

# The LFG Architecture and "Verbless" Syntactic Constructions

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## 1 Introduction

One of the most appealing things about the LFG architecture is that it does not stipulate that syntactic functions must be expressed configurationally at some level of the grammar. LFG's functional structure is a representation which abstracts away from the way in which syntactic functions are encoded, by phrase structure position or by morphological case marking. It therefore makes possible a more universal, language-independent form of syntactic representation than an architecture that uses phrase structure to model syntactic functions.

Not all aspects of f-structure are equally language-independent, however. Although there was originally no stipulation that every f-structure must contain a PRED attribute, the extended coherence condition as stated in Bresnan and Mchombo 1987 ensures that every f-structure containing at least one syntactic function will also contain a PRED.

The extended coherence condition requires that all functions in f-structure be BOUND. An argument function (i.e. a subcategorizable function like SUBJ, OBJ, OBL) is bound if it is the argument of a predicate (PRED). An adjunct is bound if it occurs in a [functional]-structure which contains a PRED. Finally, a topic or focus is bound whenever it is functionally identified with, or anaphorically binds, a bound function. (Bresnan and Mchombo 1987:746)

An f-structure for a clause will then contain at least a PRED attribute (typically one associated with a verb) and the syntactic functions that are listed in that PRED's lexical form. There are, however, important sentence types in many languages which are difficult to analyze along these lines. In this paper, I will first present some data from Vietnamese and Maori to illustrate the constructions in question. I will then discuss why these constructions pose a problem for the traditional LFG architecture and propose two alternative solutions.

## 2 "Verbless" Syntactic Constructions

In many languages there are important sentence types which seem to involve simply two syntactic functions related to each other directly, without the mediation of a verb. We will examine two such constructions briefly, the topic-comment construction and nominal sentences.

### 2.1 The Topic-Comment Construction

Japanese, Mandarin, and Vietnamese are examples of languages in which the topic-comment construction is an important sentence type (Li and Thompson 1976). Topics in these languages differ crucially from the topics in topicalization in English and its close relatives in that a topic does not necessarily correspond to a gap. The Vietnamese examples (1) - (3) illustrate different types of topic constructions. In (1) the topic corresponds to a gap in the comment.

- (1) Cái cửa, thì — thường đóng.  
CLASSIFIER door TOPIC MARKER usually close  
'(As for) this door, (it) is usually closed.'

In (2) the topic is related semantically to an overt constituent in the comment. In this example, there is a part/whole relationship between the door and the office.

- (2) Cái phòng, thì cửa thường đóng.  
CLASSIFIER office TOPIC MARKER door usually close  
'(As for) this office, (the) door is usually closed.'

In (3) the topic is not related to any specific constituent in the comment.

- (3) Đi Sài-gòn, thì tôi đi mỗi tuần ba lần.  
go Saigon TOPIC MARKER I go each week three time  
'(As for) going to Saigon, I go three times every week.'

In each case, however, the topic specifies the semantic domain that the comment must be interpreted in relation to. I have argued that a uniform analysis for all these constructions may be achieved by using both a TOPIC and a COMMENT function in f-structure (Rosén 1988). The problem that arises with such an analysis is that this involves an f-structure nucleus with no PRED.

Several authors have proposed distinguishing between internal and external topics, see for example Aissen (1992) and King (1995). Internal topics are bound in the sense of Bresnan and Mchombo mentioned above, while external topics are not. For Vietnamese, this kind of analysis would mean that the topic in (1) would be an internal topic, whereas the topics in (2) and (3) would be external topics. Although such an analysis is certainly possible, it does not reflect the syntactic structure of the topic-comment construction.

## 2.2 Nominal Sentences

In many languages, predication of a property of an individual may be done by simply using two nominal phrases. In such languages, either there is no copula verb at all, or its use is not obligatory. Maori is a language that has no copula, and the example in (4) is a nominal sentence. (This example is from Biggs (1969:24).)

- (4) He taariana, te hoiho.  
INDEF stallion DEF-SG horse  
"The horse is a stallion."

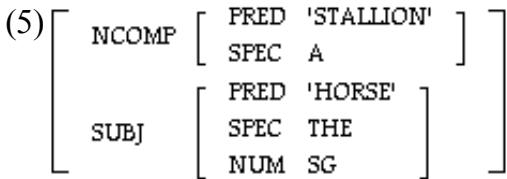
The first NP in this sentence is a predicative complement, and the second is the subject. Semantically, the predicative complement predicates a property of the referent of the subject phrase, in this case the property of being a stallion.

According to Otto Jespersen, this type of sentence is "extremely frequent" in many languages. He mentions both Greek and Russian as examples of Indo-European languages "which have a copula, but do not use it as extensively as e.g. English." (Jespersen 1924:121) In Russian, for instance, the copula is not used in this type of sentences in the present tense, but it must be used in other tenses. In Maori, however, there is no copula,

and thus the relation between the two nominal phrases is never expressed by a verb, but only by the grammatical construction as a whole.<sup>1</sup>

### 3 Alternative Analyses for "Verbless" Syntactic Constructions

Why are these constructions problematical for LFG? Why couldn't we simply propose an f-structure such as (5) for the sentence in (4)?



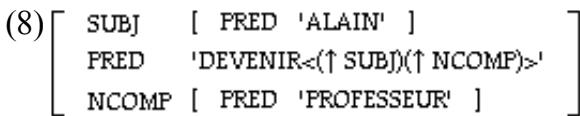
This f-structure is incoherent, since it contains two governable functions that are not governed by a local predicate. But since the sentence in (4) does not have a verb, there is nowhere to get a PRED with an argument list from.

In *The Mental Representation of Grammatical Relations*, predicative complements are not extensively discussed, but several authors do treat them. Jane Grimshaw suggests that the French verb *devenir* 'become' has the lexical form shown in (6) (Grimshaw 1982:137).

(6) *devenir*: V, (PRED) = 'DEVENIR((SUBJ),(NCOMP))'

This lexical form would permit the f-structure in (8)<sup>2</sup> for the sentence in (7).

(7) Alain deviendra professeur.  
Alain become-FUT teacher  
'Alain will become a teacher.'



This f-structure looks just like the f-structure for a transitive verb, except that there is an NCOMP rather than an OBJ.

Other authors have analyzed predicative complements in a way that departs more radically from the treatment of objects. In his discussion of the analysis of predicate adjectives in Icelandic, Avery Andrews says the following:

It is a basic principle of the theory that all predication relations are represented in functional structure. Thus, if an adjective predicates something of an entity referred to by some NP, then that adjective must have an argument in functional structure referring to the same entity. Hence, in an example such as (27a) *vinsæl* must have as argument either the NP *hún* itself or a functional structure pronoun coreferential with *hún*.

There are three ways in which this could be achieved. First, the adjective could be the functional head, with the copula serving merely as a mood- and tense-bearing element. Second, the copula could be a head taking the adjective as a complement under functional control. Third, the copula could be a head taking the adjective as a complement under anaphoric control. (Andrews 1982:446)

Andrews example (27a) is given below as (9) (Andrews 1982:445).

- (9) Hún er vinsæl.  
 she-NOM is popular-NOM  
 'She is popular.'

Andrews rules out his first suggestion on metatheoretical grounds, and rejects the third alternative because he says such a structure would require that the copula be a predicate relating an NP and a proposition, and that there is no reason to suppose that the copula takes the SUBJ as a predicate argument, since it does not itself predicate anything of it. He opts therefore for the second possibility, which results in the f-structure in (10) (Andrews 1982:447).

(10)	$\left[ \begin{array}{ll} \text{SUBJ} & [ \text{PRED } 'PRO' ]_s \\ \text{PRED} & 'VERA<(\uparrow \text{ACOMP})>' \\ \text{ACOMP} & \left[ \begin{array}{ll} \text{SUBJ} & [ ]_s \\ \text{PRED} & 'VINSÆL<(\uparrow \text{SUBJ})>' \end{array} \right] \end{array} \right]$
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The control equation  $(\wedge \text{ACOMP SUBJ}) = (\wedge \text{SUBJ})$  in the lexical entry for the copula ensures that the SUBJ of the ACOMP will be functionally controlled by the SUBJ of the copula.

As we can see, Grimshaw and Andrews agree that the predicative complement is semantically a predicate, but this has different consequences for their analyses. Grimshaw does not suggest that this semantic property of predicative complements should have an effect on how the f-structure looks. For Andrews, however, it is important that ACOMP and NCOMP are so-called open functions. The open functions are those which must receive a SUBJ through functional control.

When there is no verb that links the subject and the predicative complement, it becomes more apparent that using an open function does not solve the problem of having a nominal phrase that functions as a semantic predicate.

(11)	$\left[ \begin{array}{ll} \text{NCOMP} & \left[ \begin{array}{ll} \text{SUBJ} & [ ]_s \\ \text{PRED} & 'STALLION<(\uparrow \text{SUBJ})>' \\ \text{SPEC} & \text{A} \end{array} \right] \\ \text{SUBJ} & \left[ \begin{array}{ll} \text{PRED} & 'HORSE' \\ \text{SPEC} & \text{THE} \\ \text{NUM} & \text{SG} \end{array} \right]_s \end{array} \right]$
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It doesn't help to have the PRED of the NCOMP subcategorized for a SUBJ, the f-structure is still incoherent since the NCOMP is not subcategorized for by any PRED. And in any case, this analysis would mean that all nouns would have to be subcategorized for subjects, which is certainly not desirable. In order to analyze nominal sentences, then, we must either introduce a PRED in some other way than by using a verb, or we must change the well-formedness requirements for f-structures.

LFG's lexical forms capture the intuition that verbs require certain syntactic functions. The verb in a sentence helps us to interpret the nominal phrases in a sentence as filling various syntactic functions. In a nominal sentence, however, there is no verb that helps us to interpret the various nominal phrases. It is the syntactic construction itself that provides the information about how these phrases are to be interpreted. In Maori, the first NP is the predicative complement and the second is the subject. Since this information comes from the syntax and not from the lexicon, it might seem natural to let the phrase structure rule for this sentence type introduce a PRED that could subcategorize for these functions.

$$(12) S \rightarrow \frac{\text{NP} \quad \text{NP}}{(\uparrow \text{NCOMP}) = \downarrow \quad (\uparrow \text{SUBJ}) = \downarrow} \quad \frac{}{(\uparrow \text{PRED}) = 'HAS-PROPERTY<(\uparrow \text{SUBJ})(\uparrow \text{NCOMP})>'} \quad \frac{}{}$$

This would result in a coherent f-structure.

(13)	<table border="1"> <tr> <td>NCOMP</td><td>[ PRED 'STALLION' SPEC A ]</td></tr> <tr> <td>PRED</td><td>'HAS-PROPERTY&lt;(<math>\uparrow</math> SUBJ)(<math>\uparrow</math> NCOMP)&gt;' </td></tr> <tr> <td>SUBJ</td><td>[ PRED 'HORSE' SPEC THE NUM SG ]</td></tr> </table>	NCOMP	[ PRED 'STALLION' SPEC A ]	PRED	'HAS-PROPERTY<( $\uparrow$ SUBJ)( $\uparrow$ NCOMP)>'	SUBJ	[ PRED 'HORSE' SPEC THE NUM SG ]
NCOMP	[ PRED 'STALLION' SPEC A ]						
PRED	'HAS-PROPERTY<( $\uparrow$ SUBJ)( $\uparrow$ NCOMP)>'						
SUBJ	[ PRED 'HORSE' SPEC THE NUM SG ]						

But in his article 'Semantics for Lexical-Functional Grammar', Per-Kristian Halvorsen says that this type of semantic form is not permissible in LFG.

All semantic forms must be introduced by lexical insertion rules. This stipulation, together with the restriction that semantic forms only encode the denotation of expressions and not the compositional structure of a construction, guarantees that the claim for universality of the semantic interpretation principles cannot be "watered down" by the introduction of semantic forms through functional annotations on the language-specific phrase structure rules. Such semantic forms could be used to arbitrarily specify how semantic composition is to proceed in certain constructions. Under the theory being developed here, an f-structure configuration would have to be recognized as belonging to one of the universally significant relations (such as the *predicate-argument* configuration) in order to be treated specially in the semantics. (Halvorsen 1983:580)

This stipulation is not completely adhered to in LFG, however. In 'Lexical-Functional Grammar: A Formal System for Grammatical Representation', Kaplan and Bresnan give a phrase structure rule for English imperatives which introduces the semantic form 'YOU' (Kaplan & Bresnan 1982:219).

(14) S →	VP
	$\uparrow = \downarrow$
	( $\uparrow$ INF) = <sub>c</sub> +
	( $\uparrow$ SUBJ PRED) = 'YOU'

Since it is a characteristic of the imperative construction that the understood subject is in the second person, it does not seem unreasonable that this information should be introduced in a phrase structure rule. Of course, this rule could instead include the schema: ( $\wedge$  SUBJ PERS) = 2. But that would not solve the problem being addressed in (14), namely that the f-structure needs a PRED for its SUBJ. In this case, however, there is a verb that this information could be associated with instead. Halvorsen does not say what kind of relations he has in mind when he mentions "universally significant relations" that could be "treated specially in the semantics", but both the topic-comment construction and nominal sentences are so widespread among the languages of the world that they would seem to be candidates.

If weighty arguments are found against the introduction of PREDS in phrase structure rules, the only other alternative would be to allow f-structures without PREDS for these constructions. In order to do this, we need to have some other way of doing the work otherwise done by the PRED. One of the main functions of PREDS is to specify the subcategorization requirements of lexical items. In addition, they specify, albeit in a kind of shorthand notation, how the semantic arguments of a predicate are assigned to syntactic functions. Instead of using this shorthand, we can spell out more explicitly how this linking is done by associating for instance situation schemata with the f-structures. In the following, I will use situation schemata similar to those used in Fenstad et al. (1987). First we will look at a simplified feature structure for the English sentence in (15).

(15) The horse ate the carrot.

Since each f-structure will have a situation schema associated with it, the equations used in lexical entries and phrase structure rules must specify whether they refer to f-structures or situation schemata. The abbreviations FS and SS in the following stand for f-structure and situation schema respectively. The most important equations for this example are introduced under the (partial) lexical entry for the verb *ate*, as shown in (16).

- (16) ate: V,  $(\uparrow \text{FS PRED}) = 'EAT <(\uparrow \text{FS SUBJ})(\uparrow \text{FS OBJ})>'$   
 $(\uparrow \text{SS REL}) = \text{eat}$   
 $(\uparrow \text{SS ARG.1}) = (\uparrow \text{FS SUBJSS})$   
 $(\uparrow \text{SS ARG.2}) = (\uparrow \text{FS OBJSS})$

The abbreviated feature structure in (17) shows how these equations establish the correct connections between semantic arguments and syntactic functions.

(17)	<table border="0" style="width: 100%;"> <tr> <td style="width: 10%;">SUBJ</td><td style="border-left: 1px solid black; padding-left: 10px;"> <table border="0" style="width: 100%;"> <tr> <td style="width: 10%;">FS</td><td style="width: 90%; text-align: center;">[ "the horse" ]</td></tr> <tr> <td>SS</td><td>[ "the horse" ]<sub>j'</sub></td></tr> </table> </td></tr> <tr> <td>FRED</td><td style="border-left: 1px solid black; padding-left: 10px;">'EAT &lt;(\uparrow \text{FS SUBJ})(\uparrow \text{FS OBJ})&gt;'</td></tr> <tr> <td>NCOMP</td><td style="border-left: 1px solid black; padding-left: 10px;"> <table border="0" style="width: 100%;"> <tr> <td style="width: 10%;">FS</td><td style="width: 90%; text-align: center;">[ "the carrot" ]</td></tr> <tr> <td>SS</td><td>[ "the carrot" ]<sub>j'</sub></td></tr> </table> </td></tr> <tr> <td>REL</td><td style="border-left: 1px solid black; padding-left: 10px;">eat</td></tr> <tr> <td>ARG.1</td><td style="border-left: 1px solid black; padding-left: 10px;">[ ]<sub>j'</sub></td></tr> <tr> <td>ARG.2</td><td style="border-left: 1px solid black; padding-left: 10px;">[ ]<sub>j'</sub></td></tr> <tr> <td>POL</td><td style="border-left: 1px solid black; padding-left: 10px;">1</td></tr> </table>	SUBJ	<table border="0" style="width: 100%;"> <tr> <td style="width: 10%;">FS</td><td style="width: 90%; text-align: center;">[ "the horse" ]</td></tr> <tr> <td>SS</td><td>[ "the horse" ]<sub>j'</sub></td></tr> </table>	FS	[ "the horse" ]	SS	[ "the horse" ] <sub>j'</sub>	FRED	'EAT <(\uparrow \text{FS SUBJ})(\uparrow \text{FS OBJ})>'	NCOMP	<table border="0" style="width: 100%;"> <tr> <td style="width: 10%;">FS</td><td style="width: 90%; text-align: center;">[ "the carrot" ]</td></tr> <tr> <td>SS</td><td>[ "the carrot" ]<sub>j'</sub></td></tr> </table>	FS	[ "the carrot" ]	SS	[ "the carrot" ] <sub>j'</sub>	REL	eat	ARG.1	[ ] <sub>j'</sub>	ARG.2	[ ] <sub>j'</sub>	POL	1
SUBJ	<table border="0" style="width: 100%;"> <tr> <td style="width: 10%;">FS</td><td style="width: 90%; text-align: center;">[ "the horse" ]</td></tr> <tr> <td>SS</td><td>[ "the horse" ]<sub>j'</sub></td></tr> </table>	FS	[ "the horse" ]	SS	[ "the horse" ] <sub>j'</sub>																		
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POL	1																						

Returning to Maori, let us examine the nominal sentence in (4) and its f-structure (5), repeated here as (18) and (19).

- (18) He taariana, te hoiho.  
INDEF stallion DEF-SG horse  
"The horse is a stallion."

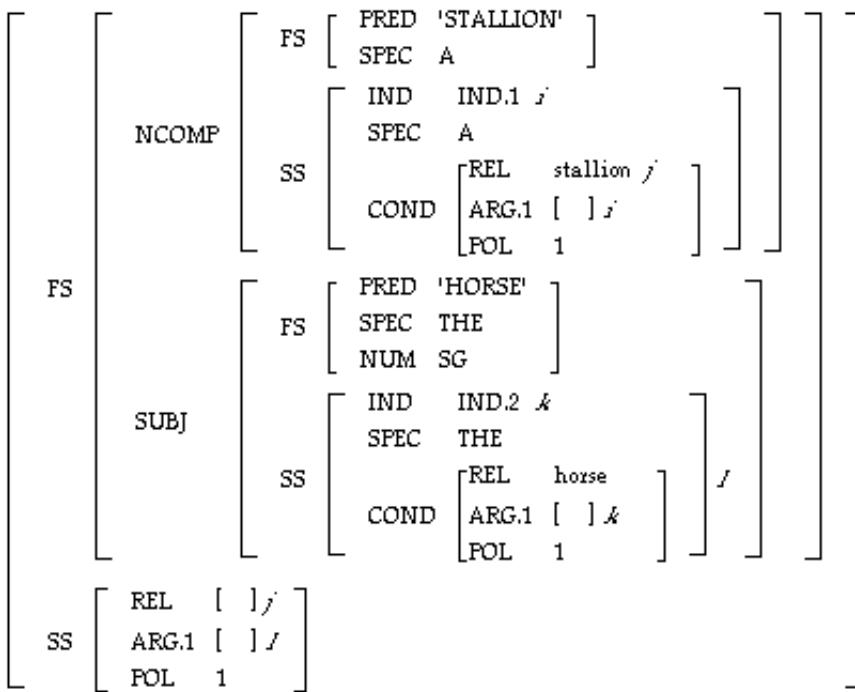
- (19)
- |              |   |              |          |     |    |
|--------------|---|--------------|----------|-----|----|
| NCOMP        | PRED 'STALLION'   | SPEC A       |          |     |    |
| SUBJ         | <table border="0" style="width: 100%;"> <tr> <td style="width: 10%;">PRED 'HORSE'</td> <td style="width: 90%; text-align: center;">SPEC THE</td> </tr> <tr> <td>NUM</td> <td>SG</td> </tr> </table> | PRED 'HORSE' | SPEC THE | NUM | SG |
| PRED 'HORSE' | SPEC THE  |              |          |     |    |
| NUM          | SG  |              |          |     |    |

Since we don't have any PRED that comes from a verb, we need to find another way of expressing the fact that the relation expressed by the predicative complement is to be interpreted as a predicate. We can in fact let the f-structure be just as it is in (19) and still get the relation expressed by the head of the predicative complement to be the main relation in the outer situation schema. Since we don't have any PRED that can carry this information, we need to have the necessary equations in the phrase structure rule. The rule we need for a nominal sentence in Maori with an NCOMP is given in (20). (This analysis is inspired by Helge Dyvik's treatment of predicative complements in the machine translation system PONS (Dyvik 1990:47-48).)

- (20) S → NP  $(\uparrow \text{FS NCOMP}) = (\downarrow \text{FS})$   $(\uparrow \text{FS SUBJ}) = (\downarrow \text{FS})$   
 $(\uparrow \text{SS REL}) = (\uparrow \text{FS NCOMP SS COND REL})$   
 $(\uparrow \text{SS ARG.1}) = (\uparrow \text{FS SUBJSS})$   
 $(\uparrow \text{SS POL}) = 1$

This will give us the feature structure in (21).

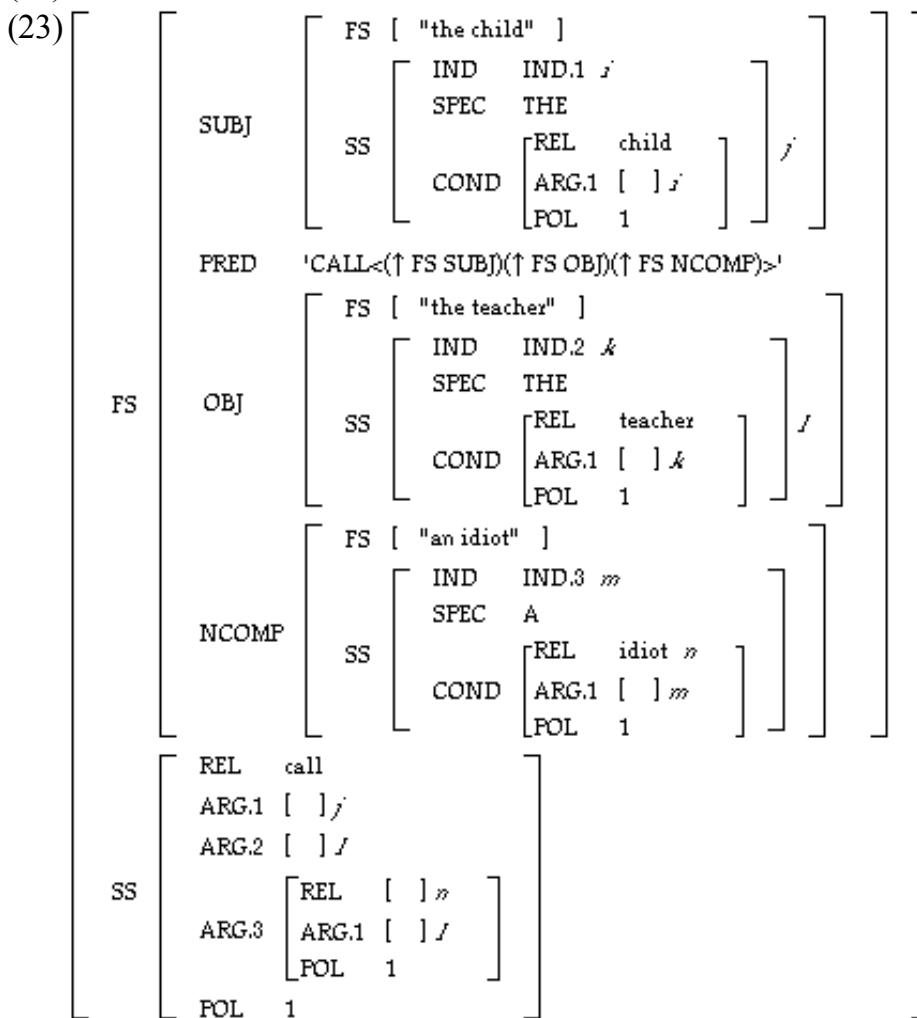
- (21)



As we can see, by following a path from the outer f-structure, we find the relation that we want for the outer situation schema. We don't need to do anything to the f-structure in order to express that the head of the NCOMP is interpreted as a predicate.

The same type of equations may be used in the analysis of objective predicative complements. For the sentence in (22), we can derive the feature structure in (23).

(22) The child called the teacher an idiot.



The equations necessary for this structure may this time be included as part of the lexical entry for the verb call, as shown in (24).

- (24) call: V,    ( $\uparrow$ FS PRED) = 'CALL-<( $\uparrow$ FS SUBJ)( $\uparrow$ FS OBJ)( $\uparrow$ FS NCOMP)>'  
              ( $\uparrow$ SS REL) = call  
              ( $\uparrow$ SS ARG.1) = ( $\uparrow$ FS SUBJSS)  
              ( $\uparrow$ SS ARG.2) = ( $\uparrow$ FS OBJSS)  
              ( $\uparrow$ SS ARG.3 REL) = ( $\uparrow$ FS NCOMPSS COND REL)  
              ( $\uparrow$ SS ARG.3 ARG.1) = ( $\uparrow$ FS OBJSS)  
              ( $\uparrow$ SS ARG.3 POL) = 1

On this analysis, a verb like *call* takes three arguments: an agent, a theme, and a proposition. We employ the same technique to link elements of the f-structure with elements of the situation schema. Specifically, the relation of the proposition is identified by following a path from the f-structure of the NCOMP, and the argument of this relation is identified by following a path from the f-structure of the OBJ. Just as in the nominal sentence in Maori, the relation expressed by the predicative complement is not associated with a verb.

## 4 Conclusion

In this paper I have tried to show that the topic-comment construction and nominal sentences are sentence types which are not possible to analyze satisfactorily within traditional LFG. Because of time limitations, I have not been able to go more deeply into the arguments for this position as concerns the topic-comment construction, and I have therefore concentrated on the analysis of nominal sentences, since they seem to present a more clear-cut case. As mentioned above, it would not be impossible to analyze Vietnamese topics as topics related to a PRED, but this does not seem to be a natural analysis. Nominal sentences, however, cannot be analyzed within traditional LFG. We must either admit the use of PREDS introduced by phrase structure rules, or allow clausal f-structures which do not contain any PRED. The second alternative would have serious consequences for coherence, since it would involve f-structures with governable syntactic functions that are not governed by any PRED.

Either one of these alternatives will work for the constructions I have discussed in this paper. In choosing one alternative rather than the other, one might of course want to consider other factors than those I have mentioned. In a recent exchange on the LFG-list, several researchers have questioned the role of PRED in current versions of LFG. In this discussion, Ron Kaplan said:

Much of the information carried by a semantic form is indeed superfluous when the syntactic system is in fact coupled with a full-fledged semantic theory. Even so, it may still be a convenient formal device to allow syntactic investigations to proceed in appropriate semantic ignorance. (Kaplan 1996)

On the other hand, it may be a formal device which makes it more difficult to distinguish between syntactic and semantic information. In an architecture which does not assume that all semantic information must be fed through the f-structure, we do not need to have anything but grammatical information there. As we have seen, it is entirely possible to let the f-structure include the information about the function of an NP, for instance whether it is SUBJ or NCOMP, and then refer to that information in the f-structure in order to build the appropriate semantic structure. This is a good illustration of the function of syntactic functions: they tell us how to interpret the various forms we find in phrases and sentences.

## Acknowledgment

I owe thanks to Helge Dyvik for his helpful comments during the preparation of this paper.

## Notes

<sup>1</sup> This is the case not only for Maori, but for all of the Polynesian languages. There is no evidence that any of these languages have ever had a copula previously either. (Marianne Haslev Skånlund, personal communication)

<sup>2</sup> This and subsequent f-structures are simplified. For the sake of brevity, I have omitted some information that is not relevant for the discussion, such as the attribute-value pair TENSE FUT in (8).

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