A morphosyntactic description of Northern Sotho as a basis for an automated translation from Northern Sotho into English

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Summary

This PhD thesis provides a morpho-syntactic description of Northern Sotho from a computational perspective. While a number of publications describe morphological and syntactical aspects of this language, may it be in the form of prescriptive study books (inter alia Lombard (1985); Van Wyk et al. (1992); Poulos and Louwrens (1994)) or of descriptive articles in linguistic journals or conference proceedings (inter alia Anderson and Kotzé (2006); Kosch (2006); De Schryver and Taljard (2006)), so far no comprehensive description is available that would provide a basis for developing a rule-based parser to analyse Northern Sotho on sentence level. This study attempts to fill the gap by describing a substantial grammar fragment. Therefore, Northern Sotho morpho-syntactic phenomena are explored which results in the following descriptions:

- language units of Northern Sotho are identified, i.e. the tokens and words that form the language. These are sorted into word class categories (parts of speech), using the descriptions of Taljard et al. (2008) as a basis;

- the formal relationships between these units, wherever possible on the level of parts of speech, are described in the form of productive morpho-syntactic phrase grammar rules. These rules are defined within the framework of generative grammar.

Additionally, an attempt is made to find generalisations on the contextual distribution of the many items contained in verbs which are polysemous in terms of their parts of speech. The grammar rules described in the preceding chapter are now explored in order to find patterns in the co-occurrence of parts of speech leading towards a future, more general linguistic modelling of Northern Sotho verbs. It is also shown how a parser could work his way step-by-step doing an analysis of a complete sentence making use of a lexicon and the rules developed here.

We have also implemented some relevant phrase grammar rules as a constraint-based grammar fragment, in line with the theory of Lexical-Functional Grammar (Kaplan and Bresnan, 1982). Here, we utilized the Xerox Linguistic Environment (XLE) with the friendly permission of the Xerox Palo Alto Research Centre (PARC).

Lastly, the study contains some basic definitions for a proposed machine translation (MT) into English attempting to support the development of MT-rules. An introduction to MT and a first contrastive description of phenomena of both languages is provided.
Key terms

Northern Sotho, English, language units, word classes, electronic grammars, morpho-syntactic analysis, Northern Sotho Verbal Phrase features, word class distribution, automated translation, machine translation, grammar implementation.
Declaration

I declare that A morphosyntactic description of Northern Sotho as a basis for an automated translation from Northern Sotho into English is to the best of my knowledge and belief, my original work. All the sources that I have used or quoted have been indicated and acknowledged by means of complete references. The material has not been submitted, either in whole or part, for a degree at this or any other university.

Dipl. Ling. Gertrud Faß
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List of Abbreviations

1st First person (inflectional element)
2nd Second person (inflectional element)
3rd Third person (inflectional element)
ADVP Adverb Phrase
AP adjective phrase
c-structure constituent structure
CALL Computer Aided Language Learning
CFG Context–Free (Phrase Structure) Grammar
CONJ conjunction
DM Distributed Morphology
f-structure functional structure
HLT Human Language Technology
LFG Lexical Functional Grammar
MT Machine Translation
NP Nominal Phrase
NPs Nominal Phrases
OBJ-TH thematic object
PARC Palo Alto Research Centre
past Subscript: past tense (inflectional element)
PF Phonological Form
pl Subscript: plural (inflectional element)
POS Part of Speech
PP Particle Phrase
PSC University of Pretoria Sepedi Corpus
refl reflexive
sg Subscript: singular (inflectional element)
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<td>SMT</td>
<td>Statistical Machine Translation</td>
</tr>
<tr>
<td>TNS-ASP</td>
<td>TENSE-ASPECT</td>
</tr>
<tr>
<td>TTS</td>
<td>Text to Speech</td>
</tr>
<tr>
<td>VBP</td>
<td>Basic Verbal Phrase</td>
</tr>
<tr>
<td>Vend</td>
<td>The suffix(es) a verb stem ends in</td>
</tr>
<tr>
<td>VIE</td>
<td>Verbal Inflectional Element</td>
</tr>
<tr>
<td>VIEimp</td>
<td>imperative verbal inflectional phrase</td>
</tr>
<tr>
<td>VP</td>
<td>Verbal Phrase</td>
</tr>
<tr>
<td>VPimp</td>
<td>imperative VP</td>
</tr>
<tr>
<td>VPpred</td>
<td>predicative VP</td>
</tr>
<tr>
<td>VPs</td>
<td>Verbal Phrases</td>
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<td>XLE</td>
<td>Xerox Linguistic Environment</td>
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