

THE REPRESENTATION OF SETSWANA DOUBLE OBJECTS IN LFG

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Abstract

Setswana is a Bantu language in the south eastern zone of Bantu languages and is one of the eleven official languages of South Africa. The technological development of Setswana includes the development of a parser that covers all the salient characteristics of Setswana morphology and syntax. One such characteristic is the occurrence of two objects, both of which may be represented in the verb by object agreement morphemes. After discussing relevant typological features of Setswana, we focus on the syntactic structure of Setswana sentences with double objects and double object agreement morphemes and on how the implementation of two Setswana objects can be modelled in XLE.

1. Introduction

Setswana is a Bantu language in the south eastern zone (zone S in Doke's classification) of Bantu languages (Cole, 1959; Guthrie, 1971) and one of the eleven official languages of South Africa. The work reported on in this article forms part of a larger project aimed at the technological development of Setswana. Previous work includes the development of a finite state morphological analyser and tokeniser (see, for example, Pretorius *et al.*, 2010). The present work also forms part of a subproject for developing a computational grammar and parser for Setswana, making use of LFG and XLE (Berg *et al.*, 2012).

Under consideration are simple declarative sentences that are in the indicative mood, present tense, positive and have more than one object. More specifically, we ask the question: 'How may such sentences and their syntactic structure be modelled in LFG and implemented in XLE?'

The structure of the article is as follows: Section 1 briefly contextualises and states the research question. Section 2 discusses specific typological features of Setswana that are relevant for addressing the research question. In section 3 we discuss in some detail the occurrence of double object and object agreement morphemes and their modelling with LFG, while the XLE implementation is touched upon in section 4. Section 5 concludes the article.

2. Setswana typological features

Setswana is an agglutinative language with a rich system of verbal inflections (Nurse, 2008: 28). Words in sentences are arranged in an SVO order. Nouns in Setswana are classified into 20 noun classes and agreement is prominent in the language.

2.1 Orthography and morphology

Verbal prefixes are written disjointly, while verbal suffixes are written conjoined to the verbal root. This disjunctive writing style has significant consequences for tokenisation in that Setswana verbs cannot be tokenised on white space only. Due to the disjunctive orthography the word as unit of morphological description needs further clarification. We follow Kosch (2006), who distinguishes between an orthographic word (a unit which is separated by spaces from other units in the sentence) and a linguistic word (a unit which functions as a member of a word category, such as a noun, pronoun, verb and adverb).

As is characteristic of agglutinative languages, Setswana verbal prefixes and suffixes provide essential information regarding type, mood, tense, aspect, and polarity (Cole, 1955:242-267; Krüger, 2006:198-243). Prefixes include negative morphemes, subject agreement morphemes, object agreement morphemes, aspectual morphemes and the temporal morpheme. The most frequently used suffixes include the causative, applicative, reciprocal, perfect and passive. Verbs can also take less frequently used suffixes while they always take a verbal ending (Cole, 1955:192-211; Krüger, 2006:257).

Example (1) illustrates both the disjunctive orthography and the agglutinative morphology. The linguistic word (verb) *ba tla thusana* ‘they will help each other’ comprises a verbal root *-thus-* to which the subject agreement morpheme *ba* of noun class 2 and the future tense morpheme *tla* have been prefixed, while the reciprocal suffix *-an-* and the verbal ending *-a* are suffixed to this verbal root.

- (1) *ba tla thusana*
ba-tla-thus-an-a
SC2-FUT-help-RECP-VEND
‘they will help each other’

In (2) the Setswana sentence only consists of two linguistic words. The two words are the noun *basimane* ‘boys’ and the verb *ba tla re thusa* ‘they will help us’. The verb consists of the subject agreement morpheme *ba* of noun class 2, the future tense morpheme *tla*, the object agreement morpheme *re* of the first person plural, the verbal root *thus-* ‘buy’ and the verbal ending *-a*. The English equivalent of this sentence consists of five linguistic words. Notice that the determiners ‘the’ and ‘a’ do not appear in Setswana.

- (2) *Basimane ba tla re thusa.*
basimane ba tla re thusa
boys they will us help
ba-simane ba-tla-re-thus-a

N2-boys SC2-FUT-OCPlPL-help-VEND
 'The boys will help us.'

The verbal prefixes and suffixes of Setswana are integral parts of the morphological structure of verbs and have morphological status in the c-structure of LFG (Bresnan, 2001:150), as shown in the following c-structure (Figure 1):

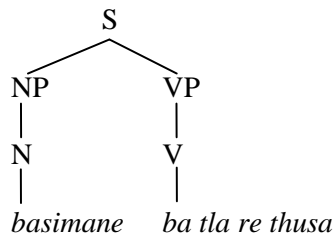


Figure 1: The c-structure for (2)

2.2 Word order

Setswana employs the SVOX word order, where 'S' represents the subject, 'V' the verb, 'O' the object and 'X' the adjuncts (Creissels, 2000:250-252; Watters, 2000:196-205).

In a simple transitive sentence in Setswana the subject appears before the verb. The object follows the verb. This is illustrated in (3) where the subject *bana* 'children' precedes the verb *ba bua* 'they speak' and an object *Setswana* 'Setswana' appears post verbally.

- (3) *Bana ba bua Setswana.*
- | | | |
|---------------|----------------|------------------|
| <i>bana</i> | <i>ba bua</i> | <i>Setswana</i> |
| children | they speak | Setswana |
| <i>ba-ana</i> | <i>ba-bu-a</i> | <i>se-tswana</i> |
| N2-children | SC2-speak-VEND | N7-tswana |
- 'The children speak Setswana.'

The object *Setswana* 'Setswana' in (3) may be replaced by the object agreement morpheme *se* which acts as an object marker. The object agreement morpheme is placed in the verbal morphology where it is prefixed immediately preceding the verbal root (further explained in section 3.2). The basic word order is then altered as illustrated in (4). This sentence consists of a subject *bana* 'children' and a verb *ba a se bua* 'they speak it'.

- (4) *Bana ba a se bua.*
- | | |
|---------------|---------------------|
| <i>bana</i> | <i>ba a se bua</i> |
| children | they it speak |
| <i>ba-ana</i> | <i>ba-a-se-bu-a</i> |

N2-children SC2-PresPre-OC7-speak-VEND
 ‘The children speak it.’

Sentences in Setswana may include verbs which can take two objects. The object immediately following the ditransitive verb is the indirect object and it is followed by the direct object as illustrated in (5).

(5) *Mosimane o harakela mosadi matlhare.*
 mosimane o harakela mosadi matlhare
 boy he rakes for woman leaves
mo-simane o-harak-el-a mo-sadi ma-tlhare
 N1-boy SC1-rake-APPL-VEND N1-woman N6-leaves
 ‘The boy rakes the leaves for the woman.’

Both the indirect object *mosadi* ‘woman’ and the direct object *matlhare* ‘leaves’ in (5) may be replaced by their respective object agreement morphemes. The object agreement morpheme of the indirect object is followed by the object agreement morpheme of the direct object. The basic word order of this sentence is illustrated in (6) where the sentence consists of a subject *mosimane* ‘boy’ and a verb *o a mo a harakela* ‘he rakes it for her’.

(6) *Mosimane o a mo a harakela.*
 mosimane o a **mo a** harakela
 boy he **her it** rake for
mo-simane o-a-mo-a-harak-el-a
 N1-boy SC1-PresPre-OC1-OC6-rake-APPL-VEND
 ‘The boy rakes it for her.’

As seen in (3), (4), (5) and (6), simple sentences in Setswana may take intransitive, transitive and ditransitive verbs. All these sentences can be modified with one or more than one adjunct referring to place, time, manner, instrument, etc.

Intransitive verbs do not have a valency for object but they may take adjuncts which would then follow the verb. In (7) the adverb of time *jaanong* ‘now’ is the adjunct.

(7) *Bana ba se bua jaanong.*
 bana ba se bua jaanong
 children they it speak now
ba-ana ba-se-bu-a jaanong
 N2-children SC2-OC7-speak-VEND ADV
 ‘The children speak it now.’

Transitive verbs may take one object which may be followed by an adjunct. In (8) the locative noun phrase *kwa gae* ‘at home’ is the adjunct.

(8) *Bana ba bua Setswana kwa gae.*

bana	ba bua	Setswana	kwa	gae
children	they speak	Setswana	at	home
<i>ba-ana</i>	<i>ba-bu-a</i>	<i>se-tswana</i>	<i>kwa</i>	<i>gae</i>
N2-children	SC2-speak-VEND	N7-tswana	DEM	N5-home

‘The children speak Setswana at home.’

Ditransitive verbs may take an indirect and a direct object (double objects) which may be followed by an adjunct. In (9) the adverb of manner *sentle* ‘properly’ is the adjunct.

(9) *Mosimane o harakela mme matlhare ka haraka sentle.*

mosimane	o harakela	mosadi	matlhare	sentle
boy	he rakes for	woman	leaves	properly
<i>mo-simane</i>	<i>o-harak-el-a</i>	<i>mo-sadi</i>	<i>ma-tlhare</i>	<i>sentle</i>
N1-boy	SC1-rake-APPL-VEND	N1-woman	N6-leaves	ADV

‘The boy rakes the leaves for the woman properly.’

A distinct word order is also followed in Setswana noun phrases (NP) where the head appears in initial position and it may be followed by different modifiers (determiners) (Creissels, 2000:232). Examples of modifiers for Setswana nouns are demonstrative pronouns (see (10)), a possessive phrase consisting of a possessive particle and a complement (see (11)), and a qualificative phrase consisting of a qualificative particle and an adjective (see (12)).

(10) bana ba

bana	bao
children	those
<i>ba-ana</i>	bao
N2-children	DEM

‘those children’

(11) bana ba rona

bana	ba	rona
children	of	us
<i>ba-ana</i>	ba	rona
N2-children	PossPart2	PossPron

‘our children’

(12) bana ba bagolo

bana	ba	bagolo
children	who are	big

<i>ba-ana</i>	ba	ba-golo
N2-children	QualPart2	ADJ2-big
‘the big children’		

The focus in this article is the simple sentences taking double objects as well as the sentences where these objects are both replaced by their respective object agreement morphemes and how these structures can be handled in LFG. This is elaborated on in section 3.

2.3 Nominal classification and concordial agreement

Two outstanding characteristics of the Bantu language family are the phenomena of nominal classification and concordial agreement (see, for example, Poulos and Louwrens, 1994). Nouns are grouped together into classes in a grammatically significant way. Nouns generate grammatical agreement by means of class prefixes. The numbering system used in this article distinguishes between 20 noun classes for Setswana.

Noun class agreement is observed in all parts of the sentence which are linked to the noun. The noun is the element in the sentence which controls the concordial agreement with other word categories such as verbs, (Kosch, 2006). Verbs in simple sentences in the indicative mood, present tense, positive include an obligatory subject agreement morpheme (see (3), for example).

Agreement markers referring to the subject in a sentence can have the status of (i) incorporated pronouns or (ii) agreement markers or (iii) forms that are ambiguous between the two (Dalrymple, 2001:132). In Setswana the obligatory subject agreement morpheme is considered either an agreement marker or an incorporated pronoun. In instances where the overt subject is present, the subject agreement morpheme is an agreement marker. As illustrated in (13), the subject agreement morpheme *o* of class 1 shows agreement with the class prefix *mo* of the class 1 noun *mosadi* ‘woman’. In this instance Kosch (2006) explains that the class 1 noun controls the concordial agreement with the verb through the class 1 subject agreement morpheme.

(13) *Mosadi o reka ditlhako.*

mosadi	o reka	ditlhako
woman	she buys	shoes
<i>mo-sadi</i>	<i>o-rek-a</i>	<i>di-tlhako</i>
N1-woman	SC1-buy-VEND	N8-shoes
‘The woman buys shoes.’		

In instances where the overt subject NP is omitted, the subject agreement marker acts as an incorporated pronoun (Bresnan, 2001:177). This process regarding Setswana is illustrated in (14) where the subject agreement morpheme *o* of noun class 1 acts as an incorporated pronoun as no overt subject appears.

(14) *O reka ditlhako.*

o reka	ditlhako
she buys	shoes
o-rek-a	di-tlhako
SC1-buy-VEND	N8-shoes
‘She buys shoes.’	

The object agreement in Setswana is different from subject agreement in that object agreement morphemes cannot co-occur with overt objects. For example, the sentence in (15) is ungrammatical because the object agreement morpheme *di* cannot co-occur with the object *ditlhako* ‘shoes’.

(15) Mosadi o **di** reka **ditlhako**.

mosadi	o di reka	ditlhako
woman	she it buys	shoes
mo-sadi	o-a-di-rek-a	di-tlhako
N1-woman	SC1-PresPre-OC8-buy-VEND	N10-shoes

An object agreement morpheme replaces the overt object NP in Setswana. In other words, either the object or the object agreement morpheme is present. Therefore, the object agreement morpheme has pronominal status. Verbs that include an object morpheme contain an incorporated pronoun, which acts as the object. In (16) *di* is the object agreement morpheme of noun class 8 and it acts as an incorporated pronoun (it).

(16) *Mosadi o a di reka.*

mosadi	o a di reka
woman	she it buys
mo-sadi	o-a-di-rek-a
N1-woman	SC1-PresPre-OC8-buy-VEND
‘The woman buys it.’	

Bresnan (2001:177) indicates that “pronoun incorporation involves the incorporation of the function of a pronoun within an inflected word, not the incorporation of the phrase structure of a pronoun into a word”. This is also applicable to Setswana. In LFG incorporated pronouns are modelled by accepting that they provide a pronominal PRED value for the subject and object functions (Dalrymple, 2001:276).

The sentence in (17) consists of only one linguistic word, a verb. This verb includes information on its subject and its object. Here both the subject agreement morpheme (*o* of noun class 1) and the object agreement morpheme (*di* of noun class 8) are incorporated pronouns. The subject agreement morpheme *o* conveys a meaning coincident with that of the pronouns ‘he’ or ‘she’ in English, while the object agreement morpheme *di* conveys a meaning coincident to that of the pronoun ‘it’.

(17) *O a di reka.*
 she it buys
o-a-di-rek-a
 SC1-PresPre-OC8-buy-VEND
 ‘She buys it.’

The correspondence between the c- and f-structures of (17) is illustrated in Figure 2:

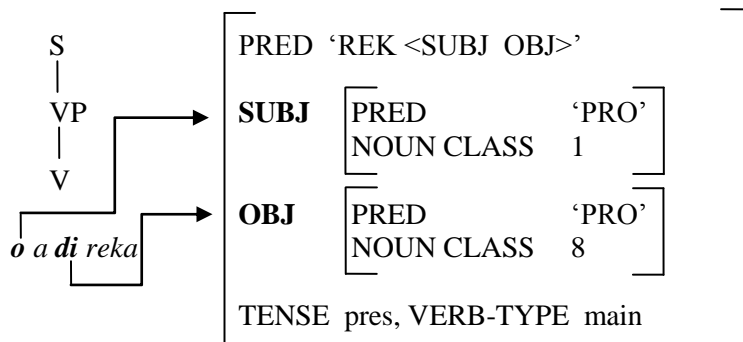


Figure 2: The correspondence between the c- and f-structure for (17)

3. Double objects and object agreement morphemes

Under certain linguistic circumstances, verbs in Setswana sentences may take two objects. The indirect object (restricted object (OBJ-TH)) is followed by the direct object (unrestricted object (OBJ)). This phenomenon was discussed in some detail by Pretorius *et al.* (2012:201-218).

Double objects may appear in the following sentence constructions (Pretorius *et al.*, 2012:208-211):

- *Verbs allowing indirect objects based on their meaning*

The meaning of Setswana verbs such as *go fa* ‘to give’, *go tshasa* ‘to spread’, *go kopa* ‘to ask’ and *go ruta* ‘to teach’ can take an indirect and a direct object. In (18) the verb *go fa* ‘to give’ subcategorises for the indirect object *bana* ‘children’ and the direct object *dimonamona* ‘sweets’.

(18) *Ke fa bana dimonamona.*

<i>ke fa</i>	<i>bana</i>	<i>dimonamona</i>
I give	children	sweets
<i>ke-f-a</i>	<i>ba-ana</i>	<i>di-monamona</i>
SCP1PL-give-VEND	N9-children	N10-sweets

‘I give the children sweets.’

Both of the objects in (18) can be replaced with an object agreement morpheme. In (19) the indirect object *bana* ‘children’ is replaced with the object agreement morpheme *ba* and the direct object *dimonamona* ‘sweets’ with the object agreement morpheme *di*.

(19) *Ke a ba di fa.*

I **them it** give
ke-a-ba-di-f-a
 SCP1PL-PresPre-OC2-OC10-give-VEND
 ‘I give them it.’

- *Verbs with the causative suffix*

The causative suffix conveys the meaning of ‘to let’ (Cole, 1955:203-208; Krüger, 2006:216). This suffix allows the verb to take an indirect object in addition to the direct object. In (20) the indirect object is *bana* ‘children’ and the direct object is *merogo* ‘vegetables’.

(20) *Mosadi o jesa bana merogo.*

<i>mosadi</i>	<i>o jesa</i>	<i>bana</i>	<i>merogo</i>
teacher	she eat to let	children	vegetables
<i>mo-sadi</i>	<i>o-j-is-a</i>	<i>ba-ana</i>	<i>me-rogo</i>
N1-woman	SC1-eat-CAUS-VEND	N2-children	N4-vegetables

‘The woman lets the children eat vegetables.’

As indicated in (21) *bana* ‘children’ and *merogo* ‘vegetables’ (in (20)) can also be replaced with object agreement morphemes in the morphological structure of the verb.

(21) *Mosadi o a ba e jesa.*

<i>mosadi</i>	<i>o a ba e jesa</i>
woman	she them it eat to let
<i>mo-sadi</i>	<i>o-a-ba-e-j-is-a</i>
N1-teacher	SC1-PresPre-OC2-OC4-eat-CAUS-VEND

‘The woman lets them eat it.’

- *Some possessive constructions*

Double objects also appear in instances where sequences of nouns appear in an object position. Here the first noun represents a possessor affected by the

action of the verb (Pretorius *et al.*, 2012:210). In Setswana the possession occurs in initial position in a possessive group, for example in (22) the possession is *seatla* ‘hand’ and the possessor is *mosimane* ‘boy’.

- (22) *seatla sa mosimane*
 seatla sa mosimane
 hand of boy
se-atla *sa* *mo-simane*
 N7-hand PossPart7 N1-boy
 ‘the boy’s hand’

The possessive group can also be inverted (Simango, 2007:928-049; Lødrup, 2009:420-440). In (23) the possessive group in (22) is inverted and the possessive particle is not used. In this instance the possessive construction appears as multiple objects. The indirect object in (23) is *mosimane* ‘boy’ and the direct object is *seatla* ‘hand’.

- (23) *Ntšwa e lomile mosimane seatla.*
 ntšwa e lomile mosimane seatla
 dog he bit boy’ hand
ne-tšwa *e-lom-il-e* *mo-simane* *se-atla*
 N9-dog SC9-bite-PERF-VEND N1-boy N7-hand
 ‘The dog bit the boy’s hand.’

Both of the objects in (23) can be replaced with object agreement morphemes. In (24) *mosimane* ‘boy’ is replaced by *mo*, the object agreement morpheme of noun class 1 and *seatla* ‘hand’ with *se*, the object agreement morpheme of noun class 7.

- (24) *Ntšwa e mo se lomile.*
 ntšwa e **mo se** lomile
 dog’ he **him it** bit
ne-tšwa *e-mo-se-lom-il-e*
 N9-dog SC9-OC1-OC7-bite-PERF-VEND
 ‘The dog bit his.’

- *Verbs with the applicative suffix*

The applicative suffix conveys the meaning of ‘for’ or ‘to’ (Cole, 1955:199-202; Krüger, 2006:232-239). The applicative suffix extends the transitivity of the Setswana verb by introducing a new object apart from the direct object (Pretorius *et al.*, 2012:211).

The treatment of Setswana double objects and double object agreement morphemes is similar for all instances mentioned above. In this paper we

only illustrate the treatment of verbs with the applicative suffix by providing the c- and f-structures of these sentences.

In (25) the indirect object *mosetsana* ‘girl’ is followed by the direct object *ditlhako* ‘shoes’.

(25) *Mosadi o rekela mosetsana ditlhako.*

mosadi	o rekela	mosetsana	ditlhako
woman	she buys for	girl	shoes
<i>mo-sadi</i>	<i>o-rek-el-a</i>	<i>mo-setsana</i>	<i>di-tlhako</i>
N1-woman	SC1-buy-APPL-VEND	N1-girl	N8-shoes
‘The woman buys the girl shoes.’			

The c-structure of (25) is:

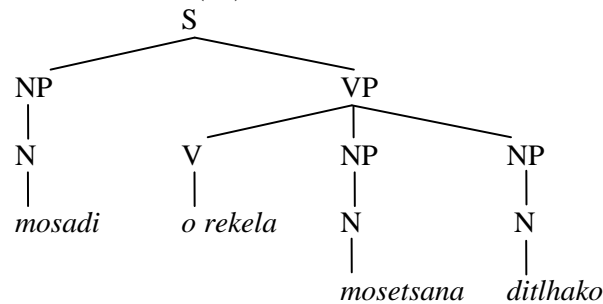


Figure 3: The c-structure for (25)

The f-structure of (25) is:

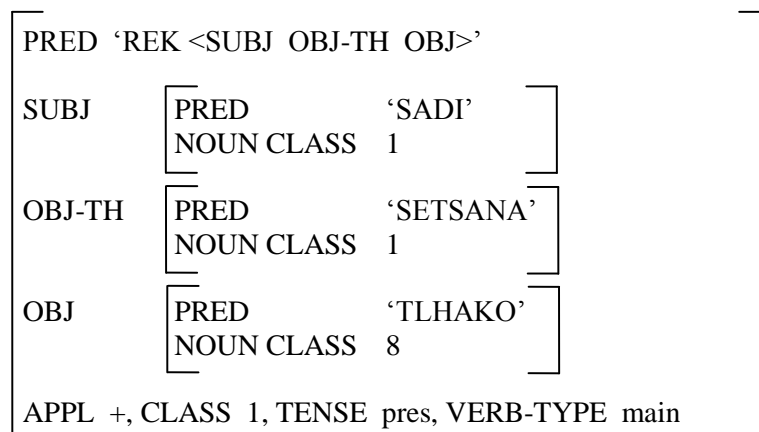


Figure 4: The f-structure for (25)

Both the indirect and direct objects in Setswana sentences with an applicative verb may be represented in the verb by object agreement morphemes. In such cases both object agreement morphemes would be prefixed to the verb.

The applicative verb *o rekela* ‘she buys for’ in (26) takes two object agreement morphemes. The indirect object *mosetsana* ‘girl’ (in (25)) is replaced with the object agreement morpheme *mo* of noun class 1 and the direct object *dithako* ‘shoes’ (in (25)) is replaced with the object agreement morpheme *di* of noun class 8.

(26) *Mosadi o a mo di rekela.*

mosadi	o a mo di rekela
woman	she her it buy for
<i>mo-sadi</i>	<i>o-a-mo-di-rek-el-a</i>
N1-woman	SC1-PresPre-OC1-OC18-buy- APPL-VEND

‘The woman buys her it.’

The c-structure of (26) is:

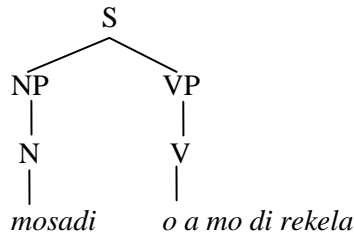


Figure 5: The c-structure for (26)

The f-structure of (26) is:

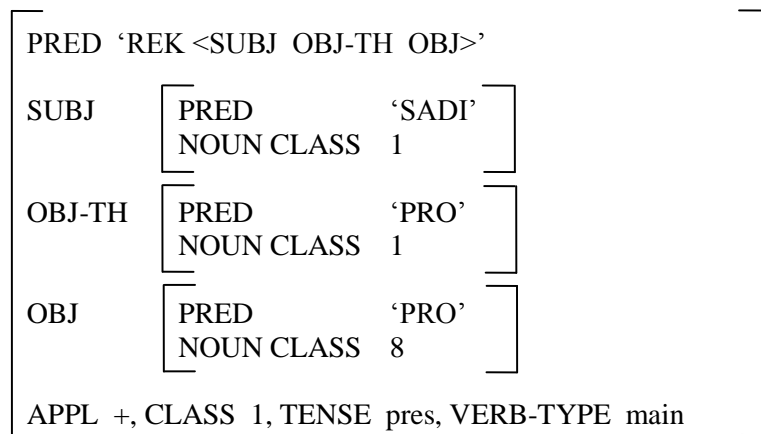


Figure 6: The f-structure for (26)

As mentioned before, the object agreement morphemes cannot co-occur with the corresponding objects. Sometimes only one of the objects is replaced by an object agreement morpheme. When the applicative verb includes an object agreement morpheme that represents the indirect object, the verb will be followed by the direct object. The direct object in (27) is *dithako* ‘shoes’.

(27) *Mosadi o mo rekela ditlhako.*

mosadi	o mo rekela	ditlhako
woman	she her buys for	shoes
<i>mo-sadi</i>	<i>o-mo-rek-el-a</i>	<i>di-tlhako</i>
N1-woman	SC1- OC1 -buy-APPL-VEND	N8-shoes

‘The woman buys (for) her shoes.’

When the applicative verb includes an object agreement morpheme that represents the direct object, the verb will be followed by the indirect object, for example in (28) the indirect object is *mosetsana* ‘girl’.

(28) *Mosadi o di rekela mosetsana.*

mosadi	o di rekela	mosetsana
woman	she it buys for	girl
<i>mo-sadi</i>	<i>o-di-rek-el-a</i>	<i>mo-setsana</i>
N1-woman	SC1- OC8 -buy-APPL-VEND	N1-girl

‘The woman buys the girl it.’

In (27) and (28) the word order is SVO:

- Subject + Verb + Direct object (27) or
- Subject + Verb + Indirect object (28).

The c-structure of (27) is:

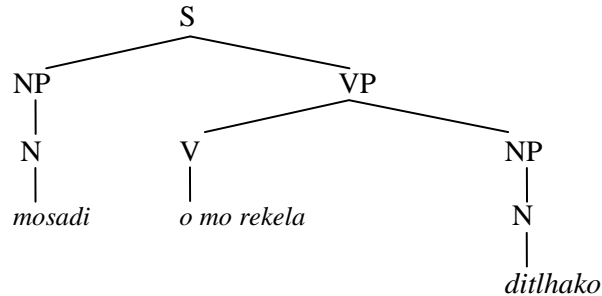


Figure 7: The c-structure for (27)

The f-structure of (27) is:

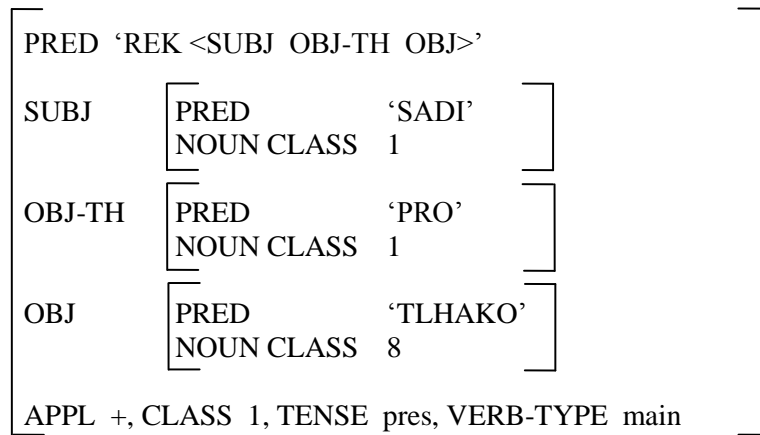


Figure 8: The f-structure for (27)

The c-structure of (28) is:

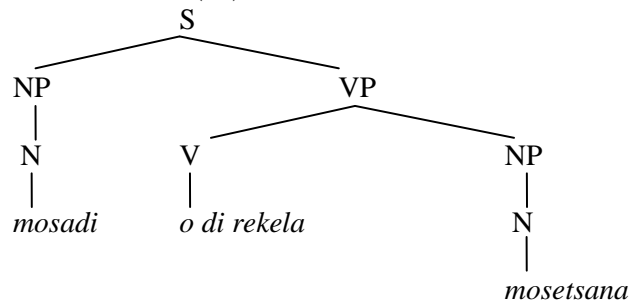


Figure 9: The c-structure for (28)

The f-structure of (28) is:

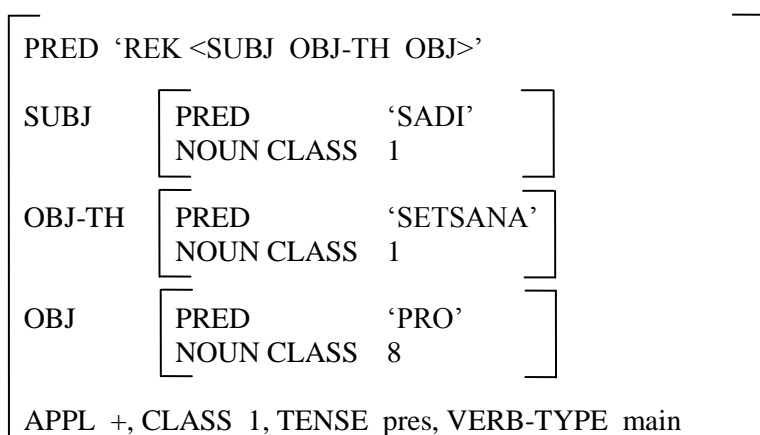


Figure 10: The f-structure for (28)

4. Modelling double objects in XLE

In order to present the parsed c- and f-structures of (22) and (23) we make use of XLE (Crouch *et al.*, 2008). In this section we consider Setswana sentences where the verb includes the applicative suffix and give a short overview of some of the Setswana entries in XLE.

In (25) the applicative verb is followed by an indirect object and a direct object. In the rules section in XLE we have written a rule to model the structure of a simple declarative sentence in the indicative mood, present tense, positive. This rule states that the sentence consists of a phrase (NP) followed by a verb phrase (VP) and that this VP consists of a verb followed by a NP which is the indirect object (OBJ-TH) and another NP which is the direct object (OBJ). This rule is further expanded by stating that in order for the sentence to include two objects the verb must be applicative and the verb cannot include a present tense morpheme *a*. The present tense morpheme *a* is only prefixed in the verbal morphology when the verb is in the present tense but when there is no object or adjunct following the verb (see (26)).

We have also elaborated on the rule that presents the structure of a simple declarative sentence in the present tense, positive, by stating that the VP of these types of sentences may only consist of an applicative verb (see (26)). This verb will include two object agreement morphemes. When two object agreement morphemes are prefixed to the verbal root we handle both of them as inflectional objects by “lifting” the morphological information, available in the morphological tag of the object agreement morpheme, to the syntactic level. In XLE we handle the first object agreement morpheme as the inflectional indirect object (INFLOBJ-TH) and the second object agreement morpheme as the inflectional direct object (INFLOBJ). In this instance a present tense morpheme *a* (PresPre) must also be included to represent a grammatical sentence.

The syntactic analyses of (25) and (26) require the prior tokenisation of the sentences and the morphological analysis of the tokens which is a standard approach in computational grammars. The Setswana verbal orthography forced us to do the tokenisation of verbs in a unique way which we elaborated on in Pretorius *et al.*, (2010). Sentences are then parsed with the XLE grammar. The morphological analysis of Setswana is based on a finite-state computational approach, using the natural language independent Xerox Finite-State tools (Beesley and Karttunen, 2003). The Xerox Finite-State tools can be incorporated in XLE.

To follow we give the output of the tokeniser, morphological analyser as well as the XLE parsed sentences of (25) and (26) as presented in Figures 11, 12, 13 and 14.

Output of the tokeniser

mosadi@o_rekela@mosetsana@ditlhako@
 mosadi@o_a_mo_di_rekela@
 (@ denotes token boundaries and _ represents whitespace)

Output of the morphological analyser

mosadi: sadi+NPre1
 o_rekela: rek+Pres+SC1+APPL+VEND
 mosetsana: setsana+NPre1
 ditlhako: tlhako+NPre8
 o_a_mo_di_rekela: rek+Pres+SC1+PresPre+OC1+OC8+
 APPL+VEND

Parsed sentences in XLE

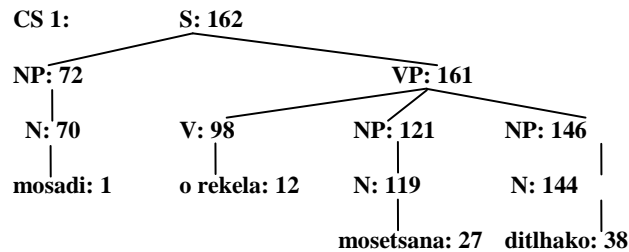


Figure 11: The c-structure for (25)

“mosadi o_rekela mosetsana ditlhako”

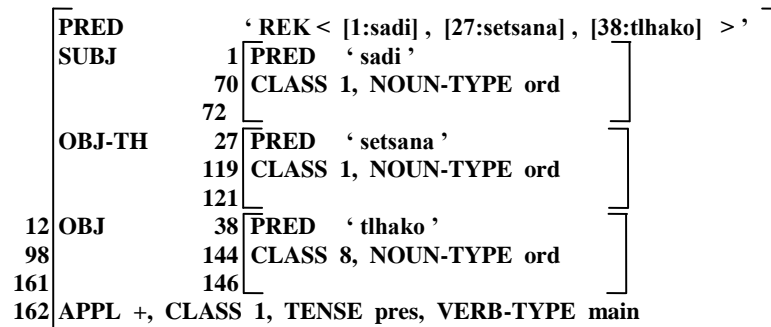


Figure 12: The f-structure for (25)

In Figure 12 the features of the verb indicate that the verb is applicative, takes a class 1 subject agreement morpheme, is in the present tense and is a main verb. It is necessary to give the class information because the verb *o_rekela* “she buys for” must agree with the noun *mosadi* ‘women’ which is also a noun in class 1. If there is not agreement between the subject noun and the verb, an inconsistent structure will be formed.

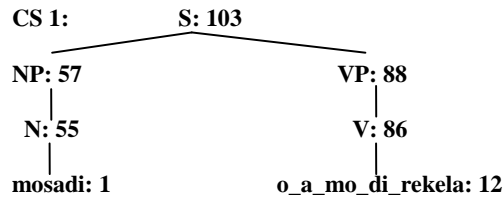


Figure 13: The c-structure for (26)

“mosadi o_a_mo_di_rekela”

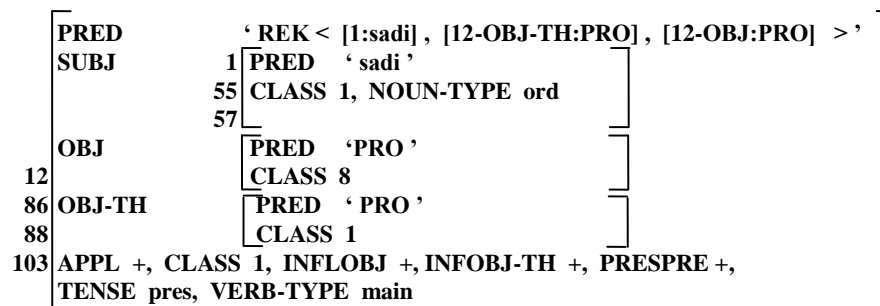


Figure 14: The f-structure for (26)

In Figure 14 the features of the verb indicate that the verb is applicative and takes a class 1 subject agreement morpheme. This main verb also has the present tense morpheme (PresPre) because the verb is in the present tense and it takes a feature of inflected indirect object and inflected direct object. The inflected objects are the corresponding object agreement morphemes which replaced the indirect and the direct object.

5. Conclusion

Setswana verbs may take two objects in certain linguistic instances, one being verbs with the applicative suffix. Both of these objects can be replaced with object agreement morphemes in the verb. They are incorporated pronouns and thus have a pronominal status. Although the object agreement morphemes of Setswana also have morpheme status in the c-structure when they are prefixed to the verbal root they act as indirect and direct objects.

It is shown that double objects and double object agreement morphemes in verbs where verbs have the applicative suffix can be accurately modelled in LFG and implemented in XLE. Future work includes a comprehensive treatment of Setswana syntax and the development of a broad coverage parser for Setswana using LFG and XLE.

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Appendix: Tags in the text

Tag	Meaning
1, 2, 3 ... 20	Class 1 to class 20
ADJ	Adjective
ADV	Adverb
APPL	Applicative suffix
CAUS	Causative suffix
DEM	Demonstrative
FUT	Future tense morpheme
INFLOBJ	Inflectional direct object
INFLOBJ-TH	Inflectional indirect object
LOC	Locative suffix
N	Noun
NPre	Noun prefix
OC	Object agreement morpheme
P1, P2, P3	First person, Second person, Third person
PERF	Perfect suffix
PL	Plural
PossPart	Possessive particle
PossPron	Possessive pronoun
Pres	Present tense
PresPre	Present tense morpheme a
QualPart	Qualificative particle
RECP	Reciprocal suffix
SC	Subject agreement morpheme
VEND	Verbal ending