

The Tswana Infinitive as a Mixed Category

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Abstract

After studying the morphological and syntactic properties of Tswana infinitives in some detail, we argue that a mixed category approach is more adequate than a phrasal approach to account for the combination of their common properties with the two different uses they are found in.

1 Introduction

Expressions which, like English verbal gerunds, share properties with both nouns and verbs have received renewed attention recently. There is a debate concerning the best way to represent their mixed properties: one possibility is to rely on phrase structures characterized by category switch (Pullum 1991), possibly enriched with functional structure sharing (Bresnan 1997); another one is to set up a new category (head value), which is neither verb nor noun, but inherits from less specified nominal and verbal categories at the same time (Malouf 2000). We think that the question cannot be solved without a detailed examination of specific phenomena. We argue here that the Tswana infinitive favors the mixed category analysis, because it combines a unique mixed morphology with two different uses (called here ‘nominal’ and ‘verbal’) of the form.¹

2 The Properties of Tswana Infinitives

2.1 Mixed morphology

In all of its uses, the Tswana infinitive has the same mixed morphology, exhibiting both verbal and nominal properties.

It patterns like a verb with respect to the three following properties:²

(i) It shows the same TAM distinctions (tense-aspect-modalities) as an indicative: it is inflected for the *present / perfect / future / potential / continuative*.

(ii) It shows the same polarity distinctions: *positive / negative*.

We give some examples in (1)-(3):

¹ Tswana (Setswana) is a Bantu language spoken by 4 million speakers in Botswana and South Africa.

² APPL= applicative; CAUS= causative; DEM= demonstrative; FIN= final vowel; GEN= genitive; INF= infinitive; LK= linker; LOC= locative; NEG= negative; O1S= 1pSg object agreement index, etc. O3:X= 3rdp index agreeing with n-class X; PFT= perfect; POT= potential; PRO1S= 1stpSg pronoun, etc.; PRO3:X= 3rdp pronoun, agreeing with NCLASS X; PSV= passive; S1S= 1stp subject agreement index, etc.; S3:X= 3rdp subject index, agreeing with n-class X, SEQ: sequential.

- (1)a. *o lema*
 ú- lím-á
 S3:1-plough-FIN
 ‘(s)he ploughs / is ploughing’
- b. *go lema*
 χù- lím-à
 INF-plough-FIN
 ‘to plough’
- (2)a. *ga a leme*
 χá-a- lím-í
 NEG-S3:1-plough-FIN
 ‘(s)he does not plough / is not ploughing’
- b. *go sa leme*
 χù-sá- lím-í
 INF-NEG-plough-FIN
 ‘not to plough’
- (3)a. *o ka lema*
 ú-ká- lím-à
 S3:1-POT-plough-FIN
 ‘(s)he can / may plough’
- b. *go ka lema*
 χù-ká- lím-à
 INF-POT-plough-FIN
 ‘to be able to plough’

(iii) It can include object markers exactly in the same way as verb forms.

- (4)a. *ke e lema*
 kí-i- lím-à
 S1S-O3:9-plough-FIN
 ‘I plough / am ploughing it’
- b. *go e lema*
 χù-i- lím-à
 INF-O3:9-plough-FIN
 ‘to plough it’

And it patterns like nouns with respect to the following three properties:

(iv) The initial syllable *go-* is a noun class prefix (15), as is made clear by nominal dependents: they take a prefix (for the demonstrative and the genitive), or a linker (for the relative clause), or both a prefix and a linker (for the adjective) which agree with the prefix *go-*.

- (5)a. *mosadi yo moša* mò-sádi jó mò-ǰá
 ‘new woman’ 1-woman 1.LK 1-new
- b. *go bina mo goša* χù- bín-à mo χù-ǰá
 ‘new dance /dancing’ INF/15-danser-FIN 15.LK 15-new

(v) The locative suffix -ng [ŋ] can be attached to them.

- (6) *Mo [go akanyeng mo ga gagwe]*
 mó χù-ákāŋ-e-ŋ mo χá-χάχwé
 PREP INF-think-FIN-LOC 15.DEM 15.GEN-PRO3:1
- ga a a lemoga fa o sa dire tiro sentle*
 NEG-S1S-PFT-notice-FIN COMP S3:1-NEG-do-FIN 9.work 7-good
- ‘While he was thinking in this way (lit. in this thinking of him) he did not notice that he was not doing the work properly’

(vi) They cannot include a subject marker.

- (7) *[Go (*ba) nwa bojalwa mo mebileng]*
 χ̣ù-nw-á bú-dzálwá mó mí-bìlé-ŋ
 INF-drink-FIN 14-beer PREP 4-street-LOC
ga go a siama NEG-S3:15-PFT-be.good-FIN
 ‘It is not good (for them) to drink beer in the streets’

These properties are summarized as follows:

(8)

verbal morphology	nominal morphology
tam markers	n-class prefix
polarity marker	locative suffix
(possible) object markers	no subject marker

Even in the nominal uses, the infinitive shows the same tam inflection as a verb. In this, Tswana contrasts with the cognate Bantu language Kikuyu, whose infinitives have an impoverished morphology (Mugane 2003).

2.2 Syntactic properties common to all uses

All uses of the Tswana infinitive share the following two properties:

(i) The phrase it heads cannot contain a subject NP. In this, of course, the infinitive contrasts sharply with verb forms, such as the indicative:

- (9)a. *Basadi *(ba) nwa bojalwa mo mebileng*
 bà-sádí bá-nw-á bú-dzálwá mó mí-bìlé-ŋ
 2-woman S3:2-drink-FIN 14-beer PREP 4-street-LOC
 ‘Women drink beer in the streets’
- b. **[Go nwa bojalwa Basadi mo mebileng]*
 χ̣ù-nw-á bú-dzálwá bà-sádí mó mí-bìlé-ŋ
 INF-drink-FIN 14-beer 2-woman PREP 4-street-LOC
ga go a siama NEG-S3:15-PFT-be.good-FIN
 ‘Women drinking beer in the streets is not proper’
- c. **[Basadi go nwa bojalwa mo mebileng]*

This property is unexpected, given the Deverbalization Hierarchy, well-supported cross-linguistically (see Malouf 2000: 96, commenting on Croft 1991), which says that, if a form inflects for tam like a verb, it also takes direct arguments (including the subject) like a verb. However, Tswana does not represent a true counter-example to this generalization, since the impossibility of a subject can be traced to a conflict between its morphology and the requirement that the occurrence of a subject be correlated with a subject marker on the verb. As illustrated in (9a), the sentence is ungrammatical if the verb form does not contain the marker *ba*. We note this requirement with the following implicational constraint:

(10) [SUBJ <canonical-synsem-i >] => [MORPHIFORM < ..., aff-i , ...>]

On the other hand, the subject marker cannot be present on the infinitive (7). Although Tswana verbal morphology results from a complex function taking into account a number of different properties, and cannot be said to be concatenative (Creissels 2005), it is realized as a template, where the n-class prefix *go-* occupies the same slot as the subject affix marker would. If this is the case, there is no way that constraint (10) can be satisfied, and the impossibility of a subject NP in a infinitival phrase follows.

(ii) An infinitival phrase includes the same dependents as the corresponding verb (excluding the subject). Thus, the infinitive combines with an object NP, locatives, PP not marked by a linker (Tswana nouns do not take PP complements), and adverbs. This is the case even in the presence of nominal dependents, such as an adjective, a genitive or a demonstrative. Example (10) illustrates the co-occurrence of an object NP (*nama*) with a demonstrative (*mo*), a genitive (*ga gago*) and an adjective (*goša*). Example (11) illustrates the co-occurrence of an object NP and an adjective.

(10) *Ke rata [go apaya nama*
kì-rát-á χύ-ápáj-à nàmà
 S1S-like-FIN INF-cook-FIN 9.meat
mo ga gago mo goša]
mó χá-χάχύ mó χύ-ǰá
 15.DEM 15.GEN-PRO2S 15.LK 15-new
 ‘I like this new way you have to cook meat’

(11) *go-lets-a katara mo go-ntle*
χύ-lits-á katará mó χύ-ntle
 INF-cry.CAUS-FIN guitar 15.LK 15-nice
 ‘a nice guitar playing’

It is worth noting immediately that nominal and verbal dependents are interspersed. For instance, in (12), the genitive occurs between two verbal dependents, the object NP and the PP.

(12) *Ga ke rate*
 NEG-S1S-like-FIN
[go nwa bojalwa ga basadi mo mebileng]
χύ-nw-á bú-dǰalwá χá-bà-sádí mó mí-bìlé-ṅ
 INF-drink-FIN 14-beer 15.GEN-2-woman PREP 4-street-LOC
 ‘I do not like women’s drinking beer in the streets’

In this respect, Tswana infinitives contrast with the well-known case of English gerunds, but they are not isolated. Not only is it the case for infinitives in other Bantu languages (see Kikuyu, Mugane 2003), but also

in West African languages (see Dagaare, Bresnan 1997). We come back to this property in section 3, since it has played a role in the discussion concerning the best way (phrasal or lexical) to represent such hybrid expressions.

2.3 The nominal use of the infinitive

As is the case for several other Bantu languages, Tswana infinitives are found in two types of uses, ‘nominal’ and ‘verbal’ (see a detailed discussion of Xhosa in du Plessis 1982, Visser 1989, du Plessis and Visser 1992, of Kikuyu in Mugane 2003, and a brief presentation of Tswana in Creissels 2003). Each is characterized by a set of correlated properties, which clearly contrast the two uses. We begin with nominal infinitives:

(i) They may include nominal dependents; we have already seen genitives (10)-(12), adjectives (5b), (10), and demonstratives (10) in preceding examples; we illustrate the relative clause in (13):

- (13) *go bina mo ke go ratang*
 χṽ-bín-à mó kí-χṽ-rát-à-ŋ
 INF-danser-FIN 15.LK S1S-O3:15-like-FIN-REL
 ‘a dance I like’

(ii) They assume all the grammatical functions in which one finds NPs: subject (9b), object (10), (12), genitive (14), complement of a preposition (6), (15).

- (14) *nako [ya go goroga ga baeng]*
 nākò já-χṽ-χṽrṽχ-à χá-bá-éŋ
 9.time 9.GEN-INF-arrive-FIN 15.GEN-2-guest
 ‘the time of the arrival of the guests’

- (15) *Ba ne ba utlwa [ka [go koma ga gagwe]]*
 bá-nè bà-útlw-à ka χṽ-kóm-à χá-χáχwé
 S3:2-AUX S3:2.SEQ-feel-FIN PREP INF-moan-FIN 15.GEN-PRO3:1
gore o lwala thata COMP S3:1-be sick-FIN very
 ‘They felt from his moaning that he was very sick’

(iii) What is understood as the first argument is realized as a genitive or unrealized, in which case it has an arbitrary or pragmatic interpretation (16): it is neither controlled nor raised. Thus, in (6) the genitive pronoun *ga gagwe* is obligatory to get the interpretation where the first argument of the infinitive is co-indexed with the matrix subject.

- (16) *[Go mpotsa] go a ntapisa.*
 χṽ-m-púts-à χṽ-á-n-táp-is-à
 INF-O1S-ask-FIN S3:15-DJT-O1S-be tired-CAUS-FIN
 Questioning makes me tired
 ‘It’s tiring that people ask (me) questions’

(iv) When used as object NPs, they observe the same linearization constraint as ordinary objects: they cannot be separated from the V.

- (17)a *Ke itse monna yo sentle.*
 kí-íts-í mù-nná jó sí-ntlè
 S1S-know-FIN 1-man 1.DEM 7-good
 ‘I know this man well’

b. **Ke itse sentle monna yo.*

- (18)a *O rata [go letsa katara mo ga gago] thata.*
 ú-rát-à χṽ-líts-à kátará mó χá-χáχṽ t^hátà
 S3:1-like-FIN INF-cry.CAUS-FIN 9.guitar 15.DEM 15.GEN-PRO2S
 much
 lit. He likes this playing (the) guitar of yours very much
 ‘He likes your playing the guitar a lot’

b. **O rata thata [go letsa katara mo ga gago].*

(v) When used as object NPs with intransitive verbs, they trigger the applicative form, like ordinary NPs. The applicative *el* affix is boldface.

- (19)a *O **gakgamalela** bopelokgale jwa mosimane.*
 ú-χáq^hamál-èl-à bú-pílúq^háli d3wá-mò-símàní
 S3:1-be surprised-APPL-FIN 14-courage 14.GEN-1-boy
 ‘He is surprised by the courage of the boy’

b. **O **gakgamala** bopelokgale jwa mosimane.*

- (20)a *O **gakgamalela** [go bua Setswana ga Lekgoa le].*
 ú-χáq^hamál-èl-à χṽ-bú-á sí-tswana
 S3:1-be surprised-APPL-FIN INF-speak-FIN 7-Tswana
 χá-lr-q^húà lé
 15.GEN-5-European 5.DEM
 lit. He is surprised by the speaking Tswana of this European
 ‘He is surprised by the fact that this European speaks Tswana’

b. **O **gakgamala** [go bua Setswana ga Lekgoa le].*

(vi) They can be pronominalized in the same way as ordinary NPs. In particular, they give rise to the object affix appropriate for n-class 15.

- (21) *A o utlule [go bua Setswana ga Lekgoa le] ?*
 INTER S2S-hear-PFT-FIN INF-speak-FIN 7-Tswana 15.GEN-5-
 European 5.DEM
 –*Ee, ke go utlule.*
 èè kǐ-χù-utlù-1-è
 yes, S1S-O3:15-hear-PFT-FIN
 ‘Did you hear this European speak Tswana ? – Yes, I heard it’

2.4 The verbal use of the infinitive

On all these aspects, the verbal use of Tswana infinitives, characterized by the following correlated properties, contrasts with the nominal one.

- (i) They do not include nominal dependents.
 (ii) They are either subject or object of verbs, or purpose modifiers; in these functions, they may alternate with *gore* finite clauses. Thus, the *gore* clause in (22b) is possible in the same environment as the verbal infinitive (no genitive), while the nominal infinitive is excluded (22c).
- (22) a *Re aga maraka [go sireletsa dikgomo mo dibataneng].*
 rǐ-áχ-á ma-raká χù-síreléts-à ði-q^hòmú mó ði-bàtànè-ŋ
 S1P-build-FIN 6-kraal INF-protect-FIN 8/10-cow PREP 8/10-beast
 of prey-LOC
 ‘We build kraals so as to protect cows from beasts of prey’
- b. *Re aga maraka [gore dikgomo di sirelediwe mo dibataneng].*
 rǐ-áχ-á ma-raká χùrǐ ði-q^hòmú ði-sírelèd-ìw-é
 S1P-build-FIN 6-kraal COMP 8/10-cow S3:8/10-protect-PSV-FIN
 mo ði-bàtànè-ŋ
 ‘We build kraals so that cows are protected from beasts of prey’
- c. * *Re aga maraka [go sirelediwa ga dikgomo mo dibataneng].*
 S1P-build-FIN 6-kraal INF-protect-PSV-FIN 8/10-cow PREP 8/10-
 beast of prey-LOC
- (iii) The subject is never realized; it is controlled (23a) or raised (23b).³

- (23) a *O rata [go letsa katarà].*
 ú-rát-á χù-łits-á kàtárà
 S3:1-like-FIN INF-cry.CAUS-FIN 9.guitar
 ‘He likes playing (the) guitar’

³ We cannot exclude, at this stage, that the subject of a verbal infinitive can also be pragmatically interpreted. The subject of a nominal infinitive still differs in that it cannot be controlled or raised.

- b. *Ba mo leta [go goroga].*
 bá-mú-lít-á χύ-χῶρῶχ-à
 S3:2-O3:1-wait-FIN INF-arrive-FIN
 ‘They are waiting for him to arrive’

(iv) It can be separated from the V, even when it is the complement of the verb, in the same way as a clause introduced by the complementizer *gore*.

- (24)a *O rata thata [go letsa katara].*
 ú-rát-à t^hátá χύ-líts-à kàtárà
 S3:1-like-FIN much INF-cry.CAUS-FIN 9.guitar
 ‘He likes very much playing (the) guitar’

- b. *Ke itse sentle [gore Mpho o tsamaile].*
 kí-ítsí sí-ntlé χῶrì mp^hᵔ ú-tsámà-ìl-è
 S1S-know-FIN 7-good COMP 1.Mpho S3:1-go away-PFT-FIN
 ‘I know well that Mpho has gone’

(v) They can be complements of intransitives without obligatorily triggering the applicative form, like *gore* clauses.

- (25)a *O gákgamala [go utlwa Lekgoa le mmuisa ka Setswana].*
 ú-χáq^hámál-à χῶ-útlw-á lí-q^húá
 S3:1-be surprised-FIN INF-hear-FIN 5-European
 lí-m-mú-ís-á ká sí-tswánà
 S3:5-O3:1-speak-CAUS-FIN PREP 7-Tswana
 ‘He is surprised to hear the European speaking to him in Tswana’

- b. *O gákgamala [gore Lekgoa le le bua Setswana].*
 ú-χáq^hámál-à χῶrì lí-q^húá lé lí-bú-á sí-tswánà
 S3:1-be surprised-FIN COMP 5-European 5.DEM S3:5-parler-FIN 7-tswana
 ‘He is surprised that this European speaks Tswana’

(vi) They cannot be represented by an object affix on the verb, like *gore* clauses.

- (26)a *A o rata [go letsa katara]?*
 -Ee, *o go rata thata.
 èè *ú-χῶ-rát-à t^hátà
 yes S3:1-O3:15-like-FIN much
 ‘Does he likes playing (the) guitar? –Yes, he likes it a lot’

- b. *A o utlule [gore Mpho o rekile koloi]?*
*–Ee, ke utlule jalo / *ke go utlule.*
 èè kī-útlú-l-è dʒalù / *kī-χó-útlú-l-è
 yes S1S-hear-PFT-FIN thus S1S-O3:15-hear-PFT-FIN
 ‘Did you hear that Mpho bought a car? –Yes, I heard that / it’

The data are summarized in the following table:

(27)	nominal Infinitives	verbal Infinitives
	may include nominal deps	may not include nominal deps
	the first argument is realized as a genitive or pragmatically interpreted	the first argument is controlled or raised
	if object, cannot be separated from the V	can be separated from the V
	trigger applicative form (with intr.)	does not obligatorily trigger applicative form (with intr.)
	pronominalized like NP	not pronominalized like NP

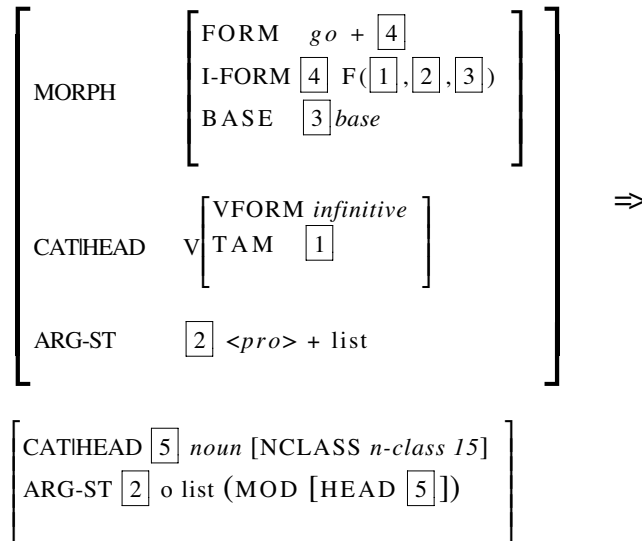
3 Phrasal Analyses for Hybrid Expressions

The data raise two questions: how do we analyze the relation between ordinary verb forms such as indicatives and the verbal infinitive, and how do we analyze the relation between the verbal and the nominal infinitives?

There is a certain rationale in taking the infinitives in their two uses to be completely separate items: in their verbal use, they syntactically behave like a verb (see (27)). However, if we look at the morphological properties, we see that the infinitive, even in its verbal use, contains the prefix *go-*, which is a n-class prefix in the nominal use.

Starting with this observation, there are two possible ways to go. The first analysis chooses to ignore this striking common morphology. Consequently, it treats the infinitive in its verbal use as a verb (the infinitive is a verb form which happens to have a prefix homonym with a n-class prefix), and the relation between the two uses can be described with a Lexical Rule, given in (28).

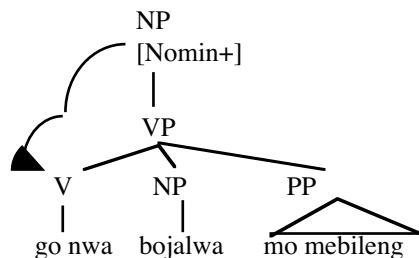
(28) Lexical Rule : verbal infinitive => nominal infinitive



This is not satisfactory. First, it is very strange that the same prefix *go-* which has nothing nominal in the verb form, miraculously transforms itself into a n-class prefix in the output of the rule. Second, the noun itself is a very strange noun, in that it is inflected like a verb, and it combines with dependents which are found nowhere else in Tswana with nouns: object NP, PP complements and adverbs. Thus, although the solution is technically possible, it completely misses the common properties of the two uses (see sections 2.1 and 2.2).

The second type of analysis attempts to account for the common morphological and syntactic properties, using a phrasal representation which relies both on nominal and verbal categories. A simple category switch analysis would look as in (29) for the verbal infinitive (cf. (7), ‘to drink beer in the street’). In order to account for the nominal prefix, we add an edge feature (such as ‘[Nomin +]’, see e.g. Tseng 2003 on edge features), which is shared by the V, and realized as the prefix *go-*.

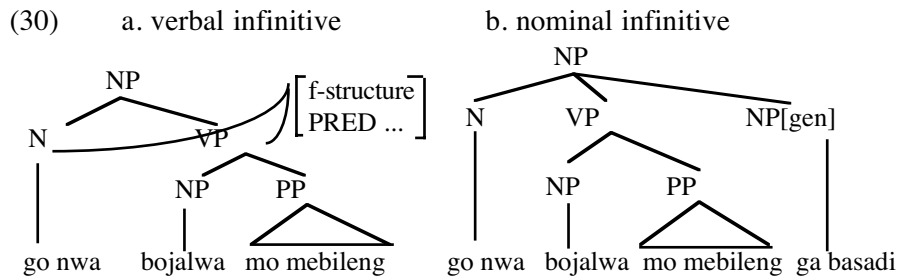
(29)



There are two problems. First, within the HPSG framework, this is not an ordinary phrase; it drastically violates the Head Feature Principle, so

that we have to set up a new construction devoted to that case. Second, this corresponds to the verbal use of the form; in spite of its containing both nominal and verbal categories, it does not help with representing the nominal use.

A more flexible version of the phrasal solution is offered in LFG by Bresnan (1997), and applied to Kikuyu by Mugane (2003). The infinitive would be an N taking a (verbless) VP complement, the N and the VP sharing their functional structure (in particular, the predicate and its arguments defined by their grammatical function).



This analysis can account for the mixed morphology: the n-class prefix would follow from the category N, while the verbal inflexion would depend on the f-structure inherited from the VP. It can also account for the fact that infinitives can take both verbal and nominal dependents (see (30b)).

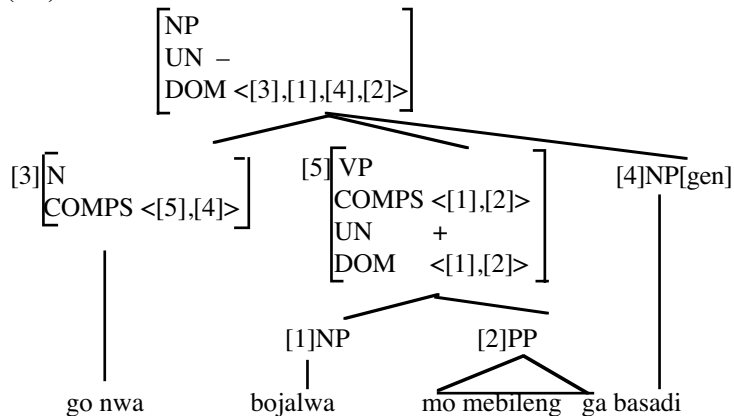
However, the definition of head sharing on which the analysis relies amounts to void the categorial distinction between N and V. It requires an extension of the extended head theory. The latter says that a ‘functional’ category (like Infl) can be an extended head if (i) it shares its functional structure with its lexical sister, and (ii) the two syntactic categories are ‘non distinct’ (like Infl and VP). In our case (see (30)), we have (a) to allow for functional structure sharing between a lexical head (the N) and its sister (the VP), and (b) to say that N and VP are ‘non distinct’. An appeal seems to be made to morphology to justify this extension (“the extended head [can be] a morphological derivative of a category identical / nondistinct from the phrase”, Bresnan 1997:14). But, of course, morphological derivation involving a verb and a noun is supposed to construct items belonging to different syntactic categories.

So, the representation in (30a) is better seen as a different configuration for head sharing, independent of the cases appealing to the notion of an ‘extended head’. In other words, (30a) is a phrasal representation of a nominalization, with a head N sharing its functional structure with a verbless VP sister. From an HPSG point of view, at least, this raises the question of how to license headless phrases: it is not clear how it can be done, given that it does not correspond to a deletion configuration. In fact, the problem is severe, when one considers infinitives without a complement as in (16). This implies a dangling VP, dominating nothing or dominating an empty category whose status is unclear.

The distinction between the two uses of infinitives is problematic for phrasal analyses of such hybrid constituents, precisely because they suppose that the constituent is always an NP. Certainly, it is a useful idea to say that the two uses differ semantically (as is done in Bresnan 1997, following an unpublished proposal by A. Spencer; we take up this proposal in section 4.2). However, the two uses also differ syntactically, as shown in sections 2.3 and 2.4. In particular, they are not found in the same environments (although there is a certain intersection). Verbal uses are found as arguments of subject control / raising verbs (23). It is an unusual property for nouns to allow for control or raising of their first argument; this characterizes nouns which form a complex predicate with the verb (as in ‘light verb constructions’). However, we have no indication that this is indeed the case. In addition, this analysis would mean that the two uses of infinitives correspond not only to different semantics, but also to different syntax, a loss of generalization if there is a way to preserve their syntactic unity.

Word order is also a source of a potential difficulty for phrasal analyses. As stressed by Mugane (2003) for Kikuyu, in the nominal use, we find that nominal and verbal dependents are interspersed (see section 2.1). The order for the phrase ‘for women to drink beer in the street’ (30b) usually contains the genitive between the object NP and the PP, see (12). A phrase structure such as (30b) does not immediately offer a way to get such an ordering. However, the problem disappears if we adopt domain union as proposed by Reape (1994), where the word order domain (the value of the feature DOM) can be bigger than the constituency domain. We can say that the VP which shares its functional structure with its N sister is not compacted (does not form a unit with respect to word order), a property noted by the feature [UN+]. Accordingly, the elements of the VP belong to the same word order domain as the genitive, at the NP level. In this proposal, (12) is analyzed as in (31).

(31)



Let us summarize the difficulties that the phrasal analyses face with the Tswana infinitives. Either they treat the verbal use of the infinitive as a pure verb form, thus failing to account for the nominal aspect of its

morphology, which is viewed as a pure accident. Or, they account for it with a special construction using both nominal and verbal categories, but this construction goes against the usual categorial properties (either it violates the Head Feature Principle, or it downplays the usual distinction between verbs and nouns), and the solution still has to be supplemented with a way to represent the distinction between the two uses, and an appeal to domain union.

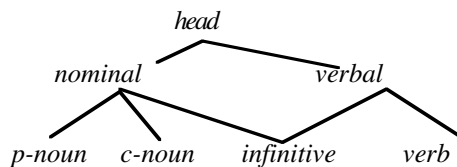
4 A Mixed Category Analysis

In this section, we show that the lexical solution proposed by Malouf (2000), which relies on setting up a mixed category, or part-of-speech which is neither N nor V, but inherits from more general verbal and nominal parts-of-speech, is superior to the phrasal analyses explored in the preceding section. It can account directly for the common properties of the two uses, without setting up a special phrase or blurring the distinction between N and V, and without appealing to domain union.

4.1 The common properties

First, we analyze the infinitive word itself. We propose that it has the same HEAD value in its verbal and nominal uses, which we call ‘infinitive’. The partial hierarchy of HEAD values that we need for Bantu languages is given in (32).

(32) A (partial) hierarchy of HEAD values for Bantu languages



The value *infinitive* inherits both from *verbal* and from *nominal*. As argued above, we want to account for the common, mixed morphology of Tswana infinitives. We do that with the following constraints which are associated with the underspecified values *verbal* and *nominal*:

$$(33) \text{ a. } \textit{verbal} \Rightarrow \left[\text{HEAD|TAM} \left[\begin{array}{l} \textit{tam} \\ \text{VFORM } \textit{vform} \\ (\text{TENSE } \textit{tense}) \\ (\text{POL } \textit{pol}) \end{array} \right] \right]$$

$$\text{ b. } \textit{nominal} \Rightarrow [\text{HEAD|NCLASS } \textit{noun-class}]$$

It must be stressed that, contrary to some presentations of this set up (e.g. Bresnan 1997), there is nothing more ‘indeterminate’ in mixed categories (head values) than in the more standard ones. Nothing prevents a precise specification of the properties attached to each value in the domain, including the ones which inherit from two underspecified values. According to (33), a word with infinitive head value has tam specifications, which correlate with a certain morphology, and also a n-class specification, which is more precisely *I5*, which correlates with prefix *go-*. Next, we account for the relation between the infinitive words and the verb. We distinguish between verb-lexemes, which are [HEAD *verbal*], and the words which are built on this lexeme, and can be either [HEAD *verb*] or [HEAD *infinitive*]. Since, in this analysis, infinitive is a head value, we propose that it constrains the VFORM value, which we call ‘infinitival’.

The relation between the syntactic properties of the verb and its morphology are specially complex in Tswana (see Creissels et al. 1997, Creissels 2005). We suppose that they result from two different functions, F1 and F2, as in (34).

$$(34) \text{ infinitive-word} \Rightarrow \left[\begin{array}{l} \text{MORPH} \left[\begin{array}{l} \text{FORM} \quad F_1(\boxed{1}, \boxed{5}) \\ \text{I-FORM} \quad \boxed{1} \quad F_2(\boxed{4}, \boxed{2}, \boxed{3}) \\ \text{BASE} \quad \boxed{2} \end{array} \right] \\ \text{CATIHEAD} \quad \textit{infinitive} \left[\begin{array}{l} \text{TAM} \quad \boxed{4} \\ \text{NCLASS} \quad \boxed{5} \quad I5 \end{array} \right] \\ \text{ARG-ST} \quad \boxed{3} \quad \langle \textit{pro} \rangle + \textit{list} \end{array} \right]$$

The *tam* and the *vform* values are further specified as in (35):

$$(35) \text{ a. } \left[\begin{array}{l} \textit{tam} \\ \text{VFORM} \quad \textit{vform} \\ \text{TENSE} \quad \textit{tense} \\ \text{POL} \quad \textit{pol} \end{array} \right]$$

b. *vform* = {*indicative, subjunctive, imperative, relative, circumstantial, sequential1, sequential2, infinitival*}

The complex functions that relate the properties of verbal words (verbs or infinitives) to their morphology result in a template that is organized around the root, and can be schematized as follows:

(36) Tswana verbal template

-4	-3	-2	-1	0	+1	+2	+3	+4
pol-1	subj-affix, n-class 15	tense, pol	obj-affix, refl.	root	caus, appl., recipr	perfect (pos)	passive	final vowel

Note that the base which appears in (34) is the combination of the root with the processes mentioned in (36), which modify the argument structure of the basic lexeme (causative, applicative, passive).

Finally, we note that the domain for head values in (32), as well as the distinction between lexemes and words, allows us to state an important cross linguistic tendency concerning nominalizations. It has been observed that words showing mixed verbal and nominal properties 'arise' from verbs, not from nouns. That is, we find verbs which are derived from nouns, but they are fully fledged verbs, they do not show mixed properties. Mixed properties characterize words which are associated with verbal lexemes. This generalization follows if, cross-linguistically, lexemes are or can be verbal (that is, underpecified, and giving rise to verb words and a mixed category like English gerunds and Tswana infinitives), while they cannot be nominal (nominal lexemes are already specified as common nouns, proper nouns etc.).

4.2 Verbal and nominal uses

The next question is how to account for the differences between the two uses of the Tswana infinitive, contrasted in sections 2.3 and 2.4. We propose that the two phrase types differ semantically, and we examine the constructions whose head is an infinitive word.

4.2.1 Denotation types

Essentially, we propose that the two uses of the infinitive differ semantically. Although the semantics of infinitive phrases in Tswana certainly requires a more in depth study, we present two arguments in favor of this hypothesis. First, when the infinitive phrase is a purpose clause, as in (22), it denotes an abstract object, presumably an 'outcome' in the typology of Ginzburg and Sag 2000, that is, a subtype of message. Thus, it is crucial to note that, in this case, the phrase cannot contain a nominal dependent such as a genitive. This indicates that a nominal use of the infinitive cannot be associated with an abstract object.

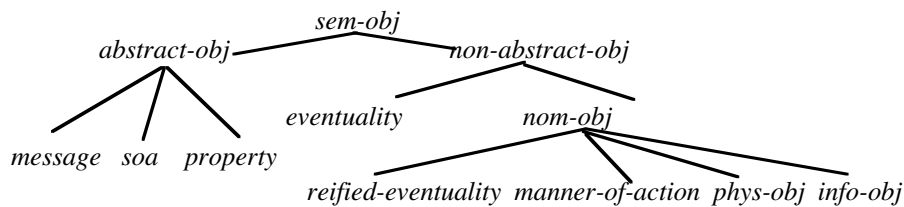
The second argument is as follows. There are some environments in which both nominal and verbal infinitives can occur. For instance, we have seen this with the psychological verb 'to be surprised' in (20) and (25), which are repeated below as (37a) and (37b).

- (37)a *O gākgamalela [go bua Setswana ga Lekgoa le].*
 ú-χáq^hámál-èl-á χú-bú-á sí-tswana
 S3:1-be surprised-APPL-FIN INF-speak-FIN 7-Tswana
 χá-lì-q^húà lé
 15.GEN-5-European 5.DEM
 ‘He is surprised by the fact that this European speaks Tswana’
- b. *O gākgamala [go utlwa Lekgoa le mmuisa ka Setswana].*
 ú-χáq^hámál-á χú-utlw-á lì-q^húà
 S3:1-be surprised-FIN INF-hear-FIN 5-European
 lí-m-mú-ís-á ká sí-tswana
 S3:5-O3:1-speak-CAUS-FIN PREP 7-Tswana
 ‘He is surprised to hear the European speaking to him in Tswana’

Thus, we can ask what the intuition of the speakers is, when asked to compare a sentence such as (37a) with a nominal infinitive phrase, and a sentence such as (37b), with a verbal infinitive phrase. As these examples attempt to show, the interpretation associated with the two complement types is somewhat different, although it is difficult to pinpoint exactly where the difference lies. In (37b), the infinitive phrase seems to denote an eventuality, while in (37a), this eventuality is reified, hence the translation with ‘the fact that’. In addition, nominal infinitives, just like French or English derived nominals, can easily denote the manner in which an action is accomplished, as in (10), rather than the eventuality itself.

Now, eventualities are not abstract objects, but parts of the world. So, we cannot say that verbal infinitive phrases are always associated with abstract objects, although they can be. On the other hand, they are not associated with reified eventualities or manner of action, like nominal infinitive phrases. If we adopt the hypothesis sometimes defended (Asher 1993) that the object denoted by derived nominals is not exactly the same as the eventuality associated with the verb, we have the type ‘reified eventuality’, and we tentatively propose the following (partial) domain of semantic objects, where the abstract objects are as in Ginzburg and Sag 2000:

(38) A (partial) hierarchy of semantic objects



We propose that verbal infinitive phrases denote either an eventuality or an abstract object, while nominal infinitive phrases denote a nom-object. The latter will be either a reified eventuality or a manner-of-action,

because these are the nom-objects compatible with the relation associated with the verbal lexeme.

How do we go from the infinitive word denotation to the phrase denotation? We assume that infinitive words are underspecified in the lexicon: they denote a non-abstract-object, which can be further resolved into eventuality or nom-object. Let us assume that it is an eventuality: the phrase is verbal. At the level of the phrase, it can remain an eventuality (as in (37b)), or it can be raised to an abstract object, as in (22) (a type of message) or as in (23b) (if phrases whose subject is raised denote a property). If the denotation of the phrase were always raised to an abstract object, we could assume that it is a property of verbal infinitive constructions to turn the type from eventuality to abstract object. However, if we are right in assuming that the larger infinitive phrase in (37b) is an eventuality, this move is not adequate. Moreover, examining the same example (37b), we note that the larger Inf phrase includes an Inf phrase argument of a perception relation, and it is certainly usual to consider that the complement of perception verbs is an eventuality. In order to get the two denotations, we have two constructions, to which we come back in the following section. On the other hand, nominal infinitive phrases are associated with a nom-obj, like their head word.

4.2.2 Infinitive constructions

We analyze all the dependents of the infinitive word as complements, whether they are subcategorized or not. The subcategorized ones are inherited by the infinitive word from the verbal lexeme: hence, they are shared by the infinitive and the verb words (such as the indicative forms). The others are modifiers which are turned into complements by the head-complements-construction. Regarding adverbs and locative PPs, we can assume either that they are modifiers which modify a verbal word (hence either a verb or an infinitive), or that they are optional complements of the verbal lexeme, and inherited as such by the infinitive. As for the nominal dependents, we analyze them all as nominal modifiers, that is, as elements which bear the specification [MOD *nominal*]. This is the case for the demonstrative, the adjective, the genitive (which, in this case, is co-indexed with the non-canonical *pro* subject of the head) and the relative clause.

Infinitive expressions can be words (as in (16)) or phrases. As for words, it remains to be seen whether it is better to treat them as lexical items directly entering the syntax, or as dominated by a head-only-construction. The question exceeds the scope of this paper, since the situation is frequent in Tswana. When they combine with complements, they are constrained by the head-complements-construction (39). As in e.g. Bouma et al. 2001, the modifiers are turned into complements.

(39) *head-complements-construction* =>

$$\left[\begin{array}{l} \text{MOTHER} \quad [\text{CATIHEAD } \boxed{1}] \\ \text{HEAD-DTR} \quad [\text{ARG-ST } \langle \boxed{2} \rangle + \boxed{3}] \\ \text{NON-HD-DTRS} \quad \boxed{3} + \text{list}([\text{MOD } [\text{HEAD } \boxed{1}]]) \end{array} \right]$$

We can now semantically specify infinitive phrases, relying on three constructions.

(40) a. *infinitive-verbal-construction* =>

$$\left[\begin{array}{l} \text{MOTHERICONTENT} \quad \boxed{1} \textit{eventuality} \\ \text{HEAD-DTR} \quad \left[\begin{array}{l} \text{HEAD } \textit{infinitive} \\ \text{CONTENT } \boxed{1} \end{array} \right] \end{array} \right]$$

b. *infinitive-nominal-construction* =>

$$\left[\begin{array}{l} \text{MOTHERICONTENT} \quad \boxed{1} \textit{nom-obj} \\ \text{HEAD-DTR} \quad \left[\begin{array}{l} \text{HEAD } \textit{infinitive} \\ \text{CONTENT } \boxed{1} \end{array} \right] \end{array} \right]$$

c. *infinitive-propositional-construction* =>

$$\left[\begin{array}{l} \text{MOTHERICONTENT} \quad \textit{abstract-object} \\ \text{HEAD-DTR} \quad \left[\begin{array}{l} \text{HEAD } \textit{infinitive} \\ \text{CONTENT} \quad \textit{eventuality} \end{array} \right] \end{array} \right]$$

An expression allowed by one of the constraints in (40) is also allowed either as a word (possibly, a head-only-construction) or as a head-complements-construction. In (40a) and (40b), the content of the construction is identified with that of the infinitive head. Thus, the description in (34) is the underspecified description common to the two uses of the infinitive, which correspond to two lexical items, differentiated solely by their semantics. Alternatively, we could set up an analysis where the infinitive word itself would be a single lexical item, associated with a relation, semantic objects such as eventuality, abstract-object and nom-object being the content of the construct that enters into the syntax. We have chosen here a more conservative analysis, which moreover does not force us to set up head-only-constructions all over Tswana syntax. Note

that an infinitive denoting an eventuality can be the head either of an eventuality or a ‘propositional’ denoting construction.⁴

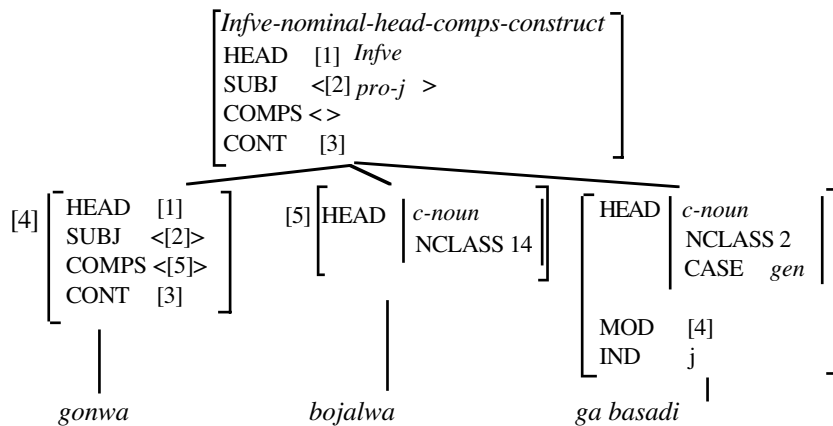
We must ensure that no nominal dependent appears in an infinitive-verbal-construct. In fact, this follows from their analysis as modifiers turned into complements. Their feature MOD specifies not only the part of speech of the expression they modify, but other properties such as content. Thus, we can say that demonstratives, genitives, adjectives and relative clauses specify that the expression they modify denote a nom-object.

Finally, let us look at word order. As indicated by the head-complements-construction, we assume that infinitive phrases have a flat structure: the head and all its complements are at the same level. It is thus completely expected that nominal dependents and dependents inherited from the verbal lexeme be interspersed, as long as linearization constraints are observed. The following are constraints on the order of the constituents in a head-complements-phrase. In addition to the initial position of the infinitive, we must ensure that the object NP (which we characterize as accusative, for simplicity) is not separated from the head, and that the nominal dependents are ordered among themselves. A relative clause comes last.

(41) Linearization constraints in the head-complements-construction

- a. Head **precedes** X
- b. NP[acc] **precedes** ¬[NP[acc]]
- c. demonstrative **precedes** NP[gen] **precedes** adjective
- d. X **precedes** [MOD nominal, HEAD verb]

An instance of a phrase which is allowed by (39), (40b) and (41) is given below.



⁴ We use ‘proposition’ as a cover term, not restricted to the denotation of a ‘proposition’, as a type of message (Ginzburg and Sag 2000). It remains to be seen how the denotation of the propositional infinitive construction is further restricted to some subtypes.

5 Conclusion

Phrasal and lexical analyses of hybrid nomino-verbal constructions are often believed to be equivalent. However, Tswana infinitives raise problems for phrasal analyses, and must be supplemented by an appeal to domain union. On the other hand, their common morpho-syntactic as well as word order properties follow straightforwardly from a domain of head values including a mixed category, while the differences between the nominal and the verbal uses are attributed solely to their semantics.

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