN into account, together with its optionality, as described above.

The first disjunct of (18), AFFIRMATIVE defined in (19), is a slightly modified version of (10): it handles the situation where the object must be marked for accusative case since verbal negation is not present in the relevant domain at all, neither locally to the verb directly subcategorising for the object nor higher in the verb chain. This is achieved by using an inside-out path which makes it possible to reach into any number of successive predicates subcategorising for XCOMP, an infinitival complement, and check if any of these predicates is negated. The statement in (19) handles sentences such as (4), whose f-structure is given in (7).

The second disjunct of (18), NEGATIVE defined in (20), handles situations where verbal negation is present. It is a conjunction of two statements: ANYNEG and NEGTYPE. The former, ANYNEG, ensures that verbal negation is present at some level, either locally or non-locally (higher within the verb chain). The latter, NEGTYPE, assigns case to the object depending on what type of negation is present (local or non-local to the predicate subcategorising for the structurally-cased object).

The statement LOCNEG defined in (23) is identical to (11) – it assigns genitive case to the object when the verb subcategorising for the object is negated, i.e., this is the obligatory genitive of negation clause. It is applied in examples such as (5), whose f-structure is given in (8) (negation is local to the predicate which subcategorises for the object).

The last statement, NONLOCNEG defined in (24), handles the case in which there is no local negation. However, the statement ANYNEG defined in (21) makes sure that there is negation at some level, so non-local negation must be present. In such environments the genitive of negation is optional – the object of the verb is assigned accusative (see sentence (13), and (15) for its f-structure) or genitive case (as in (12), with the corresponding f-structure in (14)).

### 3.1 Alternative Formalisation

Note that the constraint in (18) could be considerably simplified as follows:[4]

(25) $\textsc{strcase} \equiv [\textsc{affirmative} \ \vee \ \textsc{negative}]$

(26) $\textsc{affirmative} \equiv [\neg(\uparrow \textsc{neg}) \ \wedge \ (\uparrow \textsc{obj case}) =_c \textsc{acc}]$

(27) $\textsc{negative} \equiv [((\textsc{xcomp}^* \uparrow) \textsc{neg}) =_c + \ \wedge \ (\uparrow \textsc{obj case}) =_c \textsc{gen}]$

This constraint states that accusative case is possible whenever there is no local negation (this case is handled by (26)), while genitive case is possible whenever sentential negation is available somewhere in the verb chain, locally or non-locally (this is handled by (27)).

Though (25) is equivalent to (18) in that it allows for the same values of case in corresponding environments, the statement formalised in (18) might be better suited for use with OT (Optimality Theory) marks to, for instance, disprefer the use of accusative case when non-local negation is available. However, one of the templates called by (18) would have to be modified in order to achieve this: instead of using set-membership notation for accusative or genitive under non-local negation in (24) ($(\uparrow \textsc{obj case}) \in_c \{\textsc{acc}, \textsc{gen}\}$), a disjunction of appropriate constraining equations would have to be used, preferring $(\uparrow \textsc{obj case}) =_c \textsc{gen}$ or dispreferring $(\uparrow \textsc{obj case})$ $=_c \textsc{acc}$.

[4]Thanks are due to the internal reviewer for pointing this out.

## 4 Multiple Objects Marked for Structural Case

There is also a subtle empirical difference concerning the (probably) only Polish verb which seems to have two non-subject arguments assigned case structurally, namely, KOSZTOWAĆ 'cost':

(28) Codzienny transport kosztuje ją grosze.
daily.NOM transport.NOM costs she.ACC pennies.ACC
'Daily transport costs her pennies.' (Google)

(29) Utrzymanie nie kosztuje jej majątku.
maintenance.NOM NEG costs she.GEN fortune.GEN
'Maintenance does not cost her a fortune.' (Google)

In (28), a form of the verb KOSZTOWAĆ combines with two accusative phrases: *ją* 'her' and *grosze* 'pennies'. In (29), where the same verb is negated, both arguments occur in the genitive: *jej* 'her' and *majątku* 'fortune'.

While the facts are a little more complex, as the genitive of negation on one or the other of these two arguments is perhaps not obligatory for some speakers,[5] let us see how the analysis proposed in this paper can be modified so as to account for such cases: templates called by (18) defined in (19)–(24) assume that the argument bearing structural case is OBJ. However, these templates can be parameterised[6] by replacing OBJ with a variable, call it GF, and placing this variable as a parameter of relevant templates, as shown below:

(30) $\text{STRCASE(GF)} \equiv [\text{AFFIRMATIVE(GF)} \vee \text{NEGATIVE(GF)}]$

(31) $\text{AFFIRMATIVE(GF)} \equiv [\neg((\text{XCOMP}^{*} \uparrow)\ \text{NEG}) \wedge (\uparrow \text{GF CASE}) =_c \text{ACC}]$

(32) $\text{NEGATIVE(GF)} \equiv [\text{ANYNEG} \wedge \text{NEGTYPE(GF)}]$

(33) $\text{ANYNEG} \equiv ((\text{XCOMP}^{*} \uparrow)\ \text{NEG}) =_c +$

(34) $\text{NEGTYPE(GF)} \equiv [\text{LOCNEG(GF)} \vee \text{NONLOCNEG(GF)}]$

(35) $\text{LOCNEG(GF)} \equiv [(\uparrow \text{NEG}) =_c + \wedge (\uparrow \text{GF CASE}) =_c \text{GEN}]$

(36) $\text{NONLOCNEG(GF)} \equiv [\neg(\uparrow \text{NEG}) \wedge (\uparrow \text{GF CASE}) \in_c \{\text{ACC}, \text{GEN}\}]$

Once this change is introduced, the template STRCASE defined in (30) must be called with a parameter whose value corresponds to the grammatical function of the argument which takes structural case. Such a change makes it possible to make any number of calls to this template in the lexical entry of a verb – one for each argument assigned case structurally. This way, verbs such as POCZYTAĆ 'read' which take one object marked for structural case (see (4)–(5) and (12)–(13) for examples) make one call to (30) with an appropriate grammatical function as GF, as in (37).

[5] See Przepiórkowski 1999: 105, but more empirical research is needed to establish the facts.
[6] In fact, the currently implemented analysis contains exactly such parameterised templates.

(37) STRCASE(OBJ)

In order to account for case assignment with verbs such as KOSZTOWAĆ ‘cost’ (see (28)–(29) for examples), where two objects are marked for structural case, the lexical entry of the verb contains two calls to (30) with two different object grammatical functions, for instance OBJ and OBJ2, as in (38):

(38) STRCASE(OBJ) STRCASE(OBJ2)

When these template calls are made, they independently ensure that relevant objects bear values of structural case appropriate in the given syntactic context. The f-structure in (39) results for *Transport kosztuje ją grosze*, a slightly simplified version of (28), while (40) provides a representation of (29):

(39)
$$\left[\begin{array}{ll} \text{PRED} & \text{‘COST}\langle\boxed{1},\boxed{2},\boxed{3}\rangle\text{’} \\ \text{SUBJ} & \boxed{1}\left[\begin{array}{ll} \text{PRED} & \text{‘TRANSPORT’} \end{array}\right] \\ \text{OBJ} & \boxed{2}\left[\begin{array}{ll} \text{PRED} & \text{‘SHE’} \\ \text{CASE} & \text{ACC} \end{array}\right] \\ \text{OBJ2} & \boxed{3}\left[\begin{array}{ll} \text{PRED} & \text{‘PENNY’} \\ \text{CASE} & \text{ACC} \end{array}\right] \end{array}\right]$$

(40)
$$\left[\begin{array}{ll} \text{PRED} & \text{‘COST}\langle\boxed{1},\boxed{2},\boxed{3}\rangle\text{’} \\ \text{SUBJ} & \boxed{1}\left[\begin{array}{ll} \text{PRED} & \text{‘MAINTENANCE’} \end{array}\right] \\ \text{OBJ} & \boxed{2}\left[\begin{array}{ll} \text{PRED} & \text{‘SHE’} \\ \text{CASE} & \text{GEN} \end{array}\right] \\ \text{OBJ2} & \boxed{3}\left[\begin{array}{ll} \text{PRED} & \text{‘FORTUNE’} \\ \text{CASE} & \text{GEN} \end{array}\right] \\ \text{NEG} & + \end{array}\right]$$

## 5 Feature Indeterminacy

We have assumed so far that the value of the CASE attribute is atomic. It has been demonstrated, however, that such an assumption is problematic for the proper treatment of case syncretism, where two morphological cases expressed by a given form are both active in some construction. Within LFG, such feature indeterminacy is discussed in Dalrymple and Kaplan 2000 and in Dalrymple et al. 2009 – see these papers for references to previous work on this issue.

Consider the following constructed examples, which illustrate the problem:

(41) Marysia lubi ale też boi się Marka.
Marysia.NOM likes but also be afraid REFL Marek.ACC/GEN
‘Marysia likes as well as fears Marek.’

(42) Marysia lubi ale nie szanuje Marka.
Marysia.NOM likes but NEG respects Marek.ACC/GEN
‘Marysia likes but does not respect Marek.’

The first verb in (41), *lubi* ‘likes’, takes an object marked for structural case while the second verb, *boi się* ‘fears, is afraid’, takes an object marked for the genitive case lexically. Example (42) is similar, with the only difference being that the genitive is assigned structurally, by the negated verb *nie szanuje* ‘does not respect’.

The solution to the problem of different case requirements on a shared dependent of coordinated verbs which is proposed in Dalrymple et al. 2009 is to use a complex CASE attribute which has as many subattributes as there are cases in a given language. Each of these subattributes can take one of the two values: positive (when the relevant case value is realised in a given environment) or negative (when the relevant case value is not possible). This way, a given word can be marked for more than one case at the same time, as shown in the simplified f-structure for the word *Marka* provided in (45). According to this f-structure, the noun is marked for accusative and genitive case at the same time, as in examples (41)–(42). This should be contrasted with the situation when the value of case is atomic – see the two separate f-structures for *Marka* in (43) and (44), where the noun is marked for accusative or genitive case exclusively, respectively.

(43) $\begin{bmatrix} \text{PRED} & \text{`MAREK'} \\ \text{CASE} & \text{ACC} \end{bmatrix}$ (44) $\begin{bmatrix} \text{PRED} & \text{`MAREK'} \\ \text{CASE} & \text{GEN} \end{bmatrix}$ (45) $\begin{bmatrix} \text{PRED} & \text{`MAREK'} \\ \text{CASE} & \begin{bmatrix} \text{ACC} & + \\ \text{DAT} & - \\ \text{GEN} & + \\ \text{INST} & - \\ \text{LOC} & - \\ \text{NOM} & - \\ \text{VOC} & - \end{bmatrix} \end{bmatrix}$

It is easy to extend the analysis of this paper so that it takes into account the approach to case of Dalrymple et al. 2009; the templates of §4 and their modified versions are given below:

(46) a. $\text{AFFIRMATIVE(GF)} \equiv [\neg((\text{XCOMP}^* \uparrow)\ \text{NEG}) \wedge (\uparrow \text{GF CASE}) =_c \text{ACC}]$ (= (31))

b. $\text{AFFIRMATIVE(GF)} \equiv [\neg((\text{XCOMP}^* \uparrow)\ \text{NEG}) \wedge (\uparrow \text{GF CASE ACC}) =_c +]$

(47) a. $\text{LOCNEG(GF)} \equiv [(\uparrow \text{NEG}) =_c + \wedge (\uparrow \text{GF CASE}) =_c \text{GEN}]$ (= (35))

b. $\text{LOCNEG(GF)} \equiv [(\uparrow \text{NEG}) =_c + \wedge (\uparrow \text{GF CASE GEN}) =_c +]$

(48) a. $\text{NONLOCNEG(GF)} \equiv [\neg(\uparrow \text{NEG}) \wedge (\uparrow \text{GF CASE}) \in_c \{\text{ACC, GEN}\}]$ (= (36))

b. $\text{NONLOCNEG(GF)} \equiv [\neg(\uparrow \text{NEG}) \wedge (\uparrow \text{GF CASE } \{\text{ACC}|\text{GEN}\}) =_c +]$

(46b) and (47b), complex CASE counterparts of (31) and (35), respectively, are modified so that the value of relevant subattributes of CASE, ACC and GEN, is required to be positive (+), meaning that the object is marked for the relevant case. The modification introduced in (48b) with respect to (36), the version using a CASE attribute with atomic values, is slightly more complex. In (36) a set is used in the constraint to specify the possible values of CASE: $(\uparrow \text{GF CASE}) \in_c \{\text{ACC, GEN}\}$. This accounts for the optionality of GoN in this environment: the value of CASE must belong to the set containing ACC and GEN values. Once complex CASE attribute is adopted, it no longer makes sense to use set-based constraints: the subattributes can only take boolean values (+ or −). Functional uncertainty is used instead in the path, i.e., ($\uparrow$ GF CASE {ACC|GEN}) $=_c$ +, which is equivalent to the disjunction: [($\uparrow$ GF CASE ACC) $=_c$ + $\vee$ ($\uparrow$ GF CASE GEN) $=_c$ +]. The effect of such a constraint is that the object can be marked for accusative case, genitive case or both – this last possibility accounts for feature indeterminacy in (41)–(42).

## 6 Unlike Category Coordination

Consider the following examples from Polish:

(49) Doradził mu wyjazd i żeby nie wracał.
advised him departure.ACC and that NEG come back
'He advised him to leave and not to come back.' (Kallas 1993: p. 92, ex. (48a))

(50) (Wcale) nie doradził mu wyjazdu ani żeby nie wracał.
not at all NEG advised him departure.GEN nor that NEG come back
'He did not advise him to leave nor not to come back.'

In examples (49)–(50) the object is a coordinate phrase which consists of a nominal (a form of the noun WYJAZD 'departure') and a clause (*żeby nie wracał* 'not to come back'). However, these examples differ consistently depending on whether negation (the negation marker NIE) is present – in (49) the nominal conjunct takes accusative case, while in (50) the object is marked for genitive case. Such variation is attributable to the fact that the verb DORADZIĆ 'advise' may take a structurally case-marked object.

To allow for clausal conjuncts in (49) and (50), a constraint checking that the object contains the appropriate complementiser (ŻEBY) must be added to the constraint handling structural case assignment. The template defined in (51) can be used for this purpose: it takes GF as the parameter and checks that the value of its COMP-FORM attribute is equal to ŻEBY:

(51) COMP-ŻEBY(GF) $\equiv$ ($\uparrow$ GF COMP-FORM) $=_c$ ŻEBY

Intuitively, a disjunction of template calls to STRCASE defined in (30) and COMP-ŻEBY defined in (51) should account for unlike category coordination in (49) and (50):

(52) [STRCASE(OBJ) $\vee$ COMP-ŻEBY(OBJ)]

This is not the case, however, because the disjunction is understood too early and, rather than being resolved for each element of the relevant f-structure (here: the object) individually, it is resolved once and applied to all its elements.[7] As a result, (52) handles correctly simple cases (no coordination, coordination of elements bearing the same specification), but it cannot account for unlike category coordination witnessed in (49) and (50). In order to account for these examples, (52) must be rewritten so as to use off-path constraints, as in (53).

[7] See Patejuk and Przepiórkowski 2012a, 2014 for a detailed explanation of this problem.

(53) $$(\uparrow \textsc{obj} \qquad \begin{array}[t]{c} \textsc{pred} \\ [\neg((\textsc{xcomp}^{*}\ \textsc{obj} \leftarrow)\ \textsc{neg}) \ \wedge\ (\leftarrow \textsc{case}) =_c \textsc{acc}] \ \vee \\ [((\textsc{xcomp}^{*}\ \textsc{obj} \leftarrow)\ \textsc{neg}) =_c + \ \wedge \\ [[((\textsc{obj} \leftarrow)\ \textsc{neg}) =_c + \ \wedge\ (\leftarrow \textsc{case}) =_c \textsc{gen}] \ \vee \\ [\neg((\textsc{obj} \leftarrow)\ \textsc{neg}) \ \wedge\ (\leftarrow \textsc{case}) \in_c \{\textsc{acc}, \textsc{gen}\}]]] \ \vee \\ (\leftarrow \textsc{comp-form}) =_c \textsc{żeby} \end{array} \qquad )$$

The constraint provided in (53) is an exact off-path equivalent of (the expanded version of) (52) – it assigns appropriate structural case or allows clauses containing a żeby-type complementiser. If there is no negation at all, it assigns accusative case. If the verb assigning case is negated locally, genitive case is assigned. If there is no local negation but transferred negation is available, GoN is optional and the object may be assigned accusative or genitive case. Finally, clausal realisations of the object are also allowed (żeby-type complementiser).

The f-structure in (54) below corresponds to (50):

(54) $$\left[\begin{array}{lll} \textsc{pred} & \text{'ADVISE}\langle \boxed{1},\boxed{2},\boxed{3} \rangle\text{'} & \\ \textsc{subj} & \boxed{1} & \left[\begin{array}{ll} \textsc{pred} & \text{'PRO'} \end{array}\right] \\ \textsc{obj} & \boxed{2} & \left[\begin{array}{l} \left\{ \left[\begin{array}{ll} \textsc{pred} & \text{'DEPARTURE'} \\ \textsc{case} & \textsc{gen} \end{array}\right], \left[\begin{array}{ll} \textsc{pred} & \text{'COME\_BACK}\langle \boxed{4} \rangle\text{'} \\ \textsc{subj} & \boxed{4} \left[\begin{array}{ll} \textsc{pred} & \text{'PRO'} \end{array}\right] \\ \textsc{comp-form} & \textsc{żeby} \\ \textsc{neg} & + \end{array}\right] \right\} \\ \textsc{coord-form} \quad \textsc{ani} \end{array}\right] \\ \textsc{obj}_{\theta} & \boxed{3} & \left[\begin{array}{ll} \textsc{pred} & \text{'HE'} \\ \textsc{case} & \textsc{dat} \end{array}\right] \\ \textsc{neg} & + & \end{array}\right]$$

### 6.1 Alternative Formalisation

Note that the fragment of (53) related to structural case assignment could be simplified as described in §3.1; the following constraint would result:

(55) $$(\uparrow \textsc{obj} \qquad \begin{array}[t]{c} \textsc{pred} \\ [\neg((\textsc{obj} \leftarrow)\ \textsc{neg}) \ \wedge\ (\leftarrow \textsc{case}) =_c \textsc{acc}] \ \vee \\ [((\textsc{xcomp}^{*}\ \textsc{obj} \leftarrow)\ \textsc{neg}) =_c + \ \wedge\ (\leftarrow \textsc{case}) =_c \textsc{gen}] \ \vee \\ (\leftarrow \textsc{comp-form}) =_c \textsc{żeby} \end{array} \qquad )$$

## 7 Comparisons

### 7.1 Earlier LFG Analysis: Patejuk and Przepiórkowski 2011

The first XLE/LFG implementation of Polish structural case assignment is described in Patejuk and Przepiórkowski 2011; since this paper is only available in Polish, we will briefly present here the part concerning structural case assignment to objects, ignoring the part concerned with subjects.

The c-structure of *POLFIE* (Patejuk and Przepiórkowski 2012b) was originally based on GFJP,[8] a DCG[9] grammar of Polish presented in Świdziński 1992; its implementation used by the *Świgra* parser is described in Woliński 2004. Hence, the names of nonterminals in this early analysis follow those of *Świgra*: `ZDANIE` means 'sentence', `FF` stands for *fraza finitywna* 'finite phrase', and `FW` – for *fraza wymagana* 'required phrase' (i.e., an argument). A considerably simplified sentential rule is given below:[10,11]

```
ZDANIE --> (FW: (^ SUBJ)=!),
           FF:  ^=!
                @(STRCS)
                @(STRCO),
           (FW: (^ OBJ)=!),
           (FW: (^ OBJ_TH)=!),
           (FW: (^ XCOMP)=!
                (! CAT)=c inf
                @(NEGTR)).
```

This rule states that a sentence (`ZDANIE`) consists of – in any order – an obligatory finite phrase (`FF`) and four optional arguments (`FW`): the subject, an object, a thematic object and an infinitival open complement. There are three template calls: STRCS for case assignment to the potentially structural subject (ignored here), STRCO for case assignment to the potentially structural object (explained in detail below), and NEGTR for the "transmission of negation" within the infinitival complement.

The idea of "transmission of negation" was proposed in Przepiórkowski and Świdziński 1997 in the context of GFJP, the aforementioned DCG grammar. In Patejuk and Przepiórkowski 2011, the template NEGTR is defined as follows:

```
NEGTR =
{
~(^ NEG)
|
(^ NEG)
(! NEG TR)=+
     {
     (^ NEG LOC)=c +
     |
```

[8] *Gramatyka formalna języka polskiego* (Świdziński 1992).

[9] *Definite Clause Grammar* (Warren and Pereira 1980).

[10] The relevant fragments of the grammar are presented in the XLE notation: `^` corresponds to $\uparrow$ in theoretical LFG notation, `!` to $\downarrow$; `~` corresponds to $\neg$; `@` marks template calls.

[11] F-descriptions taken from Patejuk and Przepiórkowski 2011 are slightly modified here so as to comply with conventions adopted in the current analysis (e.g. lowercase values of attributes).

```
      ~(^ NEG LOC)
      (^ NEG TR)=c +
}     }.
```

According to this template, if the higher phrase contains the attribute NEG, with either local negation ($(\uparrow$ NEG LOC$) =_c +$) or transmitted negation ($(\uparrow$ NEG TR$) =_c +$) already established, then the current phrase must also have this attribute and, within its value, the attribute TR (for 'transmitted') must be set to '$+$'. Since this template is present on all infinitival complements, it ensures the transmission of negation downwards in verb chains.

The template responsible for case assignment to structurally-cased objects is given below.

```
STRCO =
{~(^ RQSC)
|     {(^ RQSC)=c -
      |
      (^ RQSC)=c +
           {~(^ NEG)
                {(^ OBJ CASE)= acc
                |
                ~(^ OBJ)
                (^ OBJ_TH CASE)= acc
                }
           |
           (^ NEG)
                {(^ NEG LOC)=c +
                     {(^ OBJ CASE)= gen
                     |
                     ~(^ OBJ)
                     (^ OBJ_TH CASE)= gen
                     }
                |
                ~(^ NEG LOC)
                (^ NEG TR)=c +
                     {     {(^ OBJ CASE)= gen
                           |
                           ~(^ OBJ)
                           (^ OBJ_TH CASE)= gen
                           }
                     |     {(^ OBJ CASE)= acc
                           |
                           ~(^ OBJ)
                           (^ OBJ_TH CASE)= acc
}     }     }     }     }     }.
```

This template relies on an additional attribute, apart from LOC and TR within values of NEG, namely, on RQSC, which is appropriate for verbs and stands for 'required structural case (on some object)'. This template does not do anything if RQSC is absent or if its value is '$-$' (lexical (or inherent) case). The action starts if the verb is lexically marked as RQSC $+$; if so:

- either the verb has no NEG attribute, in which case OBJ or – if there is no OBJ – OBJ_TH is assigned the accusative,
- or NEG is present, in which case:
  - either there is local negation, in which case OBJ or – if there is no OBJ – OBJ_TH is assigned the genitive case,
  - or there is no local negation but there is transmitted negation, in which case:
    - either OBJ or – if there is no OBJ – OBJ_TH is assigned the genitive case,
    - or OBJ or – if there is no OBJ – OBJ_TH is assigned the accusative case.

One problem with this analysis is that the above templates use defining case assignment equations rather than constraining equations, which is problematic for non-canonical (e.g. clausal or infinitival) realisations of OBJ or OBJ_TH – an example where a nominal marked for structural case can be coordinated with a clause was provided in (49). Unless appropriate disjunctions are used in STRCO in order to avoid assigning case to categories where it is undesired, the clause in (49) would be assigned case.

Second, the analysis is unnecessarily complex – it is repetitive, it does not use embedded templates. One complication within the above templates stems from the fact that – in the 2011 version of *POLFIE* – both OBJ and OBJ_TH were allowed to bear structural case, however, OBJ_TH could only be assigned structural case if OBJ was not present at the same time. In the current analysis the template STRCASE in (30) may be called with any object grammatical function, as determined by the lexical entry of the relevant verb. Furthermore, the analysis of Patejuk and Przepiórkowski 2011 requires the f-structure presence of two attributes whose role is purely technical: NEG TR and RQSC. In contrast, the analysis proposed in §3 only makes use of the boolean-valued NEG attribute which simply indicates whether the verb is (locally) negated or not.

Finally, examples such as (28)–(29) could not be properly accounted for on the analysis of Patejuk and Przepiórkowski 2011. The requirement for structural case is only marked on the verb (as RQSC attribute), so the usual situation where only one of non-subject arguments is assigned case structurally cannot be distinguished from the situation illustrated in (28)–(29), where both such arguments receive structural case. Besides, STRCO template can assign case to only one object – as a result, the case marking of the second object could be wrong.

## 7.2 HPSG Analysis: Przepiórkowski 1999

An even earlier analysis of structural case assignment to Polish objects which takes into account the optionality of long-distance GoN is the HPSG (Pollard and Sag 1994) analysis presented in Przepiórkowski 1999.[12] This HPSG analysis is based on an intuition similar to – but developed independently from – that of Dziwirek 1994, 1998, couched in the Relational Grammar framework (Perlmutter 1983). The main idea of this analysis is that the genitive-of-negation object is raised to the argument structure of the negated verb. The optionality of this raising mechanism reflects the optionality of long-distance GoN. The advantage of this analysis is that case assignment remains an intimately local affair between a verb and its arguments – once arguments are raised, no long-distance case assignment mechanisms are required such as those in the current analysis (see the non-local functional uncertainty constraints in (19) and (21) above). The price to be paid is, however, the postulation of some *ad hoc* constraints on this 'clause union', e.g. the constraint that arguments cannot be raised above the highest negated verb (Przepiórkowski 1999: 155, (5.209)). Other phenomena give at best mixed evidence for this stance (Przepiórkowski 1999: §5.2).

What is clear, on the other hand, is that a general 'clause union' analysis for Polish verb chains cannot be right. Consider the following example:[13]

(56) Na studiach uczono ją/*jej nie ufać takim badaniom.
on studies taught.IMPS her.ACC/GEN NEG trust.INF such.DAT investigations.DAT
'During the studies, she was taught not to trust such research.'

In this example, negation on the lower verb does not have any effect on the structurally-cased object of the higher verb: the argument of UCZYĆ 'teach' must occur in the accusative, not genitive, as negation only occurs on the lower verb (as shown in (57) for *Uczono ją nie ufać badaniom*, an abbreviated version of (56)). If both predicates were 'unioned', negation would be expected to apply to any arguments of these predicates, contrary to fact.[14]

[12] See also the two analyses in Przepiórkowski and Świdziński 1997 which, however, assume that GoN is always obligatory.

[13] On the basis of a sentence from NKJP.

[14] A similar argument may be constructed on the basis of the behaviour of *n*-words in Polish, e.g., the ungrammaticality of the following example from Przepiórkowski and Kupść 1997: 30, where the lower negation in a verb cluster cannot license a higher *n*-word:

(i) *Nikt chciał nie kupić tego domu.
nobody.NOM wanted NEG buy.INF this.GEN house.GEN

(57)
$$\begin{bmatrix} \text{PRED} & \text{‘TEACH}\langle\boxed{1},\boxed{2},\boxed{3}\rangle\text{’} \\ \text{SUBJ} & \boxed{1}\begin{bmatrix}\text{PRED} & \text{‘PRO’}\end{bmatrix} \\ \text{OBJ} & \boxed{2}\begin{bmatrix}\text{PRED} & \text{‘SHE’} \\ \text{CASE} & \text{ACC}\end{bmatrix} \\ \text{XCOMP} & \boxed{3}\begin{bmatrix}\text{PRED} & \text{‘TRUST}\langle\boxed{2},\boxed{4}\rangle\text{’} \\ \text{SUBJ} & \boxed{2} \\ \text{OBJ} & \boxed{4}\begin{bmatrix}\text{PRED} & \text{‘INVESTIGATION’}\end{bmatrix} \\ \text{NEG} & + \end{bmatrix} \end{bmatrix}$$

Hence, we conclude that the current analysis is simpler and empirically more adequate than that of Przepiórkowski 1999, even if it gives up the overwhelming generalisation that case assignment is a strictly local phenomenon.

## 8 Conclusion

This paper demonstrated how Polish structural case assignment to objects may be formalised in LFG using functional uncertainty. The case assignment statements formalised here take into account situations where case assigned to the object is influenced by verbal negation which is not local to the predicate which subcategorises for this structurally-cased object. Furthermore, the analysis is conceptually simpler, and leads to simpler representations, than either the HPSG analysis proposed in Przepiórkowski 1999 or our earlier XLE/LFG analysis presented in Patejuk and Przepiórkowski 2011. Finally, it was demonstrated that the solution offered in this paper can be modified so as to take other phenomena into consideration, including feature indeterminacy and case assignment under unlike category coordination.[15]

## References


Babby, Leonard [H.]. 1980a. *Existential Sentences and Negation in Russian*. Ann Arbor, MI: Karoma Publishers.

Babby, Leonard [H.]. 1980b. The Syntax of Surface Case Marking. In Wayne Harbert and Julia Herschensohn (eds.), *Cornell Working Papers in Linguistics*, volume 1, pages 1–32, Department of Modern Languages and Linguistics, Cornell University.

Crouch, Dick, Dalrymple, Mary, Kaplan, Ron, King, Tracy, Maxwell, John and Newman, Paula. 2011. XLE Documentation. `http://www2.parc.com/isl/groups/nltt/xle/doc/xle_toc.html`.


[15]Patejuk and Przepiórkowski 2014 (in this volume) discusses how control into one of the conjuncts can be coupled with structural case assignment to selected conjuncts.

Dalrymple, Mary and Kaplan, Ronald M. 2000. Feature Indeterminacy and Feature Resolution. *Language* 76(4), 759–798.

Dalrymple, Mary, King, Tracy Holloway and Sadler, Louisa. 2009. Indeterminacy by underspecification. *Journal of Linguistics* 45, 31–68.

Dziwirek, Katarzyna. 1994. *Polish Subjects*. New York: Garland.

Dziwirek, Katarzyna. 1998. Reduced Construction in Universal Grammar: Evidence from the Polish Object Control Construction. *Natural Language and Linguistic Theory* 16, 53–99.

Kallas, Krystyna. 1993. *Składnia współczesnych polskich konstrukcji współrzędnych*. Toruń: Wydawnictwo Uniwersytetu Mikołaja Kopernika.

Neidle, Carol. 1982. Case Agreement in Russian. In Joan Bresnan (ed.), *The Mental Representation of Grammatical Relations*, MIT Press Series on Cognitive Theory and Mental Representation, pages 391–426, Cambridge, MA: The MIT Press.

Neidle, Carol. 1988. *The Role of Case in Russian Syntax*. Dordrecht: Kluwer.

Patejuk, Agnieszka and Przepiórkowski, Adam. 2011. Przypadki strukturalne w polskiej gramatyce LFG. In Mirosław Bańko and Dorota Kopcińska (eds.), *Różne formy, różne treści: Tom ofiarowany Profesorowi Markowi Świdzińskiemu*, pages 183–193, Warsaw: Uniwersytet Warszawski, Wydział Polonistyki.

Patejuk, Agnieszka and Przepiórkowski, Adam. 2012a. A Comprehensive Analysis of Constituent Coordination for Grammar Engineering. In *Proceedings of the 24rd International Conference on Computational Linguistics (COLING 2012)*, pages 2191–2207.

Patejuk, Agnieszka and Przepiórkowski, Adam. 2012b. Towards an LFG parser for Polish: An exercise in parasitic grammar development. In *Proceedings of the Eighth International Conference on Language Resources and Evaluation, LREC 2012*, pages 3849–3852, ELRA, Istanbul, Turkey.

Patejuk, Agnieszka and Przepiórkowski, Adam. 2014. Control into Selected Conjuncts. In Miriam Butt and Tracy Holloway King (eds.), *The Proceedings of the LFG'14 Conference*, Stanford, CA: CSLI Publications, under review.

Perlmutter, David (ed.). 1983. *Studies in Relational Grammar*, volume 1. University of Chicago Press.

Pollard, Carl and Sag, Ivan A. 1994. *Head-driven Phrase Structure Grammar*. Chicago, IL: Chicago University Press / CSLI Publications.

Przepiórkowski, Adam. 1999. *Case Assignment and the Complement-Adjunct Dichotomy: A Non-Configurational Constraint-Based Approach*. Ph.D. dissertation, Universität Tübingen, Germany.

Przepiórkowski, Adam. 2000. Long Distance Genitive of Negation in Polish. *Journal of Slavic Linguistics* 8, 151–189.

Przepiórkowski, Adam, Bańko, Mirosław, Górski, Rafał L. and Lewandowska-Tomaszczyk, Barbara (eds.). 2012. *Narodowy Korpus Języka Polskiego [Eng.: National Corpus of Polish]*. Warsaw: Wydawnictwo Naukowe PWN.

Przepiórkowski, Adam, Górski, Rafał L., Łaziński, Marek and Pęzik, Piotr. 2010. Recent Developments in the National Corpus of Polish. In *Proceedings of the Seventh International Conference on Language Resources and Evaluation, LREC 2010*, ELRA, Valletta, Malta.

Przepiórkowski, Adam and Kupść, Anna. 1997. Negative Concord in Polish. IPI PAN Research Report 828, Institute of Computer Science, Polish Academy of Sciences, Warsaw.

Przepiórkowski, Adam and Świdziński, Marek. 1997. Polish Verbal Negation Revisited: A Metamorphosis vs. HPSG Account. Technical Report 829, Institute of Computer Science, Polish Academy of Sciences.

Rouveret, Alain and Vergnaud, Jean-Roger. 1980. Specifying Reference to the Subject: French causatives and conditions on representations. *Linguistic Inquiry* 11(1), 97–202.

Świdziński, Marek. 1992. *Gramatyka formalna języka polskiego*, volume 349 of *Rozprawy Uniwersytetu Warszawskiego*. Warsaw: Wydawnictwa Uniwersytetu Warszawskiego.

Vergnaud, Jean-Roger. 1982. *Dépendances et Niveaux de Representation en Syntaxe*. Ph.D. dissertation, Université Paris 7.

Warren, D. H. D. and Pereira, Fernando C. N. 1980. Definite Clause Grammars for Language Analysis — A Survey of the Formalism and a Comparison with Augmented Transition Networks. *Artificial Intelligence* 13, 231–278.

Woliński, Marcin. 2004. *Komputerowa weryfikacja gramatyki Świdzińskiego*. Ph.D. dissertation, Institute of Computer Science, Polish Academy of Sciences, Warsaw.

# CONTROL INTO SELECTED CONJUNCTS

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**Abstract**

This paper proposes an analysis of coordination of unlike categories, where some of the conjuncts are controlled and others are not. It shows that the most straightforward analysis, using defining off-path constraints, is a solution for theoretical LFG, but currently does not work in grammars implemented in XLE. For this reason, an alternative working analysis introducing a new attribute on all conjuncts, CONTROLLER, is offered.

# 1 Introduction

Two problems arise when categories corresponding to grammatical functions which prototypically differ with respect to the closed/open classification are coordinated, as in (1), an example from Polish where the first conjunct is an infinitive (*pić* 'drink'), while the other is a nominal (*papierosa* 'cigarette'):

(1) Chcę pić i papierosa.
want drink.INF and cigarette.ACC
'I want to drink and (I want) a cigarette.' (Kallas 1993: 123, ex. (102))

Arguments from case transmission given in Przepiórkowski 2004 show that functional control – not anaphoric control – is involved in Polish subject control.[1] The relevant examples are (2)–(3), where the form of the predicative adjective MIŁY 'nice' must agree in case with the controlling subject.[2]

(2) Janek chce być miły.
Janek.NOM.SG.M1 wants be.INF nice.NOM.SG.M1
'Janek wants to be nice.'

(3) Pięć dziewcząt chce być miłe / miłych.
five.ACC.PL.N girls.GEN.PL.N wants be.INF nice.ACC.PL.N nice.GEN.PL.N
'Five girls want to be nice.'

While in (2) both the subject *Janek* and the predicative adjective *miły* are marked for nominative case, in (3) the predicative adjective can either be marked for accusative case (*miłe*) or genitive case (*miłych*). This variation is attributable to the fact that the subject in (3) is a numeral phrase (*Pięć dziewcząt*) and the predicative adjective can either agree with the accusative[3] numeral head (*Pięć*) or its genitive nominal object (*dziewcząt*).

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[1]Also in Czech, see Przepiórkowski and Rosen 2005, and possibly in other Slavic languages.

[2]As indicated in glosses in (2)–(3), Polish predicative adjectives obligatorily agree with their controller in number and gender.

[3]In Polish non-agreeing numeral subjects (those which require the nominal to appear in genitive case) are marked for accusative case, not nominative. See Przepiórkowski and Patejuk 2012b for discussion.

It follows that, without coordination, the infinitival conjunct in (1) by itself would be a prototypical instance of xcomp, an open grammatical function; this is shown in the f-structure in (5), which corresponds to sentence (4). By contrast, the nominal conjunct in (1) would typically be classified as an obj, a closed grammatical function – see the f-structure (7) for example (6).

(4) Chcę pić.
want drink.inf
'I want to drink.'

(5)
$$\begin{bmatrix} \textsc{pred} & \text{`want}\langle \boxed{1},\boxed{2} \rangle\text{'} \\ \textsc{subj} & \boxed{1}\begin{bmatrix} \textsc{pred} & \text{`I'} \end{bmatrix} \\ \textsc{xcomp} & \boxed{2}\begin{bmatrix} \textsc{pred} & \text{`drink}\langle \boxed{1} \rangle\text{'} \\ \textsc{subj} & \boxed{1} \end{bmatrix} \end{bmatrix}$$

(6) Chcę papierosa.
want cigarette.acc
'I want a cigarette.'

(7)
$$\begin{bmatrix} \textsc{pred} & \text{`want}\langle \boxed{1},\boxed{2} \rangle\text{'} \\ \textsc{subj} & \boxed{1}\begin{bmatrix} \textsc{pred} & \text{`I'} \end{bmatrix} \\ \textsc{obj} & \boxed{2}\begin{bmatrix} \textsc{pred} & \text{`cigarette'} \end{bmatrix} \end{bmatrix}$$

The first issue with coordinate "unlike control" phrases such as that in (1) is their grammatical function: does the coordinated argument bear the grammatical function of the closed conjunct (obj), of the open conjunct (xcomp), or some entirely different function? The second issue is how to establish the control relations appropriately – the nominal conjunct cannot be controlled (there is nothing to be controlled), while the infinitival conjunct must be controlled (more specifically its subject). The two following sections, §2 and §3, deal with these two issues in turn. Then, §4 shows how to account for structural case assignment into selected conjuncts under unlike category coordination. Finally, §5 concludes this paper.

## 2 What Grammatical Function?

It was suggested during the obj vs. comp debate (Dalrymple and Lødrup 2000, Alsina et al. 2005, Forst 2006, Berman 2007, Börjars and Vincent 2008) that it may be reasonable to get rid of the comp grammatical function, as it distorts the distinction between f-structure and c-structure: comp is defined categorially, as the grammatical function assigned to closed clausal complements. Moreover, since clausal complements can be coordinated with uncontroversial nominal objects (see (8)), they should – at least in some cases – also bear the grammatical function obj, and their clausal categorial status should be ensured by other constraints.

(8) Pat remembered [the appointment] and [that it was important to be on time].
(Dalrymple and Lødrup 2000: ex. (5) = Sag et al. 1985: ex. (123a))

While Dalrymple and Lødrup 2000 maintain the comp vs. obj distinction, treating only some clausal arguments as obj, Alsina et al. 2005 get rid of comp altogether. Further arguments against the mixed approach of Dalrymple and Lødrup 2000 are provided by Forst (2006), who also shows the grammar engineering advantages of getting rid of COMP; other work (Berman 2007, Börjars and Vincent 2008) also supports this move.[4]

Alsina et al. 2005: 41 go further, advancing the idea that the XCOMP should also be removed from the repertoire of grammatical functions: "If we abandon the function COMP in LFG, the obvious question is, what about the function XCOMP? Given that they are both clausal complements, and that XCOMP may be considered a special case of COMP, XCOMP should probably go the same way as COMP."

However, it is not so obvious whether XCOMP should be removed on the grounds that it is the same case as COMP since there are two approaches to what can correspond to this grammatical function. In theoretical LFG, XCOMP usually represents both infinitival and predicative complements. Though both can be classified as clausal complements, as in the above quote from Alsina et al. 2005, they may correspond to various c-structure categories (infinitival phrases, predicative nominals and adjectives), unlike COMP, which corresponds to CP, a subordinate clause introduced by a complementiser or an interrogative item. Hence, XCOMP is defined by c-structure categories to a much lesser extent than COMP, and the postulate to get rid of it is less justified. By contrast, implemented grammars such as those developed within the ParGram project (Butt et al. 2002) tend to use distinct grammatical functions for infinitival complements (XCOMP) and predicative complements (XCOMP-PRED). Under such a definition of XCOMP, it is indeed a special case of COMP, differing only in the fact that it is the grammatical function corresponding to infinitival clauses.

Regardless of which of these two definitions of XCOMP is adopted, coordination such as in (1) causes a problem under the standard LFG approach to coordination, where conjuncts in a coordinate phrase correspond to the same grammatical function. Even if the lexical entry of a verb has a disjunctive specification where particular disjuncts correspond to various valence schemata, one with XCOMP, the other with OBJ, as in the lexical entry of *Chcę* in (9), only one disjunct can be chosen. As a result, a multiclausal analysis where the first conjunct is a dependent of a verb taking an infinitival complement (see (10)), while the second conjunct is a dependent of the verb taking a nominal complement (as in (11)), is not possible.

(9) Chcę V [PRED-XCOMP $\vee$ PRED-OBJ]
($\uparrow$ SUBJ NUM)= SG
($\uparrow$ SUBJ PERS)= 1

(10) PRED-XCOMP $\equiv$ ($\uparrow$ PRED)='WANT<($\uparrow$ SUBJ)($\uparrow$ XCOMP)>'

(11) PRED-OBJ $\equiv$ ($\uparrow$ PRED)='WANT<($\uparrow$ SUBJ)($\uparrow$ OBJ)>'

These considerations provide some justification for adopting the assumption that the common grammatical function assigned to the coordinate phrase in (1) is OBJ.[5]

[4] But see Lødrup 2012 for a voice of dissent.

[5] This is the decision for the particular instance of coordination in (1). Note that it does not imply that OBJ should be used as the common grammatical function for all instances of unlike category

Moreover, following Arka and Simpson (1998), who convincingly argue for the possibility of control into SUBJ in Balinese, we assume that control into OBJ is also allowed in principle.

# 3 Establishing Control Appropriately

## 3.1 First Attempt (Failed)

In order to account for (1), the (pro-dropped) matrix subject must control the subject of the infinitival. Usually control is expressed via equations such as (12).

(12) $(\uparrow \text{SUBJ}) = (\uparrow \text{OBJ SUBJ})$

The grammatical function OBJ is used in (12) instead of XCOMP, because OBJ was chosen as the common grammatical function of the coordinated argument in (1).

However, the control equation in (12) will not work in case of the coordinated object in (1). The difficulty stems from the fact that grammatical functions are distributive: "[G]overnable grammatical functions like OBJ are *distributive features*" (Dalrymple 2001: 365). This assumption is the basis of the analysis of coordination of heads which share arguments, as in (13), and for the explanation of the contrast – provided by Hall (1965: 66) – between (14) and (15); see Dalrymple 2001: 363–366.

(13) Chris selected and hired David.

(14) John washes and polishes his car in the garage.

(15) *John washes and keeps his car in the garage.

A control equation such as (12) will not yield the desired result under coordination of unlike categories such as in (1) because it would also distribute to the nominal conjunct, resulting in the violation of the coherence condition in this conjunct. This is illustrated in (16), where $\boxed{3}$ is the f-structure fragment corresponding to *papierosa* 'cigarette', where incoherence occurs – according to its PRED attribute, *papierosa* takes no arguments, yet a SUBJ attribute is introduced to its f-structure as the result of (12).

(16) *
$$\begin{bmatrix} \text{PRED} & \text{`WANT}\langle\boxed{1},\boxed{2}\rangle\text{'} \\ \text{SUBJ} & \boxed{1}\begin{bmatrix}\text{PRED} & \text{`I'}\end{bmatrix} \\ \text{OBJ} & \boxed{2}\left[\left\{ \begin{bmatrix} \text{PRED} & \text{`DRINK}\langle\boxed{1}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \end{bmatrix}, \boxed{3}\begin{bmatrix} \text{PRED} & \text{`CIGARETTE'} \\ \text{SUBJ} & \boxed{1} \end{bmatrix} \right\}\right] \end{bmatrix}$$

Unfortunately, using a disjunction such as in (17) to restrict the application of the control equation to the infinitival conjunct will not work either:[6]

coordination. This issue is outside of the scope of this paper as it is not concerned with the repertoire of LFG grammatical functions and how they are or should be defined.

[6]This analysis uses the CAT attribute to store information about the part of speech of the head.

(17) $[(\uparrow \text{OBJ CAT}) =_c \text{INF} \ \wedge \ (\uparrow \text{SUBJ}) = (\uparrow \text{OBJ SUBJ})] \ \vee \ (\uparrow \text{OBJ CAT}) \neq \text{INF}$

This is because the disjunction in (17) is interpreted too early: while the intended meaning of (17) is that each conjunct should independently satisfy either the first disjunct (the conjunct is an infinitive, the control equation in (12) is introduced) or the second one (the conjunct is not an infinitive), its current LFG interpretation is that all conjuncts must satisfy its first disjunct or all must consistently satisfy the other one. This is how this contrast may be formalised[7] (A stands for the first disjunct of (17), "$[(\uparrow \text{OBJ CAT}) =_c \text{INF} \ \wedge \ (\uparrow \text{SUBJ}) = (\uparrow \text{OBJ SUBJ})]$", B for the second one, "$(\uparrow \text{OBJ CAT}) \neq \text{INF}$", and GF for OBJ):

(18) a. $\forall x \in (\uparrow \text{GF})[A(x) \vee B(x)]$ (intended)

b. $\forall x \in (\uparrow \text{GF})A(x) \vee \forall x \in (\uparrow \text{GF})B(x)$ (actual)

In other words, the effect of the constraint provided in (17), formalised in (18b), is equivalent to having two separate lexical entries for the given verb: one which introduces the control equation if the complement is an infinitive (resulting in incoherence with the nominal conjunct of (1)), the other which checks that the complement is not an infinitive (causing incompleteness in the infinitival conjunct of (1) as its SUBJ attribute is not filled). By contrast, the desired interpretation of (17) is the one provided in (18a) – it is satisfied under coordination if each element of the given structure satisfies any of the two constraints.

The cause of this issue is that, in LFG, what is distributive is features, not statements; this problem is discussed in Przepiórkowski and Patejuk 2012a in the context of unlike category coordination in Polish subjects. The solution to this problem proposed there is to treat statements, rather than features, as distributive. If this modification were adopted, the statement in (17) would be able to handle control into selected conjuncts in sentences such as (1).

## 3.2 Second Attempt (Failed in XLE)

Another idea is to use off-path constraints to distribute the disjunction checking the category of the conjuncts and using the relevant control equation only with infinitival conjuncts – (19) below is an off-path version of (17):

(19) $$(\uparrow \text{OBJ} \quad \underset{\substack{[(\leftarrow \text{CAT}) =_c \text{INF} \ \wedge \ (\leftarrow \text{SUBJ}) = ((\text{OBJ} \leftarrow) \text{SUBJ})] \\ \vee \\ (\leftarrow \text{CAT}) \neq \text{INF}}}{\text{PRED}} \quad )$$

The off-path constraint is attached to the PRED attribute of the OBJ grammatical function (which corresponds to the coordinate phrase in (1)) – the fact that PRED is a distributive feature ensures that the off-path constraint is distributed to all elements of the relevant f-structure. The first off-path disjunct of (19), $[(\leftarrow \text{CAT}) =_c \text{INF} \ \wedge$

[7]Thanks are due to Ron Kaplan for discussing this issue and proposing the formalisation in (18).

$(\leftarrow$ SUBJ$) = (($OBJ $\leftarrow)$ SUBJ$)]$, checks whether the given element (conjunct) of the OBJ f-structure is an infinitive $((\leftarrow$ CAT$) =_c$ INF$)$ and establishes control between the subject of this element (of OBJ f-structure) and the subject of the verb WANT: $(\leftarrow$ SUBJ$) = (($OBJ $\leftarrow)$ SUBJ$)$. A complex path is used for this purpose: $(($OBJ $\leftarrow)$ SUBJ$)$ where $($OBJ $\leftarrow)$ is an inside-out path pointing to the structure which contains OBJ and then to the SUBJ of this structure. This control equation is an off-path equivalent of the plain (non-off-path) control equation provided in (12). The second off-path disjunct in (19), $(\leftarrow$ CAT$) \neq$ INF, ensures that the relevant element of OBJ f-structure is not an infinitive. For the f-structure to be well-formed, every element of OBJ f-structure must satisfy one of the disjuncts in the off-path constraint in (19).

Unfortunately, this solution will not work in implemented grammars since off-path constraints are non-constructive in the XLE system (Crouch et al. 2011) implementing LFG – they cannot introduce new attribute-value pairs to the f-structure, they can only act as constraining equations. By contrast, control equations must take the form of a defining equation to be effective: structure-sharing of the subject of WANT with the subject of its infinitival complement requires assignment rather than checking of identity – checking will not provide a value of the subject of the infinitive. This is shown in the plain control equation in (12): it uses the assignment operator "$=$", not the checking operator "$=_c$". While both operators are available in XLE in plain constraints, the former is not available in off-path constraints. For this reason, the constraint provided in (19) is not effective – it uses the assignment operator which is not available in this type of constraints in XLE.

However, it must be mentioned that this difficulty does not necessarily affect theoretical LFG analyses. There exist works which use off-path constraints in a constructive way, introducing new attribute-value pairs: these include Ash Asudeh's talk on *Reflexives in the Correspondence Architecture*.[8] More importantly, the currently prepared new edition of Dalrymple 2001 explicitly mentions that there are various types of off-path constraints: „Using the f-structure variables $\leftarrow$ and $\rightarrow$, any kind of constraint can be written as an off-path constraint; defining equations, constraining equations, existential constraints, and other kinds of f-descriptions may be specified." Similarly, the draft of the new edition of Bresnan 2000 also discusses the contrast between defining and constraining equality in the context of off-path constraints.[9]

Nevertheless, if a solution can be found which is implementable in XLE, it should perhaps be preferred to the one sketched in this subsection.

[8] We are grateful to Dag Haug for bringing this talk to our attention. The slides are available at `http://users.ox.ac.uk/~cpgl0036/slides/asudeh-iceland09-reflexives.pdf` (accessed on 6 October 2014); see the "Drip" on slide 51.

[9] „The off-path constraint in (66) is a defining equation, so even if no other part of the functional description for the f-structure had specified the feature [ TENSE PAST ], the off-path constraint would result in an f-structure that contains the feature. In contrast, if the equality in the off-path equation had been the constraining equality, $=_c$, the off-path constraint would only be satisfied if the f-structure independently contained the feature, as is the case with f-structure (65)."

### 3.3 Third Attempt (Successful)

A working solution is available[10] which takes a slightly different approach to control – instead of a control equation such as in (12), subject control verbs are annotated with its modified version in (20), which uses a new attribute – CONTROLLER:

(20) $(\uparrow \text{SUBJ}) = (\uparrow \text{OBJ CONTROLLER})$

Placed in the lexical entry of the controlling verb, (20) introduces the attribute CONTROLLER – whose value is the f-structure of SUBJ of this verb – into the f-structure of OBJ of this verb. As a result, the f-structure of the subject of the main verb is available in the f-structure of the object of this verb. If needed, this information can be used for establishing control.

In order to account for (1), c-structure rules like those in (21)–(23) are needed, apart from rules (24)–(25), which handle non-coordinated objects:

(21) $$\begin{array}{lccc} \text{VP} & \rightarrow & \text{V} & \text{OBJ-ARG} \\ & & \uparrow=\downarrow & (\uparrow \text{OBJ}) = \downarrow \end{array}$$

(22) OBJ-ARG $\rightarrow$ { OBJ-ARG$_{unlike}$ | OBJ-ARG$_{infp}$ | OBJ-ARG$_{np}$ }

(23) $$\begin{array}{lcccc} \text{OBJ-ARG}_{unlike} & \equiv & \text{INFP} & \text{Conj} & \text{NP} \\ & & \downarrow\in\uparrow & & \downarrow\in\uparrow \\ & & (\downarrow \text{CONTROLLER}) = (\downarrow \text{SUBJ}) & & \end{array}$$

(24) $$\begin{array}{lcc} \text{OBJ-ARG}_{infp} & \equiv & \text{INFP} \\ & & \downarrow=\uparrow \\ & & (\downarrow \text{CONTROLLER}) = (\downarrow \text{SUBJ}) \end{array}$$

(25) $$\begin{array}{lcc} \text{OBJ-ARG}_{np} & \equiv & \text{NP} \\ & & \downarrow=\uparrow \end{array}$$

Rule (21) assigns the grammatical function OBJ to the single argument in the VP, OBJ-ARG. Rule (22) rewrites OBJ-ARG to a disjunction of three rules whose left-hand side is not shown in the tree because $\equiv$ is used instead of $\rightarrow$ as the rewrite operator in (23)–(25).[11] Rule (23) handles the coordination of unlike categories where an infinitival phrase (INFP) is coordinated with a nominal phrase (NP):[12] as in the standard analysis of coordination, conjuncts are added to a set. The non-standard element is the equation "($\downarrow$ CONTROLLER) = ($\downarrow$ SUBJ)", which structure-shares the controller of INFP with the subject of INFP. Since this annotation is

[10]This is a modified version of a solution suggested by Mary Dalrymple after our presentation of this problem at the ParGram meeting in 2013.

[11]This formal device is used in order to make OBJ-ARG more readable as well as to make it easier to refer to its particular disjuncts. The result is equivalent to having OBJ-ARG rewrite directly to respective right-hand sides of (23)–(25).

[12]To handle examples with different ordering of conjuncts or a different number of conjuncts than in (1), the rule in (23) must be modified accordingly.

attached to INFP exclusively, the f-structure of the other conjunct, NP, is unaffected – it is not controlled, hence the coherence condition is satisfied.

The f-structure corresponding to (1) according to this analysis is provided in (26) below. It is produced by rules (21)–(23) in conjunction with the annotation (20) placed in the lexical entries of forms of the verb CHCIEĆ (‘want’).

(26)
$$\left[\begin{array}{ll} \textsc{pred} & \text{‘}\textsc{want}\langle\boxed{1},\boxed{2}\rangle\text{’} \\ \textsc{subj} & \boxed{1}\left[\begin{array}{ll}\textsc{pred} & \text{‘I’}\end{array}\right] \\ \textsc{obj} & \boxed{2}\left[\left\{\left[\begin{array}{ll}\textsc{pred} & \text{‘}\textsc{drink}\langle\boxed{1}\rangle\text{’} \\ \textsc{subj} & \boxed{1} \\ \textsc{controller} & \boxed{1}\end{array}\right], \left[\begin{array}{ll}\textsc{pred} & \text{‘}\textsc{cigarette}\text{’} \\ \textsc{controller} & \boxed{1}\end{array}\right]\right\}\right] \end{array}\right]$$

### 3.4 Support from English

There are also English examples which seem to involve object control into selected conjuncts, as in the following attested sentence:

(27) My uncle said to hell with that and taught me karate, and to fire weapons. (Google)

Following Asudeh 2005: §9, we assume that object control in English also involves functional – not anaphoric – control. In the case of TEACH, the relevant control equation is (28). Given this equation, example (27) can be handled using rules similar to the ones provided above, with the ordering of conjuncts switched in (23), and OBJ-TH used instead of OBJ as the common grammatical function in (21).

(28) $(\uparrow \textsc{obj}) = (\uparrow \textsc{obj-th controller})$

The f-structure in (29) results for *Uncle taught me karate, and to fire weapons*, a shorter version of (27):

(29)
$$\left[\begin{array}{ll} \textsc{pred} & \text{‘}\textsc{teach}\langle\boxed{1},\boxed{2},\boxed{3}\rangle\text{’} \\ \textsc{subj} & \boxed{1}\left[\begin{array}{ll}\textsc{pred} & \text{‘}\textsc{uncle}\text{’}\end{array}\right] \\ \textsc{obj} & \boxed{2}\left[\begin{array}{ll}\textsc{pred} & \text{‘I’}\end{array}\right] \\ \textsc{obj-th} & \boxed{3}\left[\left\{\left[\begin{array}{ll}\textsc{pred} & \text{‘}\textsc{karate}\text{’} \\ \textsc{controller} & \boxed{2}\end{array}\right], \left[\begin{array}{ll}\textsc{pred} & \text{‘}\textsc{fire}\langle\boxed{2},\boxed{4}\rangle\text{’} \\ \textsc{subj} & \boxed{2} \\ \textsc{obj} & \boxed{4}\left[\begin{array}{ll}\textsc{pred} & \text{‘}\textsc{weapon}\text{’}\end{array}\right] \\ \textsc{controller} & \boxed{2}\end{array}\right]\right\}\right] \end{array}\right]$$

# 4 Interaction with Case Assignment

A problem similar to control into selected conjuncts is case assignment to selected conjuncts. Consider the examples below:

(30) Nie chciał pić ani kanapki.
NEG wanted drink.INF nor sandwich.GEN
'He didn't want to drink nor (did he want) a sandwich.'
(Kallas 1993: 92, ex. (49))

(31) Chciał pić i kanapkę.
wanted drink.INF and sandwich.ACC
'He wanted to drink and (he wanted) a sandwich.'

As explained in technical detail in Patejuk and Przepiórkowski 2014 (see also Przepiórkowski and Patejuk 2012a), some arguments are assigned[13] case structurally in Polish, via rules such as (simplifying considerably):

- assign genitive to the object of a negated verb (cf. (30)),
- assign accusative to the object of a non-negated verb (cf. (31)).

As explained in §3.1 when discussing (18) (see also Przepiórkowski and Patejuk 2012a), off-path constraints must be used in order to distribute disjunctive statements to particular elements of the coordinate structure so that they can be evaluated independently for each conjunct. (32) is a constraint containing an off-path constraint making it possible to account for sentences such as (30)–(31), where one conjunct is an infinitival (and does not require case), while the other is a nominal which must bear case appropriate in the given syntactic context:

(32)
$$\left(\uparrow \underset{\begin{array}{c}[\neg((\textsc{obj} \leftarrow)\ \textsc{neg})\ \wedge\ (\leftarrow \textsc{case}) =_c \textsc{acc}]\ \vee \\ [((\textsc{obj} \leftarrow)\ \textsc{neg}) =_c +\ \wedge\ (\leftarrow \textsc{case}) =_c \textsc{gen}]\ \vee \\ (\leftarrow \textsc{cat}) =_c \textsc{inf}\end{array}}{\textsc{obj}} \quad \textsc{pred}\right)$$

The off-path constraint on the object is saying that (translating from LFG to English in a top-down manner):

- either there is no negated governor and the case of the object is accusative,
- or there is a negated governor and the case of the object is genitive,
- or the object is infinitival.

Facts – as always – are more complex (Przepiórkowski 2000): when a higher verb in a chain of infinitival (control or raising) verbs is negated, the lower object may – but does not have to – occur in the genitive. This means that an empirically more adequate equation should look as below (again, see Patejuk and Przepiórkowski 2014, this volume, for details and an alternative simpler formalisation):

[13]Though case assignment could be formalised equivalently using defining equations, a case checking approach is adopted in the current paper (hence, *case assignment* is a bit of a misnomer). Under this approach arguments must be specified for their morphological cases lexically.

(33) $(\uparrow \textsc{obj} \qquad \textsc{pred} \qquad )$

$$\begin{gathered}
[\neg((\textsc{xcomp}^{*}\ \textsc{obj} \leftarrow)\ \textsc{neg})\ \wedge\ (\leftarrow \textsc{case}) =_c \textsc{acc}]\ \vee \\
[((\textsc{xcomp}^{*}\ \textsc{obj} \leftarrow)\ \textsc{neg}) =_c +\ \wedge \\
[[((\textsc{obj} \leftarrow)\ \textsc{neg}) =_c +\ \wedge\ (\leftarrow \textsc{case}) =_c \textsc{gen}]\ \vee \\
[\neg((\textsc{obj} \leftarrow)\ \textsc{neg})\ \wedge\ (\leftarrow \textsc{case}) \in_c \{\textsc{acc}, \textsc{gen}\}]]]\ \vee \\
(\leftarrow \textsc{cat}) =_c \textsc{inf}
\end{gathered}$$

This is saying that (again translating off-path constraints in a top-down fashion):

- either there is no negation within an appropriate domain (in the verb chain) and the object is in the accusative case,
- or there is a negation within an appropriate domain (in the verb chain) and:
  - either there is a negated direct (local) governor and the case of the object is genitive,
  - or there is no negated direct (local) governor and the case of the object is genitive or accusative,
- or the object is infinitival.

# 5 Conclusion

The analysis presented in §3.3 above successfully accounts for control into one of the conjuncts and its lack in the other (see the f-structures in (26) and (29)), though it has certain shortcomings. First, this solution requires the use of an extra attribute, CONTROLLER. Second, CONTROLLER is represented on all conjuncts, including the nominal conjunct where it is spurious. These might be sufficient reasons to give preference to the solution described in §3.2, which relies on the use of defining off-path constraints. Unfortunately, this solution cannot be used in grammars implemented in XLE, which treats off-path constraints as non-constructive. For this reason, the analysis presented in §3.3 is the only (both theoretically and implementationally) working account of control into selected conjuncts that we are aware of.

An alternative would be to – following the postulate advanced in Przepiórkowski and Patejuk 2012a – treat entire statements, not just features, as distributive. Introducing such a change in the LFG formalism would make it possible to use simple and intuitive solutions such as the one presented in §3.1, without the need to resort to special analyses to account for coordination phenomena.

# References

Alsina, Alex, Mohanan, Tara and Mohanan, KP. 2005. How to Get Rid of the COMP. In Miriam Butt and Tracy Holloway King (eds.), *The Proceedings of the LFG'05 Conference*, University of Bergen, Norway: CSLI Publications.

Arka, I Wayan and Simpson, Jane. 1998. Control and complex arguments in Balinese. In Miriam Butt and Tracy Holloway King (eds.), *The Proceedings of the LFG'98 Conference*, University of Queensland, Brisbane: CSLI Publications.

Asudeh, Ash. 2005. Control and Semantic Resource Sensitivity. *Journal of Linguistics* 41(3), 465–511.

Berman, Judith. 2007. Functional Identification of Complement Clauses in German and the Specification of COMP. In Annie Zaenen, Jane Simpson, Tracy Holloway King, Jane Grimshaw, Joan Maling and Chris Manning (eds.), *Architectures, Rules, and Preferences: Variations on Themes by Joan W. Bresnan*, pages 69–83, Stanford, CA: CSLI Publications.

Börjars, Kersti and Vincent, Nigel. 2008. Objects and OBJ. In Miriam Butt and Tracy Holloway King (eds.), *The Proceedings of the LFG'08 Conference*, pages 150–168, University of Sydney, Australia: CSLI Publications.

Bresnan, Joan. 2000. *Lexical-Functional Syntax*. Blackwell Textbooks in Linguistics, Blackwell.

Butt, Miriam and King, Tracy Holloway (eds.). 2012. *The Proceedings of the LFG'12 Conference*, Stanford, CA, CSLI Publications.

Butt, Miriam, King, Tracy Holloway, Masuichi, Hiroshi and Rohrer, Christian. 2002. The Parallel Grammar Project. In N.Oostijk J. Carroll and R. Sutcliffe (eds.), *Proceedings of the Workshop on Grammar Engineering and Evaluation*, pages 1–7.

Crouch, Dick, Dalrymple, Mary, Kaplan, Ron, King, Tracy, Maxwell, John and Newman, Paula. 2011. XLE Documentation. `http://www2.parc.com/isl/groups/nltt/xle/doc/xle_toc.html`.

Dalrymple, Mary. 2001. *Lexical-Functional Grammar*. Academic Press.

Dalrymple, Mary and Lødrup, Helge. 2000. The grammatical functions of complement clauses. In Miriam Butt and Tracy Holloway King (eds.), *The Proceedings of the LFG'00 Conference*, University of California, Berkeley: CSLI Publications.

Forst, Martin. 2006. COMP in (Parallel) Grammar Writing. In Miriam Butt and Tracy Holloway King (eds.), *The Proceedings of the LFG'06 Conference*, University of Konstanz, Germany: CSLI Publications.

Hall, Barbara Corey. 1965. *Subject and Object in Modern English*. Ph.D. dissertation, Massachusetts Institute of Technology.

Kallas, Krystyna. 1993. *Składnia współczesnych polskich konstrukcji współrzędnych*. Toruń: Wydawnictwo Uniwersytetu Mikołaja Kopernika.

Lødrup, Helge. 2012. In Search of a Nominal COMP. In Butt and King (2012), pages 383–403.

Patejuk, Agnieszka and Przepiórkowski, Adam. 2014. Structural Case Assignment to Objects in Polish. In Miriam Butt and Tracy Holloway King (eds.), *The Proceedings of the LFG'14 Conference*, Stanford, CA: CSLI Publications, under review.

Przepiórkowski, Adam. 2000. Long Distance Genitive of Negation in Polish. *Journal of Slavic Linguistics* 8, 151–189.

Przepiórkowski, Adam. 2004. On Case Transmission in Polish Control and Raising Constructions. *Poznań Studies in Contemporary Linguistics* 39, 103–123.

Przepiórkowski, Adam and Patejuk, Agnieszka. 2012a. On case assignment and the coordination of unlikes: The limits of distributive features. In Butt and King (2012), pages 479–489.

Przepiórkowski, Adam and Patejuk, Agnieszka. 2012b. The puzzle of case agreement between numeral phrases and predicative adjectives in Polish. In Butt and King (2012), pages 490–502.

Przepiórkowski, Adam and Rosen, Alexandr. 2005. Czech and Polish Raising/Control with or without Structure Sharing. *Research in Language* 3, 33–66.

Sag, Ivan A., Gazdar, Gerald, Wasow, Thomas and Weisler, Steven. 1985. Coordination and How to Distinguish Categories. *Natural Language and Linguistic Theory* 3, 117–171.

# IN FAVOUR OF THE RAISING ANALYSIS OF PASSIVISATION

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**Abstract**

This paper presents arguments from Polish in support of the raising analysis of passivisation. It shows that it is preferable to the current mainstream analysis where the passivised verb is treated as the main verb. Arguments for the raising analysis are based on the interaction of passivisation and negation, as well as on coordination facts involving predicative constructions.

# 1 Introduction

In Polish it is possible to coordinate a passive form with a predicative adjective, as in the example below taken from the National Corpus of Polish (NKJP; `http://nkjp.pl/`; Przepiórkowski et al. 2010, 2012):

(1)

| | | | | | |
|---|---|---|---|---|---|
| Nasz | pas | jest | dobrze | zrobiony, | bezpieczny |
| our | runway.NOM.SG.M3 | is | well | made.NOM.SG.M3 | safe.NOM.SG.M3 |
| i | zarejestrowany | przez | Urząd | Lotnictwa | Cywilnego. |
| and | registered.NOM.SG.M3 | by | Office.ACC | Aviation.GEN | Civil.GEN |

‘Our runway is well made, safe and registered by the Civil Aviation Office.’ (NKJP)

In (1) *zrobiony* is a passive form of ZROBIĆ ‘make’, *bezpieczny* ‘safe’ is an unambiguous adjective and *zarejestrowany* is a passive form of ZAREJESTROWAĆ ‘register’, accompanied by a *by*-phrase[1] – *przez Urząd Lotnictwa Cywilnego*.

Sentences such as (1) pose a problem for analyses which treat passive and predicative items in a different way, which seems to be a widely adopted approach to these phenomena at the moment. According to such approaches, sentences such as (1) should not be acceptable, counter to fact.

Currently the standard LFG analysis of the passive seems to be the one which treats the passive form as the main verb (see § 2 for discussion), while the form of BE is a co-head which can contribute some features, but does not have a PRED attribute of its own (see the f-structure in (4), which corresponds to example (2)). By contrast, with predicative items, BE is treated as the main predicate, a raising verb

[†]We heartily thank both reviewers for their detailed comments. Some of them, especially those of the external reviewer, suggested new important research avenues to follow, as well as indicated some omissions. Unfortunately, given spatial and temporal constraints, we could not satisfactorily respond to some of these comments, but we hope to be able to do so in future work. The research reported here was partially financed by the projects NEKST (`http://nekst.ipipan.waw.pl/`) and CLARIN-PL (`http://www.clarin-pl.eu/en/`).

[1]Note that (1) features a coordination of a passive form without a *by*-phrase (*zrobiony*) and another passive form where the *by*-phrase is present (*zarejestrowany*). Such forms are sometimes referred to as short and long passives, respectively, as in the discussion of Mandarin Chinese passives, e.g. Huang 1999 (thanks are due to Paul Kroeger for drawing our attention to this issue). However, since these two forms can be coordinated in Polish, a unified account of passive is necessary.

which takes a predicative complement,[2] as in (5), the f-structure representation of (3).

(2) Nasz pas jest zarejestrowany przez Urząd Lotnictwa Cywilnego.
our runway is registered by Office Aviation Civil
'Our runway is registered by the Civil Aviation Office.'

(3) Nasz pas jest bezpieczny.
our runway is safe
'Our runway is safe.'

(4) $$\begin{bmatrix} \textsc{pred} & \text{`}\textsc{register}\langle\boxed{1},\boxed{2}\rangle\text{'} \\ \textsc{subj} & \boxed{1}\begin{bmatrix}\textsc{pred} & \text{`}\textsc{runway}\text{'}\end{bmatrix} \\ \textsc{obl}_{ag} & \boxed{2}\begin{bmatrix}\textsc{pred} & \text{`CAO'}\end{bmatrix} \\ \textsc{passive} & + \end{bmatrix}$$

(5) $$\begin{bmatrix} \textsc{pred} & \text{`}\textsc{be}\langle\boxed{2}\rangle\boxed{1}\text{'} \\ \textsc{subj} & \boxed{1}\begin{bmatrix}\textsc{pred} & \text{`}\textsc{runway}\text{'}\end{bmatrix} \\ \textsc{xcomp} & \boxed{2}\begin{bmatrix}\textsc{pred} & \text{`}\textsc{safe}\langle\boxed{1}\rangle\text{'} \\ \textsc{subj} & \boxed{1}\end{bmatrix} \end{bmatrix}$$

As these f-structures show, if passive and predicative complements have different analyses, it is not possible to account for (1) which involves a coordination of these phenomena. In order to fill this gap, a unified analysis must be adopted.

The following sections present LFG analyses of passive (§ 2) as well as of predicative items (§ 3). These are followed by a discussion of arguments showing which of the analyses of passive (§ 4) is appropriate to account for Polish data. The next section (§ 5) aims to establish which analysis of predicative items should be adopted, taking into account the possibility of a unified analysis of the passive and all kinds of predicative complements. The last section (§ 6) concludes this paper.

## 2 LFG Analyses of Passive

There are two analyses of passive in LFG; they differ considerably with respect to the f-structure representation they provide.

One analysis treats the passive verb form as the main verb, while the form of BE is a co-head which can contribute features such as tense, aspect, etc., but does not have a PRED value of its own. As it involves one clause, it can be referred to as the monoclausal or flat analysis – see the f-structure in (4). This analysis was used in Bresnan 1982b for Malayalam (see Figure 1.3b on page 13 there); it is widely used nowadays in the analyses of other languages, including English (e.g. Bresnan 2000, p. 78, ex. (12), Dalrymple 2001, p. 209, ex. (33)).

The other analysis, used in Bresnan 1982b for English (see Figure 1.4b on page 15 there), treats BE as the main verb which takes the passive verb form as

[2] In (5) the predicative adjective corresponds to an open grammatical function, XCOMP, as this seems to be the dominating analysis of such complements. It is not, however, the only possibility – see § 3 for discussion of alternative analyses.

a complement (currently open, XCOMP; VCOMP in Bresnan 1982b). Since this analysis involves two clauses, main (headed by BE) and embedded (headed by the passive form), it is sometimes referred to as a biclausal analysis of the passive: see the f-structure in (6), which provides a representation of example (2) using this analysis.

(6)
$$\left[\begin{array}{ll} \text{PRED} & \text{`BE}\langle\boxed{2}\rangle\boxed{1}\text{'} \\ \text{SUBJ} & \boxed{1}\left[\text{PRED `RUNWAY'}\right] \\ \text{XCOMP} & \boxed{2}\left[\begin{array}{ll} \text{PRED} & \text{`REGISTER}\langle\boxed{1},\boxed{3}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \\ \text{OBL}_{ag} & \boxed{3}\left[\text{PRED `CAO'}\right] \\ \text{PASSIVE} & + \end{array}\right] \end{array}\right]$$

## 3 LFG Analyses of Predicative Items

Dalrymple et al. 2004 provides an overview of possible analyses of predicative items in LFG, discussing three different analyses: one where the predicative item acts as the main predicate and two where the copula takes the predicative item as a complement, open (XCOMP) or closed (PREDLINK).

The analysis where the predicative item is the main predicate (this possibility was suggested in LFG in Andrews 1982) can be applied in languages where the copula is not obligatory – in this way, unless there is some independent motivation, there is no need to introduce an f-structure representation of the covert copula. Polish belongs to such languages – the f-structure in (10) would correspond to (7) with the copula omitted (*Nasz pas bezpieczny*). However, there are restrictions on when the copula can be omitted – utterances without a copula can only be interpreted as referring to present tense. In (7), the presence of the copula does not affect the meaning of the utterance. By contrast, in (8)–(9) the copula is obligatory to express future and past tense – when removed, the meaning of these examples changes to present tense, as in (7).[3]

[3]Since adjectives seem to uniformly agree with their subjects in gender and number, the presence of the attributes NUM and GEND on the adjective (and not just within its SUBJ value) is probably redundant. On the other hand, there are various constructions (also some types of copular constructions) where adjectives do not agree in case with the corresponding nominal, so the separate CASE attribute on the adjective is motivated.

(7) Nasz pas (jest) bezpieczny.
our runway is safe
'Our runway is safe.'

(8) Nasz pas #(będzie) bezpieczny.
our runway will be safe
'Our runway will be safe.'

(9) Nasz pas #(był) bezpieczny.
our runway was safe
'Our runway was safe.'

(10)
$$\left[\begin{array}{ll} \text{PRED} & \text{'SAFE}\langle\boxed{1}\rangle\text{'} \\ \text{SUBJ} & \boxed{1}\left[\begin{array}{ll} \text{PRED} & \text{'RUNWAY'} \\ \text{CASE} & \text{NOM} \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{M3} \end{array}\right] \\ \text{CASE} & \text{NOM} \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{M3} \end{array}\right]$$

The remaining analyses assume an f-structure representation of the copula; if the copula is absent on the surface, its f-structure representation may be introduced constructionally, by equations attached to an appropriate c-structure rule. Prototypically it is the raising verb BE, which takes a complement which can be open or closed. The use of an open predicative complement XCOMP makes it possible to conveniently account for agreement between the predicative complement and the item predicated of. This is because the latter is structure-shared with the subject of the open complement, making it possible to handle agreement locally: the predicative complement agrees in relevant features with its own subject. See (11), an extended version of the f-structure (5) (corresponding to example (3)) with agreement features represented explicitly.

(11)
$$\left[\begin{array}{ll} \text{PRED} & \text{'BE}\langle\boxed{2}\rangle\boxed{1}\text{'} \\ \text{SUBJ} & \boxed{1}\left[\begin{array}{ll} \text{PRED} & \text{'RUNWAY'} \\ \text{CASE} & \text{NOM} \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{M3} \end{array}\right] \\ \text{XCOMP} & \boxed{2}\left[\begin{array}{ll} \text{PRED} & \text{'SAFE}\langle\boxed{1}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \\ \text{CASE} & \text{NOM} \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{M3} \end{array}\right] \end{array}\right]$$

(12)
$$\left[\begin{array}{ll} \text{PRED} & \text{'BE}\langle\boxed{2}\rangle\boxed{1}\text{'} \\ \text{SUBJ} & \boxed{1}\left[\begin{array}{ll} \text{PRED} & \text{'RUNWAY'} \\ \text{CASE} & \text{NOM} \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{M3} \end{array}\right] \\ \text{PREDLINK} & \boxed{2}\left[\begin{array}{ll} \text{PRED} & \text{'SAFE'} \\ \text{CASE} & \text{NOM} \\ \text{NUM} & \text{SG} \\ \text{GEND} & \text{M3} \end{array}\right] \end{array}\right]$$

The last analysis involves PREDLINK, a closed predicative complement proposed in Butt et al. 1999. Accounting for agreement under this analysis is considerably more difficult; this is because agreement is not local, as the item predicated of is not the subject of the predicative item. On the other hand, such agreement may be handled using more complicated constraints or additional attributes, as shown in § 5.4.2. However, this PREDLINK analysis has a significant advantage over the XCOMP analysis – it can account for cases where the predicative complement has a subject of its own, as with clauses (as in (13)) or gerunds (see (14)).

(13) The problem is that they appear. (Dalrymple et al. 2004, p. 189, ex. (1d))

(14) The problem is their appearing. (Dalrymple et al. 2004, p. 189, ex. (1e))

Under the XCOMP analysis malformed f-structures are produced for such complements: the predicative complement has its own subject, while the control equation structure-shares the item predicated of with the subject of the predicative item, which results in a violation of the consistency condition (clash of PRED values). By contrast, the analysis which involves the closed complement PREDLINK does not suffer from such problems. See § 5.1 for a discussion of an example from Polish.

# 4 Which Analysis of Passive for Polish?

On the basis of Polish negation phenomena, this section argues that passive should be analysed as consisting of two clauses: the main clause, where a form of BE is the main verb, and the embedded clause, which contains the passive verb form.

## 4.1 Negation in Polish

In Polish, verbal negation is arguably a prefix on the verb, despite the fact that it is orthographically separated from verbal forms by a space; various arguments for such a stance are given in Kupść and Przepiórkowski 2002. This prefix is syntactically and semantically active: it spurs the genitive of negation (Przepiórkowski 2000) and licences *n*-words. The phenomenon of licensing such words is often referred to as negative concord – this is because while *n*-words themselves have a negative meaning, they are normally licensed only in the presence of negation.[4] An LFG analysis of genitive of negation is provided in Patejuk and Przepiórkowski 2014b; the same mechanism can be used for the licensing of *n*-words.

## 4.2 Two Places to Host Negation

In Polish, there are two places where negation can be hosted in passive constructions: on the form of the verb BE and on the passive form, as in the example below:

(15) Ani jedno spotkanie nie było nieobsadzone przez sędziego.
not even one meeting NEG be NEG.supervised by referee
'Not even one meeting was not unsupervised by a referee.' (NKJP)

Let us consider how a simplified version of this sentence (*spotkanie* 'meeting' instead of *ani jedno spotkanie* 'not even one meeting') would be represented assuming different analyses of passive presented in § 2:

[4] See Przepiórkowski and Kupść 1999 and Richter and Sailer 1999 for more details and for HPSG analyses of negative concord in Polish.

(16) $$\begin{bmatrix} \text{PRED} & \text{`SUPERVISE}\langle\boxed{1},\boxed{2}\rangle\text{'} \\ \text{SUBJ} & \boxed{1}\begin{bmatrix}\text{PRED} & \text{`MEETING'}\end{bmatrix} \\ \text{OBL}_{ag} & \boxed{2}\begin{bmatrix}\text{PRED} & \text{`REFEREE'}\end{bmatrix} \\ \text{NEG} & + \\ \text{PASSIVE} & + \end{bmatrix}$$

(17) $$\begin{bmatrix} \text{PRED} & \text{`BE}\langle\boxed{2}\rangle\boxed{1}\text{'} \\ \text{SUBJ} & \boxed{1}\begin{bmatrix}\text{PRED} & \text{`MEETING'}\end{bmatrix} \\ \text{XCOMP} & \boxed{2}\begin{bmatrix} \text{PRED} & \text{`SUPERVISE}\langle\boxed{1},\boxed{2}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \\ \text{OBL}_{ag} & \boxed{2}\begin{bmatrix}\text{PRED} & \text{`REFEREE'}\end{bmatrix} \\ \text{NEG} & + \\ \text{PASSIVE} & + \end{bmatrix} \\ \text{NEG} & + \end{bmatrix}$$

While (17) is capable of representing negation in two different places (main clause and embedded clause), this is not possible in (16). As a result, under the flat analysis, where the passive form is the main verb, the f-structure representation of the following sentences would be identical to the f-structure of (15) provided in (16):

(18) Ani jedno spotkanie nie było obsadzone przez sędziego.
not even one meeting NEG be supervised by referee
'Not even one meeting was not supervised by a referee.'

(19)*Ani jedno spotkanie było nieobsadzone przez sędziego.
not even one meeting be NEG.supervised by referee
'Not even one meeting was unsupervised by a referee.'

Clearly, the meaning of (15) is different from (18) and (19) – the difference is fundamental as (15) (which implies that all meetings were supervised by a referee) is the opposite of (18) (which implies that no meeting was supervised by a referee). While (19) is ungrammatical because of the presence of *ani*, an *n*-word which is not licensed in this syntactic context (see § 4.3 for discussion), its meaning would be equivalent to that of (18) if *ani* were removed from both sentences.

However, under the raising analysis of the passive, where BE is the main predicate which takes the passive form as an argument (open, XCOMP), the difference between sentences (15), (18) and (19) is reflected in their f-structures (17), (20) and (21), respectively.

(20) $$\left[\begin{array}{ll} \text{PRED} & \text{`BE}\langle\boxed{2}\rangle\boxed{1}\text{'} \\ \text{SUBJ} & \boxed{1}\left[\begin{array}{ll}\text{PRED} & \text{`MEETING'}\end{array}\right] \\ \text{XCOMP} & \boxed{2}\left[\begin{array}{ll} \text{PRED} & \text{`SUPERVISE}\langle\boxed{1},\boxed{2}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \\ \text{OBL}_{ag} & \boxed{2}\left[\begin{array}{ll}\text{PRED} & \text{`REFEREE'}\end{array}\right] \\ \text{PASSIVE} & + \end{array}\right] \\ \text{NEG} & + \end{array}\right]$$

(21) $$\left[\begin{array}{ll} \text{PRED} & \text{`BE}\langle\boxed{2}\rangle\boxed{1}\text{'} \\ \text{SUBJ} & \boxed{1}\left[\begin{array}{ll}\text{PRED} & \text{`MEETING'}\end{array}\right] \\ \text{XCOMP} & \boxed{2}\left[\begin{array}{ll} \text{PRED} & \text{`SUPERVISE}\langle\boxed{1},\boxed{2}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \\ \text{OBL}_{ag} & \boxed{2}\left[\begin{array}{ll}\text{PRED} & \text{`REFEREE'}\end{array}\right] \\ \text{PASSIVE} & + \\ \text{NEG} & + \end{array}\right] \end{array}\right]$$

In (15) there are two instances of negation: on BE and on the passive form – this is reflected in its f-structure provided in (17), where negation is present in the main clause headed by BE as well as in its passive complement. By contrast, in (18) and (19) negation is present in only one place, either on BE, as shown in the f-structure in (20) (negation in the main clause), or on the passive verb form, as in (21) (negation in the embedded clause). Such a representation, unlike the flat one, not only makes it possible to reflect the difference in semantics of these sentences ((15), where negation occurs in two places, is the opposite of (18) and (19), where negation is used only once), but also to account for the differences in *n*-word licensing, which is the topic of the next subsection.

## 4.3 Licensing of *n*-words

### 4.3.1 Negative Concord in Polish

In Polish there are words which can only occur when negation is available in the relevant domain – such words are known as *n*-words. These include NIKT 'nobody', NIC 'nothing', NIGDY 'never', NIGDZIE 'nowhere', NICZYJ 'nobody's' (an adjective, as in *niczyja książka* 'nobody's book'), ŻADEN 'no' (an adjective, as in *żadna książka* 'no book') and ANI 'neither/nor' (a conjunction, as in *ani Antek, ani Eryk* 'neither Antek nor Eryk') or 'not even' (as in (15): *ani jedno* 'not even one').

Consider the following examples:

(22) Nikt *(nie) odszedł głodny.
nobody.NOM NEG left hungry
'Nobody left hungry.' (NKJP)

(23) *(Nie) chcemy robić nikomu trudności.
NEG want make.INF nobody.DAT trouble
'We do not want to make any trouble for anybody'. (NKJP)

While (22)–(23) show that negation must be present for a sentence containing an *n*-word to be grammatical, (23) additionally demonstrates that negation does not have to be local to the predicate which has an *n*-word as a dependent: in (23) negation is present on the main verb (the control verb *chcemy* 'want'), while the *n*-word *nikomu* is a dependent of *robić* – see the f-structure in (25).

(24)
$$\begin{bmatrix} \text{PRED} & \text{`LEAVE}\langle\boxed{1}\rangle\text{'} \\ \text{SUBJ} & \boxed{1}\begin{bmatrix}\text{PRED} & \text{`NOBODY'}\end{bmatrix} \\ \text{XADJ} & \left\{\begin{bmatrix}\text{PRED} & \text{`HUNGRY}\langle\boxed{1}\rangle\text{'}\\ \text{SUBJ} & \boxed{1}\end{bmatrix}\right\} \\ \text{NEG} & + \end{bmatrix}$$

(25)
$$\begin{bmatrix} \text{PRED} & \text{`WANT}\langle\boxed{1},\boxed{2}\rangle\text{'} \\ \text{SUBJ} & \boxed{1}\begin{bmatrix}\text{PRED} & \text{`PRO'}\end{bmatrix} \\ \text{XCOMP} & \boxed{2}\begin{bmatrix}\text{PRED} & \text{`MAKE}\langle\boxed{1},\boxed{3},\boxed{4}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \\ \text{OBJ} & \boxed{3}\begin{bmatrix}\text{PRED} & \text{`TROUBLE'}\end{bmatrix} \\ \text{OBJ}_\theta & \boxed{4}\begin{bmatrix}\text{PRED} & \text{`NOBODY'}\end{bmatrix}\end{bmatrix} \\ \text{NEG} & + \end{bmatrix}$$

While *n*-words are negative in the sense that they express negation as standalone answers to questions (*Kto przyszedł? Nikt.* 'Who came? Nobody.'), they do not contribute additional negation when occurring in the scope of negation. So the following sentence containing sentential negation (*nie*) and three *n*-words (*nikt*, *nigdy*, *niczego*) has a single-negation (not double- or quadruple-negation) meaning.

(26) Nikt nigdy niczego mi nie dał.
nobody.NOM never nothing.GEN me NEG gave
'Nobody has ever given me anything.' (NKJP)

So far it has been demonstrated that the *n*-word must be in scope of negation – negation must be local (as in (24), which corresponds to (22)) or higher in the structure than the *n*-word (see (25) for (23)). To illustrate this, consider another example, (27), where negation is local to the infinitival argument:

(27) (*Nigdy) chcemy nie szkodzić niczemu i nikomu.
never want NEG harm nothing.DAT and nobody.DAT
'We want to do no harm to anything or anybody.' (NKJP)

(28)
$$\left[\begin{array}{ll} \text{PRED} & \text{`WANT}\langle\boxed{1},\boxed{2}\rangle\text{'} \\ \text{SUBJ} & \boxed{1}\left[\begin{array}{ll}\text{PRED} & \text{`PRO'}\end{array}\right] \\ \text{XCOMP} & \boxed{2}\left[\begin{array}{ll} \text{PRED} & \text{`HARM}\langle\boxed{1},\boxed{3}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \\ \text{OBJ}_{\theta} & \boxed{3}\left[\begin{array}{l} \left\{\left[\begin{array}{ll}\text{PRED} & \text{`NOBODY'}\end{array}\right],\left[\begin{array}{ll}\text{PRED} & \text{`NOTHING'}\end{array}\right]\right\} \\ \text{COORD-FORM} \quad \text{AND} \end{array}\right] \\ \text{NEG} & + \end{array}\right] \end{array}\right]$$

In (27), the coordinate phrase consisting of *n*-words, *niczemu i nikomu*, is licensed because it is in the scope of the sentential negation (which is local to the verb on which this phrase depends; see (28)). However, when the *n*-word *Nigdy* is present in (27), the sentence is ungrammatical. This is because *Nigdy* is not in the scope of sentential negation (it would be a dependent of *chcemy*, so it would be in a higher clause than *nie*, which belongs to *szkodzić*) – it cannot be licensed in this environment.

### 4.3.2 Negative Concord in Passives

Let us now proceed to the issue of how the licensing of *n*-words is affected by the choice of the analysis of the passive. Consider example (29) repeated from (15):

(29) Ani jedno spotkanie nie było nieobsadzone przez sędziego.
not even one meeting NEG be NEG.supervised by referee
'Not even one meeting was not unsupervised by a referee.' (NKJP)

Two variants of f-structures corresponding to (29) are provided in (16) (flat analysis where the passive form is treated as the main verb) and (17) (analysis where BE is the main verb taking the passive form as an open complement). As discussed in § 4.2, under the flat analysis sentences (29), (18) and (19) would have an identical f-structure representation, shown in (16). As a result, the flat analysis of the passive does not account for the contrast in semantics between these sentences and it is incapable of licensing *n*-words appropriately – according to the f-structure in (16), (19) should be as grammatical as the remaining two sentences. This is not the case, however, because in (19) negation is placed only on the passive form, so the *n*-word *ani* remains outside of its scope (it belongs to the f-structure of *spotkanie*), as shown in (21), the f-structure which uses the raising analysis of the passive.

Let us consider another example, (30), where negation is present only on the passive form, not on the form of BE. In this context *nikogo*, the *n*-word which is the dependent of the passive form, is licensed, while the other *n*-word, *Nigdy*, which is a dependent of *był*, is not licensed – its presence results in ungrammaticality.

(30) (*Nigdy) obiekt był niekontrolowany przez nikogo.
never site was NEG.controlled by nobody
'The site was uncontrolled by anybody.' (NKJP)

Again, this contrast cannot be accounted for under the flat analysis, see the f-structure in (31): according to this f-structure both *n*-words are in the scope of negation (locally) and therefore should be licensed, counter to fact.

However, the raising analysis produces the f-structure in (32) for (30), which makes it possible to distinguish between the two varieties of negation and correctly decide which *n*-word is licensed. According to (32) *Nigdy* is outside of the scope of negation as it belongs to the main clause while negation is placed in the open complement containing the passive form. In this context only *nikogo* is licensed as the dependent of the passive form which is negated, as indicated in (30).

(31)
$$\left[\begin{array}{ll}
\text{PRED} & \text{`CONTROL}\langle\boxed{1},\boxed{2}\rangle\text{'} \\
\text{SUBJ} & \boxed{1}\left[\begin{array}{ll}\text{PRED} & \text{`OBJECT'}\end{array}\right] \\
\text{OBL}_{ag} & \boxed{2}\left[\begin{array}{ll}\text{PRED} & \text{`NOBODY'}\end{array}\right] \\
\text{NEG} & + \\
\text{PASSIVE} & +
\end{array}\right]$$

(32)
$$\left[\begin{array}{ll}
\text{PRED} & \text{`BE}\langle\boxed{2}\rangle\boxed{1}\text{'} \\
\text{SUBJ} & \boxed{1}\left[\begin{array}{ll}\text{PRED} & \text{`OBJECT'}\end{array}\right] \\
\text{XCOMP} & \boxed{2}\left[\begin{array}{ll}
\text{PRED} & \text{`CONTROL}\langle\boxed{1},\boxed{3}\rangle\text{'} \\
\text{SUBJ} & \boxed{1} \\
\text{OBL}_{ag} & \boxed{3}\left[\begin{array}{ll}\text{PRED} & \text{`NOBODY'}\end{array}\right] \\
\text{NEG} & + \\
\text{PASSIVE} & +
\end{array}\right]
\end{array}\right]$$

# 5 A Unified Raising Analysis?

In order to account for coordination of a predicative adjective and a passive form such as shown in (1), a common analysis of these phenomena must be adopted.

The previous section, § 4, demonstrated on the basis of arguments from negation (semantics, *n*-word licensing) that a raising analysis of the passive should be adopted instead of the flat analysis where the passive form is treated as the main verb. For this reason, the analysis which treats the predicative item as the main predicate is not taken into consideration as it is incompatible with the raising analysis.

As discussed in § 3, there are two analyses of predicative complements which use a raising verb as the main verb: one involves an open complement (XCOMP, as in (11), the f-structure corresponding to (3)), while the other involves a closed complement (PREDLINK, see (12) for comparison). The aim of this section is to decide which of these analyses should be adopted for Polish.

## 5.1 Gerunds as Predicative Complements

(33) is an attested example from Polish which uses a gerund as a predicative item. As mentioned in § 3, such sentences cannot be accounted for under the analysis which treats predicative items as open (such as the XCOMP one). This is because gerunds have their own subject, as shown in the f-structure in (34), which corresponds to the following fragment of (33): *zrozumieniem cudzych przeżyć*.

| | | | | | |
|---|---|---|---|---|---|
| (33) | Empatia | jest | zrozumieniem | cudzych | przeżyć. |
| | empathy.NOM.SG.F | is | understanding.INST.SG.N | others' | experiences |

‘Empathy is understanding others’ experiences.’ (NKJP)

(34)
$$\left[\begin{array}{ll} \text{PRED} & \text{‘UNDERSTAND}\langle\boxed{1},\boxed{2}\rangle\text{’} \\ \text{SUBJ} & \boxed{1}\left[\begin{array}{ll}\text{PRED} & \text{‘PRO’}\end{array}\right] \\ \text{OBJ} & \boxed{2}\left[\begin{array}{ll}\text{PRED} & \text{‘EXPERIENCE’} \\ \text{ADJ} & \left\{\left[\begin{array}{ll}\text{PRED} & \text{‘OTHER’}\end{array}\right]\right\}\end{array}\right] \end{array}\right]$$

The f-structure in (35) uses the open complement analysis, which results in inconsistency due to the fact that the item predicated of (*Empatia*) is structure-shared with the subject of the predicative item, which, as shown in (34), has its own subject (filled by an implicit argument) – there is a clash of values of PRED of the gerund (PRO and EMPATHY at the same time).

(35)*
$$\left[\begin{array}{ll} \text{PRED} & \text{‘BE}\langle\boxed{2}\rangle\boxed{1}\text{’} \\ \text{SUBJ} & \boxed{1} \\ \text{XCOMP} & \boxed{2}\left[\begin{array}{ll} \text{PRED} & \text{‘UNDERSTAND}\langle\boxed{1},\boxed{3}\rangle\text{’} \\ \text{SUBJ} & \boxed{1}\left[\begin{array}{ll}\text{PRED} & \text{‘PRO’ / ‘EMPATHY’}\end{array}\right] \\ \text{OBJ} & \boxed{3}\left[\begin{array}{ll}\text{PRED} & \text{‘EXPERIENCE’} \\ \text{ADJ} & \left\{\left[\begin{array}{ll}\text{PRED} & \text{‘OTHER’}\end{array}\right]\right\}\end{array}\right] \end{array}\right] \end{array}\right]$$

However, there is no such problem under the closed complement analysis of predicative items, where they are assigned the PREDLINK grammatical function – there is no structure-sharing, unlike in the open complement analysis discussed above, so there is no consistency violation, as shown in the f-structure in (36):

(36)
$$\left[\begin{array}{ll} \text{PRED} & \text{‘BE}\langle\boxed{2}\rangle\boxed{1}\text{’} \\ \text{SUBJ} & \boxed{1}\left[\begin{array}{ll}\text{PRED} & \text{‘EMPATHY’}\end{array}\right] \\ \text{PREDLINK} & \boxed{2}\left[\begin{array}{ll} \text{PRED} & \text{‘UNDERSTAND}\langle\boxed{3},\boxed{4}\rangle\text{’} \\ \text{SUBJ} & \boxed{3}\left[\begin{array}{ll}\text{PRED} & \text{‘PRO’}\end{array}\right] \\ \text{OBJ} & \boxed{4}\left[\begin{array}{ll}\text{PRED} & \text{‘EXPERIENCE’}\end{array}\right] \end{array}\right] \end{array}\right]$$

## 5.2 Agreement

In Polish, predicative adjectives and passive forms such as in (1) agree in number and gender with the item they are predicated of (which serves as the controller of agreement) – in (37) the predicative adjective *trudniejsza* agrees with the subject *empatia* in relevant features (singular number, feminine gender):

(37) Empatia jest trudniejsza od współczucia.
empathy.NOM.SG.F is more difficult.NOM.SG.F than compassion
'Empathy is more difficult than compassion.' (NKJP)

This is not the case, however, when the predicative complement is a nominal (as in (38)–(39)) or a gerund (see (33)) – there is no requirement of number or gender agreement with the item predicated of:

(38) Empatia jest warunkiem rozwoju.
empathy.NOM.SG.F is condition.INST.SG.M3 development
'Empathy is a prerequisite for development.' (NKJP)

(39) Wadliwe kominki są przyczyną wielu pożarów.
faulty fireplace.NOM.PL.M3 are cause.INST.SG.F many fire
'Faulty fireplaces are the cause of many fires.' (NKJP)

This difference between adjectives and passive participles on the one hand and nouns and gerunds on the other could be taken as an argument for analysing these two groups of predicative arguments differently; such an analysis is provided in § 5.4.1.

## 5.3 Coordination

As shown in (1), it is possible to coordinate an adjective with a passive form. It is also possible to find attested instances of coordination of a nominal and a gerund:

(40) Moje pasje są fanaberiami i marnowaniem
my passion.NOM.PL.F are eccentricity.INST.PL.F and waste.INST.SG.N
czasu.
time.GEN
'My passions are eccentricities and wasting time.' (NKJP)

In (40) a predicative noun (*fanaberiami*) is coordinated with a predicative gerund (*marnowaniem*). As explained in § 5.1, a closed complement analysis must be adopted for predicative gerunds to avoid violations of consistency. Since coordination with a nominal is possible, a unified PREDLINK analysis should be adopted for such sentences – see (41) for the corresponding f-structure.

(41)
$$\left[\begin{array}{ll} \text{PRED} & \text{`BE}\langle\boxed{2}\rangle\boxed{1}\text{'} \\ \text{SUBJ} & \boxed{1}\left[\text{PRED `PASSION'}\right] \\ \text{PREDLINK} & \boxed{2}\left[\begin{array}{l} \left\{ \left[\text{PRED `ECCENTRICITY'}\right], \left[\begin{array}{ll}\text{PRED} & \text{`WASTE}\langle\boxed{3},\boxed{4}\rangle\text{'}\\ \text{SUBJ} & \boxed{3}\left[\text{PRED `PRO'}\right] \\ \text{OBJ} & \boxed{4}\left[\text{PRED `TIME'}\right]\end{array}\right]\right\} \\ \text{COORD-FORM} \quad \text{AND}\end{array}\right]\end{array}\right]$$

However, it is hard to find examples of coordination across elements of these two groups (adjectives and passive forms vs. nouns and gerunds). Sag et al. 1985 provide examples showing that in English it is possible to coordinate an adjective with a nominal which serve together as the predicative complement – see (42)–(43):

(42) Pat is either stupid or a liar. (Sag et al. 1985, p. 117, ex. (2a))

(43) Pat is a republican and proud of it. (Sag et al. 1985, p. 117, ex. (2b))

Similar examples can be found in Polish, though not without difficulty:

(44) W szkole stwierdzono, iż jestem zdolny, ale leń.
at school stated that am talented.NOM.SG.M1 but idler.NOM.SG.M1
'They said at school that I'm talented but an idler.' (NKJP)

(45) Ciągle twierdzę, że jesteś inteligentny ale cham.
still claim that are intelligent.NOM.SG.M1 but lout.NOM.SG.M1
'I still claim that you're intelligent but a lout.' (Google)

(46) Twierdzi, że oponent jest głupi i cham.
claims that opponent.NOM.SG.M1 is stupid.NOM.SG.M1 and lout.NOM.SG.M1
'He claims that the opponent is stupid and a lout.' (Google)

## 5.4 Which Analysis?

So far, it has been demonstrated using attested examples that the following can be coordinated as a predicative complement:

- adjective and passive form (see (1)),
- nominal and gerund (shown in (40)),
- adjective and nominal (as in (44)–(46)).

While it is possible (though difficult) to find instances of coordination of an adjective and a nominal (see (44)–(46)), no attested examples confirming the possibility of coordinating an adjective or passive form with a gerund were found. Though an attested example of coordination of a passive form with a nominal was not found, it is possible to construct examples similar to those which feature an adjective:

(47) Jest powszechnie lubiany, ale łobuz.
is commonly liked.NOM.SG.M1 but rascal.NOM.SG.M1
'He is generally liked but a rascal.'

On the basis of these facts, two analyses can be proposed.

### 5.4.1 Split Open/Closed Analysis

The restrictive analysis assumes that while it is possible to coordinate adjectives and passive forms on the one hand and nominals with gerunds on the other, elements belonging to distinct groups cannot be coordinated.

Such an analysis would therefore not handle sentences such as (44)–(46) (attested) and (47) (constructed). It could be argued, however, that this is a welcome feature of this analysis: such examples are not only exceedingly rare, but also restricted in various ways. In particular, these examples are acceptable when the nominal occurs in the nominative form, which is otherwise a marked option (mostly restricted to evaluative or expressive predicates; Karolak 1984, 145–146), and not when they are in the usual instrumental; compare (48) below to (47) above.

(48)*Jest powszechnie lubiany, ale łobuzem.
is commonly liked.NOM.SG.M1 but rascal.INST.SG.M1

The unacceptability of (48) cannot be directly explained away by the difference in case values: the nominative of the adjective vs. the instrumental of the noun. As shown in Przepiórkowski 1999, elements bearing different case values may be coordinated if they fill the same syntactic position. Moreover, a cased nominal may be easily coordinated with a prepositional phrase in such copular constructions, as the following demonstrates:

(49) Jestem podpity i na kacu.
am tipsy.NOM and on hangover.LOC
'I am tipsy and have a hangover.' (Google)

Another property of (44)–(47) is that such examples are most readily found with a contrastive conjunction such as *ale* 'but', although – as shown in (46) – this is not a strict requirement.

It is possible, then, that such examples are not instances of run-of-the-mill coordination, but rather exemplify a construction where an apparent conjunction occurs within constituent, as in the following attested examples:

(50) Ja także jestem laureatem ale z geografii.
I also am prizewinner but of geography
'I am also a prizewinner, but in geography.' (Google)

(51) Był prezesem, ale tylko na papierze.
was chairman but only on paper
'He a chairman but only nominally so.' (Google)

The PPs in these two examples would make no sense (or at least a very different sense) as the sole complements of the copula, i.e., in: *Jestem z geografii* 'I am from/in geography' and *Jest na papierze* 'He is on paper', but they do make sense as constituents of NPs containing also the nominal: *(Jestem) laureatem z geografii* '(I am) a prizewinner in geography' and *(Jest) prezesem na papierze* '(He is) a nominal chairman (i.e., a front man)'.

Similarly, while the non-agreeing instrumental case on the predicative adjective is a very restricted option in contemporary Polish, the following example is fully acceptable, in stark contrast to the bare *Jest powszechnie lubianym* 'He is generally liked.INST':

(52) Jest powszechnie lubianym, ale (jednak) łobuzem.
is commonly liked.INST.SG.M1 but still rascal.INST.SG.M1
'He is generally liked but (still) a rascal.'

Again, one explanation is that this is because the sentence *Jest powszechnie lubianym łobuzem* 'He is a generally liked rascal', with the instrumental NP, is acceptable, and the apparent conjunction *ale (jednak)* 'but (still)' is placed within the NP in a construction-specific way.

Excluding examples such as (44)–(47), the two types of predicative complements mentioned above could be assigned different grammatical functions. The first group, which consists of adjectives and passive forms, would correspond to the open grammatical function XCOMP, which would make it possible to account easily for agreement with the item predicated of – since it is a subject of the predicative complement, agreement can be handled locally using simple equations. The f-structure in (53) would correspond to (1)[5] under this analysis:

[5]In order to enhance readability, agreement features are not represented in (53) and (54). These are, however, represented in the partial f-structure in (11).

(53) $$\left[\begin{array}{ll} \text{PRED} & \text{`BE}\langle\boxed{2}\rangle\boxed{1}\text{'} \\ \text{SUBJ} & \boxed{1}\left[\text{PRED `RUNWAY'}\right] \\ \text{XCOMP} & \boxed{2}\left[\begin{array}{l} \left\{\begin{array}{l} \left[\begin{array}{ll} \text{PRED} & \text{`MAKE}\langle\boxed{1}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \\ \text{ADJ} & \left\{\left[\text{PRED `WELL'}\right]\right\} \\ \text{PASSIVE} & + \end{array}\right], \\ \left[\begin{array}{ll} \text{PRED} & \text{`SAFE}\langle\boxed{1}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \end{array}\right], \\ \left[\begin{array}{ll} \text{PRED} & \text{`REGISTER}\langle\boxed{1},\boxed{3}\rangle\text{'} \\ \text{SUBJ} & \boxed{1} \\ \text{OBL}_{ag} & \boxed{3}\left[\text{PRED `CAO'}\right] \\ \text{PASSIVE} & + \end{array}\right] \end{array}\right\} \\ \text{COORD-FORM} \quad \text{AND} \end{array}\right] \end{array}\right]$$

By contrast, the second group, which contains nominals and gerunds, would be assigned the closed grammatical function PREDLINK, which makes it possible to avoid problems with consistency in sentences such as (33) and (40), where the predicative complement contains a gerund which has its own subject – see (36) and (41) for f-structures of respective examples under this representation.

### 5.4.2 Unified Closed Analysis

Unlike the split analysis presented in § 5.4.1, the unified closed analysis treats all predicative complements as closed, assigning them the PREDLINK grammatical function. For this reason, it is capable of representing sentences which are rejected under the split analysis: these include the coordination of adjectives and nominals (as in (44)–(46)) and passive forms coordinated with nominals (see (47)).

As discussed in § 5.4, there are categories whose coordination is not attested in Polish: these include the coordination of a nominal and a passive form (but see the constructed (47)) and the coordination of an adjective and a gerund, which does not seem to be possible at all. The latter could be eliminated under this analysis at the level of c-structure rules by not allowing the coordination of adjectives and gerunds. If need be, the former could be blocked in the same way.[6]

The perhaps more important issue is supplying the passive form with a subject – while this would be handled under the open complement (XCOMP) analysis using structure-sharing, this device cannot be used here, as it would result in a consistency violation with predicative gerunds (as explained in § 5.1). If the subject of the passive form is not filled, the f-structure will be incomplete.

[6]Admittedly, such a c-structure-level blocking is not very explanatory and deeper reasons for excluding such coordination should be sought.

This problem could be solved by introducing a new attribute to host the item predicated of in the f-structure of the passive form or the predicative item. The value of this dedicated attribute would be structure-shared with the item predicated of. This way, the f-structure of the item predicated of would be available locally to the complement, be it a passive form or a predicative item. In fact, such an attribute, CONTROLLER, is independently proposed in Patejuk and Przepiórkowski 2014a.

There are two gains from adopting this solution: the subject of the passive form could be filled by structure-sharing the value of CONTROLLER with the SUBJ attribute of this form. Additionally, this approach makes it considerably easier to ensure agreement between predicative items which obligatorily agree with the item predicated of – as discussed in § 5.2, this applies to adjectives and passive forms.

As mentioned in § 3, since under the closed complement (PREDLINK) analysis there is no structure-sharing of the item predicated of (the controller of agreement) with the subject of the predicative item (as it is not required to have a subject), agreement must be handled in a different way.

However, once the CONTROLLER attribute is introduced, it hosts the item predicated of, which makes it possible to handle agreement similarly to the way in which it is handled by the open complement (XCOMP) analysis. When the agreement controller is available inside the f-structure of the item which requires agreement (in the CONTROLLER attribute), agreement can be handled locally by requiring that the relevant values of the CONTROLLER and the complement are equal.

The f-structure in (54) provides a representation of (1) using this analysis:

(54)
$$\left[\begin{array}{ll}
\text{PRED} & \text{`BE}\langle\boxed{2}\rangle\boxed{1}\text{'} \\
\text{SUBJ} & \boxed{1}\left[\begin{array}{ll}\text{PRED} & \text{`RUNWAY'}\end{array}\right] \\
\text{PREDLINK} & \boxed{2}\left[\begin{array}{l}
\left\{\begin{array}{l}
\left[\begin{array}{ll}
\text{PRED} & \text{`MAKE}\langle\boxed{1}\rangle\text{'} \\
\text{SUBJ} & \boxed{1} \\
\text{ADJ} & \left\{\left[\begin{array}{ll}\text{PRED} & \text{`WELL'}\end{array}\right]\right\} \\
\text{PASSIVE} & + \\
\text{CONTROLLER} & \boxed{1}
\end{array}\right], \\
\left[\begin{array}{ll}
\text{PRED} & \text{`SAFE'} \\
\text{CONTROLLER} & \boxed{1}
\end{array}\right], \\
\left[\begin{array}{ll}
\text{PRED} & \text{`REGISTER}\langle\boxed{1},\boxed{3}\rangle\text{'} \\
\text{SUBJ} & \boxed{1} \\
\text{OBL}_{ag} & \boxed{3}\left[\begin{array}{ll}\text{PRED} & \text{`CAO'}\end{array}\right] \\
\text{PASSIVE} & + \\
\text{CONTROLLER} & \boxed{1}
\end{array}\right]
\end{array}\right\} \\
\text{COORD-FORM} \quad \text{AND}
\end{array}\right]
\end{array}\right]$$

Note that the presence of the CONTROLLER attribute is crucial in case of two of the conjuncts in (54), namely, in case of the two passive forms, which equate the value of their SUBJ with that of their CONTROLLER. In case of the third conjunct there, corresponding to the adjective *bezpieczny* ‘safe’, the presence of CONTROLLER is useful for the purposes of handling agreement between the predicative adjective and the item predicated of.

The f-structure in (55) is a modified version of (41) (corresponding to example (40) where a nominal is coordinated with a gerund) with the CONTROLLER attribute added:

(55)
$$\begin{bmatrix}
\text{PRED} & \text{‘BE}\langle\boxed{2}\rangle\boxed{1}\text{’} \\
\text{SUBJ} & \boxed{1}\begin{bmatrix}\text{PRED} & \text{‘PASSION’}\end{bmatrix} \\
\text{PREDLINK} & \boxed{2}\begin{bmatrix} \left\{ \begin{bmatrix}\text{PRED} & \text{‘ECCENTRICITY’}\\ \text{CONTROLLER} & \boxed{1}\end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{‘WASTE}\langle\boxed{3},\boxed{4}\rangle\text{’}\\ \text{SUBJ} & \boxed{3}\begin{bmatrix}\text{PRED} & \text{‘PRO’}\end{bmatrix}\\ \text{OBJ} & \boxed{4}\begin{bmatrix}\text{PRED} & \text{‘TIME’}\end{bmatrix}\\ \text{CONTROLLER} & \boxed{1}\end{bmatrix}\right\} \\ \text{COORD-FORM} \quad \text{AND} \end{bmatrix}
\end{bmatrix}$$

Unlike in (54), in (55) the CONTROLLER attribute is spurious on both conjuncts, as one of them has no SUBJ attribute at all, and the other one has a subject whose value is set independently of the value of CONTROLLER. It is also not needed for handling agreement since, as explained in § 5.2, it is not required with predicative nominals. As far as we can see, while such spurious occurrences of CONTROLLER, noted also in Patejuk and Przepiórkowski 2014a, may be seen as aesthetically disturbing, they have no practical negative impact.

## 6 Conclusion

In this paper we looked at the predicative argument of the copula in Polish and considered cases where different predicative elements may be coordinated, especially where one of the conjuncts is a passive participle. Such facts show that passive and predicative constructions must be analysed alike. On the basis of the behaviour of negation in passive constructions, we decided that – at least in Polish – only one of two approaches to passivisation in LFG is viable: the biclausal approach, where the copula is treated as a raising verb, and not the monoclausal approach, where it is treated as a co-head of the passive participle. Hence, also in predicative constructions the copula must be analysed as a raising verb. This excludes the analysis which treats the predicative element as the head of such copular predicative constructions.

The other two LFG analyses of predicative constructions treat the copula as a raising verb and differ in whether the predicative argument is closed (PREDLINK) or open (XCOMP). We showed that at least in some cases, where the predicative argument is a gerund which introduces its own subject, only the former analysis (with PREDLINK arguments) is correct. On the other hand, it is much less clear whether this PREDLINK analysis should be extended to all kinds of predicative arguments, or whether some predicative constructions should involve open XCOMP predicative arguments: the latter (split PREDLINK/XCOMP) analysis may be considered to be too restrictive, while the former (unified PREDLINK) analysis seems to be too permissive. While we currently favour the split PREDLINK/XCOMP analysis, further detailed investigation into copular constructions and their semantics is needed to resolve this issue more decisively.

## References


Andrews, Avery. 1982. The Representation of Case in Modern Icelandic. In Bresnan (1982a), pages 427–503.

Borsley, Robert D. and Przepiórkowski, Adam (eds.). 1999. *Slavic in Head-Driven Phrase Structure Grammar*. Stanford, CA: CSLI Publications.

Bresnan, Joan (ed.). 1982a. *The Mental Representation of Grammatical Relations*. Cambridge, MA: The MIT Press.

Bresnan, Joan. 1982b. The passive in lexical theory. In Bresnan (1982a), pages 3–86.

Bresnan, Joan. 2000. *Lexical-Functional Syntax*. Blackwell Textbooks in Linguistics, Blackwell.

Butt, Miriam and King, Tracy Holloway (eds.). 2014. *The Proceedings of the LFG'14 Conference*, Stanford, CA, CSLI Publications, under review.

Butt, Miriam, Niño, María-Eugenia and Segond, Frédérique. 1999. *A Grammar Writer's Cookbook*. Stanford, CA: CSLI Publications.

Dalrymple, Mary. 2001. *Lexical Functional Grammar*. Academic Press.

Dalrymple, Mary, Dyvik, Helge and King, Tracy Holloway. 2004. Copular Complements: Closed or Open? In Miriam Butt and Tracy Holloway King (eds.), *The Proceedings of the LFG'04 Conference*, pages 188–198, University of Canterbury: CSLI Publications.

Huang, C.-T. James. 1999. Chinese Passives in Comparative Perspective. *Tsing Hua Journal of Chinese Studies* 29, 423–509.

Karolak, Stanisław. 1984. Składnia wyrażeń predykatywnych. In Zuzanna Topolińska (ed.), *Gramatyka współczesnego języka polskiego: Składnia*, pages 11–211, Warsaw: Wydawnictwo Naukowe PWN.

Kupść, Anna and Przepiórkowski, Adam. 2002. Morphological Aspects of Verbal Negation in Polish. In Peter Kosta and Jens Frasek (eds.), *Current Approaches to Formal Slavic Linguistics: Proceedings of the Second European Conference on Formal Description of Slavic Languages, Potsdam, 1997*, pages 337–346, Frankfurt am Main: Peter Lang.

Patejuk, Agnieszka and Przepiórkowski, Adam. 2014a. Control into Selected Conjuncts. In Butt and King (2014), under review.

Patejuk, Agnieszka and Przepiórkowski, Adam. 2014b. Structural Case Assignment to Objects in Polish. In Butt and King (2014), under review.

Przepiórkowski, Adam. 1999. *Case Assignment and the Complement-Adjunct Dichotomy: A Non-Configurational Constraint-Based Approach*. Ph.D. dissertation, Universität Tübingen, Germany.

Przepiórkowski, Adam. 2000. Long Distance Genitive of Negation in Polish. *Journal of Slavic Linguistics* 8, 151–189.

Przepiórkowski, Adam, Bańko, Mirosław, Górski, Rafał L. and Lewandowska-Tomaszczyk, Barbara (eds.). 2012. *Narodowy Korpus Języka Polskiego [Eng.: National Corpus of Polish]*. Warsaw: Wydawnictwo Naukowe PWN.

Przepiórkowski, Adam, Górski, Rafał L., Łaziński, Marek and Pęzik, Piotr. 2010. Recent Developments in the National Corpus of Polish. In *Proceedings of the Seventh International Conference on Language Resources and Evaluation, LREC 2010*, ELRA, Valletta, Malta.

Przepiórkowski, Adam and Kupść, Anna. 1999. Eventuality Negation and Negative Concord in Polish and Italian. In Borsley and Przepiórkowski (1999), pages 211–246.

Richter, Frank and Sailer, Manfred. 1999. LF Conditions on Expressions of Ty2: An HPSG Analysis of Negative Concord in Polish. In Borsley and Przepiórkowski (1999), pages 247–282.

Sag, Ivan A., Gazdar, Gerald, Wasow, Thomas and Weisler, Steven. 1985. Coordination and How to Distinguish Categories. *Natural Language and Linguistic Theory* 3, 117–171.

# LOCALITY CONSTRAINTS IN DISTANCE DISTRIBUTIVITY: A PROPOSITIONAL GLUE APPROACH

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**Abstract**

The aim of this paper is to provide a preliminary characterisation of locality constraints on distance distributivity in Polish. The generalisations are encoded using the propositional variant of glue and demonstrate its usefulness. An extension to distribution over events is sketched.

# 1 Introduction

While this paper has the ambition to be self-contained, it is preceded by a long series of papers on distance distributivity (DD) in Polish. Of these, Przepiórkowski and Patejuk 2013 presents an LFG analysis of the (morpho)syntax of Polish DD, while Przepiórkowski 2014b discusses problems with the analysis in Zimmermann 2002, the most comprehensive account of the syntax and semantics of the kind of DD that is observed in German and Slavic languages, and presents the general idea of a new semantic account couched in the "new glue" variant of Glue Semantics (Dalrymple et al. 1999, Dalrymple 2001). The technical details of this analysis – formalised in the first order variant of Glue Semantics (Kokkonidis 2008) and compatible with the (morpho)syntactic analysis of Przepiórkowski and Patejuk 2013 – are provided in Przepiórkowski 2014a.

The contribution of the current paper is empirical, theoretical and technical. On the empirical side, we attempt to provide a description of locality constraints on Polish DD. On the theoretical side, we extend the analysis of Przepiórkowski 2014a to include these empirical generalisations and sketch a further extension towards distribution over events (apart from objects). Finally, on the technical side, we replace the first order glue analysis of Przepiórkowski 2014a with an essentially propositional glue analysis, in the spirit of Lev 2007 and Andrews 2010.

# 2 Distance Distributivity

Distance distributivity[1] is a phenomenon where a distributive element such as *each* occurs at some structural distance from the phrase that restricts it and forms a constituent with some other noun phrase. For example, in *The boys have two apples each*, the distributive element *each* occurs within the object position, while its restriction, *the boys*, is the subject of the sentence. This should be contrasted with the determiner uses of *each*, as in *Each boy has two apples*, where *each* combines directly with its restriction, as other ad-nominal quantifiers do.

There are various terminological conventions in the literature, e.g., Choe 1987 calls such uses of *each* "anti-quantifiers", and Safir and Stowell 1988 call them

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[1]This section draws from the Introduction to Przepiórkowski 2014b.

"binominal". Both terms are suboptimal: much subsequent literature attempts to describe such distributive elements (DEs) as more-or-less ordinary quantifiers (not as special "anti-quantifiers") and it is clear now that DEs in other languages, including German and Polish, do not need two nominal expressions (*the boys* and *two apples* above) but – as shown by Moltmann 1991, 1997 – may quantify over events expressed by verbal constituents (hence, they are not "binominal"). In this paper we adopt the terminology of Zimmermann 2002, who introduced the term "distance distributivity" (DD), and call the nominal phrase DE attaches to (*two apples* above) "distributive share" (DS), and the phrase expressing the set of entities which restrict DE (*the boys* above) – "distributive key" (DK):[2]

(1) DD: *The boys* have *two apples* *each*.
DK DS DE

To the best of our knowledge, Zimmermann 2002 remains the only comprehensive syntactico-semantic analysis of DD of the kind observed in German and Polish. Przepiórkowski 2014b introduces a DD construction similar to inverse linking discussed, e.g., in May 1985: 68ff. and Heim and Kratzer 1998: §8.6, extensively argues that it cannot be accounted within the framework of Zimmermann 2002, and points out other problems with that analysis. An alternative first order glue analysis for Polish, though dealing only with a subset of kinds of data considered in Zimmermann 2002, is presented in Przepiórkowski 2014a. In the following section, we provide a description of locality constraints on Polish DD which motivate further restrictions to that glue analysis.

## 3 Constraints on DD in Polish

### 3.1 Permissible Grammatical Functions

A typical example of DD in Polish is given below:[3]

(2) Wagony mieszczą po 40 osób.
carriages.NOM hold DISTR 40 people
'Carriages seat 40 people each.'

Here, the distributive key (DK), *wagony*, occupies the subject position and the *po*-phrase with the distributive share (DS), *40 osób*, is found in the object position. The opposite, while perhaps less frequent, is also possible:

(3) Po 16 zawodników reprezentuje włoską Serię A i angielską Premiership.
DISTR 16 players represent Italian.ACC series.ACC A and English.ACC Premiership.ACC

[2] In Polish examples we follow Leipzig Glossing Rules, i.e., we mark the Polish DE *po* as DISTR.

[3] Unless explicitly indicated otherwise, examples are taken from the National Corpus of Polish (NKJP; `http://nkjp.pl`; Przepiórkowski et al. 2012, 2011), but they are often shortened or simplified in other ways.

'The Italian Series A and the English Premiership are represented by 16 players each.'

While a natural English translation of (3) is in the passive, note that the Polish sentence is in the active voice and the *po*-phrase is the subject. In general, DD is in various respects freer in Polish than in English, so free translations may be misleading and the reader is encouraged to pay attention to word-by-word glosses.

In these and further examples, we do not provide information about the case of the nominal phrase following *po*. As discussed at length in Przepiórkowski and Patejuk 2013, there are a number of homophonous and homonymous elements *po*, some assigning case and other transmitting case from outside, so such case information might be confusing to readers not familiar with the morphosyntax of *po*. We abstract away from such complications here and treat these morphosyntactically diverse elements as if they were a single preposition – this is in fact the traditional view (Łojasiewicz 1979, Franks 1995).

The configurations $\langle \textsc{subj}_{\mathrm{DK}}, \textsc{obj}_{\mathrm{DS}} \rangle$ and $\langle \textsc{obj}_{\mathrm{DK}}, \textsc{subj}_{\mathrm{DS}} \rangle$ illustrated in (2) and (3) do not exhaust the possibilities – apparently, the DK and the *po*-phrase containing the DS may occupy any grammatical functions, including ADJUNCT. The following examples illustrate some of these possibilities: $\langle \textsc{subj}_{\mathrm{DK}}, \textsc{adj}_{\mathrm{DS}} \rangle$ in (4), $\langle \textsc{obj-th}_{\mathrm{DK}}, \textsc{obj}_{\mathrm{DS}} \rangle$ in (5), $\langle \textsc{obl}_{\mathrm{DK}}, \textsc{obj}_{\mathrm{DS}} \rangle$ in (6), $\langle \textsc{adj}_{\mathrm{DK}}, \textsc{obj}_{\mathrm{DS}} \rangle$ in (7), $\langle \textsc{obj}_{\mathrm{DK}}, \textsc{obj-th}_{\mathrm{DS}} \rangle$ in (8), and $\langle \textsc{adj}_{\mathrm{DK}}, \textsc{adj}_{\mathrm{DS}} \rangle$ in (9).

(4) Wiele dzieci przebywa w placówce po kilka lat.
many children stay in unit DISTR several years
'Many children are staying in the unit a few years each.'

(5) W Centrali Banku wypłacono im po 1150 złotych gotówką.
in headquarters bank.GEN pay.IMPS they.DAT DISTR 1150 zloties cash.INST
'In the Bank Headquarters, they withdrew 1150 PLN in cash each.'

(6) Weźmy tylko po kilkadziesiąt metrów z dwóch ulic.
take.IMPF.1.PL only DISTR a few tens meters.GEN from two streets
'Let us only take several dozen meters from each of the two streets.'

(7) Ma po dwa pistolety z każdej strony.
have.3.SG DISTR two guns from each side
'He has two guns on each side.'

(8) Trzy pierwsze miejsca przyznano po dwóm grupom wieńcowym.
three first positions assigned.IMPS DISTR two group.PL wreath.PL
'The first three positions were assigned to two wreath groups each.' (Google)

(9) Ćwiczę pięć razy w tygodniu po 45 minut.
exercise.1.PRES five times in week DISTR 45 minutes
'I exercise for 45 minutes five times a week.'

In all the above examples the DK and the *po*-phrase containing the DS are co-dependents of the same verb, or nearly so: in (6) and (7) the DK is introduced by a preposition; this possibility is also illustrated by the following example, where the DS occurs in the subject position:

(10) Po 7 goli padło w Poroninie, Mszanie Dolnej i Klikuszowej.
DISTR 7 goals scored in Poronin, Mszana Dolna and Klikuszowa
'7 goals each were scored in Poronin, Mszana Dolna and Klikuszowa (place names; AP).'

However, DK and DS do not have to be co-dependents of the same predicate; they are not in the following examples, in which DKs are embedded within arguments of the verb:

(11) Zaledwie po kilka szkół planuje dodatkowe sprawdziany dla
only DISTR several schools plan additional tests for
kandydatów na socjologię, informatykę i nauki ekonomiczne.
candidates for sociology, informatics and sciences economic
'Only a few schools are planning additional tests for candidates for each of sociology, computer science and economics.'

(12) Po kilku chętnych zgłosiło zainteresowanie mieszkaniami
DISTR several interested ones expressed interest flats
jednopokojowymi i dwupokojowymi.
single-bedroom and two-bedroom
'A few people expressed interest in single-bedroom and in double-bedroom flats each.'

In particular, the coordinated DK *socjologię, informatykę i nauki ekonomiczne* 'sociology, computer science and economics' in (11) is relatively deeply embedded within the object headed by *sprawdziany* 'tests' – it occurs within the prepositional phrase dependent of *kandydatów* 'candidates', itself a dependent of *sprawdziany*.

The facts so far are still consistent with weaker generalisations, namely, 1) that DS and DK must belong to the same clause and 2) that the *po*-phrase must f-command DK. We will investigate these possible generalisations in the following subsections.

### 3.2 Same Clause

Starting with the former constraint, let us consider the following examples constructed on the basis of (12):

(13) a. Po pięć osób mówiło o zainteresowaniu każdym z tych
DISTR five people talked about interest.GER each of these
mieszkań.
flats
'Five people talked about their interest in each of these flats.'

b. *Po pięć osób mówiło, że są zainteresowane każdym z tych
DISTR five people talked that are.FIN interested.PAS each of these
mieszkań.
flats

c. *Po pięć osób mówiło, żeby się zainteresować każdym z tych
DISTR five people talked that REFL interest.INF each of these
mieszkań.
flats

d. Po pięć osób mówiło, że są zainteresowane mieszkaniami.
DISTR five people talked that are.FIN interested.PAS flats
'Five people talked each about their interest these flats.'

The minimal difference (13a–b) shows that the path between the *po*-phrase and the DK cannot cross a clausal boundary. Example (13c) shows that it is not finiteness that is the blocking factor, but rather the closed status of the clause (or COMP, in standard LFG terms). In this context, the acceptability of (13d) is at first surprising, but the difference of the intuitive meaning between (13b) and (13d) helps explain this apparent inconsistency. In (13a–c), the DK involves a form of the quantifier KAŻDY 'each', which enforces the binominal distributive interpretation – the DS *pięć osób* 'five people' within the *po*-phrase must be related to the nominal DK, and the (intended) meaning in each case is *For each of these flats, there are 5 people...* In contrast, the intuitive meaning of (13d) involves instead the collective understanding of *mieszkaniami* 'flats' and distribution over events expressed by the higher verb: *For each event of speaking of interest in (these) flats, 5 people were the agent of this event*. Hence, in (13d) the verbal DK is local with respect to the DS.

The above facts are still consistent with a number of understandings of the "same clause" requirement. We have already alluded to one: the dependency cannot cross the closed clause (COMP) boundary. Another is that both DS and DK are directly involved in the same event, i.e., in terms of LFG, that their f-structures are contained in exactly the same event-expressing f-structures. Example (13a) may be providing some evidence against this latter understanding of the "same clause" requirement: it involves the gerundial form *zainteresowaniu* 'interest', presumably expressing an event, and while the DK seems to be an argument of this event, the DS presumably only belongs to the domain of the higher event, expressed by *mówiło* 'talked'. In case of this example, all of these assumptions may be questioned – the apparently gerundial form may be analysed as a noun or the DS may be claimed to functionally control its subject, hence, occurring in its event domain – so let us construct a more convincing example:

(14) Po trzy lokalne gazety pisały o zapakowaniu każdej z tych
DISTR three local papers wrote about packaging.GER each of these
budowli przez Christo.
buildings by Christo
'Three local papers wrote about the wrapping of each of these buildings by Christo.'

Here, the underlying subject of the gerund is explicitly expressed by a *by*-phrase, *przez Christo* 'by Christo', so it cannot be functionally controlled by the higher *po*-phrase subject containing the DS. Moreover, the fact that such an underlying subject is present and that additional temporal or locative modifiers may be added (not shown here) convinces us that the gerund expresses an event. Yet, (14) is acceptable, so it looks like event domain is not an island for DD. The remaining understanding of "same clause", in terms of closed clausal complements being islands, should be easy to confirm by examining infinitival environments (XCOMP in terms of traditional LFG).

The following examples are again culled from the National Corpus of Polish:

(15) Po kilka osób ośmieliło się zdawać język angielski i niemiecki
DISTR several people dared REFL take language English and German
'A few people dared to take exams in each of English and German.'

(16) Po dwie osoby chcą rządzić w gminach Widawa, Buczek i Wodzierady.
DISTR two people want rule in counties Widawa Buczek and Wodzierady
'Two people want to govern Widawa, Buczek and Wodzierady each.'

As argued in Przepiórkowski 1999, 2004 on the basis of case transmission facts, in Polish, subject control involves structure-sharing (functional control in terms of LFG) and object control does not (it should be analysed via obligatory anaphoric control in terms of LFG). This means that in the two examples above the f-structure of the subject *po*-phrase is also the value of the subject of the lower verb. Hence, both DS and DK are co-dependents of the lower verb, so this configuration does not tell us anything about constraints on locality in DD; we need to look at object control instead.

Attested relevant examples are difficult to find, but the following constructed sentence seems to be acceptable, especially the version with the explicit quantifier *każdy*:

(17) Po dwie osoby radziły mi kupić te książki / każdą z tych książek.
DISTR two people advised me buy.INF these books each of these books
'Two people advised me to buy each of these books.'

Here, the *po*-phrase is the subject of the matrix object-control verb, and the DK is the object of the lower verb. Hence, they are related across the boundary of an open complement.

We conclude that the "same clause" requirement should be understood as a ban on DD across a closed clause boundary and that "event domain" or open infinitival complement are not islands for DD in Polish.

### 3.3 F-Command?

Let us turn to the second hypothesis expressed above, namely, that the f-structure corresponding to the *po*-phrase containing DS must f-command the f-structure corresponding to DK. Recall the definition of f-command, here taken from Dalrymple 2001: 159:

(18) $f$ f-commands $g$ if and only if $\neg(f\ \mathrm{GF}^*) = g$ ($f$ does not contain $g$) and $((\mathrm{GF}\ f)\ \mathrm{GF}^+) = g$ (all f-structures whose value for some grammatical function GF is $f$ also contain $g$).

While all examples above satisfy this f-command constraint, the following simplified NKJP example seems to violate it:

(19) Kościół pozwolił uczonym zabrać po włókienku czy po dwa.
church allowed scientists take DISTR thread or DISTR two
'The Church let each of the scientists take a thread or two (of the Shroud of Turin).'

Here, the object of the higher verb, *uczonym* 'scientists', controls the subject of the lower verb only anaphorically (again, see Przepiórkowski 1999, 2004 for arguments), so the f-structure of the *po*-object of the lower verb, *zabrać* 'take', does not f-command the f-structure of DK – the former only occurs as the object of the lower verb and the latter only occurs as the object of the higher verb.

An even more striking example of non-f-command would be if the DK were the subject of the higher verb instead of the controlling object of this verb, but we have not been able to find such examples in corpora. The following simplified example from NKJP, where the DS *kilkanaście procent* 'a dozen or more percent' apparently distributes over the subject *banki* of the higher verb (with the object of this higher verb only implicit), has another analysis, in which the DS distributes over the co-dependent *sobie* 'themselves', which is only anaphorically bound by *banki*:

(20) Banki każą sobie płacić po kilkanaście procent.
banks request self.DAT pay DISTR dozen or more percent
'Banks make (us) pay them a dozen or more percent each.'

A constructed example of the kind we are looking for is given in (21b).

(21) a. Kierownicy projektów polecili badaczom przygotować po raporcie.
heads projects.GEN asked researchers.DAT.PL prepare DISTR report
'PIs asked researchers to prepare a report each.'

b. Kierownicy projektów polecili zespołowi przygotować po raporcie.
heads projects.GEN asked team.DAT.SG prepare DISTR report
'PIs asked the team to prepare a report each.'

Unlike (21a), where – on the prominent understanding of the sentence – DK is the controlling object, as in (19) above, (21b) seems to be understood as involving distribution over the matrix subject DK. On the other hand, we cannot at this stage exclude the possibility that such examples are acceptable because of the availability of distribution over the events of the team preparing a report, so we do not treat this piece of data as decisive.

A final potential counterexample to the generalisation that *po*-phrases including a DS must f-command the corresponding DKs is (22), one among a few examples from the Internet cited in Przepiórkowski and Patejuk 2013 where a distributive *po*-phrase seems to be an argument of a preposition.

(22) Prawie wszyscy zawodnicy występowali w po dwóch formacjach.
almost all players played in DISTR two.LOC formations.LOC
'Almost all players played in two formations each.' (Google)

Such examples, while occasionally attested, are judged as marginal or downright unacceptable, so it is not clear whether the current analysis should try to take them into account. If so, and if we want to maintain some version of the f-command generalisation, there are at least two possible ways to tackle examples such as (22). The first is to adopt an analysis where some prepositions do not project a separate f-structure but rather add an attribute to the f-structure of their arguments; such an analysis is assumed in the PARGRAM implementation effort, where the attribute PFORM is used for this purpose. This solution would immediately solve the problem at hand – examples such as (22) would involve the run-of-the-mill f-command – but grammars employing PFORM use it only for non-semantic prepositions, and it is doubtful whether *w* 'in' in (22) is non-semantic. Second, the notion of f-command could be minimally relaxed to take the above counterexamples into account.

Summarising the facts so far, it seems that only a slightly relaxed version of f-command must hold between the *po*-phrase and the DK. It turns out, however, that f-command is not really the right relation to start with. The problem is the first part of the definition of $f$ f-commanding $g$ (cf. (18)): *$f$ does not contain $g$*. While this possibility has long remained unnoticed in the DD literature, DK may in fact be contained within the DS – both at the level of c-structure and f-structure. Such a construction – and the problems it poses for previous accounts of DD – is extensively discussed in Przepiórkowski 2014a,b. The example given there is (23), where the DS is headed by *3 przedstawicieli* '3 representatives', and the DK *25 krajów* '25 countries' is the argument of this relational noun *przedstawicieli* 'representatives':

(23) Przybyło po 3 przedstawicieli 25 krajów.
arrive.PAST DISTR 3 representatives 25.GEN countries.GEN
'3 representatives arrived from each of 25 countries.'

Another example of "DK-within-DS" may be found in the following sentence, taken from NKJP verbatim:

(24) Pojadą tam po dwie osoby wytypowane przez placówki.
drive there DISTR two people assigned by branches
'Two people assigned by each of the branch will go there.'

Here, the DK is the noun *placówki* 'branches' contained within the participial phrase *wytypowane przez placówki* 'assigned by the branches', which is a modifier of the DS *dwie osoby* 'two people'. In both cases, the f-structure for the DK is not f-commanded by the f-structure for the *po*-phrase containing the DS. Rather, DK is contained in DS.

### 3.4 Empirical Summary

Let us collect the observations of the previous subsections. We saw that the *po*-phrase introducing the DS and the DK are not restricted to any particular grammatical functions. We also showed that they must belong to the same clause and that the DK should either be f-commanded (in a slightly relaxed sense of the term) by or contained within the *po*-phrase introducing the DS. These observations may be jointly reformulated in a much simpler way – we will do so in §4.3.

## 4 Propositional Glue Analysis

### 4.1 Basics

The underlying Glue Semantics analysis of DD in Polish is presented in detail in Przepiórkowski 2014a; this subsection summarises enough of that analysis to make the current paper relatively self-contained.

Let us consider the following constructed (but uncontroversial) example (25a), its *po*-less version in (25b), and their corresponding intended meaning representations in (26a–b), in which all bare common nouns are assumed to be quantified existentially.

(25) a. Piotr kupił dziewczynom po róży. (Cf. (26a))
Piotr.NOM bought.SG girls.DAT DISTR rose.LOC
'Piotr bought (the/some) girls a rose each.'

b. Piotr kupił dziewczynom różę. (Cf. (26b))
Piotr.NOM bought.SG girls.DAT rose.ACC
'Piotr bought a rose for (the/some) girls.'

(26) a. $exists(Z, girl^s(Z) \wedge |Z| > 1,$
$\quad all(X, |X| = 1 \wedge X \subset Z,$
$\quad\quad exists(V, |V| = 1 \wedge rose^s(V), buy(p, V, X))))$

b. $exists(Z, girl^s(Z) \wedge |Z| > 1,$
$\quad exists(V, |V| = 1 \wedge rose^s(V), buy(p, V, Z))))$

In these assumed meanings, generalised quantifiers are represented as relations between an individual and two propositions involving that individual, so that $all(X, person(X), yawn(X))$ is the representation of *Everyone yawned* (Dalrymple 2001: 227). Moreover, we follow Dotlačil 2012 and earlier work on treating entities as sets,[4] and properties – as sets of such sets. For example, $girl^s$ is the property of being a non-empty set of girls – either a singleton or a set of higher cardinality (the superscript $s$ indicates the possible plural) – and $\lambda Z.\, girl^s(Z) \wedge |Z| > 1$ is the property of being a set of at least two girls. On this view, the standard inclusion relation $\subseteq$ is defined on entities. On the other hand, we ignore here event variables (but see §5), tense, aspect, etc.

[4]In particular, we do not distinguish between singleton sets and their elements.

The proposed account reflects the difference in meaning representations between (26a–b) rather directly: the distributive impact of *po* enters once a property is formed which contains the contribution of the DS (the form *róży* 'rose' in the examples above) but before this property combines with the DK (*dziewczynom* 'girls' above). The impact of *po* is to take a property holding of some set and transform it into an analogous property holding of each singleton subset of the set. In the example at hand, the property (27) is transformed into the property (28):

(27) $\lambda Z.exists(V, |V| = 1 \wedge rose^s(V), buy(p, V, Z))$

(28) $\lambda Z.all(X, |X| = 1 \wedge X \subset Z,$
$exists(V, |V| = 1 \wedge rose^s(V), buy(p, V, X)))$

The first version of a meaning constructor contributed by *po* which achieves this effect is given in (29):

(29) **[distr]** $\lambda S.\lambda Z.all(X, |X| = 1 \wedge X \subset Z, S(X)) :$
$\forall G, H.\ [e(G) \multimap t(H)] \multimap [e(G) \multimap t(H)]$

The glue side assumes the first order approach to Glue Semantics proposed in Kokkonidis 2008: atomic glue formulae are unary predicates expressing types (normally, but not necessarily, $e$ and $t$), and their sole arguments are constants (f-structures) or universally quantified variables ($G$ and $H$ in (29)).[5] The use of the first order glue instead of the earlier "new glue" is not optional in the analysis of Przepiórkowski 2014a. First, since the DK can have a variable relationship to the DS, the above constructor involves quantification over *e*-type objects, which is explicitly forbidden in the "new glue" approach (cf. Dalrymple et al. 1999: 272 and Kokkonidis 2008: 62). Second, as we will see shortly, a more complete version of the above meaning constructor makes use of an additional type, apart from the standard $e$ and $t$.

Let us put the above meaning constructor to use in an analysis of example (25a), whose f-structure is provided in (30).[6]

(30)
$$\boxed{0}\left[\begin{array}{ll} \textsc{pred} & \text{`}\textsc{buy}\langle\boxed{1},\boxed{2},\boxed{3}\rangle\text{'} \\ \textsc{subj} & \boxed{1}\left[\begin{array}{ll}\textsc{pred} & \text{`}\textsc{Piotr}\text{'}\end{array}\right] \\ \textsc{obj-th} & \boxed{2}\left[\begin{array}{ll}\textsc{pred} & \text{`}\textsc{girls}\text{'}\end{array}\right] \\ \textsc{obj} & \boxed{3}\left[\begin{array}{ll}\textsc{pred} & \text{`}\textsc{po}\langle\boxed{4}\rangle\text{'} \\ \textsc{obj} & \boxed{4}\left[\begin{array}{ll}\textsc{pred} & \text{`}\textsc{rose}\text{'}\end{array}\right]\end{array}\right] \end{array}\right]$$

Assume the following meaning constructors for the noun phrases in (25a), appropriately instantiated according to the above f-structure:

(31) **[Piotr]**
$p : e(\boxed{1})$

[5]We do not take advantage here of the possibility of introducing non-unary types or having function values as their arguments.

[6]Apart from PO and proper names, values of PRED are given in English for readers' convenience. Following Przepiórkowski and Patejuk 2013, PO is analysed here as taking an OBJECT.

(32) **[girls]**
$\lambda S.exists(Z, girl^s(Z) \wedge |Z| > 1, S(Z)) : \forall H.[e(\boxed{2}) \multimap t(H)] \multimap t(H)$

(33) **[rose]**
$\lambda S.exists(Z, rose^s(Z) \wedge |Z| = 1, S(Z)) : \forall H.[e(\boxed{4}) \multimap t(H)] \multimap t(H)$

While **[Piotr]** above is a direct instantiation of a lexical constructor, **[girls]** is the result of the combination of the lexical constructor for *dziewczynom* 'girls' in (34) and a general "existential closure" constructor such as (35), and similarly for **[rose]**.[7]

(34) **[girls_lex]** $\lambda X.girl^s(X) \wedge |X| > 1 : e(\boxed{2}) \multimap t(\boxed{2})$

(35) **[existential-n]** $\lambda R.\lambda S.exists(Z, R(Z), S(Z)) :$
$\forall H.\ [e(\boxed{2}) \multimap t(\boxed{2})] \multimap [[e(\boxed{2}) \multimap t(H)] \multimap t(H)]$

The meaning constructor for the three-argument verb *kupił* 'bought' is standard (again, ignoring the event variable, tense, etc.):

(36) **[bought]** $\lambda X.\lambda Y.\lambda Z.buy(X, Y, Z) : e(\boxed{1}) \multimap [e(\boxed{2}) \multimap [e(\boxed{3}) \multimap t(\boxed{0})]]$

The last meaning constructor needed to derive the complete meaning of sentences involving the distributive *po* is (37a) – another constructor in the lexical entry of *po*, here instantiated to (37b):

(37) **[po]**
a. $\lambda P.P : \forall F.\ [e(\uparrow) \multimap t(F)] \multimap [e((\uparrow \text{OBJ})) \multimap t(F)]$
b. $\lambda P.P : \forall F.\ [e(\boxed{3}) \multimap t(F)] \multimap [e(\boxed{4}) \multimap t(F)]$

The effect of this constructor is that any property that holds of the meaning of the *po*-phrase must instead hold of the DS within this *po*-phrase.[8]

Given the constructors **[Piotr]**, **[rose]**, **[girls]**, **[bought]** and the two constructors introduced by *po*, **[distr]** and **[po]**, the proof in Figure 1 is available. Unfortunately, there is another proof for this set of meaning constructors: **[Piotr]**, **[bought]** and **[girls]** may combine into the property (38). This property may subsequently combine with **[distr]** into (39) and further with the result of combining **[po]** and **[rose]** into (40):

(38) $\lambda Z.exists(Y, girl^s(Y) \wedge |Y| > 1, buy(p, Y, Z)) : e(\boxed{3}) \multimap t(\boxed{0})$

(39) $\lambda X.all(Z, |Z| = 1 \wedge Z \subset X,$
$exists(Y, girl^s(Y) \wedge |Y| > 1, buy(p, Y, Z))) : e(\boxed{3}) \multimap t(\boxed{0})$

(40) $exists(X, rose^s(X) \wedge |X| = 1,$
$all(Z, |Z| = 1 \wedge Z \subset X,$
$exists(Y, girl^s(Y) \wedge |Y| > 1, buy(p, Y, Z))) : t(\boxed{0})$

[7] In Polish, depending on information structure, NPs can be generally understood as indefinites, as approximated by (35), or as definites. We assume that two corresponding meaning constructors are optionally available for any noun (perhaps via a general template; cf. Asudeh et al. 2013). Moreover, information about set cardinality (e.g., $|X| > 1$ in (34)) should ideally be systematically related to grammatical number, pace Andrews 2007, and not just idiosyncratically stated in particular lexical entries.

[8] A much simpler way to achieve the same effect would be not to project a separate f-structure for *po*, but rather treat it as a non-semantic preposition. This would require reevaluating the morphosyntactic analysis of Przepiórkowski and Patejuk 2013 and, hence, it is left for future research.

$$\dfrac{\textbf{[Y : e(2)]}^1 \quad \dfrac{\textbf{[Piotr] [bought]}}{\lambda Y.\lambda Z.buy(p,Y,Z) : e(\boxed{2}) \multimap [e(\boxed{3}) \multimap t(\boxed{0})]}}{\lambda Z.buy(p,Y,Z) : e(\boxed{3}) \multimap t(\boxed{0})}$$

$$\dfrac{\dfrac{\textbf{[po] [rose]}}{\lambda S.exists(Z, rose^s(Z) \wedge |Z| = 1, S(Z)) : \forall H.[e(\boxed{3}) \multimap t(H)] \multimap t(H)} \qquad \lambda Z.buy(p,Y,Z) : e(\boxed{3}) \multimap t(\boxed{0})}{exists(Z, rose^s(Z) \wedge |Z| = 1, buy(p,Y,Z)) : t(\boxed{0})}$$

$$\dfrac{exists(Z, rose^s(Z) \wedge |Z| = 1, buy(p,Y,Z)) : t(\boxed{0})}{\lambda Y.exists(Z, rose^s(Z) \wedge |Z| = 1, buy(p,Y,Z)) : e(\boxed{2}) \multimap t(\boxed{0})}$$

$$\dfrac{\textbf{[distr]} \quad \lambda Y.exists(Z, rose^s(Z) \wedge |Z| = 1, buy(p,Y,Z)) : e(\boxed{2}) \multimap t(\boxed{0})}{\begin{array}{l}\lambda Y.all(X, |X| = 1 \wedge X \subset Y, \\ \quad exists(Z, rose^s(Z) \wedge |Z| = 1, buy(p,X,Z))) : \\ e(\boxed{2}) \multimap t(\boxed{0})\end{array}}$$

$$\dfrac{\textbf{[girls]} \quad \begin{array}{l}\lambda Y.all(X, |X| = 1 \wedge X \subset Y, \\ \quad exists(Z, rose^s(Z) \wedge |Z| = 1, buy(p,X,Z))) : \\ e(\boxed{2}) \multimap t(\boxed{0})\end{array}}{\begin{array}{l}exists(Y, girl^s(Y) \wedge |Y| > 1, \\ \quad all(X, |X| = 1 \wedge X \subset Y, \\ \qquad exists(Z, rose^s(Z) \wedge |Z| = 1, buy(p,X,Z)))) : t(\boxed{0})\end{array}}$$

Figure 1: Proof of the reading (26a) for sentence (25a)

This meaning representation may at best be interpreted as a convoluted way of writing down the collective reading of (25b) – a reading that (25a) does not have.

A way to exclude such undesired proofs is to guarantee that the meaning which **[distr]** combines with already contains the contribution of DS — this is so in the proof in Figure 1, but not in the proof just sketched, where the meaning of the DS *róży* 'rose' – instead of the intended DK *dziewczynom* 'girls' – would combine with the distributive property formed by **[distr]**. In Przepiórkowski 2014a this is achieved by *po* labelling the DS; this label is transferred in the proof until it is removed by **[distr]**, which may only combine with a meaning so labelled.

Technically, Przepiórkowski 2014a takes advantage of the possibility of introducing additional types, apart from the standard $e$ and $t$. Such an additional type, $t^d$, is to be understood as a "labelled" version of $t$ (although formally it is a new symbol, unrelated to $t$). Given this new type, two modifications are needed: a new meaning constructor for *po* which labels the DS – we will call this meaning constructor **[distr-I]** – and a modification to **[distr]** which expects such a label and removes it – we will call the so modified meaning constructor **[distr-E]**.

The version of **[distr-I]** given below ((42a) is the general version, (42b) – its instantiation in (30)) also incorporates the intended effect of **[po]**, namely that the meaning of the DS should be treated as the meaning of the whole *po*-phrase:

(41) **[distr-E]**
$\lambda S.\lambda Z.all(X, |X| = 1 \wedge X \subset Z, S(X))$ :
$\forall G, H.\ [e(G) \multimap t^d(H)] \multimap [e(G) \multimap t(H)]$

(42) **[distr-I]**

a. $\lambda \mathcal{Q}.\mathcal{Q}$ :
$\forall H. [[e((\uparrow \textsc{obj})) \multimap t(H)] \multimap t(H)] \multimap [[e(\uparrow) \multimap t(H)] \multimap t^d(H)]$

b. $\lambda \mathcal{Q}.\mathcal{Q}$ :
$\forall H. [[e(\boxed{4}) \multimap t(H)] \multimap t(H)] \multimap [[e(\boxed{3}) \multimap t(H)] \multimap t^d(H)]$

The way these new constructors are used in the proof of (26a) is demonstrated in Figure 2. On the other hand, the undesired proof sketched above is now ruled out: **[distr-E]** cannot combine with the result of composing the meanings of **[Piotr]**, **[bought]** and **[girls]** given in (38). This is because **[distr-E]** expects a glue formula of the form $e(G) \multimap t^d(H)$ and none of these three constructors contains anything of type $d$ – this type is introduced by **[distr-I]** applied to the meaning of the DS, i.e., to **[rose]**.

$$\frac{\dfrac{\textbf{[distr-I] [rose]}}{\lambda S.exists(Z, rose^s(Z) \wedge |Z| = 1, S(Z)) : \forall H.[e(\boxed{3}) \multimap t(H)] \multimap t^d(H)} \qquad \dfrac{[Y : e(\boxed{2})]^1 \quad \dfrac{\textbf{[Piotr] [bought]}}{\lambda Y.\lambda Z.buy(p, Y, Z) : e(\boxed{2}) \multimap [e(\boxed{3}) \multimap t(\boxed{0})]}}{\lambda Z.buy(p, Y, Z) : e(\boxed{3}) \multimap t(\boxed{0})}}{exists(Z, rose^s(Z) \wedge |Z| = 1, buy(p, Y, Z)) : t^d(\boxed{0})}$$

$$\frac{exists(Z, rose^s(Z) \wedge |Z| = 1, buy(p, Y, Z)) : t^d(\boxed{0})}{\lambda Y.exists(Z, rose^s(Z) \wedge |Z| = 1, buy(p, Y, Z)) : e(\boxed{2}) \multimap t^d(\boxed{0})}$$

$$\frac{\textbf{[distr-E]} \quad \lambda Y.exists(Z, rose^s(Z) \wedge |Z| = 1, buy(p, Y, Z)) : e(\boxed{2}) \multimap t^d(\boxed{0})}{\lambda Y.all(X, |X| = 1 \wedge X \subset Y, exists(Z, rose^s(Z) \wedge |Z| = 1, buy(p, X, Z))) : e(\boxed{2}) \multimap t(\boxed{0})}$$

$$\frac{\textbf{[girls]} \quad \lambda Y.all(X, |X| = 1 \wedge X \subset Y, exists(Z, rose^s(Z) \wedge |Z| = 1, buy(p, X, Z))) : e(\boxed{2}) \multimap t(\boxed{0})}{exists(Y, girl^s(Y) \wedge |Y| > 1, all(X, |X| = 1 \wedge X \subset Y, exists(Z, rose^s(Z) \wedge |Z| = 1, buy(p, X, Z)))) : t(\boxed{0})}$$

Figure 2: Proof of the reading (26a) for sentence (25a) using semantically constrained meaning constructors of *po*

## 4.2 Propositional Glue

Andrews 2010 argues – following an implementational idea of Lev 2007 – for further simplification of the underlying glue logic from the first order approach of Kokkonidis 2008[9] to propositional logic, where atomic formulae such as $e(\boxed{1})$ are treated as unanalysable propositional symbols. The obvious problem for this idea

[9]The "new glue" of Dalrymple et al. 1999 and Dalrymple 2001 may also be considered first order despite its second order looks: Kokkonidis 2008: 59 shows that "new glue" is equivalent to a certain subset of first order glue.

is universal quantification in glue formulae for quantifiers. Also the meaning constructor **[distr-E]** uses such quantification – more robustly than is usual in LFG literature, as one of the glue variables ($G$ in (41) and earlier in (29)) is $e$-typed.

Such quantification can, however, be avoided via the use of inside-out functional uncertainty (iofu) and local names (Dalrymple 2001: 143–148). For example, if GF is defined as in (43), the iofu assigned to the local name $\%F$ in (44) – when evaluated on any value of some grammatical function (or on the matrix f-structure) – specifies all such f-substructures within the whole matrix f-structure.[10]

(43) $\mathrm{GF} \equiv \{\textsc{subj}|\textsc{obj}|\textsc{obj}_\theta|\textsc{obl}|\textsc{xcomp}|\textsc{comp}|\textsc{adj}|\textsc{xadj}\} \in^*$

(44) $((\mathrm{GF}^* \uparrow)\ \mathrm{GF}^*) = \%F$

Similarly, the uninstantiated meaning constructors **[distr-E]** and **[distr-I]** given above in (41) and (42a) would be replaced by the following sequences of statements in the lexical entry of *po*:

(45) a. $((\mathrm{GF}^* \uparrow)\ \mathrm{GF}^*) = \%G$
b. $((\mathrm{GF}^* \uparrow)\ \mathrm{GF}^*) = \%H$
c. $\lambda S.\lambda Z.\mathit{all}(X, |X| = 1 \wedge X \subset Z, S(X)) :$
$[e(\%G) \multimap t^d(\%H)] \multimap [e(\%G) \multimap t(\%H)]$

(46) a. $((\mathrm{GF}^* \uparrow)\ \mathrm{GF}^*) = \%F$
b. $\lambda \mathcal{Q}.\mathcal{Q} :$
$[[e((\uparrow \textsc{obj})) \multimap t(\%F)] \multimap t(\%F)] \multimap [[e(\uparrow) \multimap t(\%F)] \multimap t^d(\%F)]$

These statements can be simplified by noticing that $\%H$ in (45) and $\%F$ in (46) point to the same f-structure, namely, to the f-structure which corresponds to the scope of the quantifier expressed by the DK (the matrix f-structure $\boxed{0}$ in the running example).[11] Hence, the semantic contributions of the distributive *po* may be jointly expressed as follows:

(47) a. $((\mathrm{GF}^* \uparrow)\ \mathrm{GF}^*) = \%G$
b. $((\mathrm{GF}^* \uparrow)\ \mathrm{GF}^*) = \%H$
c. $\lambda S.\lambda Z.\mathit{all}(X, |X| = 1 \wedge X \subset Z, S(X)) :$
$[e(\%G) \multimap t^d(\%H)] \multimap [e(\%G) \multimap t(\%H)]$
d. $\lambda \mathcal{Q}.\mathcal{Q} :$
$[[e((\uparrow \textsc{obj})) \multimap t(\%H)] \multimap t(\%H)] \multimap [[e(\uparrow) \multimap t(\%H)] \multimap t^d(\%H)]$

Note that specifications such as $e(\%G)$ are not that different from specifications such as $e((\uparrow \textsc{obj}))$; the difference is the number of their instantiations. While in the context of the f-structure (30) the latter instantiates deterministically to $e(\boxed{4})$, the former has five such possible instantiations: $e(\boxed{0}), \ldots, e(\boxed{4})$. This may be a practical problem for a naïve implementation of this idea, as lexical entries containing such meaning constructors become considerably ambiguous, but the proof space does not change, given sufficiently robust specifications of iofu paths. On the other hand,

[10] The slightly unusual $\in^*$ in (43) ensures that possibly nested coordinate structures are also properly traversed by this iofu.

[11] Slightly abusing the transformational terminology, we will call such scope-providing f-structures "landing sites" of the quantifier.

constraining such paths may provide a useful way of constraining glue analyses, as we will see in the next subsection.

## 4.3 Locality Constraints

Lev 2007: 77, 259 and Andrews 2010: 144 do not attempt to construct iofu paths which can instantiate to all possible f-structures (of relevant types), as in (44) above, but rather directly constrain such paths to f-structures containing a given one, as in (48) below, since only such f-structures are possible "landing sites" of quantifiers.

(48) $(\mathrm{GF}^{*}\uparrow) = \%F$

Andrews 2010: 144 mentions that, "[t]o give the idea some empirical bite, one would also want to see the iofu paths used to impose some constraints", but does not attempt to formulate such additional constraints. That is exactly what we will do in this subsection.

In §3, we saw that the *po*-phrase introducing the DS and the DK must belong to the same clause and that the DK should either be f-commanded (in a relaxed sense of the term) by or contained within the *po*-phrase introducing the DS. One more observation is needed to reformulate these constraints in simpler terms, namely, that the *po*-phrase is usually a direct dependent of the landing site of the quantifier expressed by the DK, i.e., a direct dependent of the f-structure specified by $\%H$ in (47). In a couple of very specific cases discussed in §3.3 – *po*-phrases within prepositional phrases and *po*-phrases in the domain of the lower verb in object-control constructions – there is one intervening f-structure. So, at the level of the *po*-phrase, the constraint on its functional position may be expressed as: $(\mathrm{GF}\ (\mathrm{GF})\uparrow) = \%H$. This should be constrained even further, as neither of the two GFs can be a COMP: being a kind of a prepositional or nominal phrase, the f-structure of the *po*-phrase cannot be a direct value of COMP, and in the case when there is an intervening f-structure, it must be the value of XCOMP (in object-control cases) or of some GF which allows f-structures of prepositional phrases as values (again, not a COMP). Hence, the constraint on the position of the f-structure for the *po*-phrase may be formulated as follows:

(49) $\mathrm{GF}_{\neg\mathrm{COMP}} \equiv \{\textsc{subj}|\textsc{obj}|\textsc{obj}_{\theta}|\textsc{obl}|\textsc{xcomp}|\textsc{adj}|\textsc{xadj}\} \in^{*}$

(50) $(\mathrm{GF}_{\neg\mathrm{COMP}}\ (\mathrm{GF}_{\neg\mathrm{COMP}})\uparrow) = \%H$

Let us now turn to the f-structure of the distributive key, represented by $\%G$ in (47). We saw that the path between the *po*-phrase and the DK must not contain COMP. When DK is not contained within the *po*-phrase, the path goes via the landing site of DK, so the part of the path between the landing site and the DK must also be COMP-free:[12]

(51) $(\%H\ \mathrm{GF}^{*}_{\neg\mathrm{COMP}}) = \%G$

[12] The COMP-freeness of the other part is already expressed by (50). Note also the use of the Kleene star instead of a plus in (51); the possibility of $\%H = \%G$ is crucial for the extension to events presented in §5.

Does this constraint also hold when DK is contained within the *po*-phrase? An attempt to construct examples minimally differing from the grammatical cases of "DK-within-DS" shows that this constraint also holds in such cases; compare (24) above with (52). The latter, if acceptable at all, does not have the meaning where people distribute over branches:[13]

(52) *Pojadą tam po dwie osoby, które zostały wytypowane przez placówki.
drive there DISTR two people which were.INF assigned by branches

Hence, (50)–(51), with $\mathrm{GF}_{\neg\mathrm{COMP}}$ defined in (49), seem to capture the basic locality generalisations between f-structures corresponding to the *po*-phrase introducing the DS, the DK, and the landing site of the DK. The final version of the relevant meaning constructors is given below:

(53) a. $(\mathrm{GF}_{\neg\mathrm{COMP}}\ (\mathrm{GF}_{\neg\mathrm{COMP}})\uparrow) = \%H$
b. $(\%H\ \mathrm{GF}^{*}_{\neg\mathrm{COMP}}) = \%G$
c. $\lambda S.\lambda Z.all(X, |X| = 1 \wedge X \subset Z, S(X)) :$
$[e(\%G) \multimap t^{d}(\%H)] \multimap [e(\%G) \multimap t(\%H)]$
d. $\lambda \mathcal{Q}.\mathcal{Q} :$
$[[e((\uparrow \textsc{obj})) \multimap t(\%H)] \multimap t(\%H)] \multimap [[e(\uparrow) \multimap t(\%H)] \multimap t^{d}(\%H)]$

Unfortunately, while these meaning constructors express valid linguistic constraints in Polish DD, and some of the spurious proofs are avoided, there are still multiple proofs available for sentences considered above, as verified by the Glue Logic theorem prover available at `http://xerxes.carleton.ca/~giorgolo/tp.html`. The matter of further constraints on the analysis is, however, left for future research.

## 5 Extension to Events

Moltmann 1991, 1997 and Zimmermann 2002 give multiple German examples of distribution over events; here, we will look at two corresponding examples in Polish, taken from Przepiórkowski 2014a, which does not provide an analysis of distribution of events:

(54) Piotr miał po dwa powody by chwalić i krytykować Marię.
Piotr had DISTR two reasons to praise and criticise Maria.
'Piotr had two reasons each to criticise and to praise Maria.'

(55) Papież zwiedzał po trzy kraje.
Pope visited DISTR three countries
'The Pope visited three countries each time.'

In (54), there are two events expressed by two coordinated verbs; the DS *dwa powody* 'two reasons' distributes over these events. In (55), the events constituting the DK are not given so explicitly; rather, the DS *trzy kraje* 'three countries' distributes over some contextually understood set of visiting events expressed by the single

[13] Again, perhaps this sentence can be made sense of on the interpretation where distribution is over some contextually given set of events expressed by the matrix verb.

verb *zwiedzał* ‘visited’. The meaning of this latter sentence seems to be: “for each (within some contextually given domain) event of the Pope visiting, he visited three countries”.

The extension of the current analysis to events is rather simple and mainly consists in reintroducing the standard event variable to the semantic representations of verbs. We assume the following lexical meaning constructor for *zwiedzał* ‘visited’:

(56) **[visited]**
$\lambda X.\lambda Y.\lambda E.visit(E, X, Y) : e((\uparrow \textsc{subj})) \multimap [e((\uparrow \textsc{obj})) \multimap [e(\uparrow) \multimap t(\uparrow)]]$

Just like nouns, verbs have an associated optional existential closure constructor associated with them (Asudeh 2012: 344):

(57) **[existential-v]**
$\lambda P.exists(E, event^s(E), P(E)) : [e(\uparrow) \multimap t(\uparrow)] \multimap t(\uparrow)$

Let us assume the following simplified f-structure for (55) and treat *Papież* ‘Pope’ as if it were a proper name:

(58)
$$\boxed{0}\left[\begin{array}{ll} \textsc{pred} & \text{‘}\textsc{visit}\langle\boxed{1},\boxed{2}\rangle\text{’} \\ \textsc{subj} & \boxed{1}\left[\begin{array}{ll}\textsc{pred} & \text{‘Pope’}\end{array}\right] \\ \textsc{obj} & \boxed{2}\left[\begin{array}{ll}\textsc{pred} & \text{‘}\textsc{po}\langle\boxed{3}\rangle\text{’} \\ \textsc{obj} & \boxed{3}\left[\begin{array}{ll}\textsc{spec} & \text{‘3’}\\ \textsc{pred} & \text{‘}\textsc{countries}\text{’}\end{array}\right]\end{array}\right]\end{array}\right]$$

Then the meaning constructor (56) instantiates to (59), and the meaning constructors for *Papież* ‘Pope’ and *trzy kraje* ‘3 countries’ are given below it.

(59) **[visited]**
$\lambda X.\lambda Y.\lambda E.visit(E, X, Y) : e(\boxed{1}) \multimap [e(\boxed{2}) \multimap [e(\boxed{0}) \multimap t(\boxed{0})]]$

(60) **[Pope]** $p : \boxed{1}$

(61) **[3-countries]**
$\lambda S.exists(X, |X| = 3 \wedge country^s(X), S(X)) : [e(\boxed{3}) \multimap t(\boxed{0})] \multimap t(\boxed{0})$

Two comments are due about **[3-countries]**. First, this meaning constructor results from the combination of the usual meaning constructor for a common noun such as *kraje* ‘countries’ and the meaning constructor of the existential cardinal quantifier *3* (see Przepiórkowski 2014a for examples of such quantifiers). Second, we assume that the local name used in such meaning constructors of quantifiers is defined as in Andrews 2010: 144: $(\text{GF}^* \uparrow) = \%H$, i.e., given (58): $(\text{GF}^* \boxed{3}) = \%H$. Hence, instantiating $(\text{GF}^* \boxed{3})$ to $(\textsc{obj obj}\ \boxed{3})$, $\%H$ may become $\boxed{0}$.

Additionally, we assume the following instantiations of the meaning constructors introduced in (53) by *po*:

(62) **[distr-E]**
$\lambda S.\lambda Z.all(X, |X| = 1 \wedge X \subset Z, S(X)) : [e(\boxed{0}) \multimap t^d(\boxed{0})] \multimap [e(\boxed{0}) \multimap t(\boxed{0})]$

(63) **[distr-I]**
$\lambda \mathcal{Q}.\mathcal{Q} : [[e(\boxed{3}) \multimap t(\boxed{0})] \multimap t(\boxed{0})] \multimap [[e(\boxed{2}) \multimap t(\boxed{0})] \multimap t^d(\boxed{0})]$

These instantiations are possible via the following mappings ($\mapsto$) of iofu specifications in (53a–b) into f-structures:

(64) a. $\%H = (\mathrm{GF}_{\neg\textsc{comp}}\ (\mathrm{GF}_{\neg\textsc{comp}})\ \boxed{2}) \mapsto (\textsc{obj}\ \boxed{2}) = \boxed{0}$

b. $\%G = (\%H\ \mathrm{GF}^{*}_{\neg\textsc{comp}}) \mapsto (\boxed{0}\ \mathrm{GF}^{*}_{\neg\textsc{comp}}) \mapsto \boxed{0}$

Note in particular that the f-structure of the DK, specified by $\%G$, is the same as the landing site, specified by $\%H$. This is because distribution is over events introduced by the verb which is also the only possible landing site of the quantifier. Given such instantiations, the complete proof of the intended meaning of (55) is given in Figure 3.

**[Pope] [visited]**

$$\lambda Y.\lambda E.visit(E,p,Y) : e(\boxed{2}) \multimap [e(\boxed{0}) \multimap t(\boxed{0})] \qquad [Y : e(\boxed{2})]^{1}$$

$$\lambda E.visit(E,p,Y) : e(\boxed{0}) \multimap t(\boxed{0}) \qquad [E : e(\boxed{0})]^{2}$$

$$visit(E,p,Y) : t(\boxed{0})$$

$$\lambda Y.visit(E,p,Y) : e(\boxed{2}) \multimap t(\boxed{0})$$

**[distr-I] [3-countries]**

$$\lambda S.exists(Z, country^{s}(Z) \wedge |Z| = 3, S(Z)) : [e(\boxed{2}) \multimap t(\boxed{0})] \multimap t^{d}(\boxed{0})$$

$$exists(Z, country^{s}(Z) \wedge |Z| = 3, visit(E,p,Z)) : t^{d}(\boxed{0})$$

$$\lambda E.exists(Z, country^{s}(Z) \wedge |Z| = 3, visit(E,p,Z)) : e(\boxed{0}) \multimap t^{d}(\boxed{0})$$

**[distr-E]**

$$\lambda E.all(X, |X| = 1 \wedge X \subset E, exists(Z, country^{s}(Z) \wedge |Z| = 3, visit(X,p,Z)) : e(\boxed{0}) \multimap t(\boxed{0})$$

**[existential-v]**

$$exists(E, event^{s}(E), all(X, |X| = 1 \wedge X \subset E, exists(Z, country^{s}(Z) \wedge |Z| = 3, visit(X,p,Z)))) : t(\boxed{0})$$

Figure 3: Proof for sentence (55)

# 6 Conclusion

The empirical contribution of this paper lies in the investigation of locality constraints on distance distributivity in Polish. They turn out to be broadly similar to those in other languages discussed in the DD literature, with facts crucially extending the known generalisations already discussed in Przepiórkowski 2014a,b. The proposed analysis may, however, be interesting for the glue audience, as it is couched in propositional glue and takes advantage of its strengths. Some of them are inherited from first order glue: the possibility of defining various types without the need to extend the underlying logic and quantification (here, via iofu definitions of local names) over types different than $t$. Another – important for the current analysis – is inherent to propositional glue: the possibility of encoding f-structure locality constraints within specifications of propositional symbols. We hope that – by decoupling the use of propositional glue from implementational issues (Lev 2007) or proof nets (Andrews 2010) – this account will encourage other researchers to have a closer look at this variant of glue.

## References


Andrews, Avery D. 2007. Input and Glue in OT-LFG. In Annie Zaenen, Jane Simpson, Tracy Holloway King, Jane Grimshaw, Joan Maling and Chris Manning (eds.), *Architectures, Rules, and Preferences: Variations on Themes by Joan W. Bresnan*, pages 319–340, Stanford, CA: CSLI Publications.

Andrews, Avery D. 2010. Propositional Glue and the Correspondence Architecture of LFG. *Linguistics and Philosophy* 33(3), 141–170.

Asudeh, Ash. 2012. *The Logic of Pronominal Resumption*. Oxford: Oxford University Press.

Asudeh, Ash, Dalrymple, Mary and Toivonen, Ida. 2013. Constructions with Lexical Integrity. *Journal of Language Modelling* 1(1), 1–54.

Choe, Jae-Woong. 1987. *Anti-quantifiers and a Theory of Distributivity*. Ph. D. dissertation, University of Massachusetts, Amherst.

Dalrymple, Mary. 2001. *Lexical Functional Grammar*. San Diego, CA: Academic Press.

Dalrymple, Mary, Gupta, Vineet, Lamping, John and Saraswat, Vijay. 1999. Relating Resource-based Semantics to Categorial Semantics. In Mary Dalrymple (ed.), *Semantics and Syntax in Lexical Functional Grammar: The Resource Logic Approach*, pages 261–280, Cambridge, MA: The MIT Press.

Dotlačil, Jakub. 2012. Binominal *each* as an Anaphoric Determiner: Compositional Analysis. In Ana Aguilar Guevara, Anna Chernilovskaya and Rick Nouwen (eds.), *Proceedings of Sinn und Bedeutung 16: Volume 1*, volume 16 of *MIT Working Papers in Linguistics*, pages 211–224.

Franks, Steven. 1995. *Parameters of Slavic Morphosyntax*. New York: Oxford University Press.

Heim, Irene and Kratzer, Angelika. 1998. *Semantics in Generative Grammar*. Blackwell Textbooks in Linguistics, Malden, MA: Blackwell.

Kokkonidis, Miltiadis. 2008. First-Order Glue. *Journal of Logic, Language and Information* 17(1), 43–68.

Lev, Iddo. 2007. *Packed Computation of Exact Meaning Representations*. Ph. D. dissertation, Stanford University.

Łojasiewicz, Anna. 1979. O budowie wyrażeń z przyimkiem *po* dystrybutywnym. *Polonica* V, 153–160.

May, Robert. 1985. *Logical Form: Its Structure and Derivation*, volume 12 of *Linguistic Inquiry Monographs*. Cambridge, MA: The MIT Press.

Moltmann, Friederike. 1991. On the syntax and semantics of binary distributive quantifiers. In *Proceedings of the North East Linguistic Society (NELS), Vol. 22*, pages 279–292.

Moltmann, Friederike. 1997. *Parts and Wholes in Semantics*. Oxford: Oxford University Press.

Przepiórkowski, Adam. 1999. *Case Assignment and the Complement-Adjunct Dichotomy: A Non-Configurational Constraint-Based Approach*. Ph. D. dissertation, Universität Tübingen, Tübingen.

Przepiórkowski, Adam. 2004. On Case Transmission in Polish Control and Raising Constructions. *Poznań Studies in Contemporary Linguistics* 39, 103–123.

Przepiórkowski, Adam. 2014a. Distance Distributivity in Polish: Towards a Glue Semantics Approach, accepted to *Empirical Issues in Syntax and Semantics 10* (CSSP 2013 Proceedings).

Przepiórkowski, Adam. 2014b. A Weakly Compositional Analysis of Distance Distributivity in Polish, submitted to *Formal Approaches to Slavic Linguistics 23 Proceedings*.

Przepiórkowski, Adam and Patejuk, Agnieszka. 2013. The Syntax of Distance Distributivity in Polish: Weak Heads in LFG via Restriction. In Miriam Butt and Tracy Holloway King (eds.), *The Proceedings of the LFG'13 Conference*, pages 482–502, Stanford, CA: CSLI Publications.

Przepiórkowski, Adam, Bańko, Mirosław, Górski, Rafał L., Lewandowska-Tomaszczyk, Barbara, Łaziński, Marek and Pęzik, Piotr. 2011. National Corpus of Polish. In Zygmunt Vetulani (ed.), *Proceedings of the 5th Language & Technology Conference: Human Language Technologies as a Challenge for Computer Science and Linguistics*, pages 259–263, Poznań, Poland.

Przepiórkowski, Adam, Bańko, Mirosław, Górski, Rafał L. and Lewandowska-Tomaszczyk, Barbara (eds.). 2012. *Narodowy Korpus Języka Polskiego*. Warsaw: Wydawnictwo Naukowe PWN.

Safir, Ken and Stowell, Tim. 1988. Binominal *each*. In *Proceedings of the North East Linguistic Society (NELS), Vol. 18*, pages 426–450.

Zimmermann, Malte. 2002. *'Boys buying two sausages* each*' – On the Syntax and Semantics of Distance Distributivity*. Ph. D. dissertation, Universiteit van Amsterdam.

# AN LFG ACCOUNT OF THE COMPOUND PARTICLE *TOIUNO* IN SPONTANEOUS JAPANESE

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**Abstract**

Compound particles are an integrated unit of words that serves as a particle. This paper reveals novel characteristics of *toiuno* based on the Corpus of Spontaneous Japanese. In particular, (i) the selectional restriction on the compound particle *toiuno* is much more flexible than the composed counterpart *to-iu-no*, and (ii) the compound particle *toiuno* exhibits the ambivalence regarding the "head" and the "bound" status. These structural properties are naturally handled in LFG, with special reference to the DOM(INANT) attribute in line with Falk (2001).

# 1 Introduction[1]

"Compound particles" (複合辞) have recently been extensively explored in Japanese linguistics (Fujita & Yamazaki 2006). This paper contributes to this growing body of research by presenting novel data of the compound particle *toiuno* based on a dialogue corpus and also by developing a formal account within the framework of Lexical-Functional Grammar (LFG).

Section 2 clarifies the notion "compound particle" and gives a preliminary characterisation of the compound particle *toiuno*. The following two sections, Sections 3 and 4, draw novel observations regarding structural/interpretive aspects of *toiuno* based on the Corpus of Spontaneous Japanese, setting out two syntactic puzzles: (i) the "flexibility" issue and (ii) the "ambivalence" issue. These puzzles are formally addressed in Section 5 within LFG, with special reference to the DOM attribute (Falk 2001). Finally, the main results of the paper are summarised in Section 6.

# 2 The Compound Particle *Toiuno*

A unique feature of Japanese is that it exhibits a great number of compound particles. A compound particle is an integrated cluster of words which, as a whole, behaves as a particle and has its own meaning/function irreducible to the semantic compositions of each item (Matsuki 1990: 35). As admitted in Matsuki (1990: 49), this definition is vague in some respects; in fact, it is not fully obvious how compound particles are clearly differentiated from idioms

[1] This article benefitted from the discussions with David Cram, Mary Dalrymple, Stephen Horn, Jieun Kiaer, Tomokazu Takehisa, Misato Tokunaga, and especially, Anna Kibort and Louise Mycock. I'm also grateful for constructive suggestions made at the 11th SE-LFG Meeting (18/05/2013, SOAS) and the LFG Conference 2014 (18/07/2014, University of Michigan). Finally, I'd like to thank the LFG Proceedings reviewers for their valuable comments and suggestions.

and constructions. Nevertheless, it offers a good starting point of explicating the notion of compound particles (Fujita 2006).

Compared with other verbs in Japanese, *iu* 'say' is exceptional in that it has given rise to a huge number of compound particles (Sunakawa 2006a), bringing about extensive research (Kim 1989, Masuoka 2012, Matsuki 1990, 2006, Nakahata 1990, Oshima 2010, Sunakawa 2006a, 2006b, Takahashi 1994, Takahashi 1996, Terakura 1983). A specific example of a compound particle that involves the verb *iu* is *toiuno*, as illustrated in (1).[2]

| | | | |
|---|---|---|---|
| (1) | *Tom-wa* | [*guaba* ***toiuno***]-*o* | *tabeta* |
| | Tom-TOP | [guava TOIUNO]-ACC | ate |

'Tom ate the thing called guava.'

In (1), *toiuno* may be interpreted as 'the thing called,' as in 'the thing called guava,' though this may not be appropriate for other instances of *toiuno*. In this paper, *toiuno* is simply glossed as TOIUNO because the main focus of our investigation is its syntactic aspects.

The compound particle *toiuno* is literally formed by a combination of three words: the complmentiser *to*, the verb *iu* 'say,' and the nominaliser *no*. The linearly ordered three words may form the composed counterpart *to-iu-no*, as in (2). This counterpart of the compound particle *toiuno* is called the *no*-nominalisation *to-iu-no*.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (2) | [[*kare-ga* | *baka* | *da* | ***to***] | ***iu*** | ***no***]-*wa* | *hidoi* |
| | [[he-NOM | stupid | COP | COMP] | say | NO]-TOP | mean |

'Saying that he is stupid is mean.'

The complementiser *to* marks clause-embedding, and the embedded clause is selected as a complement by the verb *iu*, and it is finally nominalised by the particle *no*. That is to say, the nominaliser *no* turns the preceding clause *kare-ga bakada to iu* into a nominal that denotes the action 'to say that he is stupid.' Despite this decomposition in (2), native speakers of Japanese would feel that *toiuno* in (1) constitutes a fixed expression and that the whole complex *toiuno* functions as a particle, where the meaning of the verb *iu* 'say' is bleached. This intuition is orthographically reflected: the compound particle *toiuno* is notated in "hiragana" characters (というの), whereas the *no*-nominalisation *to-iu-no* is often written in "kanji" characters (と言うの). This orthographical distinction is also attested in a corpus used for my research (see Section 3). Further, they are also distinguished in terms of prosody, though intonation cues were not used in my current corpus work.

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[2] In the literature, *toiu* is recognised as a compound particle, but there is no consensus as to whether *toiuno* is a compound particle. Section 3.2 presents the data indicating that *toiuno* is a compound particle. See also footnotes 5 and 6.

In the literature on *toiuno* and compound particles in general, a principal research aim has been to detect the meaning/function of *toiuno* in discourse. In the literature on the nominaliser *no* (Kamio 1983, Kitagawa & Ross 1982, Kuno 1973, Kuroda 1992, Makino 1968, McGloin 1985, Oshima 2010, Seraku 2013), a main research topic has been the syntactic/semantic aspects of *no*. Thus, while there is a wealth of previous studies on each of *toiuno* and *no*-nominalisation, the relation between them has not been seriously explored, though the two seem to be intuitively distinct, as reflected in orthographies and intonations. The next section attempts to establish the status of *toiuno* as a compound particle by revealing unique properties of *toiuno* that are not shared by the *no*-nominalisation *to-iu-no*.

## 3 The Flexibility of *Toiuno*

This section presents the corpus-aided observations that the compound particle *toiuno* significantly differs from the *no*-nominalisation *to-iu-no*. I collected the naturally-occurring data of *toiuno* by using the CSJ (Corpus of Spontaneous Japanese, 2$^{nd}$ edn.) (National Institute for Japanese Language and Linguistics, 2008). The CSJ is a digitalised collection of spontaneous Japanese strings of 7.52 million words (amounting to 660 hours). More than 90 % of the data are "monologue" (e.g., academic presentation speech), and the rest is "dialogue" (e.g., free conversation) or "recitation."

For a concordancer, I utilised Himawari, ver. 1.3 (National Institute for Japanese Language and Linguistics, 2011). I searched the CSJ for the string *no-wa* in Hiragana characters (のは), where *wa* is a topic marker. A reason for specifying the string as *no-wa* (rather than *toiuno*) is practical in that the data collection was part of my larger project for extracting "cleft sentences," which involve the succession *no-wa*, from the corpus (Seraku 2013). I obtained 2,734 sentences containing the string *no-wa*, and I manually picked up the ones with *toiuno-wa* by resorting to the orthogonal distinction (というの for *toiuno* vs. と言うの for *to-iu-no*). The number of sentences with *toiuno-wa* was 1,656, as summarised in the table below:

| | OCCURENCES | PERCENTAGE |
|---|---|---|
| *no-wa* | 2,734 | 100% |
| *toiuno-wa* | 1,656 | 60.57% |

Table 1. The distribution of *toiuno-wa* over *no-wa* strings

Although the reason for specifying the string as *no-wa* is a practical one, it brings two advantages. First, in *no-wa*, what precedes *no* is underspecified and it allows phonological variants of *toiuno* to be hit, as in (3).

(3) *tteiuno*, *tteeno, teno, ttsuuno*, *cchyuuno*, …

These variants are included in the 1,656 examples. Second, the specification of the string as *no-wa* allows the expression *toiunowa* to be hit, for more on which see Section 4 below.

Due to the specification *no-wa*, the data exclude examples of *toiuno* with particles other than *wa* in (4), where *ga* is a nominative case particle, *o* is an accusative case particle, *ni* is a dative case particle, etc.

(4) *toiuno-ga*, *toiuno-o*, *toiuno-ni*, …

The exclusion of the expressions in (4) is not necessarily undesirable. Firstly, it is claimed that *toiuno-wa* behaves differently from the related phrases such as *toiuno-ga* (Masuoka 2012). Secondly, the sample size of 1,656 instances is large enough to shed light on interesting differences between the compound particle *toiuno* and the *no*-nominalisation *to-iu-no*, as will be shown below.

In what follows, four characteristics of the compound particle *toiuno* will be elucidated which are not shared by the *no*-nominalisation *to-iu-no*. These data lend support to the claim that *toiuno* constitutes a complex expression, distinct from the *no*-nominalisation *to-iu-no*. What is of special note for our purposes is that, as will be stated in Section 3.3, the compound particle *toiuno* allows a wider range of phrases to precede it than the *no*-nominalisation *to-iu-no*. This structural property is called the "flexibility" feature of *toiuno*.

### 3.1 Re-interpretation

Once again, consider the example (1), reproduced here as (5).

| | | | | |
|---|---|---|---|---|
| (5) | *Tom-wa* | [*guaba* ***toiuno***]-*o* | *tabeta* |
| | Tom-TOP | [guava TOIUNO]-ACC | ate |
| | 'Tom ate the thing called guava.' | | |

It is possible to re-interpret (5) as an instance of the *no*-nominalisation *to-iu-no*. The interpretation in (6) is not completely identical to the one in (5), but one might take this as counterevidence for our claim that *toiuno* is irreducible to the *no*-nominalisation *to-iu-no*.

| | | | | | | |
|---|---|---|---|---|---|---|
| (6) | *Tom-wa* | [*guaba* | ***to*** | ***iu*** | ***no***]-*o* | *tabeta* |
| | Tom-TOP | [guava | COMP | say | NO]-ACC | ate |
| | 'Tom ate what they call guava.' | | | | | |

Yet, the CSJ is full of examples where such re-interpretations are not valid. To take (7) as an example, it is possible to re-interpret *toiuno* as *to-iu-no*, but the resulting interpretation (8) differs drastically from the original one in (7).

| | | | | | |
|---|---|---|---|---|---|
| (7) | [*kanzenni* | *haishi* | ***toiuno***]*-wa* | *muri* | *nano-de…* |
| | [completely | abolish | TOIUNO]-TOP | impossible | COP-because |

‘Because abolishing it completely is impossible, ….’ (S00F0099)[3]

(8) ‘Because saying “Completely abolish it” is impossible, …’

These data show that the compound particle *toiuno* cannot be equated with the *no*-nominalisation *to-iu-no*.

One may object that the above data just show that *to* and *iu* in *toiuno* form a complex, but excluding *no*; that is, it is still possible to claim that there is no compound particle *toiuno* but it merely consists of the complex part *toiu* and a pronominal *no*. There are two grounds for this objection. First, *toiuno* in (7) may be contextually interpreted as, say, *toiu-keikaku* by replacing the seemingly pronominal *no* with the concrete noun *keikaku* ‘plan.’ The interpretation would be “A plan like abolishing it completely is impossible,” which is close, if not identical, to the interpretation in (7). Second, there are many cases where *toiu* follows a concrete noun, as illustrated in (9).

| | | | |
|---|---|---|---|
| (9) | [*kodomo-e-no* | *kokugo-kyooikusya* | ***toiu*** |
| | [child-to-GEN | national.language-educationalist | TOIU |
| | *gensetsu*]*-ga* | *miraremasu* | |
| | statement]-NOM | be.seen | |

‘We can see statements like “national language educationalists for children”.’ (A02F0148)

It is plausible to assume that there is a sequence “the compound particle *toiu* plus the pronominal *no*.” It seems, however, that not all of the cases can be analysed in this way; the next subsection shows there are examples where *no* is indeed an integral element of the compound particle *toiuno*.

### 3.2 Connotation

As pointed out in Kuroda (1992) among many others, when the nominaliser *no* denotes a human, the string is not compatible with polite expressions. This is because in these cases, *no* yields a derogatory-related connotation.[4]

| | | | | |
|---|---|---|---|---|
| (10) | ?[*se-ga* | *takai* | ***no***]*-ga* | *irassyatta* |
| | [height-NOM | tall | NO]-NOM | came.POLITE |

‘A tall person came.’

---

[3] If an example is drawn from the CSJ, the ID is presented at the end of each example. In citing examples, irrelevant parts (e.g., meta-linguistic annotation) were suppressed. Further, phonological variants of *toiuno* (see (3)) are also expressed as *toiuno*.

[4] Seraku (2013: Ch. 4) notes that the type of connotation is context-dependent; in some situations, it may be an affectionate familiarity to an individual denoted.

In (10), the *no*-headed part denotes a human, and, as expected, the string with the polite expression *irassyatta* is not felicitous due to a confliction between the politeness encoded in *irassyatta* and the derogatory-related connotation implied through the use of *no*.

Interestingly, the CSJ contains cases of *toiuno* where a human is denoted without such connotations being detected (see also Niwa 1993: endnote 2).

(11) [*saigomade* *yarinuita* ***kata*** ***toiuno***]-*wa*
[until.the.end have.completed person.POLITE TOIUNO]-TOP
[[*imademo* *jibun-no* *senmonno* *shigoto-o* *motte*
[[even.now self-GEN specialised work-ACC have
*ganbatteyatteru*] *kata*]-*ga* *ooi*
work.hard.POLITE] person.POLITE]-NOM abundant
'As for those who have completed their work, most of them pursue their specialised works even now.' (S05F0463)

(12) [*nihon-jin* *nihon-bunka-ron* *nanteiu* *koto*]-*o*
[Japanese-people Japanese-culture-study such.as thing]-ACC
*kataru-sai-ni-wa* *yahari* [*Kawai.Hayao*-***san*** ***toiuno***]-*wa*
talk-time-at-TOP definitely [Kawai.Hayao-Mr.POLITE TOIUNO]-TOP
*hazusenai-kata* *toiuhuuni* *iwareru* *guraino-kata* *nandesu*
important-person like be.said like-person.POLITE COP
'When we talk about things such as the study of Japanese people or Japanese culture, Mr. Hayao Kawai is definitely considered to be an essential person for such discussion.' (S00M0004)

In (11), the politeness marker *kata* is used, but the sentence is acceptable; in a similar vein, (12) has the politeness marker *san*, but the sentence is felicitous. If there were derogatory-related connotations, the strings would be unnatural. So, it is reasonable to hold that *toiuno* constitutes a compound particle, where the nominaliser *no*, a locus of connotation, is not recognised as a separate word as in *to-iu-no* or *toiu-no*.[5]

[5] As pointed out by an annonymous reviewer, one could view *toiuno* as a contraction of *toiu mono*, where *mono* refers to an entity in general. This is plausible for some cases of *toiuno* like (5), but it is not obvious whether it accounts for the full spectrum of my corpus data. First, as will be mentioned in the next subsection, *toiuno* may be preceded by an embedded question or a demonstrative, whereas *toiu mono* cannot be normally preceded by these elements. Second, *mono* refers to an entity (rather than an abstract concept or a thing, which is referred to by, e.g., the noun *koto*), whereas the *toiuno*-complex could refer to an abstract concept such as a query in the case of embedded questions (see (14)). Thus, while the contraction analysis is plausible for some cases, I contend that there also exists the compound particle *toiuno*.

### 3.3 Pre-*toiuno* Phrases

This subsection points out that the category of what precedes the compound particle *toiuno* is much wider than the category of what precedes the *no*-nominalisation *to-iu-no*.

Firstly, *iu* 'say' in *to-iu-no* is a verb which cannot select an embedded question as an argument. Thus, (13) is not acceptable unless the embedded part is understood to be a direct quotation.

| (13) | **Bill-wa* | [*Mary-ga* | *mujitsu* | *ka* | ***to*** | ***iu*** | ***no***]-*o* | *kii-ta* |
|---|---|---|---|---|---|---|---|---|
| | Bill-TOP | [Mary-NOM | innocent | Q | COMP | say | NO]-ACC | hear-PAST |

Int. 'Bill heard that someone asks whether Mary is innocent.'

This restriction does not hold of the compound particle *toiuno*. As shown in (14), *toiuno* follows an embedded question even if the embedded part is not a quotation. Out of 1,656 cases of the compound particle *toiuno* (see Table 1), *toiuno* follows an embedded question in 65 examples.

| (14) | [*sore-ga* | *jibun-nitotte* | *kooka-ga-a-tta* | *nokadouka* |
|---|---|---|---|---|
| | [that-NOM | self-for | effect-NOM-exist-PAST | whether |
| | ***toiuno***]-*wa* | *gimon* | *nandesu* | |
| | TOIUNO]-TOP | question | COP | |

'It is questionable whether it was effective for me.' (S00M0065)

Secondly, two cases are found where *toiuno* follows a demonstrative.

| (15) | [*sore* | ***toiuno***]-*wa* | [*oto-o* | *kikiwakeru* |
|---|---|---|---|---|
| | [that | TOIUNO]-TOP | [sound-ACC | listen.distinguish |
| | *kontororu*]-*ga* | *dekite-nai* | | |
| | control]-NOM | possible-NEG | | |

'As for that, it cannot distinguish sounds while listening to them.' (S00M0053)

| (16) | [*sore* | ***toiuno***]-*wa* | [*tobira-no* | *nai* | *toire*] | *nandesu* |
|---|---|---|---|---|---|---|
| | [that | TOIUNO]-TOP | [door-GEN | non-existent | toilet] | COP |

'As for that, it is a toilet without a door.' (S05F1600)

This contrasts with the *no*-nominalisation *to-iu-no*. In (17), *to-iu-no* cannot be preceded by a demonstrative unless the embedded part is a quotation; this is expected since *to* is a sentential complementiser.

| (17) | **Tom-wa* | [*Mary-ga* | [*sore* | ***to***] | ***iu*** | ***no***]-*o* | *kii-ta* |
|---|---|---|---|---|---|---|---|
| | Tom-TOP | [Mary-NOM | [that | COMP] | say | NO]-ACC | hear-PAST |

Int. 'Tom hears that Mary said that.'

To sum up, the compound particle *toiuno* is more flexible with respect to the types of element that may precede it than the *no*-nominalisation *to-iu-no*. This discrepancy corroborates our claim that the compound particle *toiuno* is irreducible to the *no*-nominalisation *to-iu-no*, as well as posing a challenge of how this flexiblity is to be structurally characterised.

### 3.4 Form of the Compound Particle

The CSJ does not have any examples of *toiuno* where the verb *iu* is negated. In addition, there are no examples of *toiuno* where a subject of *iu* is expressed. In fact, if we negate *iu* or if we express a subject of *iu* in any examples of *toiuno* cited in this paper, they are no longer regarded as cases of compound particles. These results are consistent with our claim that *toiuno* forms a unit which is not reduced to the *no*-nominalisation *to-iu-no*.

Nevertheless, there are some (at least, seemingly) problematic examples. First, the CSJ contains instances of *toittano*, where *itta* is in past tense form of the verb *iu* 'say.' If *toiuno* is a complex unit, *iu* in *toiuno* should not be conjugated. In the case of *toittano*, however, it does not express a past tense; even if *toittano* in (18) is replaced with *toiuno*, it does not change the tense of the clause (see also Matsuki 1990: 51).

(18) [*nenreesoo* *gotono* *wasya-no-tokutyoo*
[age depending.on speaker-of-characteristics
***toittano***]-*wa* *donoyouna* *mono* *dearu* *ka*
TOITTANO]-TOP how thing COP Q
'What are the characteristics of speakers, depending on their age?'
(A01M0115)

The suffix *ta* may be used for other purposes than the past-tense marker (see Tsujimura 2007 for a summary). Consider the following examples:

(19) [Context: The speaker sees the princess approaching him/her.]
*hime-ga* *ki-**ta***
princess-NOM came-IFS
'The princess is here!'

(20) *kyou-wa* [*Tom-ga* *kuru* *hi*] *da-**tta*** *na*
today-TOP [T-NOM came day] COP-RS SFP
'(I recall that) today is the day when Tom comes, isn't it?'

(21) *saa,* *ka-**tta*** *ka-**tta***
come.on buy-COM buy-COM
'Come on, buy this!'

In (19), the suffix *ta* is used to denote an “immediate future state.” In (20), what is denoted is a “recalled state.” In (21), *ta* specifies the speech act of the sentence as a “command.” Clearly, all of these functions are irrelevant to the *toittano* example in (18). I shall assume that *toittano* is a compound particle distinct from *toiuno*; that is, the language user knows two distinct compound particles *toiuno* and *toittano* (though they may be related diachronically and functionally). There seem to be slight meaning differences between clauses with *toiuno* and those with *toittano*, but they are too subtle to be explicated within the limit of the present paper.

Next, as shown in (22), the CSJ contains examples in which *moushimasu*, which is a polite form of *iu*, appears in the sequence of *toiuno*.

(22)

| | | | |
|---|---|---|---|
| [*suiron* | ***tomoushimasuno***]-*wa* | *zentei-kara* | |
| [inference | TOMOUSHIMASUNO]-TOP | premise-from | |
| *ketsuron-o* | *michibikidasu* | *shikouyousiki* | *da* |
| conclusion-ACC | derive | style.of.thought | COP |

‘Inference is a style of thought that derives a conclusion from premises.’ (A02F0082)

But it seems to me that *suiron tomoushimasuno* is interpreted as “what I (humbly) call inference.” Further, in the CSJ, *moushimasu* is notated with the “kanji” characters (と申しますの), as in the case of the *no*-nominalisation *to-iu-no* (と言うの). Thus, this may be yet another case of *no*-nominalisation.

A more problematic example is (23). The CSJ contains a single example where the particle *ka* is inserted into *toiuno-wa*, as in *tokaiuno-wa*.

(23)

| | | | |
|---|---|---|---|
| [*taiguu* | ***tokaiuno***]-*wa* | *kesshite* | *kotoba-dake-de* |
| [treatment | TOKAIUNO]-TOP | at.all | language-only-by |
| *jitsugenshiteru* | *wakejyanai* | | |
| is.realised | not.the.case | | |

‘It is not the case at all that treatments are realised only by the language.’ (A13M0979)

This example may support Matsuki’s (1990: 37) idea that there is a degree of status as a compound particle: other things being equal, X is more like a compound particle than Y if the predicate part of X loses more properties of the predicate (e.g., conjugation) than that of Y. Even the data (18) and (22) may be treated in this fashion, but I shall leave this issue for future work.

### 3.5 Summary

The CSJ data shed light on the unique features of *toiuno* that are not attested in the *no*-nominalisation *to-iu-no*. It is concluded that *toiuno* is a fixed unit that cannot be reduced to a mere composition of *to*, *iu*, and *no*.[6] In particular, what is fruitful for building an account of *toiuno* is that *toiuno* is "flexible" in that it may be preceded by a range of elements such as nouns, demonstratives, declarative clauses, and embedded questions. In the next section, another structural feature of *toiuno* will be surveyed: the "ambivalence" of *toiuno*.

## 4 The Ambivalence of *Toiuno*

The native speakers would have the intuition that *toiuno* is a head of a phrase. This intuition is reflected by the translation in (1); what is denoted from the speaker's perspective is not a guava but a thing called guava. The head status of *toiuno* also conforms to the head-finality of Japanese. Further, if *toiuno* is a head, the following ambiguity will be anticipated:

(24) [adjective [noun [$_{\text{HEAD}}$ ***toiuno***]]]

(25) [[adjective noun] [$_{\text{HEAD}}$ ***toiuno***]]

This two-way structuring manifests itself in (26), where the a-interpretation corresponds to the structure (24), and the b-interpretation to the structure (25).

(26) *midoriirooshita guaba* ***toiuno***
green.coloured guava TOIUNO
a. 'the green-coloured thing called guava' (normally acceptable)
b. 'the thing called green-coloured guava' (requires a special context)

The acceptability patterns of these readings are explained if we assume that *toiuno* is a head of the *toiuno*-phrase, together with our world knowledge that the usual colour of guavas is green. The a-interpretation is felicitous, e.g., in a context where the speaker identifies guavas by mentioning their usual colour. The b-interpretation is normally infelicitous because it implies that there are non-green-coloured guavas. On these grounds, it is reasonable to assume that *toiuno* is a head that selects a preceding element as a complement.

At the same time, there are also pieces of evidence which suggest that the compound particle *toiuno* is not a head but rather a bound-morpheme. The

[6] This does not deny a diachronic relation between *toiuno* and *to-iu-no*. According to Matsuki (2006: 207), (i) an essential process at the initial stage of compound-particle formation is "generalisation" (e.g., a verb loses selectional restrictions and a wider variety of items could be an argument), and (ii) what matters at a later stage is "subjectification" (e.g., a verb gains a discourse-oriented/inter-personal function). The "generalisation" is clearly seen in *toiuno*, and, as will be examined in Section 4, the "subjectification" is seen in *toiunowa*. It would then be reasonable to assume the diachronic path: *to-iu-no* > *toiuno* > *toiunowa*.

first piece of evidence is concerned with the obligatory presence of a *toiuno*-preceding element. The last section observed that *toiuno* allows a variety of elements to precede it. In fact, *toiuno* does not even have to follow anything as long as it is suffixed by the topic marker *wa*. There are 40 sentence-initial cases out of 2,734 strings with the string *no-wa* (see Table 1).

(27) ***toiunowa*** *watashi-wa* *syoogakkoo-jidai-ni* *titioya-no*
TOIUNOWA I-TOP primary.school-period-at father-GEN
*tenkin-de* *firipin-ni* *sundemashita*
job.relocation-at Philippine-in lived
'That is to say, when I was a primary student, I lived in Philippine due to my father's job relocation.' (S01F0217)

In this case, however, there is no sense of thematic/contrastive topic despite the presence of the topic marker *wa*. It then seems that *wa* is incorporated into *toiuno* and that the whole complex *toiunowa* forms another compound particle, distinct from *toiuno-wa*. Notably, *toiunowa* has a distinct function that is not shared by *toiuno-wa*: it serves as a discourse marker as shown in the translation 'that is to say' (see also footnote 6). As a further confirmation, consider (28). If *toiunowa* is a discourse marker, its position over a sentence is restricted to, e.g., a sentence-initial position. For instance, it is expected that *toiunowa* cannot be licensed at an argument position of a predicate. This expectation is borne out in (28).

(28) **Tom-wa* ***toiunowa*** *tabeta*
Tom-TOP TOIUNOWA ate
Int. 'Tom ate something (or a contextually salient entity).'

Therefore, assuming that *toiunowa* constitutes a distinct compound particle as a discourse marker, there is a morpho-syntactic restriction on the compound particle *toiuno*: *toiuno* cannot stand on its own and requires some element (whose syntactic category is quite flexible; see Section 3.3) to precede it.

Second, the fact that the *toiuno*-complex is case-marked (see (4)) suggests that the complex is an NP (see Section 5.3 for details). A subject NP in Japanese is usually marked with the nominative case particle *ga*, but a subject in a nominal-modifying clause may be marked with the genitive case particle *no*, a phenomenon called the "Nominative-Genitive Conversion" (Harada 1971). If the pre-*toiuno* part were a complement selected by the NP head *toiuno*, we would expect that when the pre-*toiuno* part is a clause, a subject NP in this nominal-modifying clause may be marked with the genitive case particle *no*. This expectation, however, is not satisfied, as shown in (29).

(29) [*Tom-ga/*no* *nai-ta* ***toiuno***]-*wa* *odoroki* *da*.
[Tom-NOM/GEN cry-PAST TOIUNO]-TOP surprise COP
'It is surprising that Tom cried.'

Third, adjectival verbs in Japanese have different forms depending on whether they appear within a nominal-modifying clause or a non-modifying clause (Frellesvig 2010). Adjectival verbs should be in "conclusive" form in a non-modifying clause and in "ad-nominal" form in a nominal-modifying clause. Thus, if *toiuno* were a head NP that selects the preceding clause as a modifying complement, an adjectival verb within the clause would be in ad-nominal form (but not in conclusive form). As demonstrated in (30), however, the form licensed in this environment is "conclusive" form (not "ad-nominal" form) of the adjectival verb meaning 'genuine.'

(30) [*kono-houseki-ga* *honmonoda/*honmonona* ***toiuno***]-*wa*
[this-jewel-NOM genuine.CON/genuine.ADN TOIUNO]-TOP
*odoroki* *da*.
surprise COP
'It is surprising that this jewel is genuine.'

The upshot is that the compound particle *toiuno* poses the "ambivalence" puzzle. On the one hand, the native speakers have the intuition that in the *toiuno*-complex, the head is *toiuno* (rather than a pre-*toiuno* element), and this intuition is in conformity with (i) the free translation given in (1), (ii) the head-finality of Japanese, and (iii) the distribution of the readings in (26). On the other hand, *toiuno* seems to be a bound morpheme in that (i) it requires an overt preceding phrase, (ii) it disallows the Nominative-Genitive Conversion, and (iii) the embedded predicate must be in conclusive form. This puzzle, as well as the flexibility puzzle in Section 3, will be given a theoretical solution in the next section.

## 5 The LFG Account

We turn to articulating an account which predicts syntactic characteristics of *toiuno*, especially its flexible and ambivalent nature. These issues are handled based on the core assumptions of LFG (Bresnan 2001, Dalrymple 2001):

- Grammatical functions are primitive syntactic notions, to be kept apart from syntactic tree structures. The former is represented in f(unctional)-structure while the latter in c(onstituent)-structure.
- Syntactic computations amount to satisfaction of a set of constraints rather than a series of derivations.

The “flexible” issue is solved by proposing that *toiuno* imposes a constraint which specifies legitimate grammatical functions of a pre-*toiuno* phrase. The “ambivalence” issue is treated by claiming that the head property is modelled at c-structure while the bound-property is modelled at f-structure with the DOM(INANT) attribute in line with Falk (2001).

### 5.1 The “Ambivalence” Issue

A similar “ambivalent” situation holds in construct-state genitives in Hebrew.

(31) *ešet* *(*ha-politikay*) [Hebrew]
wife.CONSTR the-politician
‘the politician’s wife’ (Falk 2001, with inessential modifications)

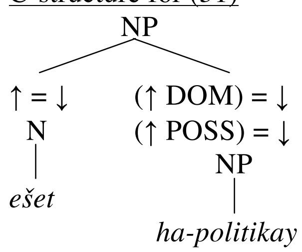
The construct-state genitive *ešet* serves as a head noun, as indicated by the translation. It also behaves like a bound morpheme, requiring a possessor NP; see Falk (2001) for additional pieces of evidence for the bound-property.

Building upon Winter (2000), Falk (2001) postulates DOM(INANT) in f-structure to model the dependency relation of a construct-state genitive on a possessor NP. DOM is an attribute whose value is to be identified with the f-structure of a dominating phrase.[7] In (31), DOM makes sure that the head *ešet* morphologically depends on its argument *ha-politikay*. Falk assumes the phrase structure rule (32), generating the c-structure (33). (The f-description at the terminal nodes are left out for reasons of brevity.)

(32) Phrase structure rule

| | | | | |
|---|---|---|---|---|
| NP | → | N | NP | AP* |
| | | $\uparrow = \downarrow$ | $(\uparrow \text{DOM}) = \downarrow$ | $\downarrow \in (\uparrow \text{ADJ})$ |
| | | | $(\uparrow \text{POSS}) = \downarrow$ | |

(33) C-structure for (31)




The entry of *ešet* is defined as (34), where the existential constraint ($\uparrow$ DOM) requires that the attribute DOM should be present in the local f-structure for

[7] Construct-state genitives may be dependent on adjuncts. Falk (2001) accounts for the data by enriching the phrase structure rule with a disjunction consisting of POSS and ADJ. This complication is orthogonal to our discussion.

*ešet*. Based on the c-structure (33) above, this lexical specification generates the f-structure (35).[8]

(34) Entry of *ešet*

N (↑ PRED) = 'wife(↑ POSS)'
(↑ NUM) = SG
(↑ DOM)

(35) F-structure for (31)

$$\begin{bmatrix} \text{PRED} & \text{'wife<(↑ POSS)>'} \\ \text{NUM} & \text{SG} \\ \text{DEF} & + \\ \text{POSS} & \begin{bmatrix} \text{PRED} & \text{'politician'} \\ \text{NUM} & \text{SG} \\ \text{DEF} & + \end{bmatrix} \\ \text{DOM} & \end{bmatrix}$$

To scrutinise parallelisms between the construct-state genitive and *toiuno* goes beyond the scope of the present paper; what is important to our concern is that in both constructions, there is a dependency relation of a head on its argument. To the extent that this affinity is observed, the attribute DOM is beneficial for developing an account of *toiuno* as well. First, *toiuno* is a head that selects a preceding phrase as an argument. Second, *toiuno* encodes DOM whose value is supplied by the f-structure of the *toiuno*-preceding phrase. So, the lexical entry of *toiuno* is (partially) defined in (36).

(36) Entry of *toiuno* (1st version)

(↑ PRED) = 'toiuno(↑ GF)'
(↑ DOM)

What remains to be clarified is threefold as follows:

- What is a relevant grammatical function GF in (36)? (Section 5.2)
- What is the syntactic category of *toiuno*? (Section 5.3)
- What is a relevant phrase structure rule for *toiuno*? (Section 5.4)

Before closing the present subsection, a few caveats are in order. First, it is simply assumed that DOM is expressed over f-structure, leaving open a

[8] The entry is simplified for purposes of presentation. In a fuller version, the constraint (↑ DEF) = (↑ DOM DEF) is included so that the definiteness of *ešet* always matches that of the dominating phrase *ha-politikay*.

possibility that it might be better represented in other structures. As also suggested in Falk (2001), the m(orphological)-structure (Butt et al. 1996) is a promising candidate. In more recent work, argument-structure is captured in s(emantic)-structure (Asudeh & Giorgolo 2012). See also Asudeh (2006) for a coherent view of correspondences among distinct LFG structures.

As a second caveat, one might wonder whether it is possible to derive the bound-property of *toiuno* in c-structure, rather than in f-structure. Recall that *toiuno* exhibits the head-property as well; so, if one posits a head-position to be occupied by a bound morpheme, it is not licit in terms of the Principle of Lexical Integrity (Dalrymple 2001).

### 5.2 The "Flexibility" Issue

Let us first clarify the grammatical function GF in the entry (36). As shown in Section 3.3, a range of phrases may precede *toiuno*. This flexibility is dealt with by hypothesising the disjunction of (↑ OBJ) and (↑ COMP), as in (37).

(37) Entry of *toiuno* (2nd version)
{(↑ PRED) = 'toiuno<(↑ OBJ)>' | (↑ PRED) = 'toiuno<(↑ COMP)>'}
(↑ DOM)

This disjunction covers the data given in Section 3.3. OBJ encompasses NPs and demonstratives, and COMP declarative clauses and embedded questions.

The disjunction is independently motivated by the grammatical fact that some predicates in Japanese select either OBJ or COMP as a complement. For instance, *tazune* 'ask' selects OBJ in (38) or COMP in (39).

| | | | |
|---|---|---|---|
| (38) | *Tom-wa* | *sono-riyuu-o* | *tazune-ta* |
| | Tom-TOP | that-reason-ACC | ask-PAST |
| | 'Tom asked that reason.' | | |

| | | | | | |
|---|---|---|---|---|---|
| (39) | *Mary-wa* | [*Tom-ga* | *hannin* | *ka*] | *tazune-ta* |
| | Mary-TOP | [Tom-NOM | culprit | COMP] | ask-PAST |
| | 'Mary asked whether Tom was a culprit.' | | | | |

In fact, the distinction between OBJ and COMP is up to debate in the LFG literature (Alsina et al. 2005), and perhaps, our disjunction may be reduced to (↑ PRED) = 'toiuno<(↑ OBJ)>'. Further discussions are left for future work.

### 5.3 The Category of *Toiuno*

Recall that the *toiuno*-complex is case-marked (see Section 4). This suggests that the *toiuno*-complex is an NP. Provided that *toiuno* is a head of the phrase, the category of *toiuno* would be an N. The category information can thus be added to the entry of *toiuno* as in (40).

(40) Entry of *toiuno* (final version)
N
{(↑ PRED) = 'toiuno<(↑ OBJ)>' | (↑ PRED) = 'toiuno<(↑ COMP)>'}
(↑ DOM)

In this lexical specification, *toiuno* is an argument-taking noun. This is not a radical category; see, for instance, the relational noun *sister* in *sister of X*, where the PP *of X* is an argument of the head N *sister*.

But the argument of *toiuno* has a unique property. Japanese is fully pro-drop, and, in general, arguments may be omitted. In *toiuno*, however, its argument cannot be dropped (see Section 4). I suspect this is a residue of the complementiser *to* that obligatorily requires a preceding phrase. Another possible reason is that the *toiuno*-complex denotes an entity characterised by a preceding phrase. In (1), *guaba toiuno* denotes an entity characterised by being called guava. These dependency relations of *toiuno* on a preceding item are formally modelled as the attribute DOM in our account.

### 5.4 Phrase Structure Rule for *Toiuno*

So far, the following points have been established:

- *Toiuno* is a head N, and the *toiuno*-complex is an NP.
- *Toiuno* selects a preceding phrase as a complement.
- The function of a preceding phrase may be OBJ or COMP.
- The category of a preceding phrase may be an NP, a demonstrative DP, a declarative clause IP, or an embedded question CP.

These structural characterisations may be formulated as the phrase structure rule (41) with a metacategory notation XP (Dalrymple 2001: 94). I stipulate this phrase structure rule for *toiuno* (and possibly its related expressions such as *toittano* (18)) but not for nouns in general.

(41) Phrase structure rule ($1^{st}$ version) for *toiuno*

$$\begin{array}{lll} NP \rightarrow & XP & N \\ & \{(\uparrow OBJ) \mid (\uparrow COMP)\} = \downarrow & \uparrow = \downarrow \end{array}$$

where XP ≡ {NP | DP | IP | CP}

The value of DOM is to be equated with the f-structure of a preceding phrase. In line with Falk (2001), this constraint is added to the phrase structure rule.

(42) Phrase structure rule (2nd version) for *toiuno*

| | | | |
|---|---|---|---|
| NP | → | XP | N |
| | | {(↑ OBJ) ǀ (↑ COMP)} = ↓ | ↑ = ↓ |
| | | (↑ DOM) = ↓ | |

where XP ≡ {NP ǀ DP ǀ IP ǀ CP }

Finally, the rule does not mention a specifier, but the *toiuno*-complex may be marked by a demonstrative as illustrated in (43). Thus, an (optional) specifier D is added to the rule. The final version of the rule is given in (43).

(43) [*kono* [*guava* ***toiuno***]]
[this [guava TOIUNO]]
'this thing called guava'

(44) Phrase structure rule (final version) for *toiuno*

| | | | | |
|---|---|---|---|---|
| a. | NP | → | (D) | N' |
| | | | (↑ DEF) = ↓ | ↑ = ↓ |
| b. | N' | → | XP | N |
| | | | {(↑ OBJ) ǀ (↑ COMP)} = ↓ | ↑ = ↓ |
| | | | (↑ DOM) = ↓ | |

where XP ≡ {NP ǀ DP ǀ IP ǀ CP }

**5.5 Summary**

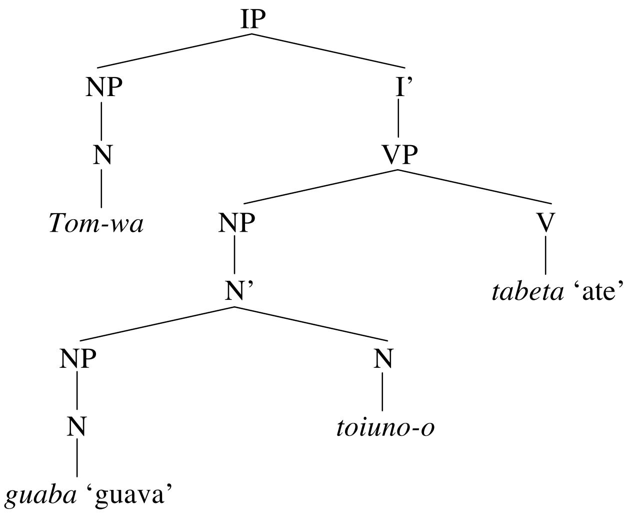
This section has proposed the entry of *toiuno* (40), reproduced here as (45) and the phrase structure rule (44). *Toiuno* is a noun that selects a preceding phrase as a complement and forms an NP (with an optional D as a specifier). The category of a preceding phrase is diverse, raging over NP, DP, IP, and CP. The grammatical function of a preceding phrase is more restricted; it must be OBJ or COMP. The feature DOM models the bound status of *toiuno*, while its head status is directly encoded in the phrase structure rule.

(45) Entry of *toiuno* (final version)
N
{(↑ PRED) = 'toiuno<(↑ OBJ)>' ǀ (↑ PRED) = 'toiuno<(↑ COMP)>'}
(↑ DOM)

As an illustration, the entry of *toiuno* and the phrase structure rule map the string (46) onto the c-structure (47). The f-description is disregarded; what is essential is that *toiuno* selects an NP as a complement. The f-structure is presented in (48), where the grammatical function of the complement *guaba* 'guava' is OBJ.

(46) *Tom-wa* [*guaba* ***toiuno***]-*o* *tabeta*
Tom-TOP [guava TOIUNO]-ACC ate
'Tom ate the thing called guava.'

(47) C-structure of (46)




(48) F-structure of (46)

$$\left[\begin{array}{ll} \text{PRED} & \text{'eat<SUBJ, OBJ>'} \\ \text{TENSE} & \text{PAST} \\ \text{SUBJ} & \left[\text{PRED} \quad \text{'Tom'}\right] \\ \text{OBJ} & \left[\begin{array}{ll} \text{PRED} & \text{'toiuno<(}\uparrow\text{ OBJ)>'} \\ \text{OBJ} & \left[\text{PRED} \quad \text{'guava'}\right] \\ \text{DOM} & \end{array}\right] \end{array}\right]$$

## 6 Conclusion

This paper has examined the corpus data of the compound particle *toiuno* and has set out the "flexibility" and "ambivalence" issues. These are satisfactorily handled in LFG. The flexibility of argument-selection by *toiuno* is reflected in the disjunction in the lexical entry of *toiuno*. As for the ambivalence issue, the head-property is expressed in c-structure where *toiuno* is a noun which selects a complement, and the bound-property is expressed in f-structure with the attribute DOM. Since the present paper has focussed on syntactic aspects of *toiuno*, semantic and other facets of the phenomenon are set aside. For instance, the syntactic exponent of the content of *toiuno* is represented as 'toiuno<(↑ OBJ)>' or 'toiuno<(↑ COMP)>', but its semantic properties have been ignored. One plausible answer is to hold that *toiuno* encodes a semantic function of quotation (see also Niwa 1993); this will be adequate for (46) (see the translation 'the thing called guava'), but it is not fully obvious what type of semantic function is operative in other examples. Further, there are also architectural issues with regard to the appropriate level for the attribute DOM to be represented (see Section 5.1) as well as the possibility of eliminating COMP from the LFG inventory (see Section 5.2). These are residual topics for future investigations.

## References


Alsina, Alex, Mohanan, KP, and Mohanan, Tara. 2005. How to get rid of the COMP. *Proceedings of the LFG 2005 Conference*. Stanford: CSLI Publications.

Asudeh, Ash. 2006. Direct compositionality and the architecture of LFG. In Butt, M., Dalrymple, M., and King, T. (eds.) *Intelligent Linguistic Architectures*. Stanford: CSLI Publications.

Asudeh, Ash & Giorgolo, Gianluca. 2012. Flexible composition for optional and derived arguments. *Proceedings of the LFG 2012 Conference*. Stanford: CSLI Publications.

Bresnan, Joan. 2001. *Lexical-Functional Syntax*. Oxford: Wiley Blackwell.

Butt, Miriam, Fortmann, Chirstian, and Rohrer, Christian. 1996. Syntactic analyses for parallel grammars. *Proceedings of the COLING 1996*. Copenhagen: Center for Sprogteknologi.

Falk, Yehuda. 2001. Constituent structure and grammatical functions in the Hebrew action nominal. *Proceedings of the LFG 2001 Conference*. Stanford: CSLI Publications.

Frellesvig, Bjarke. 2010. *A History of the Japanese Language*. Cambridge: Cambridge University Press.

Fujita, Yasuyuki. 2006. Fukugouji kenkyuu no tenkai to mondaiten. (An overview of research on Japanese compound particles.) In Fujita, Y. & Yamazaki, M. (eds.) 2006.

Fujita, Yasuyuki & Yamazaki, Makoto (eds.) 2006. *Fukugooji Kenkyuu no Genzai*. (Current Topics in the Study of Japanese Compound Particles) Osaka: Izumi Shoin.

Harada, Shin-Ichi. 1971. *Ga-no* conversion and idiolectal variations in Japanese. *Gengo Kenkyu* 60, 25-38.

Kamio, Akio. 1983. Meeshiku no koozoo. (Structure of noun phrases) In Inoue, K. (ed.) *Nihongo no Koozoo*. Toyko: Sanseido.

Kim, Eunju. 1989. Rentaisyuusyoku koozoo niokeru "toiu" no imi kinoo. (Meaning and function of "toiu" in adnominal modification structure) *Kokugogaku Kenkyu* 29: 21-34.

Kitagawa, Chisato and Ross, Claudia. 1982. Prenominal modification in Chinese and Japanese. *Linguistic Analysis* 9: 19-53.

Kuno, Susumu. 1973. *The Structure of the Japanese Language*. Cambridge, MA: MIT Press.

Kuroda, Shige-Yuki. 1992. *Japanese Syntax and Semantics*. Dordrecht: Kluwer.

Makino, Seiichi. 1968. *Some Aspects of Japanese Nominalization*. Kanagawa: Tokai University Press.

Masuoka, Takashi. 2012. Zokuseejyojyutsu to syudaihyooshiki. (Property predication and topic marker). In Kageyama, T. (ed.) *Zokusee Jyojyutsu no Sekai*. Tokyo: Kuroshio.

Matsuki, Masae. 1990. Fukugouji no ninteikijyun, syakudosettei no kokoromi. (Towards the criteria of compound particles) *Bulletin of Center for Japanese Language* (Waseda University): 27-52.

Matsuki, Masae. 2006. Fukugooji kenkyuu to bunpooka. (Research in compound particle and grammaticalization) In Fujita, Y. & Yamazaki, M. (eds.) 2006.

McGloin, Naomi. 1985. *No*-pronominalization in Japanese. *Papers in Japanese Linguistics* 10: 1-15.

Nakahata, Takayuki. 1990. "Toiu" no kinoo nitsuite. (On the function of "to iu") *Handai Nihongo Kenkyu* 2: 43-55.

Niwa, Tetsuya. 1993. In'you o arawasu rentai fukugouji "toiu". ("Toiu" as an adnominal compound particle representing quotation) *Jinbun Kenkyu* 45: 25-60.

Oshima, Motoo. 2010. *Nihongo Rentai Syuusyoku Kouzou no Kenkyuu*. Tokyo: Hituzi.

Seraku, Tohru. 2013. *Clefts, Relatives, and Language Dynamics*. D.Phil. thesis, University of Oxford.

Sunakawa, Yuriko. 2006a. *Iu* o mochiita kanyoohyoogen. (Idiomatic expressions Involving *iu* 'say') In Kurashima, T. (ed.) *Nihongo Jisyogaku no Kouchiku*. Tokyo: Ofu.

Sunakawa, Yuriko. 2006b. Iu o mochiita fukugooji. (The grammaticization of the verb "iu" (to say)) In Fujita, Y. & Yamazaki, M. (eds.) 2006.

Takahashi, Minako. 1994. Meishiku syuusyoku hyougen niokeru "toiu"no kaizaikanousei nitsuite. *Machikaneyama Ronsou* 28: 47-63.

Takahashi, Taro. 1996. Toiumono, toiukoto, toiuno. *Rissho Daigaku Jinbun Kagaku Kenkyujo Nenpo* 34: 41-52.

Terakura, Hiroko. 1983. Noun modification and the use of *to yuu*. *Journal of the Association of Teachers of Japanese* 18: 23-55.

Winter, Shuly. 2000. Definiteness in the Hebrew noun phrase. *Journal of Linguistics* 36: 319-63.

# NON-REFLEXIVE BINDING IN WARLPIRI

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**Abstract**

This paper presents an f-command based analysis of non-reflexive (possessive) Warlpiri binding. Simpson (1991) provides a c-command based analysis of a set of non-reflexive binding data, and explains binding differences between English and Warlpiri binding data by a difference in structure, proposing a flat structure for Warlpiri and a hierarchical structure for English. I assume a more hierarchical structure for Warlpiri along the lines of Simpson (2007) and illustrate that an f-command based approach using lexical specification of binding constraints as proposed by Dalrymple (1993) is better capable of accounting for the Walrpiri binding data. Not only does a hierarchical structure for Walrpiri not allow for a c-command based approach, but a level of variation in the binding data in Warlpiri illustrates that lexical specification of binding constraints for different dialects/individual speakers is necessary to account for the data. For the specific variety of non-reflexive binding data described by Simpson (1991) I propose an analysis only taking f-command into account (and not the grammatical function hierarchy or f-precedence), which is a novel way of accounting for binding data.

# 1 Introduction

Warlpiri is a language of the Pama-Nyungan language family spoken in Australia, and has around 2,500 speakers (according to the 2006 census). It is traditionally referred to in the literature as a typical case of a "non-configurational" language, a language which illustrates free word order, the use of syntactically discontinuous constituents, and extensive use of null anaphora (Hale, 1983). Languages traditionally labelled as non-configurational, including Warlpiri, have received different types of analyses in different frameworks. In transformational frameworks, such as Principles and Parameters and Minimalism, grammatical functions are defined in terms of tree configurations. This means that configurational and non-configurational languages are the same underlyingly. This point is argued by Legate (2002) for Warlpiri, claiming that Warlpiri is in fact a configurational language, and that any variation is accounted for by a microparametric analysis. Binding phenomena are accounted for by the phrase structural relation of c-command. In LFG, trees represent the surface word order of a sentence, and all information about grammatical functions is contained inside the f-structure. Configurational and non-configurational languages may have different c-structures in LFG. In LFG, both the relations of c-command and f-command have been used in different works to account for binding phenomena. F-command is more widely used, but c-command has been used to account for Warlpiri binding by Simpson (1991).

This paper will look at a case of apparent lack of subject/object asymmetry in Warlpiri, namely non-reflexive, possessive binding. In approaches using c-command to account for binding, configurational languages have been assigned hierarchical structures to account for subject/object asymmetries in the binding data. Non-configurational languages, as mentioned, have often been analysed as being underlyingly configurational (Legate, 2002), with a hierarchical structure, but they have also often been analysed as having a flat structure, e.g. Simpson (1991) for Warlpiri. The flat structure neatly accounts for the lack of subject/object asymmetries attested in a variety of Warlpiri described by Simpson (1991). In this paper it will be illustrated that LFG's relation of f-command is better capable of accounting for the non-reflexive binding data in Warlpiri, assuming lexical specification of binding constraints.

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Before illustrating the data, I will discuss general word order characteristics and proposed structures for Warlpiri in Section 2 and provide an introduction to binding in Section 3. Section 4 gives an overview of the non-reflexive binding data, followed by a discussion of an account of this data in Warlpiri by Simpson (1991) in Section 5. In Section 6 I discuss arguments in favour of an f-command analysis and lexical specification, and provide a new analysis for the binding data. In Section 7 further evidence is provided for a lexical specification analysis, illustrating a multitude of dialects, and the conclusion of this paper follows in Section 8.

## 2 Warlpiri word order and structure

As mentioned, Warlpiri is known for its 'free' word order. The term 'free' here is not actually accurate, as the word order appears to be determined by discourse functions (Simpson, 2007). The word order is, however, unconstrained by the syntax:

(1) a. *Ngarrka-ngku ka wawirri panti-rni.*
man-ERG AUX kangaroo.ABS spear.NPST

b. *Wawirri ka panti-rni ngarrka-ngku.*
kangaroo.ABS AUX spear.NPST man-ERG

c. *Panti-rni ka ngarrka-ngku wawirri.*
spear.NPST AUX man-ERG kangaroo.ABS
'The man is spearing the kangaroo.'

(Hale, 1983, p. 6)

Any of these orderings is allowed, with all relative orderings of subject, object and verb being allowed. In terms of grammatical functions and the verb there is thus free word order, but the different orderings will be appropriate in different information structural contexts. The only syntactic (and not information structural) constraint in Warlpiri sentences is the set position of the auxiliary element (marked as AUX), which in these cases occurs in second position. The auxiliary AUX is not really an auxiliary in the traditional sense; it is a constituent which expresses negation, modal, aspectual and temporal relations, as well as subject and non-subject person and number features (Laughren, 1999). In the literature it is referred to as AUX and I will retain this term to denote this constituent.[1] The AUX is argued to be an enclitic which forms a phonological unit with the preceding phonological word (Nash, 1980; Austin & Bresnan, 1996).

The auxiliary constituent appears in second position in the sentences in (1), and many works on Warlpiri give this as the set position of the AUX, e.g. Hale (1983); Simpson (1991). As an enclitic, it attaches to the first phonological word. Later works, however, point out that the auxiliary may occur in first or third position as well. An example of first position is the following (with the AUX in bold):

(2) ***Kapi-rna-rla*** *yi-nyi.*
FUTCOMP-1sS-3sDAT give.NPST
'I will give (it) to him.'

(Hale *et al.* , 1995, p. 1432)

[1]The auxiliary appears in most sentences but it is in fact optional: if the (main) verb is marked by either an irrealis or a past tense suffix, the auxiliary may be phonologically null (Laughren, 1999). Simpson (1991) notes that in nominal-headed sentences in Warlpiri the auxiliary is also optional.

Here we see that the AUX appears in first position followed by the verb. Hale *et al.* (1995) mention that the other ordering (V - AUX) is allowed too. They claim that when the auxiliary is disyllabic or longer, it is allowed to appear in initial position, which is the case in (2). The view as the AUX as an enclitic might explain this: if it is monosyllabic it cannot stand by itself.[2] When the AUX appears sentence-initially like this, Laughren *et al.* (2005) claim that this is to emphasize the tense/aspect component of the AUX. An example of the AUX in third position is the following:

| | | | | |
|---|---|---|---|---|
| (3) | *Pangurnu-ju* | *nyarrpara-wiyi* | ***ka-nkulu*** | *marda-ni?* |
| | shovel-KN | where-before | PRES-2PL | hold.NPST |

‘Where have you got a shovel?’

(Hale (1959) via Simpson (2007, p. 409))

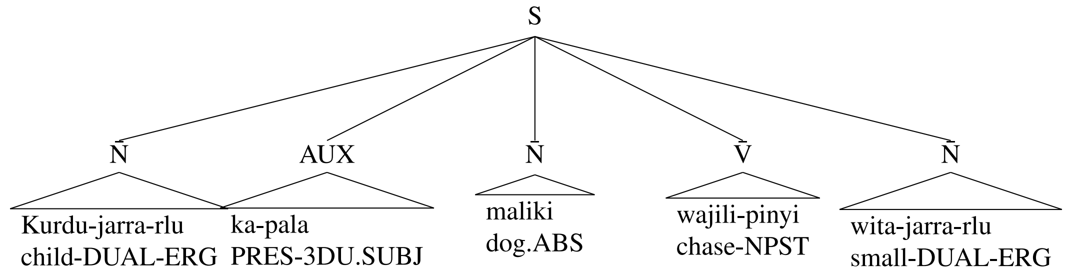
In this example, Simpson (2007) claims, the first constituent, *pangurnuju* has a topic function, and the second constituent *nyarrparawiyi* has a focus function (as is also evident from the fact that it is a wh-word). This gives us the order TOPIC - FOCUS - AUX - V.

Several structures have been proposed for Warlpiri over the years. Simpson (1991) proposes a flat structure, based on the fact that ordering appears free at first glance. Simpson (1991) assumes flat structures with a root S node. An example of this is shown in (5), for the example in (4):[3,4]

| | | | | | |
|---|---|---|---|---|---|
| (4) | *Kurdu-jarra-rlu* | *ka-pala* | *maliki* | *wajili-pinyi* | *wita-jarra-rlu.* |
| | child-DUAL-ERG | PRES-3DU.SUBJ | dog.ABS | chase-NPST | small-DUAL-ERG |

‘The two small children are chasing the dog.’

(5)




This structure is important for the discussion in this paper, as it plays a central role in Simpson's (1991) account of Warlpiri binding which will be discussed later.

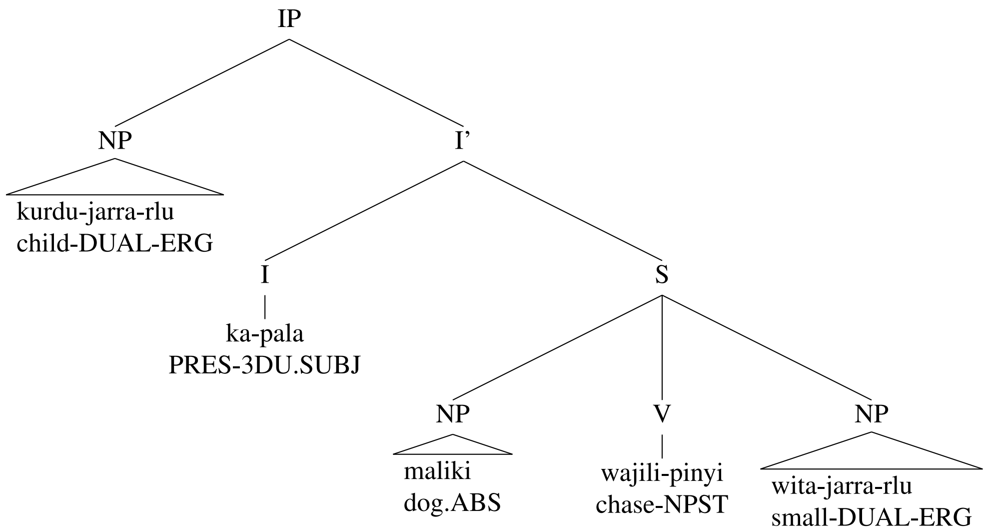
The structure in (5) has been fine tuned by Austin & Bresnan (1996), to include the fact that the position before the AUX is taken up by (a) specific discourse function(s). Austin & Bresnan (1996) propose a structure with an IP level, extending Simpson's (1991) analysis in line with suggestions by Kroeger (1993). This gives us a structure like the one in (6), for example (4):

[2]The exact factors playing a role in determining the position of the AUX are still debated. For example, Legate (2008) challenges the idea that AUX elements are second position clitics, and that their placement depends on whether they are monosyllabic or polysyllabic.

[3]Note that example (4) contains a nominal discontinuity, namely between *kurdu-jarra-rlu* (‘child’, dual number, ergative case) and *wita-jarra-rlu* (‘small’, dual number, ergative case). As mentioned, Hale (1983) takes this to be a characteristic of non-configurational languages.

[4]The use of N̄, V̄ and AUX as constituents is a choice made by Simpson (1991) in her analysis of Warlpiri; I will not go into details on this, but the overall structure should be clear.

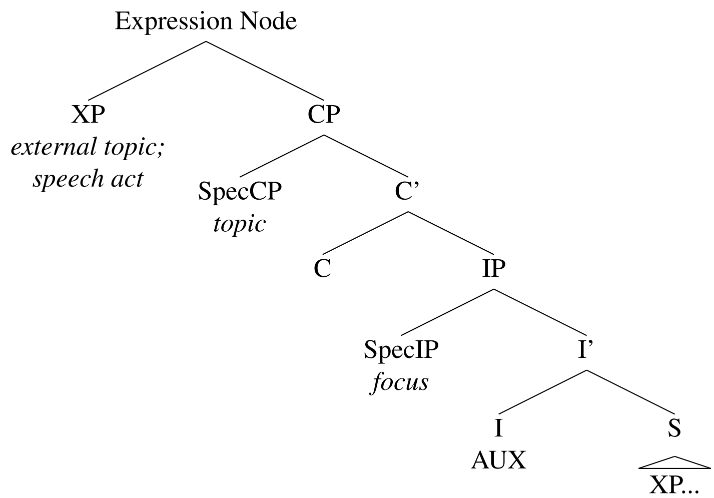
(6)




The positing of an IP gives the AUX a fixed position, namely in I. Any pre-AUX constituent appears in SpecIP, making it possible to be assigned a specific discourse function (Aissen, 1992; Kroeger, 1993; King, 1995; Bresnan, 2001). According to Swartz (1988), this is the focus function in Warlpiri, but as has been shown in example (3), there may also be a topic constituent preceding the AUX (in fact, in (3) there is both a topic and a focus constituent preceding the AUX). Note that the sister of I is the exocentric S category. This gives at least a partial flat structure to the overall Warlpiri structure.

The observation that two constituents may appear before the AUX led Simpson (2007) to revise her own 1991 structure and propose a structure including both an IP and a CP:

(7)




The root node of this structure is what Simpson (2007) refers to as an Expression node, accounting for the existence of external, hanging topics and what she refers to as 'speech acts' appearing before the CP clause. As speech act markers she lists *karinganta* ('I say'), *kulanganta* ('I thought counterfactually') and *kala* ('but'). Relevant for the current discussion is mainly the inclusion of CP and IP projections. This means that there are two specifiers of functional projections, rendering a specific position for both topic (SpecCP) and focus (SpecIP). Simpson (2007) claims that verbs can be base-generated in C, following Grimshaw's extended projections (Grimshaw, 2005). This would account for the position of verbs before the AUX: this order is allowed.[5] In this paper I will assume that the structure in (7) is the correct one for Warlpiri, as it takes into account that Warlpiri word order is strongly determined by the discourse, and moreover it is able to account for the Warlpiri examples in which more than one constituent may appear before the AUX, as shown in example (3).

# 3 Binding and its LFG analysis

Binding refers to the distribution of pronouns and the relation to their antecedent. Different anaphoric elements show different constraints on how they may be bound. See the following examples:

(8) Peter$_i$ sees himself$_{i/*j}$.

(9) Peter$_i$ sees him$_{*i/j}$.

Here we see that the reflexive pronoun in (8) must be bound by the subject of the sentence. The pronoun ‘him’ in (9) cannot be bound by the subject of the sentence, but it is allowed to corefer with an external person (although this is not binding, as the antecedent itself does not appear inside the clause). The examples in (8) and (9) reflect the traditional Binding Conditions A and B respectively, as proposed by Chomsky (1981). These conditions are not generally assumed within LFG, but will be shown here for the sake of completeness:

(10) Binding conditions along the lines of Chomsky (1981, p. 188)[6]

- **Binding Condition A:** A reflexive anaphor is bound in its governing category: it must have a local antecedent
- **Binding Condition B:** A pronoun (non-reflexive) is free in its governing category: it can have an antecedent as long as the antecedent is not local and does not c-command the pronoun.
- **Binding Condition C:** An R-expression is free: it cannot have an antecedent that c-commands it.

(11) **C-command**: node A c-commands node B iff:
- A does not dominate B
- B does not dominate A
- the branching node that dominates A also dominates B

Binding Condition A allows for example (8) and Binding Condition B ensures that (9) is ungrammatical. There is also Condition C, which accounts for a sentence such as the following:

(12) He$_{*i/*j/k}$ believed that Peter$_i$ had seen John$_j$.

[5] Simpson (2007) also claims that the negator *kula* is a complementiser and therefore appears in C position. Examples of *kula* - FOCUS - AUX are in fact attested (see Simpson (2007)). She states that examples of this kind are rare, as the negator itself already has a focus function of some kind. Having *kula* in C position, would imply that it could be preceded by a topic constituent; examples of this kind are indeed attested, see Simpson (2007). She does not mention any other elements that can occur in C position.

[6] The exact phrasing of these conditions has been augmented in order to make the conditions more clear.

This is traditional binding theory, and it is not used in LFG. In LFG, the relation of f-command if often used instead of c-command to account for binding phenomena. Moreover, the grammatical function hierarchy and f-precedence are assumed to play a role in many cases of binding. Their definitions are as follows:[7]

(13)
- **F-command**: f-structure $f$ f-commands f-structure $g$ iff:
  - $f$ does not contain $g$
  - all f-structures that contain $f$ also contain $g$
  (Dalrymple, 2001)
- **Grammatical function hierarchy**:[8]
  SUBJ $>$ OBJ $>$ OBJ$_\theta$ $>$ OBL$_\theta$ $>$ COMPL $>$ ADJUNCT
  (Bresnan, 2001)
- **F-precedence**: $f$ f-precedes $g$ if the rightmost node in $\phi^{-1}(f)$ precedes the rightmost node in $\phi^{-1}(g)$
  (Bresnan, 2001)

Note that f-command and f-precedence are LFG-specific concepts, but that the grammatical function hierarchy has been used in other frameworks as well. F-command is similar to c-command, except that it applies to f-structures instead of c-structures. Both c-command and f-command allow for mutually c-commanding/f-commanding nodes. F-precedence is an f-structure concept, though it makes reference to c-structure; it relies on linear order. It has been noted in theories of binding that the grammatical function hierarchy and linear order play a role; the LFG-specific version of the grammatical function hierarchy and f-precedence are the LFG equivalents of this. Interestingly, Bresnan (2001), instead of using c-command, uses a relation called *Syntactic Rank* to account for binding data (at least in English), a relation which takes both f-command the grammatical function hierachy into account:

(14) **Syntactic Rank:** *A* locally outranks *B* if *A* and *B* belong to the same f-structure and *A* is more prominent than *B* on the grammatical function hierarchy. *A* outranks *B* if *A* locally outranks some *C* which contains *B*.
(Bresnan, 2001)

As will be illustrated in later sections, one does not need a relation like this to account for the non-reflexive Warlpiri data; one only needs f-command.

In order to see how these factors play a role, we need to look at some more data. Take for example the following ungrammatical example with a reflexive:

(15) Himself$_{*i/*j}$ sees Peter$_i$.

If one compares this example to example (8) (‘Peter$_i$ sees himself$_{i/*j}$’) it is evident that there is an asymmetry between subject and object. Under traditional binding accounts, assuming c-command plays a role, (15) can be ruled out in the bound to *i* (‘Peter’) reading because of the structural superiority of the pronoun: the pronoun c-commands its antecedent. This is if one assumes that English has a hierarchical structure, which is common. Traditional binding analyses

[7] The exact definition of f-precedence varies in different accounts; we assume the definition by Bresnan (2001) here. For slightly differently phrased definitions, see for example Bresnan (1995) and Dalrymple *et al.* (2001). The exact definition does not make a difference for the purposes of this paper.

[8] Bresnan (2001) refers to this hierarchy as the ‘relational hierarchy’. A grammatical function hierarchy of this kind was originally introduced by Keenan & Comrie (1977).

account for the ungrammaticality of the bound reading in (15) with the use of Binding Condition C; example (15) is a violation of Condition C. This shows that something which might appear to be a linear order phenomenon (the pronoun preceding the antecedent in (15)) can be reduced to an asymmetry in strcuture in accounts of binding using c-command. The bound to *j* reading is out as well because of Condition A; the reflexive needs a local antedecent. In an LFG account using f-command, c-structural superiority is not available to account for binding data, so one needs to appeal to other factors. Considering that example (8) is grammatical with a bound reading but (15) is not, one could either say that f-precedence plays a role, or that the grammatical function hierarchy plays a role. Assuming that f-precedence plays a role, one could say that pronouns may not precede their antecedents. Assuming that the grammatical function hierarchy plays a role, one could say that a reflexive pronoun may only be bound by a subject and not by an object. In this particular example another issue is the morphology: there is no subject reflexive (e.g. something like 'heself').

An example which does not have the morphology problem that (15) has, but shows a similar grammaticality pattern, is example (12), repeated here in (16):

(16) He$_{*i/*j/k}$ believed that Peter$_i$ had seen John$_j$.

Recall that in traditional binding theory the ungrammaticality of the bound readings is taken to be a violation of Condition C, appealing to the structural superiority of the pronoun. Even though it seems that linear ordering appears to play a role at first glance, as in (15), one can use a structural relation to account for the ungrammaticality. The same thing is true in an f-command approach: in this type of approach one can account for the ungrammaticality of the bound readings by saying that the pronoun f-commands it antecedent, ruling the sentence out. This shows that things that appear to be due to linear order/f-precedence (or the grammatical function hierarchy) can in some cases be easily accounted for by c-command or f-command.

So far I have discussed both c-command and f-command based approaches. In Section 1 it was mentioned that transformational accounts always use c-command (forced by the choice of theory, as f-command is an LFG-specific concept). In these accounts, many linear order phenomena can be reduced to an asymmetry in structure. The same is true for Simpson's (1991) LFG analysis, as she uses c-command. How this works will be explained in more detail in Section 5. However, in LFG most accounts have appealed to f-structural rather than c-structural means to account for binding phenomena (Dalrymple, 1993; Bresnan, 2001; Dalrymple, 2001). F-command is used instead of c-command to account for binding phenomena (or in the case of Bresnan (2001), Syntactic Rank, which incorporates f-command).

There are good reasons to choose an f-command over a c-command approach, and the most compelling piece of evidence comes from work on binding by Dalrymple (1993), an approach which I follow in this paper. She proposes to have lexical specification of binding constraints rather than universal constraints proposed in more traditional (especially transformational) accounts of binding. Based on data from Norwegian and Marathi she illustrates that the distinction between reflexives and (non-reflexive) pronominals (versus reciprocals) is not as straightforward as had previously been assumed. Dalrymple shows that these languages have more than simply two kinds of anaphoric elements. For example, Norwegian has five anaphoric elements in total and two different anaphoric elements (*seg selv* and *ham selv*) which together correspond to the reflexive in English.

(17) a.

| | | | | | | |
|---|---|---|---|---|---|---|
| *Jon* | *fortalte* | *meg* | *om* | *seg* | *selv/*ham* | *selv.* |
| Jon | told | me | about | self | | |

‘Jon$_i$ told me about himself$_i$.’

b.

| | | | | | | |
|---|---|---|---|---|---|---|
| *Vi* | *fortalte* | *Jon* | *om* | **seg* | *selv/ham* | *selv.* |
| we | told | John | about | self | | |

‘We told John$_i$ about himself$_i$.’

(Dalrymple, 1993, p.27-29)

The anaphoric element *seg selv* has to refer to the subject in its coargument domain (the domain containing all the coarguments of the anaphoric element), and the element *ham selv* has to refer to an argument in its minimal complete nucleus which is not the subject (the minimal domain including a SUBJ function (Dalrymple, 2001)). More formally, we say that *seg selv* has to be bound to the subject in its coargument domain, and *ham selv* has to be bound to an argumet in its minimal complete nucleus, but disjoint from the subject in its minimal complete nucleus. Each of these elements thus has different binding conditions. This data shows that Condition A cannot fully take care of the data; lexical specification is a way to deal with this. For a full overview of the five different anaphoric elements and their binding conditions, see Dalrymple (1993). Each element has different domains in which they must be bound, or must be free. For our purposes it is important that lexical specification of binding constraints enables one to give different constraints to individual anaphoric elements, rather than having a single (cross-linguistic) rule for binding.

## 4 Warlpiri non-reflexive possessive binding data

The specific data that is central to this paper are non-reflexive possessive binding data. This is data originally elicited by Mary Laughren and presented by Simpson (1991) as evidence for her use of c-command in accounting for Warlpiri binding (as will be discussed in the next section). Interestingly, in this set of Warlpiri binding data, linear order and the grammatical function hierarchy do not appear to play a role. The first set of data that Simpson (1991) provides is one in which the pronoun is an argument of the verb, and its antecedent is embedded inside a coargument. This data is shown in (18) in the case where the pronoun is the subject:

(18) Pronoun functions as subject (PRO-SUBJ):

a.

| | | | | |
|---|---|---|---|---|
| *Jakamarra-kurlangu* | *maliki* | *ka* | *nyanungu-rlu* | *wajili-pi-nyi.* |
| Jakamarra-POSS | dog | PRES | he-ERG | chase.NPST |

‘He$_{*i/j}$ chases Jakamarra$_i$’s dog.’

b.

| | | | | |
|---|---|---|---|---|
| *Nyanungu-rlu* | *ka* | *Jakamarra-kurlangu* | *maliki* | *wajili-pi-nyi.* |
| he-ERG | PRES | Jakamarra-POSS | dog | chase.NPST |

‘He$_{*i/j}$ chases Jakamarra$_i$’s dog.’

(Simpson (1991, p. 179), elicited by Mary Laughren)

This data (which will be referred to as PRO-SUBJ examples) illustrates that binding between a pronoun and an antecedent embedded in a coargument of the pronoun is not grammatical. The fact that both orders, *pronoun* $>$ *antecedent* and *antecedent* $>$ *pronoun*, are ungrammatical, implies that linear ordering does not play a role in this type of binding. Now let us look at the case where the pronoun is the object:

(19) Pronoun functions as object (PRO-OBJ):

a. *Jakamarra-kurlangu maliki-rli ka nyanungu wajili-pi-nyi.*
Jakamarra-POSS dog-ERG PRES him chase.NPST
'Jakamarra$_i$'s dog chases him$_{*i/j}$.'

b. *Nyanungu ka Jakamarra-kurlangu maliki-rli wajili-pi-nyi.*
him PRES Jakamarra-POSS dog-ERG chase.NPST
'Jakamarra$_i$'s dog chases him$_{*i/j}$.'

(Simpson (1991, p. 179-180), elicited by Mary Laughren)

This data (which will be referred to as PRO-OBJ examples) is very similar to the one in (18), other than the case marking. Again the sentences are ungrammatical in either order. The fact that the same grammaticality pattern arises with the pronoun as either subject or object shows that there is a symmetry in binding, and it implies that the grammatical function hierarchy, which is assumed to play a role in many LFG accounts of binding, does not play a role in this data.

Both of these observations, the fact that both linear ordering and the grammatical function hierarchy do not play a role in this data, are interesting. The symmetry attested in this Warlpiri data is unlike that seen in many other languages. An example of this is English, widely discussed in the binding literature. I will illustrate the difference here as it plays a role in the next section discussing arguments brought forth by Simpson (1991) for an analysis based on c-structure relations. In English there are the following patterns for the PRO-SUBJ and PRO-OBJ examples:

(20) a. English PRO-SUBJ:
*He$_{*i/j}$ chases John$_i$'s dog.*

b. English PRO-OBJ:
*John$_i$'s dog chases him$_{i/j}$.*

We thus see that the English PRO-SUBJ patterns with the Warlpiri data by being ungrammatical with the coreference, whereas the PRO-OBJ example is fine in English, and therefore different from the Warlpiri data.[9] In transformational accounts, as well as in Simpson's (1991) LFG account, this asymmetry in English has been accounted for by positing a VP constituent and working with a relation of c-command, as will be illustrated in the next section.

Apart from the type of data where a pronoun is itself an argument of the verb, there is also data in which the pronoun appears as a possessive pronoun. The patterns are different from the PRO-SUBJ and PRO-OBJ examples, but they too illustrate that linear order does not play a role in this set of data. There are again two different cases, one in which the possessive pronoun appears inside the subject (with the antecedent being the object), and one in which the possessive pronoun appears inside the object (with the antecedent being the subject). The first kind will be referred to as POSS-IN-SUBJ examples and the second kind as POSS-IN-OBJ examples:

(21) Possessive pronoun inside subject (POSS-IN-SUBJ):

a. *Jakamarra ka nyanungu-nyangu-rlu maliki-rli wajili-pi-nyi.*
Jakamarra PRES he-POSS-ERG dog-ERG chase.NPST
'His$_{i/j}$ dog chases Jakamarra$_i$.

[9] I do not discuss linear order for the English data as English word order is much more rigid than Warlpiri word order in terms of argument functions. I focus purely on the binding differences depending on what role the subject and object play in binding.

b. *Maliki* *nyanungu-nyangu-rlu* *ka* *Jakamarra* *wajili-pi-nyi.*
dog he-POSS-ERG PRES Jakamarra chase.NPST
'His$_{i/j}$ dog chases Jakamarra$_i$.

(Simpson (1991, p 180), elicited by Mary Laughren)

(22) Possessive pronoun inside object (POSS-IN-OBJ):

a. *Jakamarra-rlu* *ka* *wajirli-pi-nyi* *maliki* *nyanungu-nyangu.*
Jakamarra-ERG PRES chase.NPST dog he-POSS
'Jakamarra$_i$ chases his$_{i/j}$ dog.

b. *Nyanungu-nyangu* *ka* *wajirli-pi-nyi* *maliki* *Jakamarra-rlu.*
he-POSS PRES chase.NPST dog Jakamarra-ERG
'Jakamarra$_i$ chases his$_{i/j}$ dog.

(Simpson (1991, p. 180), elicited by Mary Laughren)

Notice that the pronoun in these examples is the same as in the PRO-SUBJ and PRO-OBJ examples (*nyanungu*), but it now has the possessive suffix *-nyangu*. We see that both the POSS-IN-SUBJ and the POSS-IN-OBJ examples are grammatical with coreference, no matter what the relative ordering of pronoun and antecedent is. This shows that linear ordering also does not play a role here. Whether the grammatical function hierarchy plays a role is a slightly different story. The big difference between the non-possessive pronoun data (PRO-SUBJ and PRO-OBJ) and the possessive pronoun data (POSS-IN-SUBJ and POSS-IN-OBJ) is that in the second set the pronoun is embedded inside an argument of the verb; it it not an argument iself as it is in the first set of data. I leave this issue open for the moment.

Briefly contrasting this with English again, we see that the patterning in Warlpiri and English is the same (apart from the freedom of word order in terms of argument functions). In English these examples are also acceptable with coreference:

(23) a. English POSS-IN-SUBJ
*His$_{i/j}$ dog chases John$_i$.*

b. English PRO-OBJ:
*John$_i$ chases his$_{i/j}$ dog.*

As a summary of the grammaticality patterns for the Warlrpiri and English possessive binding data, there is the overview in Table 1.

Table 1: An overview of the possessive binding data contrasting Warlpiri and English

| | Warlpiri | English | Type of sentence |
|---|---|---|---|
| (a) He$_i$ chases J$_i$'s dog. | * | * | PRO is SUBJ |
| (b) J$_i$'s dog chases him$_i$. | * | ✓ | PRO is OBJ |
| (c) His$_i$ dog chases J$_i$. | ✓ | ✓ | POSS PRO in SUBJ |
| (d) J$_i$ chases his$_i$ dog. | ✓ | ✓ | POSS PRO in OBJ |

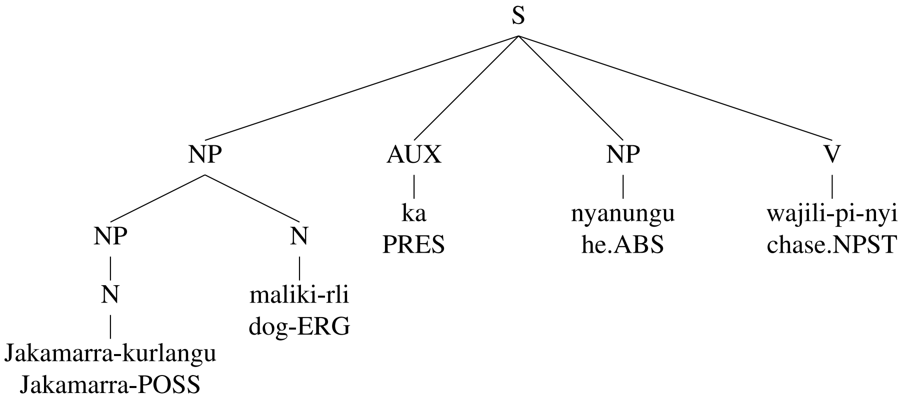
This table can be used as a reference in the next section.

## 5 Simpson's arguments for a c-command analysis

The data presented in the previous section has been accounted for by Simpson (1991) with the use of c-structural relations, uncommon for an LFG approach. She even argues specifically against an f-command based approach. Simpson's argument is as follows. She assumes a flat structure for Warlpiri (as illustrated above in (5)), and a hierarchical structure with VP (thereby creating a structural subject-object asymmetry) for English. Her main aim is to have a uniform binding constraint for both Warlpiri and English (and presumably for other languages too, although Simpson (1991) does not mention this explicitly). The constraint that she assumes is that **a pronoun may not c-command its antecedent.** In order to see how this constraint accounts for the data in Table 1 we need to look at some actual structures.

First we will start by looking at the PRO-OBJ and PRO-SUBJ examples. An example of a structure of a PRO-OBJ example in Warlpiri, ungrammatical with a coreference reading, is the following:[10]

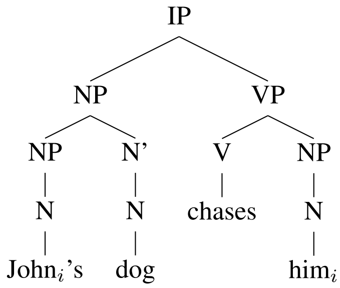
(24) PRO-OBJ Warlpiri structure:




*'Jakamarra's dog$_i$ chases him$_i$.'

This is ungrammatical, Simpson (1991) claims, because the pronoun c-commands its antecedent. It is also clear that the relative order between antecedent and pronoun does not matter, as we are dealing with a flat structure and hence with mutual c-command. The PRO-SUBJ example is ungrammatical for the same reason as the PRO-OBJ example is (one can imagine a similar flat structure with the only difference being the case marking), also in either order. In English the PRO-OBJ example is acceptable with coreference, because the pronoun does not c-command its antecedent:

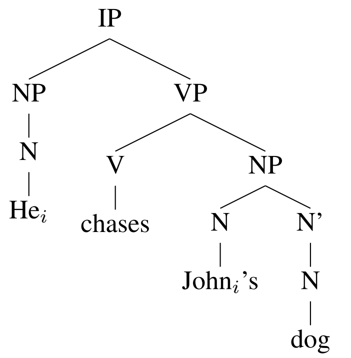
(25) PRO-OBJ English structure:




[10]Note that Simpson (1991) used N̄ to denote nominal constituents; here we simply use NP. The choice of constituent is not directly relevant to the issues at hand. The possessor is represented in SpecNP.

The English PRO-SUBJ example is not acceptable with coreference, however, and this is because the pronoun in this case does c-command its antecedent:

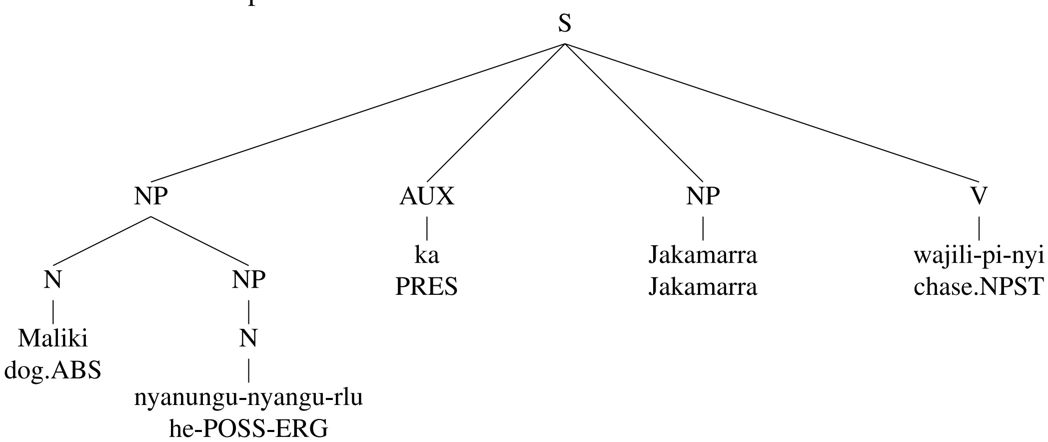
(26) PRO-SUBJ English structure:
*




This clearly illustrates that the asymmetry in English structure accounts for the asymmetry in binding patterns, and that the symmetry in Warlpiri structure accounts for the symmetry in binding patterns.

Now the possessive pronoun data will be looked at. As has been illustrated, these examples are all grammatical with coreference, and the reason for this according to Simpson (1991) is because the pronoun is always embedded inside another NP, meaning it does not c-command its antecedent (in either Warlpiri or English). The structure for a Warlpiri POSS-IN-SUBJ sentence (grammatical with coreference) is the following:

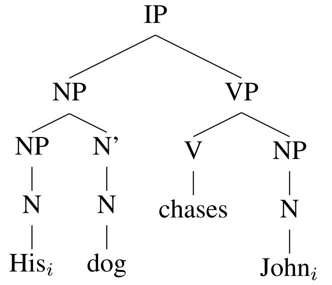
(27) POSS-IN-SUBJ Warlpiri structure:




'His$_i$ dog chases Jakamarra$_i$.'

This example is fine because the pronoun does not c-command its antecedent. Again, the relative order between antecedent and pronoun does not matter. One can imagine a similar structure for the POSS-IN-OBJ examples with the same outcome, in either order. For English there is the same pattern with the possessive pronoun being embedded:

(28) POSS-IN-SUBJ English structure:




Recall that that the POSS-IN-OBJ example for English with the embedded pronoun is grammatical, which should be evident from the embeddedness of the structure.

This is part one of Simpson's reasoning, arguing in favour of a c-command approach. Secondly, she specifically argues against an f-command approach. Her point is that the f-structure for the Warlpiri and English sentences are pretty much the same, and that if one wants to posit a uniform constraint (as the one she gives for c-command) one cannot account for the difference in data as summarized in Table 1 with the use of f-command. Here are the f-structures for the PRO-SUBJ and PRO-OBJ examples:

(29) PRO-SUBJ f-structure:

$$\begin{bmatrix} \text{PRED} & \text{`chase}\langle\text{SUBJ,OBJ}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix}\text{PRED} & \text{`PRO'}\end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{SPEC} & \begin{bmatrix}\text{PRED `J'}\end{bmatrix} \\ \text{PRED} & \text{`dog'}\end{bmatrix}\end{bmatrix}$$

(30) PRO-OBJ f-structure:

$$\begin{bmatrix} \text{PRED} & \text{`chase}\langle\text{SUBJ,OBJ}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{SPEC} & \begin{bmatrix}\text{PRED `J'}\end{bmatrix} \\ \text{PRED} & \text{`dog'}\end{bmatrix} \\ \text{OBJ} & \begin{bmatrix}\text{PRED} & \text{`PRO'}\end{bmatrix}\end{bmatrix}$$

Importantly, the f-structure for Warlpiri and English is (largely) the same for these sentences. The f-structural relations between pronoun and antecedent are exactly the same. As illustrated, the PRO-OBJ examples are ungrammatical in Warlpiri with coreference but grammatical in English with coreference; a uniform constraint on the f-structure (using f-command) can therefore not account for the data. However, as will be seen later, there does not appear to be a clear reason to posit a uniform constraint. In any case, Simpson (1991) gives this as an argument against the use of f-command in accounting for this binding data.

# 6 An f-command analysis

In this section I will illustrate that one can in fact account for the binding data presented in Section 4 with the use of f-command. In order to do this I do not assume a uniform constraint for different languages, but rather lexical specification of binding constraints of individual anaphoric elements. There does not appear to be a clear reason to assume a uniform constraint for different languages. As explained in Section 3, Dalrymple (1993) has proposed an account of binding with lexically specified constraints for individual anaphoric elements in different languages. I assume that this is the right type of analysis for the Warlpiri data presented in Section 4. Taking this approach, it will be shown that for the Warlpiri data, one can have an analysis only taking f-command into account, excluding linear order and the grammatical function hierarchy from the analysis. This is novel; as far as I am aware, there have been no accounts for any language giving an analysis only taking f-command into account. Most accounts of binding are required to take either f-precedence or the grammatical function hierarchy into account, but the Warlpiri data does not require this.

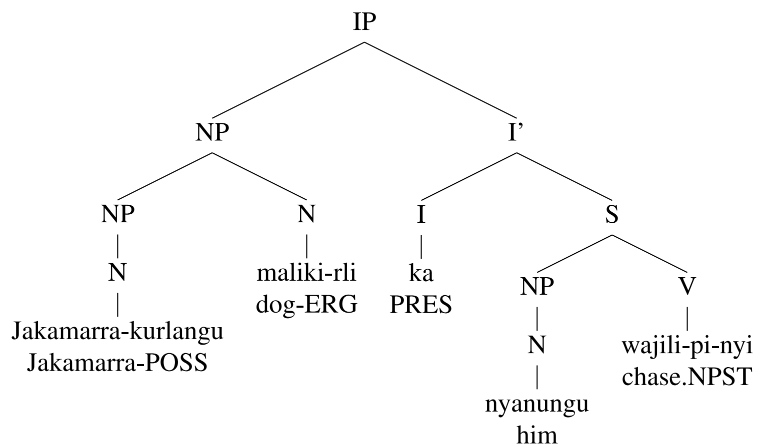
There are several arguments to propose a binding analysis of the Warlpiri data using f-command and lexical specification, going against Simpson's (1991) proposal. Firstly, Simpson's arguments from 1991 are no longer valid with her more recent structure as proposed in Simpson (2007) and shown above in (7). The second reason is that there appear to be dialects of Warlpiri that have different patterns than the ones summarized in Table 1. Thirdly, reflexive binding in Warlpiri displays an asymmetry that does not exist in the non-reflexive binding data which was presented from Simpson's (1991) work. The two last reasons will be discussed in the next section. Firstly, let us look at the first argument.

Recall the more recent structure proposed for Warlpiri by Simpson (2007) (the one I assume as well in this paper) as shown in (7), with a SpecCP position for topic constituents and a SpecIP position for focus positions. This is a hierchical structure. As an example of this, see the tree in (32) for the PRO-OBJ example in (31), repeated from (19a):

| | | | | | |
|---|---|---|---|---|---|
| (31) | *Jakamarra-kurlangu* | *maliki-rli* | *ka* | *nyanungu* | *wajili-pi-nyi.* |
| | Jakamarra-POSS | dog-ERG | PRES | him | chase.NPST |

'Jakamarra$_i$'s dog chases him$_{*i/j}$.'

(32)




Notice that in this tree structure, the first constituent, *Jakamarra-kurlangu maliki-rli* ('Jakamarra's dog'), is in focus position. It could also be in topic position; for this particular sentence there is no context given so either is possible. In either case, importantly, the antecedent appears higher in the tree than the pronoun, and therefore the antecedent c-commands the pronoun but not vice versa. As explained, Simpson (1991) accounts for the symmetric Warlpiri data (and the fact that linear order does not play a role) with an appeal to Warlpiri's flat structure. Her 1991 argument is no longer valid with a hierarchical structure of the kind shown in (32). In her original flat structure, the constraint stating that a pronoun may not c-command its antecedent, accounts for the ungrammaticality of the PRO-SUBJ and PRO-OBJ examples, in either relative order, *pronoun* > *antecedent* or *antecedent* > *pronoun*. In the hierarchical structure, one can no longer account for the case where the antecedent appears in the left periphery and the pronoun under S (as in (32)), as the pronoun in that case does not c-command its antecedent, but the sentence is still ungrammatical under the bound reading. This straightforwardly rules out a c-command analysis with a uniform rule for both English and Warlpiri.

Instead, I propose an f-command based analysis. Recall the grammaticality patterns for the non-reflexive data, as shown in Table 1 and repeated in Table 2.

Table 2: Repetition of the possessive binding data contrasting Warlpiri and English

| | Warlpiri | English | Type of sentence |
|---|---|---|---|
| (a) He$_i$ chases J$_i$'s dog. | X | X | PRO is SUBJ |
| (b) J$_i$'s dog chases him$_i$. | X | ✓ | PRO is OBJ |
| (c) His$_i$ dog chases J$_i$. | ✓ | ✓ | POSS PRO in SUBJ |
| (d) J$_i$ chases his$_i$ dog. | ✓ | ✓ | POSS PRO in OBJ |

The constraint which I propose applies to the specific anaphoric element *nyanungu* (present in all of the non-reflexive binding examples presented in Section 4). It is as follows:

(33) Lexically specified constraint on anaphoric element *nyanungu* (in the data presented by Simpson (1991), elicited by Mary Laughren):
***nyanungu* may not f-command a coreferent R-expression**

Here specifically we refer to coreferent R-expressions rather than general antecedents, as this is the only data that is available. In order to generalize to all antecedents one would need data of the kind *His dog chased him* or *He chased his dog* to test if the same constraint applies when the antecedent itself is a pronoun. Currently, the constraint does not rule these examples out. The validity of the constraint in (33) becomes clear when we look at the f-structures for PRO-SUBJ and PRO-OBJ examples:

(34) PRO-SUBJ f-structure:

$$\begin{bmatrix} \text{PRED} & \text{`chase}\langle\text{SUBJ,OBJ}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix}\text{PRED} & \text{`PRO'}\end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{SPEC} & \begin{bmatrix}\text{PRED `J'}\end{bmatrix} \\ \text{PRED} & \text{`dog'}\end{bmatrix}\end{bmatrix}$$

(35) PRO-OBJ f-structure:

$$\begin{bmatrix} \text{PRED} & \text{`chase}\langle\text{SUBJ,OBJ}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{SPEC} & \begin{bmatrix}\text{PRED `J'}\end{bmatrix} \\ \text{PRED} & \text{`dog'}\end{bmatrix} \\ \text{OBJ} & \begin{bmatrix}\text{PRED} & \text{`PRO'}\end{bmatrix}\end{bmatrix}$$

These examples are ungrammatical with coreference, and this can be explained with the constraint in (33), because the pronoun f-commands its antecedent (in both the PRO-SUBJ and PRO-OBJ examples, where the antecedent is an R-expression). The same constraint applies to the examples in which the pronoun is a possessive pronoun:

(36) POSS-IN-SUBJ f-structure:

$$\begin{bmatrix} \text{PRED} & \text{`chase}\langle\text{SUBJ,OBJ}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{SPEC} & \begin{bmatrix}\text{PRED `PRO'}\end{bmatrix} \\ \text{PRED} & \text{`dog'}\end{bmatrix} \\ \text{OBJ} & \begin{bmatrix}\text{PRED `J'}\end{bmatrix}\end{bmatrix}$$

(37) POSS-IN-OBJ f-structure:

$$\begin{bmatrix} \text{PRED} & \text{`chase}\langle\text{SUBJ,OBJ}\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix}\text{PRED `J'}\end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{SPEC} \begin{bmatrix}\text{PRED} & \text{`dog'}\end{bmatrix} \\ \text{PRED `PRO'}\end{bmatrix}\end{bmatrix}$$

The possessive pronoun data is grammatical with coreference, and the reason for this is because in this case the pronoun does not f-command its antecedent. Therefore, one invidual constraint, which is lexically specified for *nyanungu*, accounts for this set of data.

Interestingly, the constraint in (33) suffices to account for the cases in which the pronoun is the subject (PRO-SUBJ) and also the cases in which the pronoun is the object (PRO-OBJ): this means one does not have to make reference to the grammatical function hierarchy to account for the data. Also, as illustrated by the fact that there is no difference in grammaticality between the cases in which the pronoun follows its antecedent or precedes it, it becomes clear that f-precedence also does not need to be included in an analysis. We thus have the one simple binding constraint on *nyanungu* which only makes reference to the relation of f-command and nothing else. This is especially interesting, as it has not been proposed before for any other binding data as far as we are aware.

This constraint can be formalized in the way proposed by Dalrymple (1993). She uses the following templates of positive and negative binding constraints:

(38) a. Positive binding constraint:
$((\text{DomainPath} \uparrow)\ \text{AntecedentPath})_\sigma = \uparrow_\sigma$

b. Negative binding constraint:
$((\text{DomainPath} \uparrow)\ \text{AntecedentPath})_\sigma \neq \uparrow_\sigma$

In these constraints, DomainPath is the f-structure that contains the anaphoric element and its antecedent, and AntecedentPath is the path from the anaphoric element to its antecedent. The up arrow ↑ refers to the f-structure of the anaphoric element itself, and the subscript $\sigma$ refers to s(emantic)-structure. Essentially what these constraints are trying to do is, on s-structure level, equate (for the positive constraint) or not equate (for the negative constraint) an anaphoric element to a particular antecedent. For our constraint we have the formalization in (39):

(39) **Constraint:** *nyanungu* may not f-command a coreferent R-expression (for data represented by Simpson (1991), originally elicited by Mary Laughren):

$$((\text{GF} \uparrow)\ \ \text{GF}^* \underset{\neg(\rightarrow \text{PRONTYPE})}{\text{GF}}\ )_\sigma \neq \uparrow_\sigma$$

Here one can see that the DomainPath is GF, meaning that DomainPath is unconstrained. Importantly, however, there is no functional uncertainty inside DomainPath, meaning that we are always talking about GFs as arguments of the verb (or adjuncts, although I have no data about adjuncts). One can go out from the f-structure of the anaphoric element, and then go as deep into the f-structure containing the antecedent (signified by the functional uncertainty on GF* in AntecedentPath), as long as one ends at a GF which does not have a PRONTYPE, i.e. is an R-expression. This is thus the way to represent f-command, with ≠ representing that it is a negative constraint. Note that this constraint neatly rules out the case where the pronoun f-commands itself, by ensuring that the antecedent does not have a PRONTYPE (because the pronoun itself must have a PRONTYPE).

## 7 Other types of Warlpiri binding data

Another piece of evidence that lexical specification is the way forward, as mentioned, is the fact that it appears that different dialects exist, or even that individual speakers have different constraints on binding. Simpson (1991) does not only give the data displaying symmetry in binding as discussed so far. She also notes that there is data elicited by David Nash, which shows different binding patterns, implying that for the speakers he worked with, linear order does matter. For example, for the PRO-SUBJ examples, he found the following patterns:

(40) PRO-SUBJ examples as elicited by David Nash:

a.

| | | | | |
|---|---|---|---|---|
| *Jakamarra-kurlangu* | *maliki* | *ka* | *nyanungu-rlu* | *wajili-pi-nyi.* |
| Jakamarra-POSS | dog | PRES | he-ERG | chase.NPST |

'He$_i$ chases Jakamarra$_i$'s dog.'

b.

| | | | | |
|---|---|---|---|---|
| *Nyanungu-rlu* | *ka* | *Jakamarra-kurlangu* | *maliki* | *wajili-pi-nyi.* |
| he-ERG | PRES | Jakamarra-POSS | dog | chase.NPST |

*'He$_i$ chases Jakamarra$_i$'s dog.'

(Simpson (1991, p. 179))

Here we see that the PRO-SUBJ example is ungrammatical in the order *pronoun* > *antecedent* (as in Simpson's original data), but that the order *antecedent* > *pronoun* is acceptable for Nash's speakers. Also, Nash found that the PRO-OBJ examples are grammatical, in either order, the opposite of Simpson's findings. Nothing is mentioned on the grammaticality of POSS-IN-SUBJ and POSS-IN-OBJ examples in Nash's speakers. Simpson (1991) mentions Nash's data but bases her own analysis only on the data elicited by Mary Laughren which was presented above. The fact that Nash's speakers show different binding patterns is very interesting; it illustrates that there might be different dialects, or that invidiual speakers have different constraints. In terms of an f-command account of this, there are the following generalizations:

(41) Patterns in Nash's data:

- Grammatical in Nash's data with coreference: PRO-OBJ examples in either order and PRO-SUBJ in order *antecedent* > *pronoun*
- Ungrammatical in Nash's data with coreference: PRO-SUBJ example in order *pronoun* > *antecedent*

Generalizations about Nash's data:

- The f-command relation is irrelevant
- The pronoun *nyanungu* may not both f-precede its antecedent and be higher on the grammatical function hierarchy than the coargument in which the antecedent is embedded

According to these generalizations, it becomes clear that for Nash's data, the analysis is completely the opposite of the data originally presented by Simpson (1991), as f-command does not play a role, but both f-precedence and the grammatical function hierarchy do (at least it does for the argument in which the antecedent is embedded relative to the anaphoric element). This is a piece of evidence in favour of a lexical specification of binding constraints, as one can posit different constraints for different speakers/dialects, without having to posit universal rules.

A second type of evidence of variation is some data that was kindly elicited for me by Margit Bowler (p.c., Aug/Sep 2013). She tested for examples with embedded possessors, to see if embedding deeper than the first possessor of an argument of the verb makes any difference for the grammaticality of the coreference. She elicited the following PRO-OBJ example with a possessor embedded inside a possessor (in the order *antecedent* > *pronoun*):

(42)

| | | | | |
|---|---|---|---|---|
| *Jangala-kurlangu-rlu* | *yipilji-kirlangu-rlu* | *maliki-rli* | *yarlkurnu* | *nyanungu.* |
| Jangala-POSS-ERG | friend-POSS-ERG | dog-ERG | bite.PST | he.ABS |

Jangala$_i$'s friend's dog bit him$_i$.

This example is grammatical with the coreference reading, putting it more in line with Nash's data than the data elicited by Mary Laughren (and analysed by Simpson (1991)). The idea that a speaker would not find coreference acceptable in PRO-OBJ examples with only one possessor inside a coargument of the pronoun (as in Mary Laughren's elicited data), but would find coreference acceptable when the pronoun is coreferent with an even further embedded antecedent, seems unlikely. This example illustrates that variation appears to be quite widespread, and that lexical specification for individual speakers and/or dialects is a way to solve this problem. Two things should be said about the example in (42). Firstly, notice that the ergative case is marked on each part of the subject: on both possessors and on the head. This is uncommon: most of the time, there would only have one case marker (Hale *et al.* , 1995). In this particular sentence an issue is the lack of AUX, because the verb is in the past tense. If an AUX was present, it might be easier to say something more about constituency, with only a limited number of constituents being able to appear before the AUX. Potentially the three different parts of the subject are separate constituents. This is important for an overall c-structure of Warlpiri, but it does not make any difference for an f-command based binding analysis. A second issue with this data is that extensive embedding becomes more difficult to understand for the speaker and listener. Margit Bowler has pointed out that the speakers find it quite difficult to understand/produce sentences like these because of the many suffixes. This is a problem with embedded binding in general: it can become difficult to follow because of the many levels of structure. In any case, I note that this type of variation exists and needs to be accounted for: lexical specification is able to deal with this.

Finally, to give a complete picture, I note that the type of symmetry in the non-reflexive binding data as shown above in a particular dialect of Warlpiri cannot be found in reflexive binding (in at least a particular dialect). Bresnan (2001) provides the following reflexive binding data for English and Warlpiri, noting their similarity:

(43) a. Lucy is hitting herself.
     b. *Herself is hitting Lucy.

(44) a. *Napaljarri-rli* *ka-nyanu* *paka-rni.*
     Napaljarri-ERG PRES-REFL hit.NPST
     'Napaljarri is hitting herself.'
     b. **Napaljarri* *ka-nyanu* *paka-rni.*
     Napaljarri.ABS PRES-REFL hit.NPST
     'Herself is hitting Napaljarri.'

Here we see that the reflexive suffix in Warlpiri, *-nyanu* may not function as the subject and have the object as its antecedent. There is thus an asymmetry between subject and object in this type of reflexive binding. This can be dealt with with lexical specification, in this case by saying that the anaphoric element needs to be bound to a subject in its coargument domain. However, there is an issue here, namely that the reflexive suffix is in fact a bound suffix (to the AUX) and not a free pronoun. If we assume that the suffix projects a PRO on its own in the f-structure, this should not be a problem. The reflexive data in any case reinforces the fact that different binding patterns are attested within one language: not only are individual anaphoric elements constrained in different ways for different dialects/speakers, but different individual anaphoric elements also have different constraints which need to be accounted for. This is not a new finding; this is the reason why the traditional binding conditions A, B and C were introduced. However, lexical specification makes it possible to specify more than three different types of constraints (which is necessary for certain languages, as has been illustrated above), and it makes it possible to posit individual constraints for different dialects/speakers, as appear necessary in Warlpiri.

# 8 Conclusion

In this paper I have proposed an f-command only approach for a set of Warlpiri binding data which was elicited by Mary Laughren and presented by Simpson (1991). This type of analyis is unique in the fact that the grammatical function hierarchy and linear order do not appear to play a role; as far as I am aware, this has never been proposed for any language. I have explained Simpson's (1991) arguments for c-command, but show that in fact, they are no longer valid with her newer structure as proposed in Simpson (1991). Moreover, there does not appear to be a clear need to posit a uniform constraint as Simpson (1991) does. Rather, I propose a simple constraint for the data, which is lexically specified specifically for the anaphoric element *nyanungu*.

Further evidence for lexical specification of binding constraints (along the lines of Dalrymple (1993)) comes from the fact that the binding data shows variation and I believe that there might be several dialects and/or that individual speakers might have different internal constraints. A lexical specification analysis solves this neatly by allowing different dialects/speakers to have different constraints. Data from reflexive binding also shows that the symmetry attested in the non-reflexive binding examples in Simpson (1991) is not attested in reflexive binding, according to Bresnan (2001). This shows that symmetry of binding and therefore the lack of subject/object asymmetries is not an overall characteristic of Warlpiri. This means that this cannot be said to be a characteristic of non-configurational languages (if one were to classify Warlpiri as non-configurational, which I do[11]). This is an interesting outcome: in a classification of non-configurational languages one will need to look for other charactistics. In general, it appears that the issue of configurationality relates to c-structure only, meaning that binding, accounted for in the f-structure, is taken completely out of the domain of configurationality.

# 9 References


Aissen, Judith. 1992. Topic and Focus in Mayan. *Language*, **68**(1), 43–80.

Austin, Peter, & Bresnan, Joan. 1996. Non-configurationality in Australian Aboriginal languages. *Natural Language and Linguistic Theory*, **14(2)**, 215–268.

Bresnan, Joan. 1995. Linear order, syntactic rank, and empty categories: On weak crossover. *Pages 241–274 of:* Dalrymple, Mary, Kaplan, Ronald M., Maxwell, John T., & Zaenen, Annie (eds), *Formal Issues in Lexical-Functional Grammar*. Stanford University: CSLI Publications.

Bresnan, Joan. 2001. *Lexical-Functional Syntax*. Malden, MA; Oxford: Blackwell Publishers Inc.

Chomsky, Noam. 1981. *Lectures on Government and Binding*. Dordrecht: Foris.

Dalrymple, Mary. 1993. *The Syntax of Anaphoric Binding*. Stanford, CA: CSLI.

Dalrymple, Mary. 2001. *Lexical-Functional Grammar*. Syntax and Semantics, vol. 34. San Diego; London: Academic Press.

Dalrymple, Mary, Kaplan, Ron, & King, Tracy Holloway. 2001. Weak crossover and the absence of traces. *In:* Butt, M., & King, T.H. (eds), *Proceedings of the LFG01 Conference*. CSLI Publications.

Grimshaw, Jane. 2005. *Words and Structure*. Stanford, CA: CSLI Publications.


[11] For my PhD thesis I am currently working on a more indepth investigation into the nature of configurationality, which will give more details on these types of issues.

Hale, Kenneth L. 1959. *Walbiri field notes*. Australian Institute of Aboriginal and Torres Strait Islander Studies MS 865 Nos A4540-6, A4589, Ngaliya A4599.

Hale, Kenneth L. 1983. Warlpiri and the grammar of non-configurational languages. *Natural Language and Linguistic Theory*, **1.1**, 5–47.

Hale, Kenneth L, Laughren, Mary, & Simpson, Jane. 1995. Warlpiri Syntax. *Pages 1430–51 of:* Jacobs, Joachim, von Stechow, Arnim, Sternefeld, Wolfgang, & Vennemann, Theo (eds), *Syntax. Ein internationales Handbuch zeitgenössischer Forschung: An International Handbook of Contemporary Research*. Berlin New York: Walter de Gruyter.

Keenan, Edward L., & Comrie, Bernard. 1977. Noun Phrase Accessibility and Universal Grammar. *Linguistic Inquiry*, **8**, 63–99.

King, Tracy Holloway. 1995. *Configuring Topic and Focus in Russian*. Dissertations in Linguistics. Stanford, CA: CSLI.

Kroeger, Paul. 1993. *Phrase Structure and Grammatical Relations in Tagalog*. Dissertations in Linguistics. Stanford, CA: CSLI.

Laughren, Mary. 1999. Constraints on the Pre-auxiliary Position in Warlpiri and the Nature of the Auxiliary. *In:* Henderson, John (ed), *Proceedings of the 1999 Conference of the Australian Linguistic Society*.

Laughren, Mary, Pensalfini, Rob, & Mylne, Tom. 2005. Accounting for verb initial order in an Australian language. *Pages 367–401 of:* Carnie, A., Harley, H., & Dooley, S.A. (eds), *Verb First: On the syntax of verb-initial languages*. Amsterdam & Philadelphia: J. Benjamins.

Legate, Julie Anne. 2002 (August). *Warlpiri: Theoretical Implications*. Ph.D. thesis, Massachusetts Institute of Technology.

Legate, Julie Anne. 2008. Warlpiri and the theory of second position clitics. *Natural Language and Linguistic Theory*, **26**, 3–60.

Nash, David. 1980. *Topics in Warlpiri Grammar*. Ph.D. thesis, MIT. Published in 1986 by Garland, New York.

Simpson, Jane. 1991. *Warlpiri Morpho-Syntax: a Lexicalist Approach*. Studies in Natural Language and Linguistic Theory, vol. 23. Dordrecht: Kluwer Academic Publishers.

Simpson, Jane. 2007. Expressing Pragmatic Constraints on Word Order. *Pages 403–427 of:* Zaenen, Annie, Simpson, Jane, King, Tracy Holloway, Grimshaw, Jane, Maling, Joan, & Manning, Chris (eds), *Architectures, Rules, and Preferences: Variations on Themes by Joan W. Bresnan*. Stanford, CA: CSLI Publications.

Swartz, Stephen. 1988. Pragmatic Structure and Word Order in Warlpiri. *Papers in Australian Linguistics*, **17**, 151–166.

# INFORMATION STRUCTURE AND THE ENGLISH LEFT PERIPHERY

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**Abstract**

This paper uses two English structures with noncanonical word-order (Topicalization and Left-dislocation) as case studies into information-structure (IS). It is argued that topicalized elements have a contrastive IS-interpretation, while left-dislocated ones are like regular topics. Based on these observations, a new framework for IS is proposed, based on the features NEW and D(iscourse)-LINKED. As "contrast" is judged to be essential for the proper characterization of IS, it is integrated into the proposed architecture, as an additional d-linking feature. This framework is argued to be an improved amalgamation of previous IS-architectures.

# 1 Introduction

Languages commonly use a variety of methods to express the information-structural (IS) features of a sentence[1]. Besides intonation and certain morphemes (the Japanese topic marker *wa* is a common example), word order variation is one of the prime tools for such strategies. This is even true for English, a so-called "GF-configurational language", which is commonly assumed to have a relatively fixed word-order.

This paper has two goals. First, I will investigate the information-structural properties of two English structures which utilize word-order variation for such purposes. (1a) and (1b) provide examples for the constructions.

(1) a. *Chris, we like.*
b. *Chris, we like him.*

The common name in the literature for the configuration in (1a) is "Topicalization" (abbreviated as TOP henceforth), while (1b) is most commonly called "Left-Dislocation" (abbreviated as LD). Both feature an argument in a non-canonical, left-peripheral position[2]. The obvious difference between the two is that while in TOP, the canonical position of the fronted

[1] I would like to express my gratitude for the invaluable comments of the two anonymous reviewers of this paper. All remaining errors are of course mine.

[2] Following Birner & Ward (1998), the discussion of TOP and LD is limited to lexically subcategorized elements. Adjuncts can also occur in the left-peripheral position, but their function is more like scene-setting and they occur much more freely than one would expect from topicalized or left-dislocated elements. For example, (ia) could be discourse initial, unlike (ib). I will argue that this is because in (ib), the initial element necessarily has a contrastive interpretation, while in ia it does not.

(i) a. *In New York, there's always something to do.* (could be felicitous discourse-initially)
b. *#In a basket, I put your clothes.* (could not be infelicitous discourse-initially)

constituent is empty, in LD, it is filled with a co-referential resumptive pronoun.

The second goal of the paper is to propose a novel feature-based information-structural framework for LFG, one which is capable of accommodating the various IS-categories that have been put forward in the literature.

Both of these constructions are commonly regarded as topic-marking devices. For instance, Dalrymple (2001: 391) offers the following f-structure for 1a:

(2)

$$\left[\begin{array}{lll} \text{PRED} & \text{like <(SUBJ)(OBJ)>} & \\ \text{TOPIC} & \text{PRED} & [\text{Chris}] \\ \text{SUBJ} & \text{PRED} & [\text{pro}] \\ \text{OBJ} & & \end{array}\right]$$

Although it has been noted (for instance see Dalrymple and Nikola 2011:65-66) that the discourse function labels that appear in f-structures do not necessarily tightly correspond to the exact IS-roles of the elements that bear them, the relationship has not been investigated in depth.

Despite the intuitive appeal of this characterization, not everybody has shared these ideas. There are several functionalist researchers who have called these assumptions into question. For instance, Prince (1999) writes the following about TOP:

> A glance at the literature over the past thirty years shows that this assumption has been maintained by syntacticians as well as by functionalists, although it has never been proven or even, to my knowledge, seriously investigated.

Prince argued in several papers (Prince 1981, 1998, 1999) that rather than being simple topic-marking devices, both TOP and LD may actually have several functions, and marking a topic is crucially *not* one of them. In this paper, I argue that Price's claims are partially correct. The claim that TOP and LD simply mark topics cannot be maintained (especially in the case of TOP), but a more fine-grained view of IS-notions can capture the generalizations about these constructions. In particular, I consider it essential that the LFG approach to IS should integrate the notion of "contrast".

The structure of the paper is the following. In section 2 I investigate the IS-properties of TOP and LD. Section 3 reviews the approaches to IS that has been proposed in the literature. Section 4 outlines a new IS-framework. Section

5 utilizes this framework for the treatment of TOP and LD in the form of annotated phrase-structure rules. Finally, section 6 summarizes the paper.

# 2 Information structure at the English Left-Periphery

## 2.1 Information-structure and Topicalization

That TOP is not simply a topic-marking device is obvious from the fact that topicalized entities may fail the basic topichood-tests, which are the following:

(i) *The "as for X"-test*:
Can the sentence be plausibly paraphrased with an initial "as for X"-phrase, where X is the supposed topic expression?
(ii) *The "what about X"-test:*
Can the sentence plausibly answer a "what about X"-question, where X is the supposed topic expression?
(iii) *The "say about X that…"-test:*
Can the sentence be plausibly reported about using an initial "Y said about X that…"-phrase, where X is the supposed topic expression?

Now consider the following example, from Prince (1999):

(3) a. *Thanks to all who answered my note about asking about gloves. Didn't look at this bb for several days and was astounded that there were 11 answers.* *<u>Some I missed, darn.</u>*

b. *#As for some, I missed them, darn.*

c. A: *#What about some?*
B*: Some I missed, darn.*

d. *#She said about some that she missed them.*

The problem that underlies the intuition that these sentences fail the tests is that the noun phrase *some* is not definite and fails to provide an adequate referent about which the sentence could predicate something. The fact that in (3), the TOP is felicitous nevertheless strongly suggests that the fronted constituent is not a topic.

Prince (1981) has already noted that a topicalized constituent like *Chris* in (1a) may actually serve two distinct functions in the discourse: it can either be some kind of topic or some kind of focus. But what is the exact nature of these topic-like and focus-like entities?

I argue that the fronted phrases in TOP are actually contrastive elements, so TOP marks Contrastive Foci (CF) and Contrastive Topics (CT). To claim this, I need to have a working definition of "contrast". This is not entirely straightforward. One of the earliest definitions of contrastiveness was provided by Chafe (1976). He defined “contrast” as assertion on the part of the speaker that one of “a limited number of candidates” is “correct”. Birner & Ward (1998) criticizes this view on the basis of examples like (4):

(4) *John Smith resigned to accept the position of president of X company” – then you know he resigned. This little nuance you recognize immediately when you’re in corporate life.*

They point out that “it seems unlikely that the speaker is asserting that one little nuance is the ‘correct selection’ from some set of little nuances (Birner and Ward 1998:41).”

Others (e.g. É. Kiss 1998) emphasize the existence of a limited number of candidates, some (e.g. Jacobs 1988) add that these alternatives must be explicitly mentioned in the context.

The definition that I am going to use is from Titov (2013), who asserts that for something to qualify as contrastive, “the set of alternatives must become active in the discourse at the point the sentence containing the contrastive element is uttered. No sooner and no later.” It is important to note that Titov refers to a pragmatic set of alternatives, which are contextually salient entities. This is not the same as a “semantic set of alternatives which is usually taken to form the basis for the interpretation of foci generally (Krifka 2008)”. This is crucial, since for example Kenesei (2006) shows, both New Information Focus (NIF) and Contrastive Focus also know as Identificational Focus) involves set-membership at the level of semantics. The difference according to Kenesei (2006) is that with CF, it is also asserted that the set includes no other members. This may be illustrated with the following dialogue:

(5) a. *Kit* *hívtál* *meg?*
who.$_{acc}$ invited.2SG PREVERB
‘Who did you invite’

b. *Meghívtam* *(például)* *Jánost*$_{NIF}$.
invited.1SG for example John.ACC
‘I invited (for example) John.’

c. *Jánost*$_{CF}$ *hívtam* *meg.*
John.ACC invited.1SG preverb
‘I invited JOHN (and not somebody else).’

According to Kenesei (2006), both the NIF in (5b) and the CF in (5c) would include a reference to a set-membership (“people I invited”) in the semantic representation. However, at the level of pragmatics, it is only CF which evokes alternatives. In other words, only CF signals to the hearers that other candidates are potentially present in the discourse. In section 4, I will make use of this idea by positing that CF evokes sister nodes in a discourse-tree.

As for the CF-use of TOP, Choi (1997), referring to Ward (1988), notes that the fronted phrase actually refers to two discourse elements: one, a set or a scale, and two, a specification of a value or an element in that set on that scale. In this example this would mean that (1a, *Chris, I like*) evokes a set of people that I may like and picks *Chris* as a member of that set. If this is correct, then the sentence meets the criteria for contrastiveness defined by Titov (2013), mentioned earlier: the set of alternatives becomes active in the discourse at the point the sentence containing the contrastive element is uttered. When TOP is used this way, the sentence has only one pitch accent, an H* tone (which Jackendoff 1972 calls A-accent) on the fronted constituent.

In the CT-use of TOP, the sentence has two accents. On the initial expression, it has an L+H* tone. This is called B-accent by Jackendoff (1972), and there is also an A-accent on some later constituent of the sentence. This is exactly the pattern that is associated with CTs (Büring 2003).

There is additional supportive evidence for the claim that TOP may mark contrastive topics. It is generally accepted that topics should be referential (e.g. Reinhart 1981, Lambrecht 1994). Considering this, it is striking that there are several grammatical elements that may be topicalized, but would not count as referential under a basic understanding of the concept: verbs ((6a), (6b)), adjectives (6c) and propositions (6d). If topicalization was about (referential) topics, all these examples would be predicted to be unacceptable.

(6) a. *Surrender, we never will.*
b. *To win, we at least tried.*
c. *Happy, Tom will never be.*
d. *That Tom was a movie star, we would never have guessed.*

The claim that TOPs mark CTs also sheds some light on the question of why they can be used with nonreferential expressions, demonstrated in (6). For reasons that are not clear to me at this point, the referentiality restrictions on Contrastive Topics are lighter than on regular topics. The reasons for this should be subject to further investigation. Nevertheless, the fact remains. For instance, Gécseg (2001) notes that in Hungarian (as in 6b-c), infinitives and adjectives can serve as CTs, unlike regular topics (the same fact holds for foci as well):

| | | | | | | |
|---|---|---|---|---|---|---|
| (7) | a. | *Úszni*$_{CT}$ | *tudok.* | | | (Hungarian) |
| | | swim.INF | can.1SG | | | |
| | | 'To swim, I'm able to.' (as opposed to e.g., skiing) | | | | |
| | b. | *Szép-nek*$_{CT}$ | *szép* | *a* | *húgod.* | |
| | | pretty-DAT | pretty | the | sister.POSS.2SG | |
| | | 'Pretty, your sister in fact is.' (but she may not be smart) | | | | |
| | | (lit.: 'For nice, nice your sister really is.') | | | | |

## 2.2 Information-structure and Left-dislocation

Now let's turn to the other construction with a noncanonical word-order, Left-dislocation. Here the canonical position of the initial element is filled with a resumptive pronoun, as in (1b), *Chris, I like him.*

Prince (1998) claims that there are 3 basic functions for LD:

(i) island-amnesty,
(ii) simplifying discourse processing,
(iii) signaling a "poset-inference."

In the first use, it is actually applied as covert topicalization. The speaker would like to use TOP, but faces a syntactic obstacle, e.g. an island, and thus is forced to put a resumptive pronoun in the canonical position of the initial element. One such example is shown in (8).[3]

(8) *Chris, the story about *(him) was funny.*

In this case, it cannot be decided whether the speaker uses TOP or LD, as he/she is constrained by syntax. The context and the intonation would clarify this, but as this use is clearly forced by core syntax and has nothing to do with Information-structure, I exclude it from the scope of this paper.

The second function of LD is "simplifying discourse processing." According to Prince (1998), this means that by using LD, people remove discourse-new entities from positions that are dispreferred by them. Prince's (1998) example for this is the following segment:

[3] While in some languages, the distribution of gaps and resumptive pronouns is more complex, it is a fairly uncontroversial generalization in the literature that English uses resumptive pronouns for a very restricted set of purposes. Their main function is to neutralize island-violations like the one in (8), and possibly they can be inserted in some sentences for parsing purposes, for instance in (iib) from Falk (2002).

(ii) a. *This is the girl that John likes (*her).*
b. *This is the girl that Peter said that John thinks that yesterday his mother had given some cakes to ?(her).*

(9) *My sister got stabbed. She died. Two of my sisters were living together on 18$^{th}$ Street. They had gone to bed, and this man, their girlfriend's husband, came in. He started fussing with my sister and she started to scream. <u>The landlady, she went up, and he laid her out.</u> So sister went to get a wash cloth to put on her, he stabbed her in the back.*

According to Prince (1998), the landlady in its original position would be a subject and subjects are generally dispreferred as discourse-new entities.[4] One can also approach this from the perspective of Lambrecht's (1994: 185) "Principle of the separation of reference and role": do not introduce a referent and talk about it in the same clause.

The third use of LD according to Prince (1998) is to trigger an inference on the part of the hearer that the entity represented by the initial NP stands in a salient partially-ordered set relation to some entity or entities already evoked in the discourse-model. Partially ordered sets, "posets" are "defined by a partial ordering *R* on some set of entities, e, such that, for all *e*-1, *e*-2, and *e*-3 that are elements of *e*, *R* is either reflexive, transitive, and antisymmetric or, alternatively, irreflexive, transitive, and asymmetric" (Prince 1998). In essence, this means that the left-dislocated entity has some set relation with other elements.

Prince (1998) sees these functions as unrelated entities. However, subsequent research suggests that there may be a way to have a unified view of functions 2 and 3 (as was stated, the first function is set aside in this paper).

Gregory & Michaelis (2001) have conducted a corpus study on TOP and LD. They suggest that the overarching function of LD is that of "topic promotion", that is, to bring entities into the discourse. They have compared all the LD tokens with all the TOP tokens and have found 3 factors that back up this claim.

First, they examined the givenness of LDs, compared to TOPs. They used Gundel, Hedberg & Zacharski's (1993) cognitive statuses to determine the referential givenness of an element in the discourse. These are (from the lowest to the highest givenness): type identifiable, referential, uniquely identifiable, familiar, activated, in focus. In (9) there is an example for each status (examples (9a) to (9e) are from Gundel, Hedberg & Zacharski 1993).

(10) *I couldn't sleep last night,*
  a. Type identifiable: *<u>A</u> dog (next door) kept me awake.*
  b. Referential: *<u>This</u> dog (next door) kept me awake.*
  c. Uniquely identifiable: *<u>The</u> dog (next door) kept me awake.*
  d. Familiar: *<u>That</u> dog (next door) kept me awake.*
  e. Activated: *<u>That</u> kept me awake.*

[4] There is a traditionally assumed connection between subjecthood and topichood, see Lambrecht (1994), chapter 4.2.

f. In focus: *I couldn't sleep last night because of your dog. It. kept barking.*

The authors found that LD has relatively low givenness in the discourse, the most typical givenness status being uniquely identifiable. According to Gregory and Michaelis (2001), this is expected if LD is a topic-promotion device, since "uniquely identifiable status alone represents the intersection of discourse-new and hearer-old statuses," entities that can be identified by the hearer, but are not in the current discourse yet. TOPs, on the other hand, had higher activation status, which is expected if they are contrasted to some discourse elements, as was established in the previous section.

Gregory & Michaelis's (2001) second target for investigation was the anaphoricity of left-dislocated and topicalized entities. They categorized tokens according to the type of the anaphoric link that the fronted element had to the discourse (from highest to lowest): directly mentioned, the entity is member of a set that has been mentioned, none. They found that LDs tended to have low anaphoricity, which is expected if their role is topic promotion.

Gregory & Michaelis (2001)'s final factor was topic persistence. They measured to what extent the fronted elements in LD and TOP tend to remain topics of the subsequent discourse. They found that LD has a high topic persistence, as opposed to TOP. This is in line with what we have discussed in connection with these structures: LD is a topic promoter, so one expects that the entity introduced by it is going to be talked about. We do not have such expectations for contrasted elements introduced by TOP.

The conclusion that may be drawn from these observations is that it is plausible to regard LD as a topic-marking device, if we define "topic" in the way that for instance Gazdik (2011) does. Her term is "thematic shifter", and it is seen as a discourse function whose role is either to introduce a new discourse-topic or to open a new subtopic of an existing one.

Seeing LD as a topic-marking device gets additional support from the fact that nonreferential left-dislocated meanings are quite infelicitous:

(11) a. *#Surrender, we will never do so.*
b. *#Happy, Tom will never be like that.*
c. *?That Tom was a movie star, we would have never guessed that.*

## 3 Information-structure taxonomies

Since Choi (1996) and Butt & King (1996), IS is viewed as an independent level of representation in LFG, where the sentences' discourse-contextual and information packaging characteristics are represented[5].

Choi (1996), in her account of German and Korean scrambling, was one of the first researchers to incorporate information-structure in an analysis in an LFG-setting. She proposed that information-structural notions could be decomposed into feature matrices. Choi's framework involved two independent features: PROM(inent) and NEW. These features could have either positive or negative specifications, yielding the following taxonomy for IS-categories:

| | + NEW | – NEW |
|---|---|---|
| + PROM | Contrastive Focus | Topic |
| – PROM | Completive Focus | Tail |

**Figure 1.**
IS-taxonomy of Choi (1996)

In this framework, + PROM means that the discourse function is prominent in the discourse and + NEW means that it introduces novel information.

The decompositional approach has been very influential. Butt & King (1996) offered another version of it, as they accounted for word-order in Urdu and Turkish. They used the same features, but the set of discourse functions occupying the taxonomy is different:

| | + NEW | – NEW |
|---|---|---|
| + PROM | Focus | Topic |
| – PROM | Completive Information | Background Information |

**Figure 2.**
IS-taxonomy of Butt & King (1996)

This framework has been used in several subsequent approaches, see e.g. Butt & King (1997), Dalrymple & Nikolaeva (2011) and Mycock (2013).

Cook & Payne (2006) replaced PROM with TOPICAL and they also enriched the feature-set, adding a CONTRASTIVE feature. The meanings of TOPICAL and NEW remained fairly obscure. Also, this move doubled the available discourse functions, including an unattested one (Contrastive Tail).

[5] For space-limitations, I cannot review every LFG-work about IS. Apart from the ones discussed, the reader might also be referred to Andreasson (2007) and Sulger (2009).

| | | + NEW | – NEW |
|---|---|---|---|
| + TOPICAL | + CONTRASTIVE | Contrastive New-information Topic | Contrastive Old-information Topic |
| | – CONTRASTIVE | New-information Topic | Old-information Topic |
| – TOPICAL | + CONTRASTIVE | Contrastive Focus | Contrastive Tail |
| | – CONTRASTIVE | Non-contrastive Focus | Tail |

**Figure 3.**
IS-taxonomy of Cook & Payne (2006)

Gazdik (2011) kept the PROM feature but replaced NEW by D(iscourse)-LINKED. Also, in Gazdik's system, IS is integrated into a wider representation of discourse-structure. This means that several IS-categories can occupy one slot in the taxonomy and it is the discourse context that ultimately specifies which discourse function is assigned to which element in the sentence.

| | + D-LINKED | – D-LINKED |
|---|---|---|
| + PROM | Thematic Shifter, Contrastive Topic | Focus, Hocus[6] |
| – PROM | Background Information | Completive Information |

**Figure 4.**
IS-taxonomy of Gazdik (2011)

As we can see, the landscape is not very clear. Three main issues obscure the view: i. it is not clear how many discourse functions we should distinguish, ii. it is not clear what features we should use, and iii. it is often inadequately defined what these features really mean.

A closely related problem to the first and second issues is the status of "contrast". With the exception of Cook & Payne (2006), the LFG-taxonomies do not recognize contrast as a feature of information-structure. This appears to go against the current in generative linguistics. Several authors have argued in the Minimalist tradition that contrast is an independent notion of IS, and it plays an important role in a number of pragmatico-syntactic phenomena (see for example É. Kiss (1998), Molnár (2002) or Lopez (2009).

For instance, Neeleman et al. (2009) propose the following taxonomy:

[6] Hocus was originally proposed by Kálmán (1985), for newsworthy preverbal NPs in a neutral Hungarian sentences. I assume that they can be regarded as New Information Foci, but further research has to be done on this issue.

| | TOPIC | FOCUS |
|---|---|---|
| + CONTRASTIVE | Contrastive Topic | Contrastive |
| – CONTRASTIVE | Non-contrastive Topic | Non-contrastive Focus |

**Figure 6.**
IS-taxonomy of Neeleman et al. (2011)

They deem it necessary to set up a taxonomy like this because one can find linguistic phenomena that make reference to the individual features in it.

For example, A-scrambling in Dutch is possible with elements that bear contrastive IS-categories, Contrastive Topics and Contrastive Foci.

(12) a. *Ik geloof dat <u>alleen DIT boek</u>$_{CF}$ Jan Marie gegeven*
I believe that only this book John Mary given
*heeft.*
has
'I believe that John has given only this book to Mary.'

b. *Ik geloof dat <u>zo'n boek</u>$_{CT}$ alleen JAN Marie gegeven*
I believe that such-a book only John Mary given
*heeft.*
has
'I believe that only John has given such a book to Mary.'

Additionally, I have argued in section 2 that TOP is also a construction that involves contrastive discourse functions.

Next, Neeleman et al. (2009) argue that the distribution of the marker *wa* in Japanese indicates the generalization that the feature TOPIC is licensed in clause-initial position. That is, *wa* is a marker for topic, be they contrastive or non-contrastive ones. (13a) is an example for a non-contrastive *wa*-marked topic, while (13b) is a contrastive one.

(13) a. A: *Tell me about that dog.*
B: *Sono <u>inu-wa</u>$_{TOPIC}$ kinoo John-o kande - simatta.*
that dog-WA yesterday John-ACC bite - closed
'The dog bit John yesterday.'

b. A: *What did John eat at the party yesterday?*
B: *Hmm, John-wa doo-ka sira-nai-kedo,*
('Well, I don't know about John, but…)
*<u>Bill-wa</u>$_{CT}$ 8-zi-goro MAME-O tabeteita (yo).*
Bill-WA 8 o'clock-around beans-ACC eating (PRT)
'As for Bill, he was eating beans around 8 o'clock.'

Finally, Neeleman et al. (2009) argue that in Russian, the feature FOCUS is licensed in a clause-final position. This generalization on the surface only holds for New-information Focus (NIF), as illustrated by (14).

| | | |
|---|---|---|
| (14) | A: *Čto Saša čitajet?* ' | B: *Saša čitajet kniguNIF.* |
| | what.ACC Sasa reads | Sasa reads book.ACC |
| | 'What does Sasa read? | 'Sasa reads a book' |

Neeleman et al. (2009) argue, however that while CF is normally left-peripheral, it ends up there as a result of movement. The launching site is clause-final, just as in the case of NIF. Arguments to support this position come from the complementary distribution of CF and NIF (no sentence in Russian can contain both of them), scope relations (while scope in Russian is generally dictated by surface order, CFs always take narrow scope, even though they are at the beginning of the sentence) and the possibility of split scrambling, where part of a scrambled material remains in the original position of the constituent, as illustrated by (15).

(15) *JAZ-PIANISTACF mal'čiki slyšhali [vystuplenije]CF*
jazz pianist-GEN boys.NOM heard performance-ACC
*(a ne jaz-gitarista).*
(and not jazz- guitarist.GEN)
'The boys listened to the performance of the jazz pianist and not of the jazz guitarist.'

Although an LFG-analysis (without "movement") would provide a different account of the Russian facts, the point is that the presence of CONTRAST causes syntactic differences that are problematic to account for if the feature itself is not integrated into the system.

## 4 A new proposal for information-structure

In this section I aim to construct an IS-taxonomy that builds on all the previous approaches and also improves upon them. The improvement involves two aspects: firstly, my proposal will include all (and only) the well-established IS-categories, and secondly, I will attempt to provide a clearer definition of the features than the existing frameworks do. My suggestion is shown in figure 7.

<table>
<tr><td colspan="2"></td><td>+ NEW</td><td>– NEW</td></tr>
<tr><td rowspan="2">+ D-LINKED</td><td>+ CONTRASTIVE</td><td>Contrastive Focus</td><td>Contrastive Topic</td></tr>
<tr><td>– CONTRASTIVE</td><td>New Information Focus</td><td>Topic</td></tr>
<tr><td colspan="2">– D-LINKED</td><td>Completive Information</td><td>Background Information</td></tr>
</table>

**Figure 7.**
The proposed IS-taxonomy

As can be seen, six discourse functions are distinguished with the features NEW, D-LINKED and CONTRASTIVE. Now the task is to provide a definition for these labels.

Let's begin with NEW. As established in Gundel (1988) and Lambrecht (1994), (and also noted in Mycock 2013) it is crucial to distinguish between two kinds of newness: referential and relational. If something is referentially new, it introduces information that has not been present in the discourse. The information can come from several sources, e.g. it can be explicitly mentioned in the discourse, or it may be generally known background information. In Gundel's and Fretheim's (2004:176) words, "referential givenness-newness involves a relation between a linguistic expression and a corresponding non-linguistic entity in the speaker/hearer's mind, the discourse (model), or some real or possible world, depending on where the referents or corresponding meanings of these linguistic expressions are assumed to reside." This definition is not the one that I will use. The other "relational" sense provides a much more fruitful way to think about NEW. It means an element provides new information in relation to the logical subject of the sentence. Let's illuminate this with an example from Lambrecht (1994).

(16) A: *When did you move to Switzerland?*
B: *When I was sixteen.*

As Lambrecht (1994:48) notes, "what constitutes the information conveyed by this answer is not the fact that at some point in his life the speaker was seventeen (…) but the RELATION (emphasis by Lambrecht) established between an act of moving to Switzerland, the person involved in that act, and the time at which the moving occurred". In other words, the answer provides a value for X in the proposition evoked by the question: *I was X (years old) when I moved to Switzerland.* So, using Lambrecht's (1994) terminology, +NEW elements in a sentence are part of the assertion, while –NEW elements are part of the presupposition.

To define discourse-linking and contrast, I assume that discourses have their internal structures which are plausibly represented by the kinds of discourse-trees proposed by Büring (2003). Once this assumption is made, we have a ready tool to define D-LINKED and CONTRASTIVE.

A discourse function is D-LINKED if its interpretation is dependent on a specific configuration in a discourse tree. In particular, it is common in the D-LINKED IS-categories that they are related to a Question Under Discussion (QUD, Büring 2003). This is enough for the non-contrastive categories, Topic and New Information Focus. I must note that the way I understand "topic" follows Gazdik (2011), as "the constituent that links the sentence to the preceding discourse by introducing a subtopic of the discourse topic". This discourse topic is the QUD (as was noted in 2.2, "thematic shifter" is also a possible label). New Information Focus is also related to a QUD, but in this case the QUD is a question, to which NIF provides an answer. These are illustrated in figures 8a and 8b. One may observe that these are all vertical relations in a discourse tree.

QUD: *I tell you about my friend.*

*Jack*$_{\text{TOPIC}}$ *bought a Chevrolet.*

**Figure 8a.**
Topic in a discourse-tree.

QUD: *What car did Jack buy?*

*Jack bought a Chevrolet*$_{\text{NIF}}$.

**Figure 8b.**
NIF in a discourse-tree.

Continuing this line of reasoning, "contrast" can be defined as an additional discourse-linking feature. Let's restate Titov's (2013) definition of contrast, from section 2: for something to qualify as contrastive, a set of alternatives must become active in the discourse at the point the sentence containing the contrastive element is uttered. In the context of discourse-trees, this means that additional, horizontal nodes become active in a discourse-tree, when a +CONTRASTIVE element is contained in the sentence. This is illustrated by figures 9a and 9b.

QUD: *What car did Chris buy?*

*Did he buy a Chevrolet?* *Did he buy a Chevrolet?*

*?* *YES*

*A Chevrolet*$_{\text{CT}}$*, Jack bought (but I don't know about a Chevrolet).*

**Figure 9a.**
Contrastive Topic in a discourse-tree.

(10a) shows that when a sentence contains a CT, it evokes alternative questions in the discourse tree. An answer to the alternative questions is not necessarily provided. On the other hand, Contrastive Focus also evokes these alternative questions, but it also provides an answer to them (Titov 2013).

QUD: *What car did Jack buy?*

*Did he buy a Chevrolet?* *Did he buy a Chevrolet?*

*NO* *YES*

*A CHEVROLET*$_{CF}$ *Jack bought (and not a Chevrolet).*

**Figure 9b.**

Contrastive Focus in a discourse-tree.

The non-D-LINKED discourse functions are Completive Information and Background Information. Completive Information is new, additional information in the assertion, like *yesterday* is (17a). Background Information is repeated information from the presupposition, like *yesterday* in (17b).

(17) a A: *What car did John buy?*
B: *John bought a Chevrolet yesterday*$_{COMP\ INF}$.

b A: *What car did John buy yesterday?*
B: *John bought a Chevrolet yesterday*$_{BACKG\ INF}$.

These are not dependent on such discourse-configurations; they can be added to any discourse situation.

Before the last section, let me make some comments on the feature PROM, as it has been used in several IS taxonomies in LFG. The reason why I have discarded it is that it is very problematic to define what "prominence" really is. Firstly, it is relational notion, so an element can be prominent only as compared to another element. Furthermore, the label PROM may cause confusion because prominence can be defined at various levels.

For instance, Mycock (2013) suggests that question-words may populate the taxonomy of Butt & King (1996) if a Q feature is posited for them. The resulting system is this:

| | + NEW | – NEW |
|---|---|---|
| + PROM | Focus | Topic |
| | **Q: Questioning Focus** | **Q: Sorting key** |
| – PROM | Completive Information | Background Information |
| | **Q: Non-sorting key** | **Q: Echo-question** |

**Figure 10.**

The taxonomy of question words in Mycock (2013)

In this system, echo-questions are –PROM. However, they clearly have a high degree of phonetic prominence.

(18) A: *John bought a Chevrolet.*
B: *John bought WHAT*$_{ECHO\text{-}Q}$*?*

Finally, as Mycock (2013) acknowledges, prominence is an inherently graded notion and this is obscured by the binary system.

Nevertheless, Mycock's (2013) system offers some intriguing cross-linguistic generalizations involving PROM. In particular, she introduces the Principle of Relative Prominence Encoding.

(19) Principle of Relative Prominence Encoding: A −PROM question word will only be syntactically "highlighted" in a language (i.e. appear ex situ, as the filler element in a long-distance dependency) if its +PROM question word counterpart is also by default syntactically highlighted.

This means that for example one cannot find a language where non-sorting key question-words are highlighted, but a sorting keys are not[7]. The situation is similar with Questioning Foci and Echo-questions.

This is a valuable generalization, one that should be reflected in the system proposed by this paper as well. Thus, I propose that PROM is best viewed as an emergent notion, one that is the result of newness and discourse-linkedness. If we assume that +NEW is more prominent than –NEW and +D-LINKED is more prominent than –D-LINKED, then Mycock's (2013) insights could be integrated into my framework this way:

<table>
<tr><td colspan="2"></td><td>+ NEW</td><td>− NEW</td></tr>
<tr><td rowspan="2">+ D-LINKED</td><td>+ CONTRASTIVE</td><td>Contrastive Focus</td><td>Contrastive Topic</td></tr>
<tr><td>− CONTRASTIVE</td><td>New Information Focus<br>**Q: Questioning Focus**</td><td>Topic<br>**Q: Sorting key**</td></tr>
<tr><td colspan="2">− D-LINKED</td><td>Completive Information<br>**Q: Non-sorting key**</td><td>Background Information<br>**Q: Echo question**</td></tr>
</table>

**Figure 11.**
A possible integration with Mycock (2013)

(20) Order of question-word prominence:
Questioning focus > Sorting key > Non-sorting key > Echo question

[7] In an interrogative sentence with multiple question words, the sorting key is the question word according to which the answer is expected to organize the information. In (ii), *who* is the sorting key. The other question word(s) are non-sorting keys.

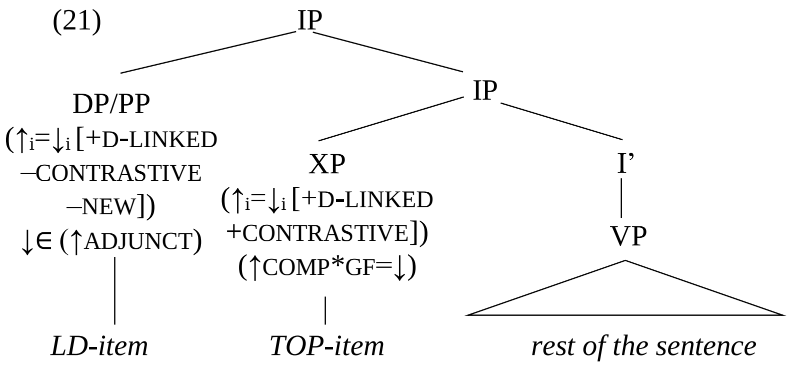
ii) Q: *Who bought what?*
A: *Mark bought a Chevrolet and Kate bought a Cadillac.*

I have to admit that this last section is speculative. There are some obvious problems like the lack of question word-types in the +CONTRASTIVE row. One could hypothesize that contrast and Q are somehow incompatible. However, at present, I cannot add further details to this point and must leave it to further research. Nevertheless, I think the system proposed is promising and is not incompatible with previous approaches, which is a desirable trait for progress.

## 5 The English Left-Periphery

In this last section I return to TOP and LD and offer some tentative LFG phrase structure rules for English, using the proposed IS system.

(21)




So I propose that the fronted elements are attached via IP-adjunction. The LD-topic is an adjunct because the clause itself is complete without it. The left-dislocated element is usually represented as a resumptive pronoun. It must be noted that although the configuration with a resumptive subject is the most common case, this is not a necessity. Lambrecht (1994) offers the following LD-example:

(22) *Tulips, you have to plant new bulbs every year?*

Fronted adjunct PPs which serve a scene-setting role may also be assumed to be a case of LD. These are different from TOP, which involves arguments and can never be discourse initial (see footnote 2).

Topicalized constituents are arguments and must have some grammatical function in the clause. Also, various constraints can be specified about the path of TOP (see Dalrymple 2001: 395 and references therein).

As a reviewer rightly notes, various questions remain. For example, it should be investigated why the result is degraded if a sentence contains both a left-dislocated and a topicalized constituent. The degradation is even more pronounced if the LD-item is an adjunct PP.

(23) a. ?*Chris*$_{TOPIC}$*, a Chevrolet*$_{CT}$ *he did buy.*
b. **In June*$_{TOPIC}$*, a Chevrolet*$_{CT}$ *I did buy.*

One may approach this issue from the perspective of sentence processing and argue that too much initial material causes processing difficulties. In (23b), the PP in principle could receive an analysis in which it is a topicalized element. In this case two constituent would aspire for the single TOP-slot, leading to ungrammaticality. (23a) is unambiguous in this respect, the resumptive pronoun is a clear indication that it is a left-dislocated element. The fact that ambiguity worsens the situation could support a processing based explanation.

An alternative would be to say that there is just one left-peripheral position, so a sentence can only contain either a TOP or an LD. But we need to note that question words do occur in sentences with LD, so there must be a possible position for them. It might be conceived that (24) is uttered by someone entering a room, looking for *Chris*. The sentence is quite bad as a TOP-sentence, without the resumptive pronoun.

(24) a . *Chris, where is *(he)?*
b. *Chris, where did he buy what?*

*Where* in (24a) is a questioning focus and a sorting key in (24b). These are non-contrastive categories, their presence indicates that the Q feature must have a crucial role in licensing. The phrase-structure in (21) does not cover these cases, so there is much room for further research.

## 6 Summary

In this paper I investigated the nature of information-structure, using two English "fronting" constructions, Topicalization and Left-dislocation as case studies. I argued that Topicalization involves contrastive discourse functions (Contrastive Focus and Contrastive Topic), while Left-dislocation is a marker for Topics (interpreted as thematic shifters). To implement this into LFG, I proposed a new information-structural architecture, using the features NEW, D-LINKED and CONTRASTIVE. This framework builds on previous approaches and also improves upon them.

Various questions remain with the proposed framework, especially with the phrase-structure implementation. Also, Mycock (personal communication) remarks that the definition of features, most crucially the D-LINKED feature is still not satisfactory. Even so, I hope that this paper offers some valuable additions to the current interest in the information-structure-syntax interface.

## References


Andreasson**,** Maia. (2007). The architecture of i-structure. In Butt, Miriam & King, Tracy Holloway (eds.), *Proceedings of the LFG07 Conference*. Stanford: CSLI Publications, 26-43.

Birner, Betty & Gregory Ward (1998). *Information status and noncanonical word order in English*. Amsterdam/Philadelphia: John Benjamins Company.

Butt, Miriam. & King, Tracy Holloway (1996). Structural topic and focus without movement. In Butt, Miriam & King, Tracy Holloway (eds.), *Proceedings of the LFG96 Conference*. Stanford: CSLI Publications.

Büring, Daniel. (2003). On d-trees, beans, and b-accents. *Linguistics & Philosophy*, 26(5), 511–545.

Dalrymple, Mary & Nikolaeva, Irina. (2011). *Objects and information structure*. Cambridge: Cambridge University Press.

Chafe, Wallace. (1976). Givenness, contrastiveness, definiteness, subjects, topics, and point of) view. In Charles Li (ed.), *Subject and Topic*. New York: Academic Press, 25-55.

Choi, Hye-Won. (1996). *Optimizing structure in context*. Doctoral dissertation, Stanford University.

Cook, Philippa & Payne, John. (2006). Information structure and scope in German. In In Butt, Miriam & King, Tracy Holloway (eds.), *Proceedings of the LFG06 Conference*. Stanford: CSLI Publications, 124–144.

Dalrymple, Mary. (2001). *Lexical Functional Grammar*. San Diego: Academic Press.

É. Kiss, Katalin. (1998). Identificational Focus versus Information Focus. *Language* 74, 245-273.

Gazdik, Anna. (2011). *Multiple Questions in French and Hungarian.* Université Paris Diderot & Eötvös Loránd University, Doctoral dissertation.

Gregory, Michelle. L. & Michaelis, Laura A. (2001). Topicalization and left-dislocation: A functional opposition revisited. *Journal of Pragmatics*. 33. 1665–1706.

Gundel, Jeanette K., Hedberg, Nancy & Zacharski Ron. (1993). Cognitive status and the form of referring expressions in discourse. *Language* 69:274-307.

Gundel, Jeanette K. & Fretheim, Thorstein. (2004). Topic and focus. In Horn, Laurence R. & Ward, Gregory (eds.), *The Handbook of Pragmatics*, 175-196. Blackwell Publishing.

Jackendoff, Ray. (1972). *Semantic interpretation in generative grammar*. Cambridge: MIT Press.

Jacobs, Joachim. (1988). Fokus-Hinter grund-Gliederung und Grammatik. In H. Altmann (ed.) *Intonationsforschungen*, 89-134. (Linguistische Arbeiten 200). Tubingen: Niemeyer.

Kálmán, László. (1985). Word Order in Neutral Sentences. *Approaches to Hungarian 1*, 13–23.

Kenesei, I. (2006). Focus as identification. In Valéria, Molnár and Susanne Winkler (eds.), *The architecture of focus*. Berlin – New York: Mouton de Gruyter, 137-168.

Krifka, Manfred. (2008). Basic notions of information structure. *Acta Linguistica Hungarica* 55, 243-276.

Lambrecht, Knud. (1994). *Information structure and sentence form*. Cambridge: Cambridge University Press.

Lopez, Luis. (2009). *A Derivational Syntax for Information Structure.* Oxford Studies in Theoretical Linguistics 23, Oxford University Press.

Molnár, Valéria. (2002). Contrast - from a contrastive perspective. Information *Structure in a Cross-Linguistic Perspective*, 147-161. Editions Rodopi.

Mycock, Louise (2013). Discourse Functions of Question Words. In Butt, Miriam & King, Tracy Holloway (eds.), *Proceedings of the LFG13 Conference*, 419-439.

Neeleman, Ad, Titov, Elena, van de Koot, Hans. & Vermeulen, Reiko. (2009). A syntactic typology of topic, focus and contrast. In Van Craenenbroeck, Jeroen (ed.). *Alternatives to Cartography* (pp.15-52). Berlin: Mouton de Gruyter.

Prince, Ellen. (1981). Topicalization, Focus-Movement, and Yiddish-Movement: A pragmatic differentiation. *Berkeley Linguistics Society* 7, 249-64.

Prince, Ellen. (1998). On the limits of syntax, with reference to left-dislocation and topicalization. In Peter Cullicover, Louise McNally (eds.), *Syntax and Semantics 29 - The limits of syntax*. New York: Academic Press.

Prince, Ellen. (1999). How not to mark topics: 'Topicalization' in English and Yiddish. In *Texas Linguistics Forum*, Chapter 8. Austin: University of Texas.

Reinhart, Tanya. (1981). Pragmatics and linguistics: an analysis of sentence topics. *Philosophica* 27, 53-94.

Sulger, Sebastian. (2009). Irish clefting and Information-Structure. In Butt, Miriam & King, Tracy Holloway (eds.), *Proceedings of the LFG09 Conference*. Stanford: CSLI Publications, 562-582.

Titov, Elena. (2013). Do contrastive topics exist? *Journal of Linguistics*, Vol. 49, Issue 2, 413-454.

Ward, Gregory. (1988). *The semantics and pragmatics of preposing*. NY/London: Garland Publishing.

# DISTRIBUTIONAL DIFFERENCES BETWEEN OLD ENGLISH MAIN CLAUSES WITH AND WITHOUT A CONJUNCTION

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**Abstract**

Old English main clauses and main clauses introduced by a conjunction pattern differently in terms of verb placement and topicalization. An LFG model is proposed to capture these differences. It allows conjunctions to be inserted under `C`, thereby blocking the `CP`-layer as a locus for finite verbs and topics. The model is supported by a statistical examination of relevant word order patterns in the extant Old English text corpus.

# 1 Introduction

A distinction is commonly made between Old English ordinary main clauses and those main clauses that are introduced by a conjunction like *and* 'and', *ac* 'but' or *ne* 'nor' (e.g., Mitchell 1985: 694, 967; Bech 2001: 86-93). The reason is that there are two pervasive word order differences between these two clause types.

Firstly, in contrast to main clauses (henceforth MC), main clauses with a conjunction (henceforth CC) show substantial rates of verb-final patterns, as in (1).[1]

(1) **&** hie þa Romane be þara biscepa lare hie swa cuce *bebyrgdan*
and they the Romans by the bishops' lore them thus alive buried
'And the Romans buried them alive according to the bishops' teaching'
(coorosiu,Or_4:7.98.9.2019)

Secondly, preposing of a non-subject constituent in front of a subject, commonly referred to as 'topicalization', is more common in MCs than in CCs. That is to say, constituent fronting is more likely in a sentence such as (2a), where the topic appears in clause-initial position, than in a sentence like (2b), which is introduced by a conjunction.

(2) a. [$_{\text{DP}}$ Todældu wæteru ] we lætað ut of urum eagum
divided waters we let out of our eyes
'We let the divided waters out of our eyes'
(cocura,CP:53.413.27.2858)

b. **and** [$_{\text{DP}}$ þone sang ] we sungon unseldon mid heom
and the song we sang frequently with them
'And we frequently sang the song with them'
(coaelive,ÆLS_[Swithun]:262.4384)

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[1]Many Old English manuscripts include the so-called 'Tironian note *ond*' for the word 'and.' It looks like '7' but is rendered here as the ampersand sign '&.'

In this paper, I will present an LFG model of Old English main clauses with and without conjunctions that accounts for these distributional differences. Section 2 formalizes the verb placement facts. Section 3 supports the proposed model with empirical data from the extant Old English text corpus. Sections 4 and 5 do the same for the topicalization facts. Section 6 concludes.[2]

# 2 Formal Analysis I: Verb Placement

In this section, I formalize the distributional difference in verb placement between Old English MCs and CCs. I will first analyze possible verb positions in Old English, then introduce the concept of C-head conjunctions and finally show how the resulting model accounts for the observed clause type effect.

## 2.1 Verb Positions in Old English

I will follow the analysis of Old English verb placement patterns as laid out in Pintzuk (1999). Subject pronouns play an important role in this description as diagnostic elements because they can occur in only one fixed position, namely the specifier of `IP`. Pronominal subjects are underlined in the following examples.

The finite verb in "ordinary" main clauses, i.e. in positive, indicative declaratives, is positioned in `I`, the lowest possible position for finite verbs in Old English. Pronominal subjects will therefore unvaryingly occur before the finite verb and after preposed constituents, (3a). Full subjects, on the other hand, can be placed in a lower position, the specifier of `VP`, creating verb-second patterns, (3b).

(3) a. þis bebod [$_{\text{IP}}$ ic *nam* æt minum Fæder ]
this command I took at my father
'I received this command from my father'
(cowsgosp,Jn_[WSCp]:10.18.6634)

b. ðæne aþ [$_{\text{IP}}$ *nam* Wulfsige se scirigman ]
the oath took Wulfsige the sheriff
'Sheriff Wulfsige received the oath'
(codocu3,Ch_1458_[Rob_41]:36.50)

The head `I` can be variably headed with respect to its complement, `VP`, i.e. the model of Old English can generate both head-final (e.g. object-verb) as well as head-initial (e.g. verb-object) `IP`s, (4). This is true for main as well as subordinate clauses. For example, (5a) illustrates a head-initial, (5b) a head-final `IP`. The particle *ut* 'out' is a diagnostic identifying the position of `VP`.

[2]The syntactically parsed *York Corpus of Old English, YCOE* (Taylor et al. 2003) is the source for all examples, their citation, and the statistical counts that the generalizations described here are based on. I followed the annotation scheme of the YCOE to determine whether a clause was to be counted as main, coordinated, or subordinate. Appendix 1 lists all electronic text files that were included in the quantitative analyses.

(4) $\mathrm{I'} \rightarrow \left\{ \begin{array}{ll} \mathrm{VP} & \mathrm{I} \\ \uparrow=\downarrow & \uparrow=\downarrow \end{array} \;\middle|\; \begin{array}{ll} \mathrm{I} & \mathrm{VP} \\ \uparrow=\downarrow & \uparrow=\downarrow \end{array} \right\}$

(5) a. þa yflan [$_{IP}$ hig *awurpon* [$_{VP}$ ut ] ]
the evil they threw out
'They threw out the bad ones' (cowsgosp,Mt_[WSCp]:13.48.900)

b. manega deofolseocnyssa [$_{IP}$ he [$_{VP}$ ut ] *adraf* ]
many devil-sicknesses he out drove
'He drove out many demoniacal possessions'
(cowsgosp,Mk_[WSCp]:1.34.2248)

In contrast, a few contexts allow the finite verb to occur high in C, thus preceding pronominal subjects. These contexts are clauses with interrogative force, (6a), or with initial presentational adverbs like *þa* and *þonne* 'then,' (6b), where high verb placement is essentially categorical. Furthermore, negative verbs, (6c), and subjunctive verbs tend to be placed high, (6d), but may also occur in I.[3]

(6) a. hwanon *come* þu Giezi?
whence come you Gehazi
'Where do you come from, Gehazi?'
(cocathom1,ÆCHom_I,_27:408.241.5443)

b. þa *cwoman* we to sumre byrig
then came we to some city
'Then we arrived in a city' (coalex,Alex:15.1.126)

c. *Ne æt* he næfre flæsc
not ate he never flesh
'He didn't ever eat meat'
(comart3,Mart_5_[Kotzor]:Ju22,A.8.1012)

d. *Lufian* we urne Sceppend
love.subjunctive we our creator
'Let us love our creator'
(coblick,HomU_18_[BlHom_1]:5.51.50)

[3]Other contexts may allow high verb placement as well. For example, high verbs may occur in imperatives, verb-first conditionals or particularly dramatic and lively narratives (e.g., Kemenade 1987: 44-5) as in (i). However, these contexts are relatively rare. I will therefore ignore them here.

(i) *Comon* hi of þrim folcum, ðam strangestan Germanie
came they from three peoples the strongest of-Germany
'They came from the three strongest peoples of Germany'
(cobede,Bede_1:12.52.2.469)

The following annotated phrase structure rules captures these generalizations.

(7) a. $\texttt{C} \rightarrow \underset{\downarrow \in (\uparrow \texttt{ ADJ})}{\texttt{NEG}} \quad \underset{\uparrow = \downarrow}{\texttt{C}}$

b. $\texttt{C} \rightarrow \underset{\begin{array}{c}\uparrow = \downarrow \\ \{ \ (\uparrow \texttt{ CLAUSE-TYPE}) = \texttt{int} \\ \mid (\uparrow \texttt{ UDF ADJ-TYPE}) =_c \texttt{pres-top} \\ \mid (\uparrow \texttt{ ADJ} \in \texttt{ADJ-TYPE}) =_c \texttt{neg} \\ \mid (\uparrow \texttt{ MOOD}) =_c \texttt{subjunctive} \ \}\end{array}}{\texttt{V}}$

If a finite verb is placed under C, the clause is interpreted as interrogative. Alternatively, finite verbs are licensed under C if there exists a clause-initial underspecified discourse function, UDF, that contains an adjunct type pres-top feature introduced by adverbs like *þa* or *þonne*. Mutually exclusive clause-type and UDF adjunct type requirements on I will rule out low verb placement in these contexts thus ensuring the obligatory nature of these constraints. Finally, a verb may appear in C if a member of the set of adjuncts includes a neg feature or if the verb's mood is subjunctive. Since no parallel negative constraints are found on I, negative or subjunctive verbs may also be placed low.

## 2.2 Dual Category Membership of Conjunctions

I propose that Old English conjunctions belong to two distinct categories. They may function as *logical connectors* as in Modern English. In this case, they are introduced as category CONJ by a phrase structure rule for sentential coordination, which builds a coordinate structure with a set of individual conjunct clauses, (8a). The conjunction bears a non-distributive COORD-FORM feature, (8b).

(8) a. $\texttt{CP} \rightarrow \underset{\downarrow \in \uparrow}{\texttt{CP}^{+}} \quad \underset{\uparrow = \downarrow}{\texttt{CONJ}} \quad \underset{\downarrow \in \uparrow}{\texttt{CP}}$

b. *and* CONJ (↑ COORD-FORM)= and

Alternatively, Old English conjunctions can be of the same type as complementizers, i.e. C, and I therefore refer to those items as *C-head conjunctions*. A set of X-bar compliant phrase structure rules constructs the Old English clausal left periphery, headed by C, (9a). Since conjunctions are of the same category, (9b), they may be inserted under this position.

(9) a. $\texttt{CP} \rightarrow \underset{\uparrow = \downarrow}{\texttt{C}'} \qquad \texttt{C}' \rightarrow \underset{\uparrow = \downarrow}{\texttt{C}} \quad \underset{\uparrow = \downarrow}{\texttt{IP}}$

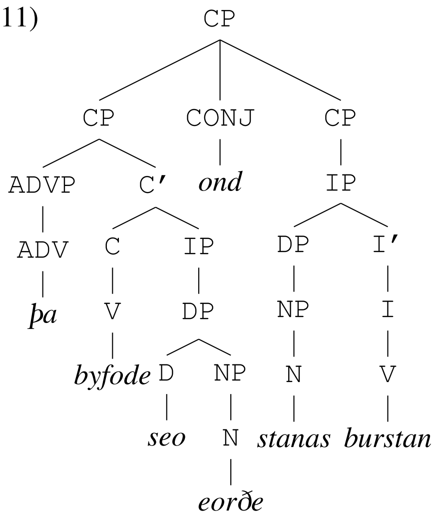
b. *and* C (↑ COORD-FORM)= and

The final CP-clausal conjunct in (8a) can be annotated with a negative existential constraint, $\neg(\downarrow \text{COORD-FORM})$. This rules out simultaneous application of both logical connectors and C-head conjunctions in the same structure.

Old English constructions of the form 'clause - conjunction - clause' will now be ambiguous between parses of the conjunction as a logical connector or as a C-head conjunction. For example, the sentence in (10) can be analyzed as a coordinate structure with a logical connector, as in (11), or as two independent clauses each with their own f-structure, as shown in (12).

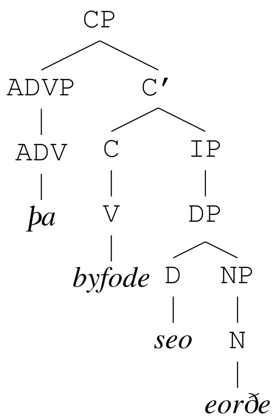
(10) þa byfode seo eorðe ond stanas burstan
then quaked the earth and stones burst
'Then the earth quaked and stones burst'
(comart3,Mart_5_[Kotzor]:Ma25,A.15.459-460)

(11)

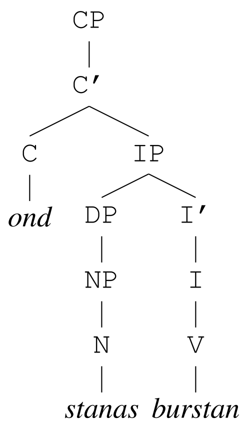



$$\left[\begin{array}{l}\left\{\begin{array}{l}\left[\begin{array}{ll}\text{PRED} & \text{‘quake⟨SUBJ⟩’}\\ \text{SUBJ} & \left[\begin{array}{ll}\text{PRED} & \text{‘earth’}\\ \text{DEF} & +\\ \text{CASE} & \text{nom}\\ \text{NUM} & \text{sg}\\ \text{GENDER} & \text{fem}\end{array}\right]\\ \text{ADJ} & \left\{\left[\begin{array}{ll}\text{PRED} & \text{‘then’}\\ \text{ADJ-TYPE} & \text{pres-top}\end{array}\right]\right\}\\ \text{TENSE} & \text{past}\\ \text{MOOD} & \text{ind}\end{array}\right]\\ \left[\begin{array}{ll}\text{PRED} & \text{‘burst⟨SUBJ⟩’}\\ \text{SUBJ} & \left[\begin{array}{ll}\text{PRED} & \text{‘stone’}\\ \text{CASE} & \text{nom}\\ \text{NUM} & \text{pl}\\ \text{GENDER} & \text{masc}\end{array}\right]\\ \text{TENSE} & \text{past}\\ \text{MOOD} & \text{ind}\end{array}\right]\end{array}\right\}\\ \text{COORD-FORM} \quad \text{and}\end{array}\right]$$

(12)




$$\left[\begin{array}{ll}\text{PRED} & \text{‘quake⟨SUBJ⟩’}\\ \text{SUBJ} & \left[\begin{array}{ll}\text{PRED} & \text{‘earth’}\\ \text{DEF} & +\\ \text{CASE} & \text{nom}\\ \text{NUM} & \text{sg}\\ \text{GENDER} & \text{fem}\end{array}\right]\\ \text{ADJ} & \left\{\left[\begin{array}{ll}\text{PRED} & \text{‘then’}\\ \text{ADJ-TYPE} & \text{pres-top}\end{array}\right]\right\}\\ \text{TENSE} & \text{past}\\ \text{MOOD} & \text{ind}\end{array}\right]$$

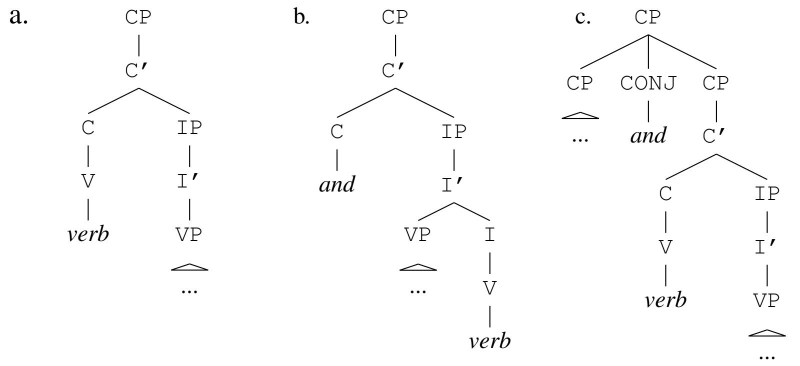



$$\left[\begin{array}{ll}\text{PRED} & \text{‘burst⟨SUBJ⟩’}\\ \text{SUBJ} & \left[\begin{array}{ll}\text{PRED} & \text{‘stone’}\\ \text{CASE} & \text{nom}\\ \text{NUM} & \text{pl}\\ \text{GENDER} & \text{masc}\end{array}\right]\\ \text{TENSE} & \text{past}\\ \text{MOOD} & \text{ind}\\ \text{COORD-FORM} & \text{and}\end{array}\right]$$

## 2.3 Accounting for the Distributional Difference in Verb Placement

The proposed analysis accounts for the fact that CCs are more commonly verb-final than MCs as follows. `C` is a potential verb position in all MCs (in the contexts outlined above), (13a). C-head conjunctions, however, may block the verb's appearance under `C`. Consequently, C-head conjunctions will force higher rates of structures with the finite verb in `I` than MCs in general, and higher rates of verb-final patterns in particular, (13b). C-head conjunctions in CCs behave exactly like complementizers in subordinate clauses in this respect. However, the complementarity between high verbs in `C` (in the contexts outlined above) and the presence of conjunctions is merely a tendency and not categorical (unlike the complementarity between verbs in `C` and complementizers in subordinate clauses). The reason is that conjunctions are not necessarily inserted under `C` but may be logical connectors instead and can then co-occur with verbs in `C`, (13c). Hence, CCs will show more verb-final structures than MCs but fewer than subordinate clauses.[4]

(13)




# 3 Statistical Evidence I

## 3.1 Source of Surplus of Verb-Final Structures in CCs

The above model requires that CCs should have a higher rate of I-final word order specifically at the expense of constructions with high verb placement and not because of an inherently higher rate of I-final headedness. I assessed the validity of this assumption by counting three types of MCs and CCs in the surviving Old English texts. The first type shows the finite verb immediately preceding a subject pronoun, (14). This *VS...* pattern indicates high verb placement.

[4]The distributional difference in verb placement between MCs and CCs follows largely from the same structural configurations as in den Besten's (1983) classical analysis of the verb-second constraint in Modern West Germanic. The actual rates of I-initial and I-final headedness in MCs and CCs can be assumed to be basically identical.

(14) a. *Ne geherst* [$_{\mathrm{IP}}$ þu þas word fram me ]
not hear you these words from me
'You do not hear these words from me'
(coalcuin,Alc_[Warn_35]:435.331)

b. **&** þa *æteawde* [$_{\mathrm{IP}}$ he hine Nerone þy þriddan dæge ]
and then appeared he reflexive Nero the third day
'And then he appeared to Nero on the third day'
(coblick,LS_32_[PeterandPaul[BlHom_15]]:183.221.2364)

The second type includes any kind of overt subject, a subsequent finite verb, where the two elements are not immediately adjacent. Instead, there is an intervening `VP`-constituent such as a non-pronominal object, non-finite verb, predicate, particle etc., as in (15). This *S...V* pattern is indicative of I-final headedness.

(15) a. Moyses [$_{\mathrm{I'}}$ ða Godes hæse [$_{\mathrm{I}}$ *gefylde* ] ]
Moses then God's order fulfilled
'Then Moses fulfilled God's order'
(cocathom2,ÆCHom_II,_12.1:114.133.2471)

b. **and** his geferan [$_{\mathrm{I'}}$ ða mid fleame [$_{\mathrm{I}}$ *ætburston* ] ]
and his companions then with flight escaped
'And his companions then escaped by flight'
(cocathom2,ÆACHom_II,_14.1:141.114.3124)

The third type consists of any kind of overt subject with an immediately following finite verb, (16). Negation, light adverbs or pronouns may intervene between subject and verb. An example with an intervening pronoun is shown in (17). This *SV* pattern is compatible with an I-initial parse.

(16) a. þæt word [$_{\mathrm{I'}}$ [$_{\mathrm{I}}$ *is* ] ælmihtig God ]
that word is almighty God
'That word is the almighty God'
(cocathom1,ÆCHom_I,_25:385.189.4940)

b. **&** þæt word [$_{\mathrm{I'}}$ [$_{\mathrm{I}}$ *wæs* ] God ]
and that word was God
(cocathom1,ÆCHom_I,_2:195.166.421)

(17) a. Philippus [ him [$_{\mathrm{I}}$ *dyde* ] heora wig unweorð ] ]
Phillipus for-himself did their warfare unworthy
'Philip considered their warfare unworthy of his attention'
(coorosiu,Or_3:7.64.28.1264)

b. **ne** nenig man [ hine [$_{\mathrm{I}}$ *geseah* ] swiðe hlahendne ] ]
nor no man him saw very laughing
'Nor did any man see him laughing very much'
(cochad,LS_3_[Chad]:233.151)

The results of this investigation are presented in Table 1 below. It also includes the counts for subordinate clauses (SC) but only for comparative purposes.

| Clause type | High verb *V S ...* | Verb-final *S ... V* | Other *S V* |
|---|---|---|---|
| MC | 6,066 (19.5%) | 1,822 (5.9%) | 23,147 (74.6%) |
| CC | 952 (5.2%) | 2,952 (16.2%) | 14,362 (78.6%) |
| SC | 37 (0.1%) | 9,844 (39.3%) | 15,169 (60.6%) |

Table 1: Verb Positions in MCs, CCs and SCs

As Table 1 shows, 19.5% of all MCs in the sample place the verb before a subject pronoun and hence under C while only 5.9% of all MCs are verb-final. The pattern is essentially inverted in CCs. Only 5.2% of all CCs are indicative of high verb placement[5] whereas 16.2% of all CCs are I-final. This difference is significant ($\chi^2$=2987.0, df=1, $p<0.001$, odds ratio = 10.32, 95% confidence intervals: 9.43 – 11.29) and suggests that CCs do indeed manifest more verb-final structures than MCs precisely because of a reduction in high verb placement. In contrast, there is a much smaller difference between these patterns and clauses with (potentially) I-initial phrase structure, comprising 74.6% of all MCs and 78.6% of all CCs respectively. A chi-square test reveals that this difference, too, is statistically significant. However, the clause type effect is weak as measured by the odds ratio. Specifically, the odds of finding a (potentially) I-initial sentence is only about 1.25 times greater for CCs as compared to those for MCs ($\chi^2$=103.1, df=1, $p<0.001$, odds ratio = 1.25, 95% confidence intervals: 1.20 – 1.31). This finding supports the assumption that the actual rates of the variants of IP-headedness do not substantially differ between MCs and CCs.

## 3.2 Effect of Separation on I-final Clauses

The formal analysis given above entails a differential realization of IP-headedness between clauses introduced by conjunctions that are separated from a subject pronoun and thus must necessarily be logical connectors, (18a), and those that are immediately adjacent to a pronominal subject and can thus potentially be analyzed as C-head conjunctions, (18b). If the conjunction must be a logical connector, the frequency of I-final structures should not differ substantially between CCs and MCs. If the conjunction can be analyzed as a C-head, more I-final structures are expected in CCs than in MCs.

[5]It is not the case that MCs place the verb more frequently under C than CCs simply because they have more negation overall. In fact, negation is somewhat more probable in CCs (10.2%, 1,831/17,985 examples) than in MCs (7.5% 2,280/30,293 examples). A similar assessment for the effect of verbal mood is hard to obtain since the corpus annotation for subjunctives is relatively inaccurate (Ann Taylor, p.c.). I am grateful to Aaron Ecay for raising this point.

(18) a. *CC-separated: necessarily logical connector*

**&** [$_{PP}$ on ðam seofoðan dæge] he *geendode* his weorc
and on the seventh day he ended his work

'And on the seventh day, he finished his creation'
(cocathom1,ÆCHom_I,_1:182.95.90)

b. *CC-adjacent: potential C-head conjunction*

**and** he ða mid geleafan his lif *geendode*
and he then with belief his life ended

'And he then ended his life with faith'
(coaelive,ÆLS_[Maccabees]:104.4880)

I collected all main clauses with pronominal subjects and finite verbs. For each example, I recorded the variable 'clause type' with the variants MC, separated CC and adjacent CC. In separated CCs, some constituent, including finite verbs, intervenes between conjunction and pronominal subject. In adjacent CCs, the conjunction is immediately followed by the subject pronoun. I then observed whether the finite verb appeared in a configuration that indicates I-final headedness or not.

Table 2 below summarizes the results of this investigation. As for the previous study, the table also includes the counts for subordinate clauses (SC) to illustrate the fact that, regarding the rate of I-final headedness, CCs fall in between this clause type and MCs.

| Clause type | I-final | Other |
|---|---|---|
| MC | 717 (4.1%) | 16,926 (95.9%) |
| CC-separated | 266 (7.6%) | 3,216 (92.4%) |
| CC-adjacent | 1,523 (20.3%) | 5,986 (79.7%) |
| SC | 7,289 (41.4%) | 10,345 (58.6%) |

Table 2: I-final Headedness in MCs, separated CCs, adjacent CCs and SCs

As expected, I-final clauses are significantly more common in clauses with potential C-head conjunctions, 20.3%, than in MCs, 4.1% ($\chi^2$=1763.3.6, df=1, $p$<0.001, odds ratio = 6.00, 95% confidence intervals: 5.47 – 6.60) or in clauses that necessarily include logical connectors, 7.6% ($\chi^2$=278.1, df=1, $p$<0.001, odds ratio = 3.08, 95% confidence intervals: 2.68 - 3.53). In contrast, there is a much smaller, although significant, difference in the rate of I-final headedness between MCs and separated CCs, which has a much smaller effect size as measured by the odds ratio ($\chi^2$=83.0, df=1, $p$<0.001, odds ratio = 1.95, 95% confidence intervals: 1.68 – 2.26). These statistics thus provide further evidence for the proposed analysis, in which the high rate of I-final CCs predominantly result from conjunctions that block C as a verb position and not from the presence of conjunctions generally.

# 4 Formal Analysis II: Topicalization

This section deals with the formal implementation of topicalization in Old English. As before, I will first outline the formal model and then show how it entails the distributional difference in the rate of topicalization between MCs and CCs.

## 4.1 Topicalization in Old English

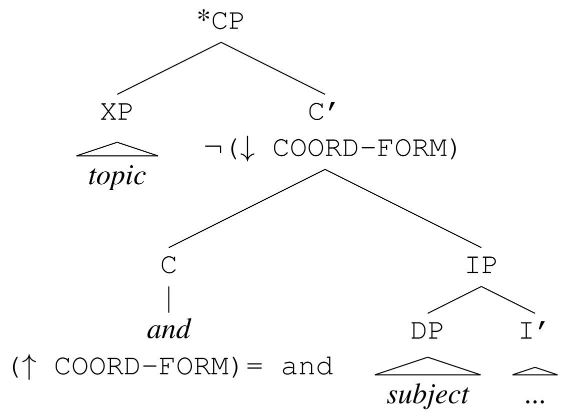
It is not uncommon for Old English heavy constituents to be placed in a discourse function in clause-initial position, a phenomenon commonly referred to as 'topicalization.' I use the term here as a convenient way of referring to any configuration that involves constituent fronting to the clausal left periphery (for discussions of the information structure of Old English topics, see e.g., Speyer 2010; Light 2012).

I model topicalization with the annotated phrase structure rule in (19). An underspecified discourse function, `UDF`, in the specifier of `CP` must be unified with a grammatical function, which may be arbitrarily deeply embedded within complemented clauses.

(19)
$$\begin{array}{lcc} \texttt{CP} \rightarrow & \texttt{XP} & \texttt{C}' \\ & (\uparrow \texttt{ UDF}) = \downarrow & \uparrow = \downarrow \\ & (\uparrow \texttt{ UDF}) = (\uparrow \{\texttt{XCOMP}|\texttt{COMP}\}^* \texttt{ GF}) & \neg(\downarrow \texttt{ COORD-FORM}) \end{array}$$

I constructed the model in such a ways as to rule out parses with a topic in the specifier of `CP` and, simultaneously, a conjunction under `C`. This is achieved by annotating `C′` with a negative existential constraint, ¬(↓ `COORD-FORM`), which conflicts with the feature specification of C-head conjunctions. Hence, C-head conjunctions will be incompatible with the topicalization rule and, as desired, structures of the form 'topic - conjunction - subject' cannot be generated, (20).

(20)




It might be objected that this constraint makes the model too restrictive as there are examples attested in Old English that might be compatible with a parse that involves a clause-initial topic followed by a potential C-head conjunction. For example, (21) includes the conjunction, *and*, preceded by a nominative left-dislocation, *John the evangelist*, which could be assumed to be placed in the specifier of `CP`.

(21) [$_{CP}$ [$_{DP}$ Iohannes se godspellere, þe Gode wæs gecweme, ] [$_{C'}$ **and**
John the evangelist, who to-God was pleasant and
[$_{IP}$ Crist hine lufode for þære clænnysse ]]]
Christ him loved for the cleanness
'St. John, who was pleasant to God, and Christ loved him for his chastity'
(colsigef,ÆLet_5_[Sigefyrth]:26.11)

Furthermore, parallel constructions can be found in subordinate clauses, where a topic is placed in front of a complementizer, as in (22). Constituent fronting to the C-domain that includes an overt C-head may thus be another commonality between CCs and subordinate clauses.

(22) Wite se abbod þeah, [$_{CP}$ [$_{DP}$ eal þæt he do ] [$_{C'}$ **þæt**
know.subjunctive the abbot however, all that he does that
[$_{IP}$ he hit do mid Godes ege ] ] ]
he it does with God's awe
'The abbot must know that he should do all that he does in the fear of God'
(cobenrul,BenR:3.16.5.231)

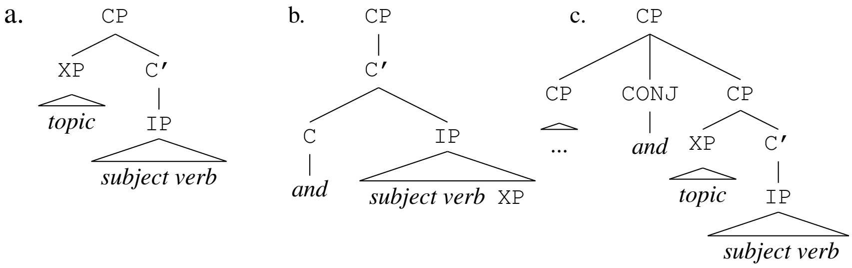
However, structures like (21), for which I found only 5 relevant instances, are considerably rarer than structures like (22), for which there may be about 100 instances in the surviving Old English texts. This difference would be surprising if simultaneous application of topicalization and C-head conjunctions were a genuine grammatical option in Old English. Moreover, alternative parses for the potential counterexamples always remain possible. For instance, (21) could be analyzed with conjunction of the relative clause so that the entire string would be one left-dislocated noun phrase resumed by the pronominal subject of the following sentence.[6] Finally, configurations as in (21) could also result from speech disfluencies, copying errors or Latin interference effects. Thus, it is plausible to maintain the assumption that structures with a topic in the specifier of CP and a conjunction under C are in fact ungrammatical.

[6] I am indebted to Cynthia Allen for pointing out this alternative parse.

### 4.2 Accounting for the Distributional Difference in Topicalization

The above analysis allows MCs to freely apply the topicalization rule (at least as long as certain requirements imposed by information structure are obeyed), (23a). If a C-head conjunction is present, topicalization will be prohibited, (23b). However, this does not entail that the presence and absence of clause-initial topics distributes in a complementary way between MCs and CCs. Instead, the word order 'conjunction - topic - subject' can still be generated through the usage of logical connectors, (23c). Thus, the proposed analysis successfully models a reduction in, but not a complete lack of, Old English topicalized elements in CCs.

(23)




## 5 Statistical Evidence II

### 5.1 Non-Subject Topicalization

I measured the rates of topicalization in MCs and CCs for four non-subject topic categories: non-pronominal object `DP`s, `PP`s, `ADVP`s and `ADJP`s. The examples in (24) illustrate `DP`s. The frequencies of four related constructions were determined for each of these topic categories. All of them include subject pronouns as indicators of the position of the `IP` boundary.

The first structure places the topic `XP` immediately before the subject pronoun. Additional elements may precede the topic. This configuration indicates topicalization in MCs, (24a). The second structure is parallel to the first except that a conjunction appears in clause-initial position. As before, other elements may precede the topic category. This word order pattern indicates topicalization in CCs, (24b). The third construction type includes the same category that was searched for as a topic but positioned after the finite verb. That is to say, there is a potential topic lower in the structure that could theoretically have fronted but failed to do so (abstracting away from information structure constraints). The clause must be introduced by the subject pronoun. This word order type reflects MCs in which the topicalization rule did not apply, (24c). The last configuration also shows a potential topic category in post-verbal position. Now, however, the clause-initial position must show a conjunction followed immediately by the pronominal subject. Such structures reflect CCs with no topicalization, (24d).

(24) a. [$_{DP}$ Langsume tale ] we magon macian be ðysum
long tale we may make about this
'We could write a long tale about this'
(coaelhom,ÆHom_23:80.3745)

b. **&** [$_{DP}$ horses hyda ] hi habbað him to hrægle gedon
and horse's hide they have themselves to clothing done
'And they used horse hide for their clothing'
(comarvel,Marv:26.1.130)

c. He arærde ða on ðære ylcan byrig [$_{DP}$ mære cyrcan ]
He reared then in the same city great church
'He then built a great church in the same city'
(cocathom2,ÆCHom_II,_38:287.262.6496)

d. **Ac** he worhte [$_{DP}$ fela wundra ] ætforan þam deman
but he worked many wonders before the judge
'But he performed many miracles in front of the judge'
(coaelive,ÆLS_[Exalt_of_Cross]:202.5672)

The rate of topicalization can now be calculated as the proportion of sentences with a topic in pre-subject position out of all relevant sentences. Table 3 summarizes the results of this study.

| XP category | Clause type | Topicalization *XP - spro - V* | No Topicalization *spro - V - XP* |
|---|---|---|---|
| DP | MC | 716 (31.7%) | 1,546 (69.7%) |
| | CC | 382 (17.3%) | 1,829 (82.7%) |
| PP | MC | 994 (32.9%) | 2,024 (67.1%) |
| | CC | 589 (17.5%) | 2,768 (82.5%) |
| ADVP | MC | 1,947 (56.7%) | 1,484 (43.3%) |
| | CC | 605 (33.1%) | 1,222 (66.9%) |
| ADJP | MC | 45 (12.6%) | 312 (87.4%) |
| | CC | 12 (3.4%) | 337 (96.6%) |

Table 3: Topicalization Rates by Category in MCs and CCs

The rate of topicalization is significantly lower in CCs than in MCs for all topic categories. The effect, as measured by the odds ratios, is moderate in all contexts. More precisely, the odds of non-subject topicalization are more than twice as high for MCs than for CCs. The topicalization rates range, for CCs and MCs respectively, from 33.1% and 56.7% for `ADVP`s, which have the highest propensity to occur before subjects ($\chi^2$=265.6, df=1, $p$<0.001, odds ratio = 2.65, 95% confidence intervals: 2.35 – 2.98), 17.3% and 31.7% for `DP`s ($\chi^2$=124.0, df=1, $p$<0.001, odds ratio = 2.22, 95% confidence intervals: 1.92 – 2.55), 17.3% and 31.7% for

PPs ($\chi^2$=200.9, df=1, $p$<0.001, odds ratio = 2.30, 95% confidence intervals: 2.05 – 2.59), to only 3.4% and 12.6% for ADJPs ($\chi^2$=18.8, df=1, $p$<0.001, odds ratio = 4.05, 95% confidence intervals: 2.10 – 7.80). These findings are expected under the assumptions of a model that allows inserting some of the conjunctions in CCs with post-verbal potential topics under C since such a configuration blocks topicalization to the specifier of CP.

## 5.2 Subject Topicalization

I will now offer one possible measurement of the topicalization rate of non-pronominal subjects in MCs and CCs. Unfortunately, it is not an easy task to ascertain that subjects can be placed in the clause-initial topic position to begin with. The reason is that 'subject - verb' sentences also allow analyses with the subject in the canonical subject position, the specifier of IP.

Nevertheless I assume that parses are available, and in fact common, in which non-pronominal subjects are positioned in the C-domain. Firstly, as shown above, there is ample evidence for the existence of a discourse function in the clausal left periphery through fronted non-subjects and it seems natural to extend the applicability of this position to all grammatical functions, including subjects. Secondly, verbs are virtually always placed under C if they are both negative and subjunctive. Hence, a subject preceding such a verb is probably positioned in the specifier of CP, as in (25).

(25) [$_{CP}$ [$_{DP}$ Ræpsas ] [$_{C'}$ **ne syn** [$_{IP}$ gesungene mid Alleluian ] ] ]
reply not be.subjunctive sung with hallelujah
'A response (in church service) should not be sung with a hallelujah'
(cobenrul,BenR:15.39.20.518)

Thirdly, non-subject pronouns often occur in the left periphery of the clause in Old English. In this case, they indicate the IP-boundary. A subject preceding such a preposed pronoun is therefore likely to be positioned in the specifier CP. This is illustrated in (26).

(26) [$_{CP}$ [$_{DP}$ min God ] [$_{IP}$ **me** asende to _ sona his engel ] ]
my God me sent to soon his angel
'My God sent his angel to me at once'
(coaelhom,ÆHom_22:326.3470)

Since the frequency of subject topicalization is hard to estimate directly, I used another construction as a proxy. I counted all instances of sentences with left-dislocation and subject resumption. The underlying assumption is that the left-dislocated constituent behaves similarly to a topic in the specifier of CP with the resumptive element occurring within the IP. Left-dislocation and resumption were required to be immediately adjacent so that the resultant structures resemble topicalization more closely. This is illustrated by the parses in (27).

(27) a. [$_{CP}$ [$_{DP}$ se þe ytt þysne hlaf]$_i$ [$_{IP}$ he$_i$ leofað on ecnysse ] ]
he who eats this loaf he lives in eternity
'He who eats of the bread will live forever'
(cocathom1,ÆCHom_I,_2:192.82.362)

b. **and** [$_{CP}$ [$_{DP}$ se ðe on geleafan wunað]$_i$ [$_{IP}$ se$_i$ leofað on ecnysse ] ]
and he who in faith lives he lives in eternity
'He who lives in the true faith will live forever'
(coaelive,ÆLS_[Apollinaris]:237.4713)

Next, it is necessary to determine the frequency of clauses in which the topicalization rule fails to apply. I employed for this purpose constructions of the form 'verb - non-pronominal subject' where the verb appears clause-initially. Positive, indicative lexical verbs are normally placed in `I` (although there may be exceptions). Thus, non-pronominal subjects that follow such verbs are positioned in a low subject position, modeled as the specifier of `VP`, and cannot possibly be parsed as topics in the specifier of `CP`. Pronouns or adverbs may intervene between the initial verb and the subject. Subordinate clauses may precede the initial verb. The sentences in (28) exemplify this structure.

(28) a. [$_{IP}$ *Sende* [$_{VP}$ Balthild seo cwen mycel weorod ] ]
sent Balthild the queen much troop
'Queen Balthild sent a great army'
(cobede,Bede_5:17.456.4.4577)

b. **&** [$_{IP}$ *com* [$_{VP}$ Swegn eorl in mid vii scipon ] ]
and came Sweyn Earl in with seven ships
'And then Earl Sweyn came in with seven ships'
(Chronicle3_cochronE,ChronE_[Plummer]:1046.21.2188)

The rate of subject topicalization can now be calculated as the proportion of sentences with subject left-dislocations out of all relevant sentences. The result of this investigation is presented below in Table 4.

| Clause type | Topicalization<br>*Resumptive Subject - Verb* | No Topicalization<br>*Verb-First - Subject* |
|---|---|---|
| MC | 583 (79.5%) | 150 (20.5%) |
| CC | 276 (64.0%) | 155 (36.0%) |

Table 4: Subject Topicalization in MCs and CCs

As expected, subjects topicalize significantly less frequently in CCs than in MCs. The association between clause type and topicalization in this sample is comparable to the measurements of non-subject topicalization as shown by a similar value of the odds ratio ($\chi^2$=32.9, df=1, $p$<0.001, odds ratio = 2.18, 95% confidence intervals: 1.67 – 2.85). Hence, this investigation, too, provides some evidence for a lower rate of topicalization in CCs than in MCs. My model can account for this finding by parsing some of the clause-initial conjunctions in verb-first structures as C-head conjunctions thus blocking the C-domain as a potential locus for the subject.

## 6 Conclusion

In this paper, I argued that a syntactic model in which conjunctions may vie for a structural slot with finite verbs successfully captures the distributional differences regarding verb placement and constituent fronting between Old English main clauses and main clauses introduced by a conjunction. Various extensions of this work are conceivable. Firstly, the findings could be strengthened by investigating the word order distributions in more detail, for example for different conjunctions, by individual texts or in specific information-structural alignments. Secondly, it may be possible to discover semantic differences between C-head conjunctions and logical connectors. Finally, and most importantly, the diachronic development of word order patterns in MCs and CCs should be investigated since the postulation of C-head conjunctions has interesting theoretical implications for the predicted trajectory of change for the loss of head-final IPs and high verb placement.

# A Text Files Used for the Quantitative Studies

The electronic text files listed below were used for the quantitative studies. The YCOE manual offers details on each text file, such as word count and underlying edition. The texts do not all come from exactly the same period, but were composed roughly between 875 - 1100.

coalex.o23.psd, comarvel.o23.psd, cochad.o24.psd, cochristoph.psd, cosolsat2.psd, comart1.psd, comart2.psd, comart3.o23.psd, cochronA.o23.psd, cochronC.psd, cochronD.psd, cochronE.o34.psd (duplicate content in the Anglo-Saxon Chronicle files [A]-[E] has been removed), coprefcura.o2.psd, cocura.o2.psd, cocuraC.psd, cobede.o2.psd, coboeth.o2.psd, coorosiu.o2.psd, coprefsolilo.psd, cosolilo.psd, codocu1.o1.psd, codocu2.o12.psd, codocu2.o2.psd, codocu3.o23.psd, codocu3.o3.psd, codocu4.o24.psd, colaece.o2.psd, coherbar.psd, coquadru.o23.psd, conicodA.psd, covinsal.psd, coblick.o23.psd, coverhom.psd, coverhomE.psd, coverhomL.psd, cobenrul.o3.psd, cochdrul.psd, comary.psd, coeuphr.psd, cosevensl.psd, cowsgosp.o3.psd, codicts.o34.psd, coprefcath1.o3.psd, cocathom1.o3.psd, coprefcath2.o3.psd, cocathom2.o3.psd, coaelhom.o3.psd, copreflives.o3.psd, coaelive.o3.psd, coprefgen.o3.psd, coepigen.o3.psd, cootest.o3.psd, cotempo.o3.psd, colwsigeXa.o34.psd, colwgeat.psd, colsigewZ.o34.psd, colsigef.o3.psd, colwstan1.o3.psd, colwstan2.o3.psd, coalcuin.psd, coinspolX.psd, cocanedgX.psd, cowulf.o34.psd, colaw6atr.o3.psd (the Laws of Aethelred VI are the only laws included because they were written by Wulfstan), cobyrhtf.o3.psd, colacnu.o23.psd, coapollo.o3.psd, conicodD.psd, corood.psd, cojames.psd, coeust.psd, comargaT.psd, comargaC.o34.psd, coleofri.o4.psd, coneot.psd

## References


Bech, Kristin. 2001. *Word Order Patterns in Old and Middle English: A Syntactic and Pragmatic Study*. PhD Dissertation: University of Bergen.

Besten, Hans den. 1983. On the Interaction of Root Transformations and Lexical Deletive Rules. In Werner Abraham (ed.) *On the Formal Syntax of the Westgermania*, pages 47–131. Amsterdam: John Benjamins.

Kemenade, Ans van. 1987. *Syntactic Case and Morphological Case in the History of English*. Dordrecht: Foris.

Kemenade, Ans van. 1997. V2 and Embedded Topicalisation in Old and Middle English. In Ans van Kemenade and Nigel Vincent (eds.) *Parameters of Morpho-Syntactic Change*, pages 326–352. Cambridge: Cambridge University Press.

Light, Caitlin. 2012. *The Syntax and Pragmatics of Fronting in Germanic*. PhD Dissertation: University of Pennsylvania.

Mitchell, Bruce. 1985. *Old English Syntax*. Oxford: Clarendon.

Pintzuk, Susan. 1999. *Phrase Structures in Competition: Variation and Change in Old English Word Order*. New York: Garland.

Speyer, Augustin. 2010. *Topicalization and Stress Clash Avoidance in the History of English*. Berlin: de Gruyter.

Taylor, Ann, Anthony Warner, Susan Pintzuk, and Frank Beths. 2003. *The York-Toronto-Helsinki Corpus of Old English Prose (YCOE)*. http://www-users.york.ac.uk/ lang22/YCOE/YcoeHome.htm (Accessed 10 April 2014). Oxford Text Archive.