Past Tense Marking in Afrikaans*

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1 Introduction

In our presentation of the past tense marking system in Afrikaans, we will argue that the data can best be presented in terms of scope underspecification and multiple exponence of temporal operators. We will use *Lexical Resource Semantics* (Richter and Sailer, 2001a; Bouma, 2003) to analyze the data.

1.1 Motivation

As discussed in the literature (de Villiers, 1971; Ponelis, 1979; Donaldson, 1993; Van der Kleij, 1999), the past tense forms in Afrikaans leads to systematic ambiguities. Sentence (1) illustrates this ambiguity. In (a)–(c) we indicate the three possible temporal readings,[1] first by an English translation and then by an expression which explicitly indicates certain semantic operators. In the latter, we use the operator "ˆ" to indicate intensional contexts, and the operator "PAST" to indicate a semantic past tense.

(1) Jan wou die boek gekoop het.
Jan wanted.IMP the book bought.PART AUX

a. Jan wanted to have bought the book.
PAST(Jan wants ˆPAST(Jan buys the book))

b. Jan wants to have bought the book.
Jan wants ˆPAST(Jan buys the book)

c. Jan wanted to buy the book.
PAST(Jan wants ˆ(Jan buys the book))

Sentence (1) contains two morphological markings for anteriority: the imperfect verb *wou*, and the complex *gekoop het*. There is at least one past tense operator in each reading. The three readings, then, differ with respect to the number of past operators and with respect to the scope. In (a) there occur two past operators, one for each verb. In (b) only the embedded verb is interpreted as past. In (c) the past operator has scope over the modal verb. Notably in (b) the modal verb is morphologically marked as past, but it is not in the scope of a past operator.

1.2 Aims and Structure

Aims of the talk:

- Major claim: the Afrikaans tense system can best be presented in terms of underspecification and multiple exponence
- This is work in progress.
- We will focus on simple clauses and ignore sequence-of-tense effects in embedded clauses.
- We will not focus on a particular analysis of semantic tense — all we need for our purpose is an analysis in which tense is treated as an operator in the semantic representation (logical form) of a clause.

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[1] In addition to the past tense use, *wou* and *gekoop het* can also be irrealis. Hence the readings *Jan would love to have bought the book.*, and *Jan would love to buy the book.* are also possible. We will ignore these irrealis readings throughout this paper.

Structure

2 Afrikaans Verbal Morphology

In comparison to the verbal systems of related languages such as Dutch or English, Afrikaans verbal morphology is relatively simple. Basically, verbs have two forms: a temporally unmarked form and a form that is marked as past. For some modal verbs, both forms are expressed with morphologically simple words (*wil* (*want*), *wou* (*wanted*)), for other verbs, the unmarked form is simple, and the past form resembles morphologically the present perfect of Dutch or English (*koop* (*buy*), *gekoop het* (*bought*)).

(2) Afrikaans verbal forms:

base form	English	past participle	past form	fin. present	fin. past
wees	be	gewees	—	is	was
hê	have	gehê/gehad	—	het	(had)
koop	buy	gekoop	—	—	—
kan	can	—	kon	—	—
sal	will	—	sou	—	—
wil	want	—	wou	—	—
moet	must	—	moes	—	—
het	perfect aux	—	—	—	—

Unless there is an explicit finite present form, the base form is used as finite and infinite:

(3) a. Hy weet publisiteit **is** belangrijk.
he knows publicity is important

b. Hy weet publisiteit kan belangrijk **wees**.
he knows publicity can important be

(4) a. Ampie **het** 'n donkie.
Ampie has a donkey

b. Ampie wil 'n donkie **hê**/ *het.
Ampie wants a donkey have

(5) a. Jan **skryf** 'n boek oor sy pa.
Jan writes a book about his father

b. Jan wil 'n boek oor sy pa **skryf**.
Jan wants a book about his father write

(6) a. Jan **wil** 'n boek oor sy pa skryf.
Jan wants a book about his father write

b. Jan sal a boek oor sy pa **wil** skryf.
Jan will a book about his father want write 'Jan will want to write a book about his father.'

(7) a. Jan **het** 'n boek oor sy pa geskryf.
Jan AUX a book about his father written 'Jan wrote a book about his father.'

b. Jan moet 'n boek oor sy pa geskryf **het**/ *hê.
Jan must a book over his father written AUX/ have 'Jan must have written a book over his father.'

(8) Afrikaans tense forms:

	wees	hê	skryf	kan doen
presens	is	het	skryf	kan doen
perfek	gewees het/was	het gehad	het geskryf	(het kan doen)
imperfek	was	(had)	—	kon doen
presens-perfek	—	—	—	kan gedoen het
imperfek-perfek	—	—	—	kon gedoen het
perfek-imperfek	—	—	—	(het kon doen)

The perfect auxiliary *het* does not have a participle form. Thus there is no morphological "Doppelperfekt" (double perfect) as in (Southern) German or Yiddish (both of which also lack an imperfect form for most verbs).

(9) a. * het gedoen gehad
AUX done had

b. Yiddish: ikh hob aykh gehat gevarnt ir zolt nit geyn.
I have you.PL had.PART warned.PART you.PL ought not go.INF

'I had warned you (formal) not to go.' (Katz, 1987, p.,138)

3 The Interpretation of Tenses in Simple Clauses

Depending on the verb class (*wees*, *hê*, regular verb, modal verb), the potential of past tense marking differs. For illustration, consider the pattern of regular verbs (data quoted from de Villiers (1971), p. 47).

(10) a. Hy het dadelik huis toe gestap.
he AUX really house towards stepped.PART 'He really stepped towards his house.'

b. Toe stap hy dadelik huis toe.
Then goes he really house towards 'Then, he really stepped towards his house.'

c. Verlede week stap hy huis toe, en daar sien hy sy buurman voor die hekkie.
last week steps he house towards and there sees he his neighbor in front of the hedge

'Last week, he stepped towards his house and there he saw his neighbor in front of the hedge.'

The following observations hold for regular verbs:

- If there is no other indication for anteriority, the *perfek* is used.
- If there is another indication for anteriority, the *presens* can be used.

For verbs which have an *imperfek* form, there is a tendency to use this *imperfek* form in all simple past contexts.

(11) a. Hy was dadelik tuis.
he was.IMP really home

b. Toe was/ is hy dadelik tuis.
then was.IMP/ is.PRES he really home

c. Verlede week was/ is hy dadelik tuis en daar kom sy maat op besoek.
last week was.IMP/ is.PRES he really home and his friend comes to see him.

(12) a. Hy wou huis toe stap.
he wanted.IMP house towards step

b. Toe wou/ wil hy huis toe stap.
then wanted.IMP/ wants.PRES he house towards step

c. Verlede week wou/ wil hy huis toe stap en daar sien hy sy buurman ...
last week wanted.IMP/ wants.PRES he house towards step ...

3.1 The *Perfek* as Past

Van der Kleij (1999) argues that (in unembedded clauses) the Afrikaans *perfek* is interpreted as semantic past tense, i.e., it corresponds to the Dutch imperfect, We will present her evidence for such a purely temporal interpretation of the *perfek*.

***sedert* (*since*)** In combination with the adverb *sedert* (*since*), Van der Kleij (1999) (p. 17f.) observes that: (i) the *presens* is compatible with an interpretation in which the event is still occurring during speech time; (ii) if a *perfek* is used, the event must have ended before the speech time.

(13) Hy woon sedert 1985/ vanaf sy tiende lewensjaar in Kaapstad.
he lives since 1985/ from on his tenth year in Kaapstad

'He has been living in Kaapstad since 1985/ from his tenth year of life.'

(14) a. Hy het sedert 1985/ vanaf sy tiende lewensjaar in Kaapstad gewoon.
he AUX since 1985/ from on his tenth year in Kaapstad lived.PART

b. * ... en daar woon hy nou nog.
and he still lives there.

⟹ This pattern is compatible with any account of the perfect in which the speech time is not included in the interval denoted by the perfect operator.

***vir* (*for*)** A similar observation holds for *vir* (*for*) (Van der Kleij, 1999, p. 18):

(15) Hy het vir tien jaar in Kaapstad gewoon.
he AUX for ten years in Kaapstad lived.PART

'He lived in Kaapstad for ten years.'

Sentence (15) only has one reading. In this reading the interval of 10 years must precede the speech time and the state may no longer hold at the speech time.
⟹ There is no *extended-now interpretation* for the *perfek*.

Other past adverbials

(16) a. Gister het hy in Dorpstraat geloop.
yesterday AUX he in Dorpstraat walked.PART

'Yesterday he walked in Dorpstraat.'

b. Gister loop hy in Dorpstraat.
yesterday walk.PRES he in Dorpstraat

⟹ The *perfek* is compatible with past tense adverbials.

Individual level predicates

(17) a. Ek weet dat my pa se oupa groene oë gehad het.
I know that my father 's grandfather green eyes had.PART AUX

'I know that my father's grandfather had green eyes.'

b. Dutch: Ik weet dat de oupa van mijn vader groene ogen had/ *gehad heeft.
I know that the grandfather of my father green eyes had.IMP/ had.PART AUX

⟹ Individual level predicates are ok with a *perfek*.

Future adverbials

(18) a. * Môre het ek hom gesien (en dan sal ek alles vir jou vertel).
tomorrow AUX I him seen.PART and then will I everything to you tell

b. Môre sal ek hom gesien het ...
tomorrow will I him seen.PART AUX ...

$\Longrightarrow$ The *perfek* is incompatible with future adverbials.

Conclusion We conclude that the *perfek* has a non-aspectual, temporal use.

(19) Jan het gebel.
Jan AUX called.PART

PAST(Jan calls)

For the rest of the paper we will propose a more formal semantic expression as the logical form of (19). In fact we will work with two different logical forms, a simple expression in (20) and a more explicit expression in (21). We will assume that our semantic ontology contains *event(ualitie)s* (events and states) and *times*. A time t denotes an interval. We write s^* for a special time variable, the contextually given speech time.

(20) a. Logical form of (19): $\textsc{past}(\mathsf{call}'(j))$

b. $[\![\textsc{past}(\phi)]\!] = 1$ iff there is a time t before the speech time, so that ϕ holds at t.

(21) Logical form of (19):
$\exists t[t < s^* \wedge \exists e[t \odot \tau(e) \wedge \mathsf{call}'(e, j)]]$
(where $\tau(e)$ is the time of the event e, and $t \odot t'$ is true iff the times t and t' overlap.)

3.2 The *Perfek* as Aspect?

It is an unresolved question whether or not Afrikaans *perfek* has an aspectual meaning in addition to its temporal meaning. According to Van der Kleij (1999) this is the case. First we will present her argument in favor of the ambiguity hypothesis. Then we will show that her data can be interpreted within a purely temporal analysis of the *perfek*, in which we reduce the aspectual meaning to the *Aktionsart* of the verb and to independent contextual factors.

According to Van der Kleij (1999), the *perfek* is ambiguous and can be interpreted as either temporal or aspectual. She cites *nadat* (*after*)-sentences as evidence:

(22) a. Nadat hy sy eksamen geskryf het, het hy koffie gedrink.
after he his exam written.PART AUX AUX he coffee drunk.PART

'After he had written his exam, he drank a coffee.'

b. Nadat ek hom môre gesien het, sal ek alles vir jou vertel.
after I him tomorrow seen.PART AUX will I everything to you tell

'After I have seen him tomorrow, I will tell you everything.'

The crucial observation is that the *perfek* in its temporal use is not compatible with a future adverbial such as *môre* (*tomorrow*) (see (18)).

If we want to represent Van der Kleij's intended aspectual interpretation, we have to use the more complex logical form of the *perfek*, as given in (21) above. Following the analysis of perfectives in Stechow (2002), we can assume the following logical form:

(23) (nadat) Jan die eksamen geskryf het ...
$\exists e[\tau(e) \supset t \wedge \mathsf{exam\text{-}write}'(e, j)]$
($t' \supset t$ is true iff t' and t overlap so that t includes the right hand border of t'.)

Note that in contrast to tense, aspect requires a temporal argument t to be given in the context. Therefore, there is no aspectual reading of the *perfek* in simple finite clauses. Consequently, the incompatibility with *môre* is accounted for.[2]

[2]We postpone a more detailed analysis of clauses with temporal adverbs to Section 6.

(24) a. * Môre het Jan vir Marie gesien.
tomorrow AUX Jan to Marie seen.PART

b. Past interpretation:
* $\exists t[t < s^* \wedge t \odot \mathsf{tomorrow}' \wedge \exists e[\tau(e) \odot t \wedge \mathsf{see}'(e, j, m)]$
(t cannot precede the speech time and be within tomorrow)

c. Perfect interpretation:
* $t \odot \mathsf{tomorrow}' \wedge \exists e[\tau(e) \supset t \wedge \mathsf{see}'(e, j, m)]$
(t is free in the logical form)

On the other hand: We will try to reduce the perfective interpretation to aspectual properties of the context. Then, we can assume a simple temporal interpretation of the *perfek*.

In the case of *toe*-sentences, it is the *Aktionsart* of the verb and the context that determine whether we obtain a perfective or a simultaneous interpretation.

(25) a. Toe hy sy eksamen geskryf het, het hy koffie gedrink.
when he his exam written.PART AUX AUX he coffee drunk.PART
'While he was writing his exam, he drank coffee.'

b. Toe hy sy eksamen klaar geskryf het, het hy koffie gedrink.
when he his exam ready written.PART AUX ...
'When he had written his exam, he drank coffee.'

c. Toe hy sy eksamen geskryf het, het hy 'n praktyk in die stad geopen.
when he his exam written.PART AUX AUX he a practice in the city opened.PART
'When he had written his exam, he opened a practice in the city.'

Furthermore, it is generally assumed that in subordinate clauses, the matrix clause may have an effect as if it was "resetting" the speech time of the embedded clause. In somewhat simplistic approaches, the embedded speech time is equated with the matrix event time (Hornstein, 1990). Stechow (1995) observes certain complications with this view. For our purpose we will assume that a new s^* is introduced in the embedded context. We will write $\exists s^*[s^* \approx \tau(e) \wedge \ldots]$, to indicate that this new speech time roughly corresponds to the time of the matrix event e.

If we combine these two observations we can also envisage a purely temporal interpretation of the *perfek*, where the embedded tense is temporally related to the matrix t, and *nadat* — just as the adverbial *klaar* (*ready*) — establishes the perfective reading.

(26) a. Nadat Jan môre sy examen geskryf het, sal hy koffie drink.
after Jan tomorrow his exam written.PART AUX will he coffee drink
'After Jan has written his exam tomorrow, he will drink coffee.'

b. $\exists t[t > s^* \wedge \exists e[\tau(e) \odot t \wedge \mathsf{drink\text{-}koffie}'(e, j)$
$\wedge \exists s^*[s^* \approx \tau(e) \wedge \exists t'[t' < s^* \wedge t' \odot \mathsf{tomorrow}' \wedge \exists e'[\tau(e') \odot t' \wedge \mathsf{exam\text{-}write}'(e', j)]]]]]$

The lexical contribution of the conjunction *nadat* is twofold: (i) A new "speech time" is introduced, and is said to coincide with the time of the coffee drinking ($\exists s^*[s^* \approx \tau(e) \ldots]$). (ii) The embedded clause receives a perfective interpretation, i.e., an interpretation such that the event of the exam-writing is terminated by $\tau(e)$. This second part of the interpretation is not reflected in our logical form.

With this analysis, we capture the aspectual behavior of *nadat*-clauses without assuming any aspectuality in the meaning of the *perfek*. Since we are only concerned here with the meaning of the verb forms, we will continue to ignore the aspectual properties of our examples.

3.3 The *Imperfek* as Past

It is implicitly assumed in Van der Kleij (1999) that the *imperfek* expresses a semantic past and is, therefore, morphologically and semantically similar to the Dutch imperfect.

***wees* (*be*)** It has been observed (de Villiers, 1971; Van der Kleij, 1999) that in simple clauses, the *perfek* forms and the *imperfek* form of *wees* can be freely interchanged.

(27) a. Gister was hy tuis.
yesterday was.IMP he home

b. Gister was hy tuis gewees.

c. Gister het hy tuis gewees.

There are, however, syntactic restrictions on the use of the three forms: the form *was* can only be used as a finite form. *Was gewees* can only occur if *was* is in the V2 position.[3] The form *gewees het* does not underly any syntactic restrictions.

(28) a. Ek dink dat Jan gister tuis was/ gewees het/ *gewees was
I think that Jan yesterday home was.IMP/ been.PART AUX/ been.PART was.IMP

b. Jan kan nie tuis *was/ gewees het/ *gewees was nie.
Jan can.PRES not home was.IMP/ been.PART AUX/ been.PART was.IMP not
'Jan cannot have been home.'

We also find the *imperfek* in contexts in which Van der Kleij (1999) assumes an aspectual use of the *perfek*:

(29) Nadat ek by hom môre op besoek was, sal ek alles vir jou vertel.
after I at him tomorrow on visit was.IMP will I everything to you tell
'After I have visited him tomorrow, I shall tell you everything.'

This indicates that there is no difference with respect to the temporal meaning between the *perfek* and the *imperfek*. Thus, we assume the following logical forms:

(30) Jan was tuis.
Jan was.IMP home 'Jan was at home.'

a. $\textsc{past}(\mathsf{be\text{-}home}'(j))$

b. $\exists t[t < s^* \wedge \exists s[\tau(s) \odot t \wedge \mathsf{be\text{-}home}'(s, j)]]$
(where s is a state.)

Modals For modals, we listed an *imperfek* form and a number of *perfek* forms (*het kan doen*, *het kon doen*, *kan gedoen het* and *kon gedoen het*) in (8). We will explore these forms in detail in Section 5. There is a tendency to avoid forms with *het* in the V2 position. Consequently, the following forms are rarely found:

(31) a. Jan het die boek wil lees.

b. Jan het die boek wou lees.

We assume that the *imperfek* is interpreted as the same semantic operator which we introduced for the *perfek*.

(32) Jan wou bell.
Jan wanted.IMP come 'Jan wanted to call'

a. $\textsc{past}(\mathsf{want}'(j, \hat{}\mathsf{call}'(j)))$

b. $\exists t[t < s^* \wedge \exists s[\tau(s) \odot t \wedge \mathsf{want}'(s, j, \hat{}\exists s^*[s^* \approx \tau(s) \wedge \exists e[\tau(e) \odot s^* \wedge \mathsf{call}'(e, j)]])]]$

In this logical form, we suggest that the embedded event e (the calling) is simulaneous to the matrix state s, i.e., the wanting. As noted in Katz (2001), in such contexts, the embedded event is usually interpreted as occurring after the matrix time. To keep our logical forms simple, we will ignore this problem.[4]

The logical forms given for (32) indicate just one of the possible readings of this sentence. In Section 5, we will show that *wou* introduces a modal and a past operator. The relative scope of these two operator, however, is not determined in the lexical entry. This will ultimately lead to the ambiguities outlined in (1).

[3]The restriction to the V2 position, appears to be very strong. Even a google search of *"gewees was"* delivered only two occurrences in Bible translations and one quote from an 18th century diary.
[4]A simple solution would be to incorporate this shifting into the restrictions on the embedded speech time.

3.4 Summary

We have shown that both the *perfek* and the *imperfek* can be interpreted as introducing a temporal operator PAST — or a more elaborated formula that corresponds to it. The relevant logical forms are:

(33) a. Jan het gebel.
$\textsc{past}(\mathsf{call}'(j))$
$\exists t[t < s^* \wedge \exists e[t \odot \tau(e) \wedge \mathsf{call}'(e,j)]]$

b. Jan was tuis./ Jan was tuis gewees
$\textsc{past}(\mathsf{be\text{-}home}'(j))$
$\exists t[t < s^* \wedge \exists s[\tau(s) \odot t \wedge \mathsf{be\text{-}home}'(s,j)]]$

c. Jan wou bel.
$\textsc{past}(\mathsf{want}'(j, \hat{}\mathsf{call}'(j)))$
$\exists t[t < s^* \wedge \exists s[\tau(s) \odot t \wedge \mathsf{want}'(s, j, \hat{}\exists s^*[s^* \approx \tau(s) \wedge \exists e[\tau(e) \odot s^* \wedge \mathsf{bell}'(e,j)]]])]]$

It should be noted that we have so far ignored the logical form of the *presens*. For the present tense versions of the sentences in (33), we assume that there is no explicit present tense operator in Afrikaans. With the absence of another time in the logical form, the speech time is taken as the time that overlaps with the event time. The relevant logical forms are given in (34).

(34) a. Jan bel.
Jan calls.PRES

$\mathsf{call}'(j)$
$\exists e[\tau(e) \odot s^* \wedge \mathsf{call}'(e,j)]$

b. Jan is tuis.
Jan is.PRES home

$\mathsf{be\text{-}home}'(j)$
$\exists s[\tau(s) \odot s^* \wedge \mathsf{be\text{-}home}'(s,j)]$

c. Jan wil bel.
Jan wants.PRES call

$\mathsf{want}'(j.\hat{}(\mathsf{call}'(j))$
$\exists s[\tau(s) \odot s^* \wedge \mathsf{want}'(s, j, \hat{}\exists s^*[s^* \approx \tau(s) \wedge \exists e[\tau(e) \odot s^* \wedge \mathsf{call}'(e,j)]]])]$

4 An Outline of Lexical Resource Semantics

The best introduction to *Lexical Resource Semantics* (LRS) is given in Richter and Sailer (2003). LRS combines the techniques of underspecified semantics (Reyle, 1993; Bos, 1996; Pinkal, 1996) with the properties of an HPSG grammar to yield a new system for phrasal semantics. Richter and Sailer (2003) compares the architecture of LRS with that of other systems for compositional semantics. For the present purpose, we will confine ourselves to presentating the principle ideas of LRS:

- the use of standard semantic representation languages,
- concise encoding of scope ambiguities (without storage (Cooper, 1975, 1983; Pollard and Sag, 1994)) or type shifting (Hendriks, 1993; Sailer, 2000)
- direct account of discontinuous semantic contributions
- natural expression of semantic concord phenomena by structure sharing (Richter and Sailer, 2001a,b)
- modular separation of local (lexical?) semantics and clausal semantics (Sailer, 2003)

We assume a version of intensional predicate logic such as IL (Montague, 1974) or Ty2 (Gallin, 1975) as the underlying semantic representation language. It has been shown that we can use expressions from this kind of language inside an HPSG grammar, and even as descriptions in AVMs (Sailer, 2000).

The important innovation of LRS is that the semantic contribution of a sign is no longer represented as a single expression, instead it is broken down into all its subexpressions. This is done at two levels: First, a general separation is introduced between *local* semantics and *clausal/ compositional* semantics (Sailer, 2003). Local semantics is used for selection. It is encoded as the value of an attribute CONTENT which is part of the

LOCAL value. Compositional semantics, just as the syntactic structure, is not part of the SYNSEM value of a sign. Instead it is encoded as the value of an attribute LOGICAL-FORM (LF), which is appropriate for the sort *sign*.

For a simple finite verb such as *bel* (*call*), the CONTENT value is lexically specified as follows:

(35) The lexical specification of the CONTENT value of *bel* (*call*):

$$\begin{bmatrix} \textsc{index} & \begin{bmatrix} \textsc{var} & e \end{bmatrix} \\ \textsc{main} & \mathsf{call}' \end{bmatrix}$$

The INDEX VAR(IABLE) value in (35) indicates the event variable, the MAIN value indicates the main semantic constant associated with the verb. Since we are working with a typed semantic representation language, the type of the constant indicates the type of its semantic arguments. In this particular case the arguments are: (i) an event variable e which will be identical with the INDEX VAR value; and (ii) an individual variable which will be identical with the INDEX VAR value of the subject.

As LRS is mainly a system for combinatorial semantics, the work on LRS has almost exclusively centered around the LF value. The LF attribute takes values of the sort *lrs*, which is defined in (36).

(36) The sort *lrs*:

lrs	EX(TERNAL-)CONT(ENT)	*me*
	IN(TERNAL-)CONT(ENT)	*me*
	PARTS	*list(me)*

The PARTS list contains all the subexpressions that are contributed by a sign. The INCONT value of a sign singles out one element of the PARTS list: the (sub)expression which cannot have scope over semantic material which is introduced higher in the syntactic structure of the clause. In complete utterances the EXCONT value is an expression which consists exclusively and exhaustively of the elements from the PARTS list. Thus, in a complete utterance, the LF EXCONT value contains the logical form of the utterance as a single expression.

We will also assume a SEMANTICS PRINCIPLE according to which the EXCONT and the INCONT values are shared between the mother and the head daughter in a phrase. The mother's PARTS list is the concatenation of the PARTS lists of the daughters. Finally, construction-specific constraints are imposed on the subexpression relations that hold between the expressions on the mother's PARTS list. For our very simple sentences, it is enough to state that in a head-complement-construction, where the complement is a quantified NP, the INC value of the head is a subexpression of the nuclear scope of the complement. In (37) we quote the relevant parts of the SEMANTICS PRINCIPLE from Richter and Sailer (2003).

(37) SEMANTICS PRINCIPLE

In each *headed-phrase*,

1. the EXCONT value of the head and the mother are identical,
2. the INCONT value of the head and the mother are identical,[5]
3. the PARTS value contains all and only the elements of the PARTS values of the daughters,
4. the following conditions hold:
   (a) ...
   (b) if the non-head is a quantified NP with an EXCONT value of the form $Qx[\rho \circ \nu]$[6], then the INCONT value of the head is a component of ν,
   (c) ...

We will illustrate the derivation of the following sentences, whose syntactic structures are outlined.

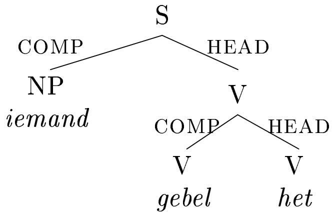
(38) a. (dat) iemand bel.
that someone calls.PRES

S
COMP HEAD
NP v
iemand *bel*

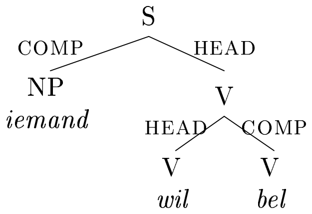
[5]We take the noun to be the head of a quantified NP.

[6]$Qx[\rho \circ \nu]$ is shorthand for the description $\begin{bmatrix} \textit{quantifier} & \\ \textsc{var} & \textit{var} \\ \textsc{scope} & \begin{bmatrix} \textit{l-const} & \\ \textsc{arg1} & \rho \\ \textsc{arg2} & \nu \end{bmatrix} \end{bmatrix}$.

b. (dat) iemand gebel het.
that someone called.PART AUX

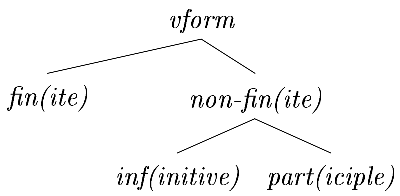


c. (dat) iemand wil bel
that someone wants call



For Afrikaans we assume the following sort hierarchy below *vform*. The VFORM values of the morphological forms are given in (39b).

(39) a. Sort hierarchy below *vform*:



b. VFORM values of the verbal forms:

English	verb	VFORM value
call	*bel*	**not** *part*
	gebel	*part*
have	*hê*	*inf*
	het	*fin*
	gehad	*part*
AUX	*het*	**not** *part*

English	verb	VFORM value
be	*wees*	*inf*
	is	*fin*
	was	*fin*
	gewees	*part*
want	*wil*	*vform*
	wou	*vform*

In the following lexical entries we will use the operator " $\triangleleft$ " for the relation subexpression, i.e., $\phi \triangleleft \psi$ is true iff the expression ϕ is a subexpression of the expression ψ.

Figure 1: The structure of the clause *(dat) iemand bel*

S

$$\left[\text{LF}\ \left[\begin{array}{ll}\text{EXC} & \boxed{5}\\ \text{INC} & \boxed{3}\\ \text{PARTS} & \left\langle s^*, e, x, \tau(e), \boxed{1}, \boxed{1a}, \boxed{2}, \boxed{2a}, \boxed{3}, \boxed{3a}, \boxed{4}, \boxed{4a}, \boxed{4b} \right\rangle\end{array}\right]\right]$$

and $\boxed{3} \triangleleft \beta$

COMP — NP, HEAD — V

NP:

$$\left[\text{LF}\ \left[\begin{array}{ll}\text{EXC} & \boxed{2}\\ \text{INC} & \boxed{1}\\ \text{PARTS} & \langle x, \boxed{1}, \boxed{1a}, \boxed{2}, \boxed{2a}\rangle\end{array}\right]\right]$$

iemand

V:

$$\left[\text{LF}\ \left[\begin{array}{ll}\text{EXC} & \boxed{5}\\ \text{INC} & \boxed{3}\\ \text{PARTS} & \left\langle s^*, e, x, \tau(e), \boxed{3}, \boxed{3a}, \boxed{4}, \boxed{4a}, \boxed{4b}\right\rangle\end{array}\right]\right]$$

bel

(40) Outline of the lexical entry of *iemand* (*somebody*):

$$\left[\begin{array}{ll}
\text{PHON} & \langle \textit{iemand} \rangle\\
\text{SYNS LOC} & \left[\begin{array}{ll}\text{CAT} & \left[\begin{array}{ll}\text{HEAD} & \textit{noun}\\ \text{VAL} & [\text{COMPS}\ \langle\rangle]\end{array}\right]\\ \text{CONT} & \left[\begin{array}{ll}\text{INDEX} & \left[\begin{array}{ll}\text{PHI} & \left[\begin{array}{ll}\text{NUM} & \textit{sg}\\ \text{PERS} & \textit{3rd}\\ \text{GEN} & \textit{masc}\end{array}\right]\\ \text{VAR} & x\end{array}\right]\\ \text{MAIN} & \boxed{1a}\ \mathsf{person}'\end{array}\right]\end{array}\right]\\
\text{LF} & \left[\begin{array}{ll}\text{EXCONT} & \boxed{2}\ \exists x[\alpha \wedge \beta]\\ \text{INCONT} & \boxed{1}\ \mathsf{person}'(x)\\ \text{PARTS} & \langle x, \boxed{1a}\mathsf{person}', \boxed{1}\mathsf{person}'(x), \boxed{2}\exists x[\alpha \wedge \beta], \boxed{2a}[\alpha \wedge \beta]\rangle\end{array}\right]
\end{array}\right]$$

and $\boxed{1} \triangleleft \alpha$ ($\mathsf{person}'(x)$ is in the restrictor of $\exists x[\ldots]$)

(41) Outline of the lexical entry of *bel* (*call*):

$$\left[\begin{array}{ll}
\text{PHON} & \langle \textit{bel} \rangle\\
\text{SYNS LOC} & \left[\begin{array}{ll}\text{CAT} & \left[\begin{array}{ll}\text{HEAD} & \left[\begin{array}{l}\textit{verb}\\ \text{VFORM}\ \textbf{not}\ \textit{part}\end{array}\right]\\ \text{VAL} & \left[\begin{array}{ll}\text{SUBJ} & \left\langle \boxed{1}\left[\ldots \text{INDEX VAR}\ x\right]\right\rangle\\ \text{COMPS} & \langle\rangle\end{array}\right]\end{array}\right]\\ \text{CONT} & \left[\begin{array}{l}\text{INDEX VAR}\ e\\ \text{MAIN}\ \boxed{3a}\ \mathsf{call}'\end{array}\right]\end{array}\right]\\
\text{LF} & \left[\begin{array}{ll}\textit{lrs} & \\ \text{EXCONT} & \textit{me}\\ \text{INCONT} & \boxed{3}\ \mathsf{call}'(e,x)\\ \text{PARTS} & \left\langle s^*, x, e, \tau(e), \boxed{3}\mathsf{call}'(e,x), \boxed{3a}\mathsf{call}'\boxed{4}\exists e[\tau(e) \odot t_? \wedge \gamma], \boxed{4a}[\tau(e) \odot t_? \wedge \gamma], \boxed{4b}\tau(e) \odot t_? \right\rangle\end{array}\right]
\end{array}\right]$$

and $\boxed{3} \triangleleft \gamma$ ($\mathsf{call}'(e,x)$ is in the scope of $\exists e[\ldots]$)
and $\tau(e) \neq t_?$

Note that the time $t_?$ is does not occur as an explicite element on a PARTS list. Therefore, it must be identical to some other time, which is explicitly mentioned. As s^* is the only time in the logical form, the time $t_?$ must be s^*. Thus, there are only two options for the EXCONT value of the sentence:[7]

(42) a. $\exists x[\mathsf{person}'(x) \wedge \exists e[\tau(e) \odot s^* \wedge \mathsf{call}'(e,x)]]$

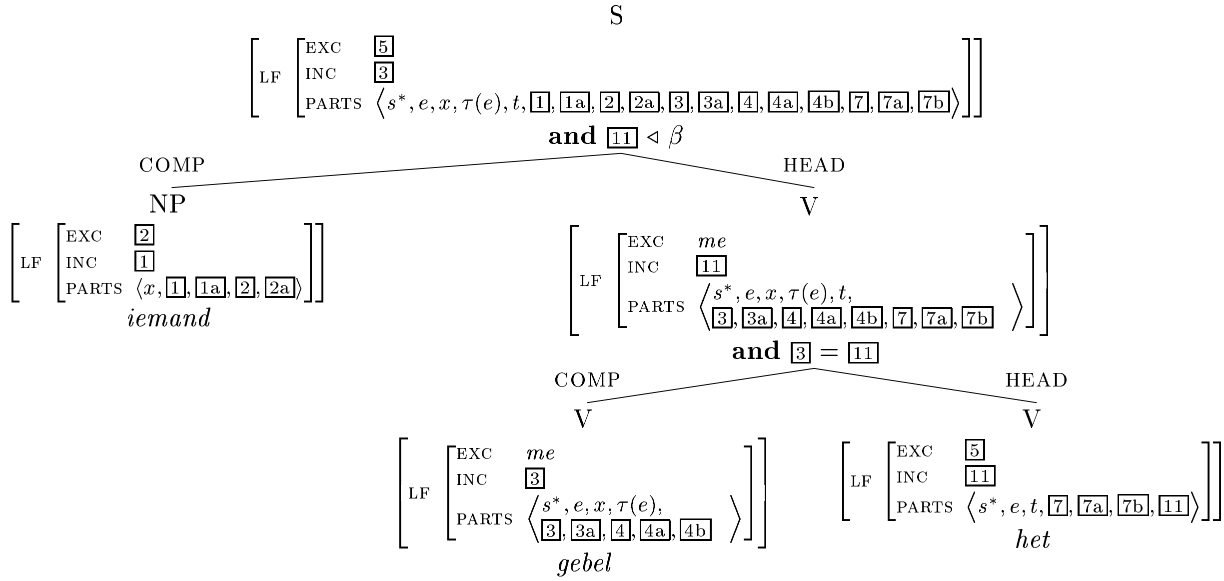
b. $\exists e[\tau(e) \odot s^* \wedge \exists x[\mathsf{person}'(x) \wedge \mathsf{call}'(e,x)]]$

In order to derive the sentence in (38b), we will assume that the semantic specification of the participle *gebel* is just like that of the finite form *bel*. For the *perfek* auxiliary *het*, we will give an outline of the lexical entry in (43).

[7] There is one more possible expression compatible with the constraints, given in (i). It has the same denotation as (42a).

(i) $\exists x[\exists e[\tau(e) \odot s^* \wedge \mathsf{person}'(x) \wedge \mathsf{call}'(e,x)]]$ = (42a)

Figure 2: The structure of the sentence *(dat) iemand gebel het.*



(43) Outline of the lexical entry of *het*:

$$\begin{bmatrix} \textsc{phon}\ \langle \textit{het} \rangle \\ \textsc{syns loc} \begin{bmatrix} \textsc{cat} \begin{bmatrix} \textsc{head} \begin{bmatrix} \textit{verb} \\ \textsc{vform}\ \textbf{not}\ \textit{part} \end{bmatrix} \\ \textsc{val} \begin{bmatrix} \textsc{subj}\ \boxed{8} \\ \textsc{comps}\ \boxed{9} \oplus \langle \boxed{10} \rangle \end{bmatrix} \end{bmatrix} \\ \textsc{cont} \begin{bmatrix} \textsc{index}\ \boxed{6} \begin{bmatrix} \textsc{var}\ e \end{bmatrix} \\ \textsc{main}\ \boxed{7b}\ t < s^* \end{bmatrix} \end{bmatrix} \\ \textsc{arg-st} \left\langle \boxed{10} \begin{bmatrix} \textsc{loc} \begin{bmatrix} \textsc{cat} \begin{bmatrix} \textsc{head} \begin{bmatrix} \textit{verb} \\ \textsc{vform}\ \textit{part} \end{bmatrix} \\ \textsc{val} \begin{bmatrix} \textsc{subj}\ \boxed{8} \\ \textsc{comps}\ \boxed{9} \end{bmatrix} \end{bmatrix} \\ \textsc{cont} \begin{bmatrix} \textsc{index}\ \boxed{6} \end{bmatrix} \end{bmatrix} \end{bmatrix} \right\rangle \\ \textsc{lf} \begin{bmatrix} \textsc{excont}\ \textit{me} \\ \textsc{incont}\ \boxed{11} \\ \textsc{parts}\ \left\langle s^*, e, t, \boxed{7}\exists t[t < s^* \wedge \delta], \boxed{7a}[t < s^* \wedge \delta], \boxed{7b} t < s^*, \boxed{11}, \right\rangle \end{bmatrix} \end{bmatrix}$$

and $\boxed{11} \triangleleft \delta$ (the INC value is in the scope of PAST)
and there is a free occurrence of t in δ

In the derivation of (38b), the auxiliary is analyzed as an argument-raising verb (Hinrichs and Nakazawa, 1994). In Richter and Sailer (2003) the following principle is proposed:

(44) Content Raising Principle:
If a head combines with a nonhead whose arguments it raises, the INCONT values of the head and the nonhead are identical.

With the lexical entry and the Content Raiser Principle, we obtain the correct logical form:

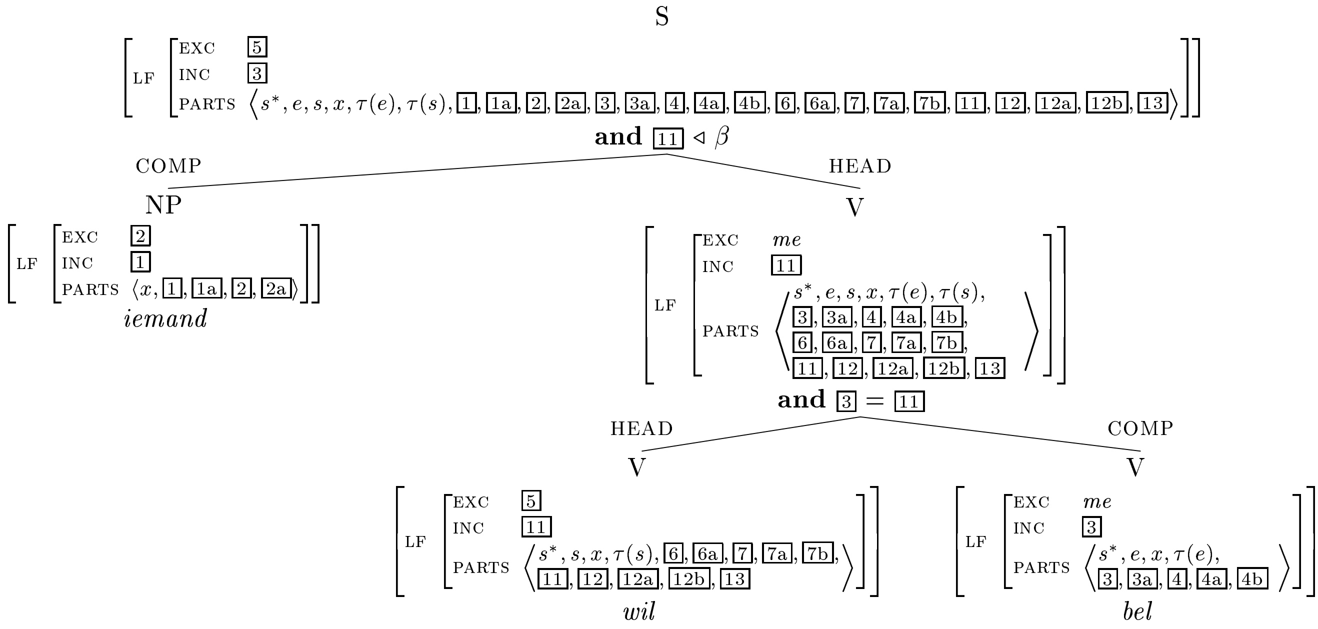
(45) $\exists x[\mathsf{person}'(x) \wedge \exists t[t < s^* \wedge \exists e[\tau(e) \odot t \wedge \mathsf{call}'(e, x)]]]$

Note that we have left the identity of the time $t_?$ unspecified in the lexical entry of *(ge)bel*. In the case of sentence (38a), the speech time s^* was the only available time in the PARTS list. In the case of the *perfek* sentence, however, there are two times: s^* and t. Choosing s^* would lead to the wrong interpretation:

(46) $ $\exists x[\mathsf{person}'(x) \wedge \exists t[t < s^* \wedge \exists e[\tau(e) \odot s^* \wedge \mathsf{call}'(e, x)]]]$

This reading is prevented by our analysis: The first restriction below the AVM in (43) requires that the expression $\mathsf{bel}'(e, x)$ ($= \boxed{11}$) be a subexpression of δ. The second restriction requires that t occur freely in δ. This is

Figure 3: The structure of the sentence *(dat) iemand wil bel.*



a natural assumption: the term $\exists t[t < s^* \wedge \delta]$ corresponds to the past operator. We want this operator to actually bind some variable in its scope. Thus, requiring a free occurrence of t n δ guarantees us that such binding occurs. As can be seen in (46), there is no occurrence of t in δ, thus, the hypothetical reading violates this restriction.

Let us, now, derive the sentence (38c). To do this we will specify the lexical entry of the modal verb *wil*.

(47) Outline of the lexical entry of *wil*:

$$
\begin{bmatrix}
\textsc{phon} & \langle \textit{wil} \rangle \\
\textsc{synsem} & \begin{bmatrix} \textsc{loc} & \begin{bmatrix} \textsc{cat} & \begin{bmatrix} \textsc{head} & \begin{bmatrix} \textit{verb} \\ \textsc{vform} \ \ \textit{vform} \end{bmatrix} \\ \textsc{val} & \begin{bmatrix} \textsc{subj} & \left\langle \begin{bmatrix} \textsc{loc cont index} \ \boxed{8} \begin{bmatrix} \textsc{var} \ x \end{bmatrix} \end{bmatrix} \right\rangle \\ \textsc{comps} & \boxed{9} \oplus \left\langle \boxed{10} \right\rangle \end{bmatrix} \end{bmatrix} \\ \textsc{cont} & \begin{bmatrix} \textsc{index var} \ s \\ \textsc{main} \ \boxed{6a} \ \mathsf{want}' \end{bmatrix} \end{bmatrix} \end{bmatrix} \\
\textsc{arg-st} & \left\langle \boxed{10} \begin{bmatrix} \textsc{loc cat val} \begin{bmatrix} \textsc{subj} & \left\langle \begin{bmatrix} \textsc{loc cont index} \ \boxed{8} \end{bmatrix} \right\rangle \\ \textsc{comps} & \boxed{9} \end{bmatrix} \end{bmatrix} \right\rangle \\
\textsc{lf} & \begin{bmatrix} \textsc{excont} & \textit{me} \\ \textsc{incont} & \boxed{11} \\ \textsc{parts} & \left\langle \begin{array}{l} s^*, s, x, \tau(s), \boxed{12}\exists s[\tau(s) \odot t_? \wedge \gamma], \boxed{12a}[\tau(s) \odot t_? \wedge \gamma]\boxed{12b}\tau(s) \odot t_?, \boxed{6}\mathsf{want}'(s, x, \ \hat{}\phi), \boxed{6a}\mathsf{want}', \\ \boxed{13}\ \hat{}\phi, \boxed{7}\exists s^*[s^* \approx \tau(s) \wedge \psi], \boxed{7a}[s^* \approx \tau(s) \wedge \psi], \boxed{7b}s^* \approx \tau(s), \boxed{11} \end{array} \right\rangle \end{bmatrix}
\end{bmatrix}
$$

and $\boxed{6} \triangleleft \gamma$ ($\mathsf{want}'(\ldots)$ is in the scope of $\exists s[\ldots]$)
and $\boxed{7} \triangleleft \phi$ (the embedded speech time is in the scope of the modal)
and $\boxed{11} \triangleleft \psi$ (the INC value is in the scope of the embedded $\exists s^*[\ldots]$)
and there is a free occurrence of s^* in ψ

Again, we have achieved the desired logical form. For the state of the modal, s, we obtain a temporal anchoring just as had been the case for the simple *present* sentence (38a): $t_?$ must be s^*, because there is no other time available on the PARTS list. Thus, we have $\exists s[\tau(s) \odot s^* \wedge \ldots]$. As for the embedded verb, *bel*, we required that the expression $\mathsf{call}'(e, x)$ (i.e., the INCONT value) be a subexpression of ψ. Therefore, the embedded s^* serves as the temporal anchor for the embedded eventuality e.

5 Analysis of the Data in (1)

5.1 Data

One of the major puzzles in the description of the usage of the tense forms in Afrikaans is the systematic ambiguity that arises in combination modals and *imperfek* or *perfek* forms (de Villiers, 1971; Ponelis, 1979; Donaldson, 1993; Van der Kleij, 1999). Sentence (1), repeated in (48), illustrates this ambiguity. In (a)–(c) we indicate the three possible temporal readings, using the logical forms of the previous sections.

(48) Jan wou die boek gekoop het.
Jan wanted.IMP the book bought.PART AUX

a. Jan wanted to have bought the book.
$\textsc{past}(\mathsf{want}'(j, {}^\wedge\textsc{past}(\mathsf{buy}'(j, \mathsf{the\text{-}book}))))$
$\exists t[t < s^* \wedge \exists e[\tau(e) \odot t \wedge \mathsf{want}'(e, j, {}^\wedge\exists s^*[s^* \approx \tau(e) \wedge \exists t[t < s^* \wedge \exists s \tau(s) \odot t \wedge \mathsf{buy}'(s, j, \mathsf{the\text{-}book})]])]]$

b. Jan wants to have bought the book.
$\mathsf{want}'(j, {}^\wedge\textsc{past}(\mathsf{buy}'(j, \mathsf{the\text{-}book})))$
$\exists e[\tau(e) \odot s^* \wedge \mathsf{want}'(e, j, {}^\wedge\exists s^*[s^* \approx \tau(e) \wedge \exists t[t < s^* \wedge \exists s[\tau(s) \odot t \wedge \mathsf{buy}'(s, j, \mathsf{the\text{-}book})]]]))]$

c. Jan wanted to buy the book.
$\textsc{past}(\mathsf{want}'(j, {}^\wedge\mathsf{buy}'(j, \mathsf{the\text{-}book})))$
$\exists t[t < s^* \wedge \exists e[\tau(e) \odot t \wedge \mathsf{want}'(e, j, {}^\wedge\exists s^*[s^* \approx \tau(e) \wedge \exists s[\tau(s) \odot s^* \wedge \mathsf{buy}'(s, j, \mathsf{the\text{-}book})]])]]$

Sentence (48) contains two morphological past markings: the verb *wou*, and the complex *gekoop het*. There is at least one past tense operator in each reading. The three readings, then, differ with respect to the number of past operators and with respect to the scope. In (a), there occur two past operators, one for each verb. In (b), only the embedded verb is interpreted as past. In (c), the past operator has scope over the modal verb.

Notably the modal verb is marked as *imperfek* in the (b)-reading, but it is not in the scope of a past operator. We also find instances of a verb that is interpreted as past, although it is not marked as *imperfek*. In (49) from Van der Kleij (1999) the unmarked form *moet* (*must*) is used instead of the *imperfek* form *moes*. Nonetheless, the indicated reading is possible.

(49) Ek moet los kon rondgeloop het.
I must.PRES freely can.IMP around.walked.PART AUX

'I had to be able to run around freely.'
$\textsc{past}(\mathsf{must}'({}^\wedge\mathsf{can}'(i, {}^\wedge\mathsf{run\text{-}around\text{-}freely}'(i))))$

To show that both the modal verb and the embedded verb can contribute a past operator, consider (50). For both sentences the (b)- and the (c)-reading are possible, but not the (a)-reading.

(50) a. Jan wou die boek koop.
Jan wanted.IMP the book buy

b. Jan wil die boek gekoop het.
Jan wil.PRES the book bought.PART AUX

This shows that every verb which is marked as past tense (i.e., which is either in *perfek* or *imperfek*) contributes a past operator. Nonetheless, the scope of this operator remains underspecified by the syntactic position of the verb. To account for the (b)- and (c)-readings of (48), a mechanism is needed which allows us to interpret only one of the two past operators.

We can describe the data on the basis of the following three generalizations:

- The *perfek* auxiliary *het* and every verb in *imperfek* contribute a PAST operator.
- The PAST operators introduced in a sentence need not be distinct from each other.
- A verb that introduces a PAST operator need not be in the scope of this operator.

5.2 Previous Account

In previous descriptions of the data, such as Ponelis (1979) or Van der Kleij (1999), two operations have been assumed that change the morphology of the verb: *preterite assimilation* (PA) and *preterite movement* (PM).

(51) Operational account of the ambiguity

a. *preterite assimilation* (PA):

modal in *presens*	+	verb in *perfek*	⇒	modal in *imperfek* + verb in *perfek*
wil		geskryf het		wou geskryf het

b. *preterite movement* (PM):

modal in *imperfek*	+	verb in infinitive	⇒	modal in *imperfek* + verb in *perfek*
wou		skryf		wou geskryf het
1st modal in *imperfek*	+	2nd modal in *presens*	⇒	both modals in *imperfek*
wou		kan skryf		wou kon skryf

Disadvantages of the operational account:

- The two operations are arbitrary
- It is unclear how to encode it in a non-operational framework such as HPSG
- There is no operation to account for the reading in (49), i.e., where the matrix verb *moet* is not marked as past, but interpreted as being in the scope of a PAST operator.

5.3 An LRS Analysis

The observations presented above are not easily accommodated with a simple view of compositionality — and are even problematic for the above-outlined operational account. Therefore, we will provide an analysis within the framework of *Lexical Resource Semantics*. While the technical advantages of LRS have not been obvious in the analysis of the simple data in Section 4, they will become transparent in our extension of the analysis to the more complicated facts.

LRS uses techniques of underspecified semantics (Reyle, 1993; Bos, 1996). As we have seen in Section 4, the embedding relations between subexpressions is constrained by the syntactic constellations, but not fully resolved by the principles of grammar. This results in a concise representation of scope ambiguities.

Bouma (2003) uses LRS for an account of scope ambiguities. Richter and Sailer (2001b) discusses instances of multiple exponence of a semantic operator, in their case negation. In their analysis, several words in a clause may contribute a negation operator to the overall logical form, but language-specific principles ensure that all these operators are identical. Our exploration of the data reveals that an analysis of Afrikaans past tense marking must account for these two phenomena: underspecification and multiple exponence. This makes LRS particularly apt for our enterprise.

In fact, we can already show that our specification of the verbs *het* and *wil* allows us to derive the wide-scope reading for the past operator, i.e., the reading required for (49). To illustrate this point we will consider the sentence in (52), for which we assume the readings in (52a) and (52b).

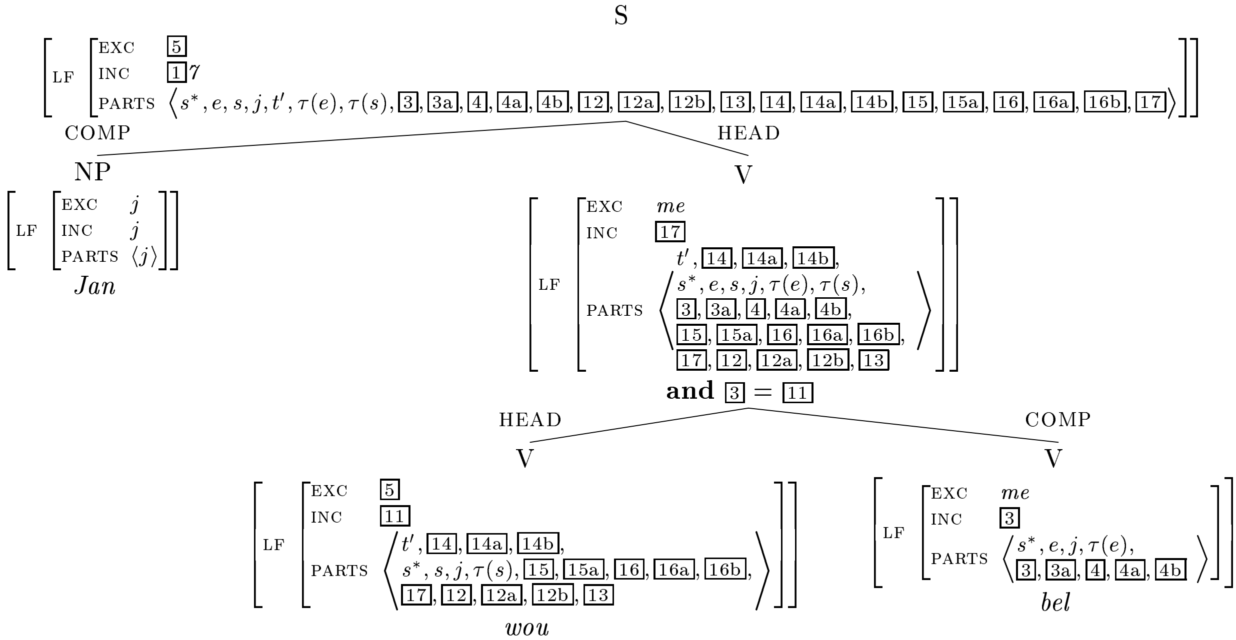
(52) Jan wil gebel het.
Jan wants.PRES called.PART AUX

a. $\mathsf{want}'(j, {}^\wedge\textsc{past}(\mathsf{call}'(j))$
$\exists s[\tau(s) \odot s^* \wedge \mathsf{want}'(s, j, {}^\wedge\exists s^*[s^* \approx \tau(s) \wedge \exists t[t < s^* \wedge \exists e[\tau(e) \odot t \wedge \mathsf{call}'(e, j)]]])]$

b. $\textsc{past}(\mathsf{want}'(j, {}^\wedge\mathsf{call}'(j))$
$\exists t[t < s^* \wedge \exists s[\tau(s) \odot t \wedge \mathsf{want}'(s, j, {}^\wedge\exists s^*[s^* \approx \tau(s) \wedge \exists e[\tau(e) \odot s^* \wedge \wedge\mathsf{call}'(e, j)]]])]]$

Note that both the auxiliary *het* and the modal verb *wil* are argument raising verbs and, thus, content raising verbs. Therefore the INCONT value of all three verbs is identical (the term $\mathsf{call}'(e, j)$). In the lexical entry of the auxiliary *het* in (43), we only require that its INCONT value be in the scope of the past operatore (i.e., be a subexpression of δ, where δ is in $\exists t[t > s^* \wedge \delta]$). Similarly, in the lexical entry of the moda in (47) we have required that its INCONT value be in the scope of the embedded speech time ($\exists s^*[s^* \approx \tau(s) \wedge \psi]$). Clearly, these two restrictions are satisfied in both readings. Thus, the scope of the past operator is underspecified in the scopal requirements of the auxiliary.

Figure 4: The structure of the sentence *(dat) Jan wou bel.*



For the modal the state s holds at s^* in the (a)-reading, whereas in the (b)-reading it holds at t. This is, again, a consequence of the fact that we did not include the time at which s holds in the PARTS list of the modal. The lexical specification of the auxiliary requires that t occur freely within the scope of the past operator. Therefore, s must be simultaneous with t in the wide-scope reading of the past operator.

To account for the data in (48), we only need the lexical entry of the *imperfek* form of the modal. To emphasize the differences between the lexical entries of *wil* and *wou*, we have added the additional semantic contribution of *wou* in the first row of the PARTS list and the additional restriction as the first restriction after the AVM.

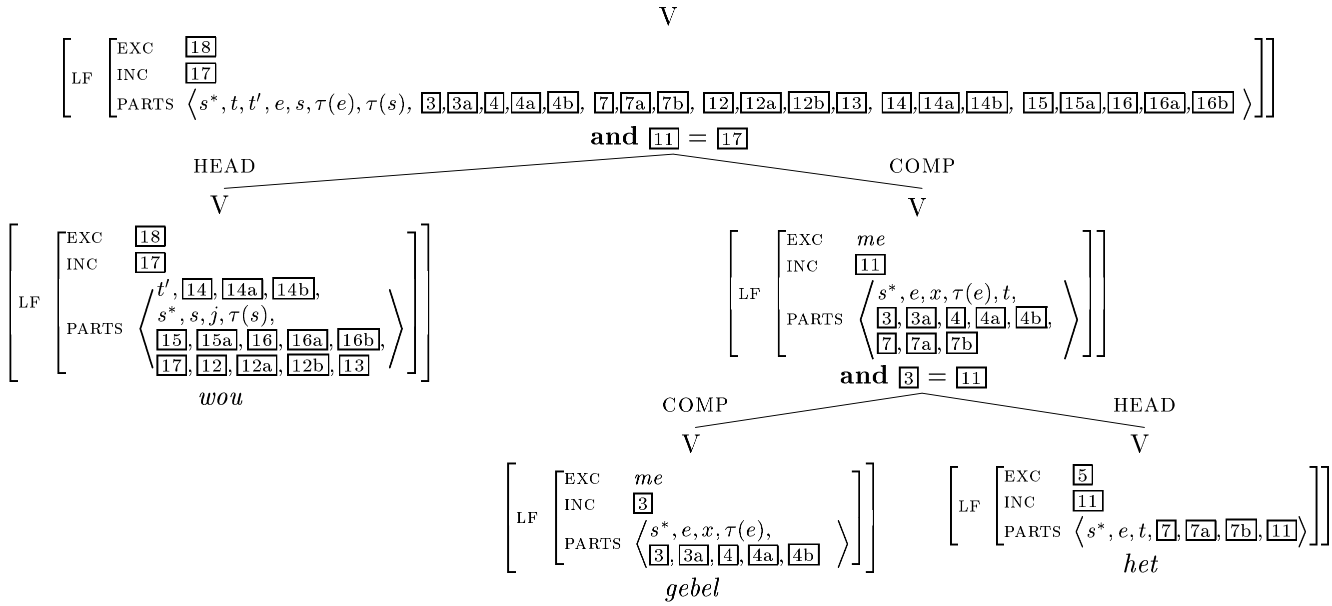
(53) Outline of the lexical entry of *wou* (*wanted.IMP*):

$$\begin{bmatrix} \text{PHON} & \langle \textit{wou} \rangle \\ \text{SYNS} & \begin{bmatrix} \text{LOC} & \begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \textit{verb} \\ \text{VFORM} & \textit{vform} \end{bmatrix} \\ \text{VAL} & \begin{bmatrix} \text{SUBJ} & \left\langle \left[\text{LOC CONT INDEX } \boxed{8} \left[\text{VAR } x\right]\right] \right\rangle \\ \text{COMPS} & \boxed{9} \oplus \left\langle \boxed{10} \right\rangle \end{bmatrix} \end{bmatrix} \\ \text{CONT} & \begin{bmatrix} \text{INDEX VAR } s \\ \text{MAIN } \boxed{15a}\ \mathsf{want}' \end{bmatrix} \end{bmatrix} \end{bmatrix} \\ \text{ARG-ST} & \left\langle \boxed{10} \left[\text{LOC CAT VAL} \begin{bmatrix} \text{SUBJ} & \left\langle \left[\text{LOC CONT INDEX } \boxed{8}\right] \right\rangle \\ \text{COMPS} & \boxed{9} \end{bmatrix}\right] \right\rangle \\ \text{LF} & \begin{bmatrix} \text{EXCONT} & \textit{me} \\ \text{INCONT} & \boxed{17} \\ \text{PARTS} & \left\langle \begin{array}{l} t', \boxed{\mathbf{14}}\exists t'[t' < s^* \wedge \epsilon], \boxed{\mathbf{14a}}[t' < s^* \wedge \epsilon], \boxed{\mathbf{14b}}t' < s^*, \\ s^*, s, x, \tau(s), \boxed{12}\exists s[\tau(s) \odot t_? \wedge \gamma], \boxed{12a}[\tau(s) \odot t_? \wedge \gamma]\boxed{12b}\tau(s) \odot t_?, \boxed{15}\mathsf{want}'(s, x, \,\hat{}\phi), \boxed{15a}\mathsf{want}', \\ \boxed{13}\,\hat{}\phi, \boxed{16}\exists s^*[s^* \approx \tau(s) \wedge \psi], \boxed{16a}[s^* \approx \tau(s) \wedge \psi], \boxed{16b}s^* \approx \tau(s), \boxed{17} \end{array} \right\rangle \end{bmatrix} \end{bmatrix}$$

and $\boxed{17} \triangleleft \epsilon$ (the INC value is in the scope of PAST)
and $\boxed{15} \triangleleft \gamma$ ($\mathsf{want}'(\ldots)$ is in the scope of $\exists s[\ldots]$)
and $\boxed{16} \triangleleft \phi$ (the embedded speech time is in the scope of the modal)
and $\boxed{17} \triangleleft \psi$ (the INC value is in the scope of the embedded $\exists s^*[\ldots]$)
and there is a free occurrence of t' in ϵ
and there is a free occurrence of s^* in ψ

The scopal requirements are the same as for sentence (52): the INCONT value ($\mathsf{call}'(e, j)$) must be in the scope of the past operator and in the scope of the intensional operator. The relative scope of these two operators is not determined in the lexical entry of *wou*. Therefore, we predict two readings for the sentence (54):

Figure 5: The structure of the VP *(dat Jan) wou gebel het*



(54) Jan wou bel.

a. $\text{PAST}(\mathsf{want}'(j, {}^\wedge\mathsf{call}'(j)))$

b. $\mathsf{want}'(j, {}^\wedge\text{PAST}(\mathsf{call}'(j)))$

Finally, we can address the structure of sentence (48). There are two past operators in this sentence, : $\exists t[t < s^* \wedge \delta]$ (from the auxiliary) and $\exists t'[t' < s^* \wedge \epsilon]$ (from the modal). If the two operators are distinct, we obtain the reading in (48a). On the other hand, nothing prevents the two operators from being identical. In this case, depending on the scope, either the (b)- or the (c)-reading of (48) will be evident. For the two past operators to be identical, the following identities hold in the structure described in Figure 5: $t = t'$, $\boxed{7} = \boxed{14}$, $\boxed{7a} = \boxed{14a}$, $\boxed{7b} = \boxed{14b}$

In the present analysis the two past operators cannot have immediate scope over each other, i.e., the following readings are correctly excluded:

(55) a. $\text{PAST}(\text{PAST}(\mathsf{want}'(j, {}^\wedge\mathsf{buy}'(j, \mathsf{the\text{-}book}))))$

b. $\mathsf{want}'(j, {}^\wedge\text{PAST}(\text{PAST}(\mathsf{buy}'(j, \mathsf{the\text{-}book}))))$

In these readings, the logical form would be $\exists t[t < s^* \wedge \exists t'[t' < t \wedge \phi]$. For Afrikaans, however, we have assumed that the past tense operator always mentions the speech time explicitly.

Another non-permissable reading is outlined in (56), where the symbol $\mathbf{T}$ is used for either s^* or t.

(56) $\$\ \exists t'[t' < s^* \wedge \exists t[t < s^* \wedge \exists s[\tau(s) \odot t' \wedge \mathsf{want}'(s, j, {}^\wedge\exists s^*[s^* \approx \tau(s) \wedge \exists e[\tau(e) \odot \mathbf{T}]])]]]$
where either $\mathbf{T} = t$ or $\mathbf{T} = s^*$

In (56), both times t and t' are temporally ordered with respect to s^*. Nonetheless, the logical form is excluded: if $\mathbf{T} = t$, then there is no free occurrence of s^* within the semantic argument of the modal. Such an occurrence is, however, required by the last restriction in the lexical entry of *wou* in (53). Similarly, if $\mathbf{T} = s^*$, then there is no further occurrence of the time t. This would violate the last restriction in the lexical specification of *het* in (43).

6 Temporal Adverbials

Our analysis carries over to the use of adverbs. We must, however, make one assumption: In Afrikaans, the value of the variable s^* is contextually determined. However, it is very easy to shift it from the concrete time of speech to a contextually given other time of speech. This is evidenced by the fact, that in Afrikaans the use of a *historic present* is very common. At the moment we are not aware of a satisfactory formal analysis of phenomena such as the historic present (or of the possibly related phenomena reported in Fabricius-Hansen (1989)). For our analysis, it suffices to assume that under certain pragmatic circumstances, the speech time can be shifted from the utterance time to another time.

We claim that for sentences as (57a) the adverb *gister* (*yesterday*) can attach to such a shifted speech time. In (57b), the adverb modifies the time introduced by the past operator, i.e., s^* remains unshifted.

(57) a. Gister bel Jan.
yesterday call.PRES Jan ‘Yesterday, Jan called.’
$\exists t'[\mathsf{yesterday}'(t') \wedge t' \odot s^* \wedge \exists e[\tau(e) \odot t' \wedge \mathsf{call}'(e,j)]]$
(where $\mathsf{yesterday}'(t')$ is true iff t' is a subinterval of yesterday)

b. Gister het Jan gebel.
yesterday AUX Jan called.PART ‘Yesterday, Jan called.’
$\exists t[t < s^* \wedge \exists t'[\mathsf{yesterday}'(t') \wedge t' \odot t \wedge \exists e[\tau(e) \odot t' \wedge \mathsf{call}'(e,j)]]]$

(58) Outline of the lexical entry of *gister* (*yesterday*):

$$\begin{bmatrix} \text{PHON} \ \langle \textit{gister} \rangle \\ \text{LF} \begin{bmatrix} \text{EXC} & me \\ \text{INC} & \mathsf{yesterday}'(t') \\ \text{PARTS} & \langle t', \exists t'[[\mathsf{yesterday}'(t') \wedge t' \odot t_?] \wedge \phi], [[\mathsf{yesterday}'(t') \wedge t' \odot t_?] \wedge \phi], [\mathsf{yesterday}'(t') \wedge t' \odot t_?], \mathsf{yesterday}'(t'), \mathsf{yesterday}' \rangle \end{bmatrix} \end{bmatrix}$$

and there is a free occurrence of t' in ϕ

Similarly, for the special temporal adverbial *toe*, we assume that it refers a contextually given time. In this case, however, the adverb itself does not contribute any further specification of this time.

(59) Outline of the lexical entry of *toe* (*then*):

$$\begin{bmatrix} \text{PHON} \ \langle \textit{toe} \rangle \\ \text{LF} \begin{bmatrix} \text{EXC} & me \\ \text{INC} & t' \odot t_? \\ \text{PARTS} & \langle t', \exists t'[t' \odot t_? \wedge \phi], [t' \odot t_? \wedge \phi], t' \odot t_? \rangle \end{bmatrix} \end{bmatrix}$$

and there is a free occurrence of t' in ϕ

Let us finally return to the incompatibility of future adverbials with *perfek*. Sentence (60) is a simplified version of (18). In (60a), we indicate the putative logical forms of the sentence.

(60) * Môre het Jan gebel.
tomorrow AUX Jan called.PART

a. Hypothetical lf of the shifted reading:
$\exists t'[\mathsf{tomorrow}'(t') \wedge t' \odot s^* \wedge \exists t[t < s^* \wedge \exists e[\tau(e) \odot \mathbf{T} \wedge \mathsf{call}'(e,j)]]]$
where either $\mathbf{T} = t$ or $\mathbf{T} = t'$

b. Hypothetical lf of the unshifted reading:
$\exists t[t < s^* \wedge \exists t'[\mathsf{tomorrow}'(t') \wedge t' \odot t \wedge \exists e[\tau(e) \odot t' \wedge \mathsf{call}'(e,j)]]]$

We can explain the ungrammaticality of the reading in (60a) as being the same kind of conflict that we found in (56): whatever the value of $\mathbf{T}$, either t or t', the respective other variable lacks one occurrence.

The unshifted reading, illustrated in (60b), can be derived. If s^* refers to the utterance time, then the expression can never be true, because the interval of tomorrow would be required to precede the utterance time.

7 Conclusion

The system of past tense marking in Afrikaans provides empirical evidence for the need for scope underspecification and multiple exponence of semantic operators within the system of compositional semantics. Since LRS has incorporated these two features, it allows for a straightforward account of the data.

There are at least three systematic extensions of the present analysis. First, more data need to be considered for Afrikaans. In particular the analysis should be extended to sequence-of-tense constellations. Second, there should be a comparison with the temporal systems of related languages, such as Dutch and German, and third, a general reflection about multiple exponence of semantic operators in natural language could be envisaged.

Temporal Systems The Germanic languages show an interesting variety of past tense marking. While morphologically the forms look very similar — there can be distinguished a present, an imperfect, and some perfect forms — there are striking differences in use and morphological potential. We have already noticed above, that Yiddish, Afrikaans and South German all have lost the imperfect form of most verbs. Nonetheless, Yiddish and South German allow the formation of a double perfect to express a pluperfect. For Dutch, however, such forms are not possible. As has been observed in Van der Kleij (1999), there are some varieties of English which allow for a multiple imperfect forms with modals.

Multiple Exponence In previous work we have argued for an analysis in terms of multiple exponence for the following semantic operators:

(61) a. Interrogative operator (Richter and Sailer, 2001a):

German: **Wer** hat **welches** Buch gelesen?
who has which book read 'Who read which book?'

b. Negation operator (Richter and Sailer, 2001b, 2003):

Polish: **Nikt** **nie** pomaga **nikomu**.
nobody NEG helped nobody 'Nobody helped anybody.'

The Afrikaans data constitute an argument for multiple exponence of yet another semantic operator, tense.

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