Subject and Object Pronominal Agreement in the Southern Bantu Languages: from a Dynamic Syntax Perspective

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Abstract

One of the most distinguishing aspects of the Bantu languages is the use of pronominal agreement markers. This thesis examines the nature of these agreement markers, focussing primarily the object marker, with Setswana being the primary language used for illustration due to the unusual feature of it allowing multiple object marker constructions. This thesis is comprised of seven chapters. The first chapter is the introduction and lays out the rest of the thesis with an explanation of what will be achieved in each chapter.

The second chapter is an introduction to the Bantu languages and is primarily concerned with their structure, though there is also a discussion on the languages and the speakers themselves.

The third chapter is an introduction to Setswana, the language primarily used in the thesis for illustration and examples. Setswana is a tone language and so this chapter includes a discussion on tone in the language, and in particular there is a section illustrating the grammatical effects of tone using the conjunctive/disjunctive distinction as identified by Creissels, 1996.[1]

The fourth chapter looks specifically at agreement in the Bantu languages, focussing on object marker agreement. It includes a discussion on the noun class system and then a comparison of two seminal works on the subject and object agreement markers in Bantu: Bresnan & Mchombo, 1987 and Demuth & Johnson, 1989.[2]

The fifth chapter is an introduction to Dynamic Syntax, the theory within which pronominal agreement is analysed in this thesis.

The sixth chapter is the analysis of multiple object marker constructions in Setswana using the tools as provided by DS. The analysis involves invoking a notion of pragmatic inference combined with Local *Adjunction.

The seventh and final chapter is the conclusion which summarises the thesis and suggests possible avenues for further study or investigation.

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[1] Creissels, Dennis. 1996. Conjunctive and disjunctive verb forms in Setswana. *South African Journal of African Languages* **16** (4): 109-115.

[2] Bresnan, Joan & Sam A. Mchombo. 1987. Topic, pronoun and agreement in Chichewa. *Language* **63.4**. 741-782

Demuth, Katherine & Mark Johnson. 1989. Interaction between Discourse Functions and Agreement in Setawana. *Journal of African Languages and Linguistics* **11**. 21-35.

Contents

Glossary

Below is a list of diacritics, abbreviations and terms found in this thesis, they are presented in alphabetical order.

´ – indicates a high tone
` – indicates a low tone
ˆ – indicates a falling tone
ˇ – indicates a rising tone
* – indicates either a proto- form or an ungrammatical example
? – indicates an ambiguously grammatical example
APP(L) – applicative
AUX – auxiliary
BEN – benefactive
C – consonant
Cl – class
COMP – complementizer
CONJ – conjunction
COP – copula
DISJ – disjunctive
F – falling (tone)
FUT – future
FV – final vowel
H – high (tone)
HAB – habitual
INDIC – indicative
INF – infinitive
L – low (tone)
LOC – locative
N – nasal
NEG – negative
Noun class – akin to gender in the Romance languages (for example)
NP – noun phrase
OC – object concord/clitic
OM – object marker
PERF/PFT – perfective
pl – plural
PRES – present
PROG – progressive
Proto – refers to a hypothetical language/system, usually an ancestral language/system
PST – past
REC – recent
REL – relative
SM – subject marker
TNS – tense
V – vowel

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A.M.

SOAS, March 2008

For my parents, Mira and Tony.

Without you I would never have made it this far.
You will never know how grateful I really am.

1 Introduction

The purpose of this thesis is, primarily, to give an analysis of multiple object markers that occur is some Bantu languages, using Setswana as the language of example and using the tools as provided by the Dynamic Syntax (henceforth DS) model as the tools of analysis. Not all Bantu languages allow multiple object marking on the verb form, and for those that do it is usually the case that there is a strict linear ordering of those object markers. However, Setswana displays not only multiple object markers on the verb, but allows for a flexible ordering of those markers with the same interpretation of the utterance. Therefore the analysis of multiple object markers must also account for the flexible ordering of those markers which it does by employing a notion of pragmatic enrichment combined with Local *Adjunction.

The intended audience for this work are both those who have a knowledge of syntax (including those both familiar and unfamiliar with DS) and those who have a knowledge of Bantu languages. Because of the dual targets, a large proportion of this thesis is taken up with introducing various necessary areas with which various readers may not be familiar. This is in order to give every reader a well rounded introduction to all of the subject matter before embarking upon the analysis. However, I do appreciate that not all of the information will be necessary or of interest to each reader, so I have endeavoured to keep each chapter as complete as possible, and attempted to avoid the need for those who have experience in either main area to read those sections about which they are familiar. In some cases this has resulted in a certain amount of repetition, and often there is a reference to a separate section and/or chapter where more detailed or further information about the matter at hand can be found.

In this chapter I will introduce the themes presented in this thesis. I will begin by introducing the notion of pragmatics that is invoked at a later stage, defining the pragmatic model as it is used in this thesis. Pragmatics is a central theme of this thesis and while it is not referred to during the initial chapters, it is introduced here because it is necessary to read the thesis with the pragmatic model in mind, in order to be able to apply the model to the later chapters, and the analysis chapter in particular. I will then give an overview of what is included in each chapter and why, followed by an explanation of the method through which the original data was gathered during my period of fieldwork.

1.1 Pragmatics

As will come to be shown, pragmatics plays a large part in this thesis. It is, therefore, important to define the pragmatic context early on in order for the whole of the remainder to be read within the appropriate parameters. The majority of this section is a summary of Sperber & Wilson (2003).

The study of pragmatics has been defined (Crystal 2003: 364) as the study of language from the users' perspective, and in particular of the choices made within the constraints of individual languages and of social interaction, as well as the impact language choices have in the act of communication. However, it is Crystal's more narrow definition of pragmatics that is applicable in this thesis, namely context. It is the aspects of context that are "formally encoded in the structure of a language" and which form part of the language user's "pragmatic competence." (Crystal 2003: 364.)

As explained by Sperber & Wilson (2003: 10) a grammar cannot account for a hearer's ability to infer certain non-linguistically explicit information that is communicated during a speech act. This is not non-verbal communication, such as body language or tone of voice, but rather the specifics of the thought being expressed by the speaker when they speak. What is being referred to here is the context within which the speech act is occurring. For example, when a speaker says *I*, s/he is referring to her/himself, the speaker, and it is the job of the hearer to infer that fact and take information from the context in order to aid that inference. Similarly, if the speaker talks about a situation involving *John, Bill* and *Mary*, it is the job of the hearer to determine which John, Bill and Mary the speaker is referring to out of all of the Johns, Bills and Marys of the world. Once again, context comes into play, and interpretation on the part of the hearer involves "an interaction between linguistic structure and non-linguistic information, only the former being dealt with by the grammar." (Sperber & Wilson 2003: 10.) The latter can be dealt with by applying a level of pragmatic decoding to the linguistic level of a speech act which is covered by the grammar, and this pragmatic level has rules and forms a system like other linguistic levels (syntax, phonology, phonetics). The rules of a pragmatic system would serve interpretation purposes and might be along the lines of: *Substitute 'I' for a reference to the speaker*, and *Substitute 'tomorrow' for a reference to the day after that in which the utterance is being spoken* (from Sperber & Wilson 2003: 12). However, for a large proportion of natural speech there are multiple possible substitutions for the referent of the utterance. Thus it is important that rules

regarding the pragmatics can take the properties of the context and thoroughly assimilate them with the properties of the semantics.

Most models of pragmatics describe comprehension (a hearer's ability to understand what is being said) as an inferential process. This is different from a decoding process. Sperber & Wilson (2003: 12-13):

> An *inferential process* starts from a set of premises and results in a set of conclusions which follow logically from, or are at least warranted by, the premises. A *decoding process* starts from a signal and results in the recovery of a message which is associated to the signal by an underlying code.

An inference is made through a process of deciding whether an assumption is to be accepted as true or as probably true based on the assumptions of the truth or probable truth of other assumptions. These assumptions form a hypothesis, and the formation of this hypothesis is a creative act of the imagination. Confirming this hypothesis is a logical process involving rules of inference, the purpose of which is to "guarantee the logical *validity*" of the inference over which they hold.

When a speaker utters a natural language string, a linguistic input system decodes the string into a logical form, or set of logical forms in the case of ambiguity. It is then the role of the hearer to complete the logical form into a propositional logical form that corresponds to what the speaker was trying to convey and that can be assessed for a truth-value. In order to comprehend a speaker, the hearer must build conceptual representations of the information being transmitted from the speaker. This is done through inference as discussed above, and the rules governing inference. Thus conceptual representations need to have certain logical properties in order to conform to a rule governed inference system. These logical properties make up the "*logical form*" (Sperber &Wilson 2003: 72) through which a conceptual representation can enter into logical processes with other conceptual representations and be confirmed as being contradictory or implicational with these other conceptual representations, and so be assessed for truthfulness. A logical form is considered to be propositional if it is semantically complete and a propositional logical form can be either true or false, this is not so of non-propositional forms. Propositional logical forms are made up of smaller constituents termed "concepts" (Sperber & Wilson 2003: 85) which are essentially constructed from the words of a natural language string. These words combine and a semantic representation of the propositional form is built through inference. Additionally, the hearer must construct the correct propositional form as intended by the speaker. In order to assign the correct propositional form to a natural language string the hearer must select one of

a possible many semantic representations as assigned to the utterance by the grammar. This is more than simple disambiguation because in order to find the correct semantic representation a hearer must also "complete" and "enrich" (Sperber & Wilson 2003: 179) any underspecified and/or vague terms in order to result in the propositional form. This is largely done through inference.

The propositional form that results from the above (disambiguation, reference assignment, in the case of underspecified forms, and enrichment) will still be "at best a tentative identification of propositional form" (Sperber & Wilson 2003: 184) and if this identification does not conform to the principle of relevance[3] it will be. For the purposes of this thesis it will suffice to identify Sperber & Wilson's two *Principles of Relevance*, the first of which concerns cognition and the second of which concerns communication (2003: 260), and their definition of relevance (2003: 125):

> *Principles of Relevance*
> a. Human cognition tends to be geared to the maximisation of relevance.
> b. Every act of ostensive communication communicates a presumption of its own optimal relevance.
>
> *Definition of Relevance*
> *Extent condition 1*: an assumption is relevant in a context to the extent that its contextual effects in this context are large.
> *Extent condition 2*: an assumption is relevant in a context to the extent that the effort required to process it in this context is small.

Effort is an important factor with regards to relevance. At each stage of the process of inference used to find the correct semantic representation of an utterance, the hearer should chose the solution according to extent condition 2 (that which requires the least amount of effort to successfully process it into the propositional form) as long as it remains consistent with the principle of relevance. The representation that requires least effort to be processed into the propositional form will be that which is most contextually relevant to the utterance in question. For example, the lexical item *bank* has two possible interpretations; as a place to store money and as the side of a river. In the utterance *I need to get some money out of the bank* the most contextually relevant interpretation of the item *bank* is the one in which money is stored, as opposed to the one that is the side of a river since it is unusual for money to be kept buried in the side of the river and more likely to be kept in a place to store money. Hence the interpretation of *bank* requiring least processing effort for the above sentence is that the speaker wishes

[3] For a full account of relevance see Sperber & Wilson (2003).

to go to the place where money is stored, rather than to the side of a river. Reference assignment involves searching the immediate context for an appropriate substitute for the underspecified form. When an utterance contains vague terms such as *some time* in the example from Sperber & Wilson (2003: 189) *It will take some time to repair your watch*, enrichment searches the context to find a possible, more concrete, concept in order to enrich the vague term. For example, in the Sperber &Wilson example, if the watch repairer is usually very fast, taking only a few minutes to make repairs, *some time* is likely to equate to more than a few minutes.

With the above in mind, we turn to the main focus of the thesis, pronominal agreement markers. Of particular interest are the multiple object agreement markers in Setswana which occur in a free order on the verb form. In order for this to be possible (as my data shows), it is the intrinsic information from the object markers (including noun class as a restriction on substitution) along with contextual knowledge which allows the hearer to establish structural relations through pragmatic inference which accounts for the flexibility of the surface word order yielding the same final interpretation. This pragmatic information relies heavily on the extent condition 2 of the definition of relevance, that of least effort in order to conform to the principle of relevance. This view of pragmatic information will inform the analysis of multiple object markers as will be seen in chapter 6.

1.2 Thesis Overview

In this section I will present an overview of the entire thesis, chapter by chapter. I hope this will be useful for the reader in allowing them to determine the most relevant chapters and sections for their purposes with a guide to the information contained in other chapters that they may find of interest or helpful to gain a rounded understanding of the thesis as a whole.

1.2.1 Chapter 1

The first chapter of this thesis (the present chapter) is the introduction in which I will outline the remainder of the thesis, each chapter in turn, describing what is in each chapter, why it is included in this thesis and what it contributes to the whole. I will also go through the methodology by which I elicited my data during fieldwork, including the informants chosen and why, and information regarding the data in chapters other than the analysis chapter.

1.2.2 Chapter 2

The second chapter is an introduction to Bantu languages. The purpose of this chapter is to give an outline of the Bantu languages providing historical information about the speakers of the languages and an outline of the literature available regarding the classification of the Bantu languages, along with background information about their structure in general and linguistic phenomena that make the Bantu languages interesting as an area of study. In the opening paragraphs to this chapter there is information regarding the term "Bantu", its origins and about its history as being a derogatory term, which is now not the case. There is also a discussion on the phylogenetic classification of the Bantu language family, the number of Bantu languages and a proposed method for determining whether a language is a member of the Bantu family or not.

The first section (2.1) is a discussion of the speakers of Bantu languages, their geographic origins and the proposed historic migration patterns of the speakers spreading the language family across sub-Saharan Africa. There is also a discussion on the number of speakers in general and by language (including numbers of first and second language speakers).

The second section (2.2) is a discussion of the classification of the Bantu languages, beginning with the different methods used for the purposes of classification and a brief history of the classification of the languages as performed and presented by a variety of different scholars which form the background for the most influential and/or referenced classifications used up to the present day. There follows an in-depth look at some of the more influential and/or referenced classifications. First is the classification by Malcolm Guthrie (1948; 1967-1971) which is perhaps the classification most widely in use at this present time. Guthrie's system of grouping Bantu languages by zone and assigning each language an individual identification number within its zone is prevalent in works relating to Bantu languages as a standard form between scholars for identifying the languages in question as it allows those who may not be familiar with a particular language to have an idea of the region in which it is spoken and other languages spoken in the same area in particular through the zonal groupings. Second is the classification by Sir Harry Johnston (1919/1922) which is not used in the present day and is largely considered to be not linguistically sophisticated. It is included here because it is similar to and preceded Guthrie's classification and because Johnston's insights are still valuable, though not widely credited. Following Johnston is a summary of other influential classifications that preceded and followed that by Guthrie in order to give a view

of the classification landscape as it stands today. These other classifications are by Clement Doke (1945) via Desmond Cole (1961), Anthony Cope (1971) and Heine, Hoff & Vossen (1977).

In the third section (2.3) Proto-Bantu (henceforth PB) is introduced, it is a hypothetical parent language for all of the Bantu languages spoken in the present day, and it leads to a discussion of three broad strategies for finding an internal classification of Bantu languages; Comparative Reconstruction (which compares lexical items across languages in order to establish degrees of relation and uses standard variations between languages to build a hypothetical ancestral form for each lexical item, which add to the stock of PB forms), the Stratificational Model (as found in Möhlig (1981) which is similar to Comparative Reconstruction in that it compares lexical items for phonological correspondences, but Möhlig proposes several ancestral proto-systems to account for the present distribution of the Bantu languages, as opposed to one all encompassing PB system) and the Lexico-Statistical method (which takes 100/200 word lists from the test languages and compares only those word lists to find cognate forms, the percentage of shared vocabulary between languages is calculated, resulting in a statistical measure of relatedness). Each of these lends itself to finding PB forms in different ways, some more directly than others, but the most relevant is Comparative Reconstruction as used by Carl Meinhof (1899, 1910) when developing his Ur-Bantu (Proto-Bantu) model which takes as its foundation the concept from Saussure, (1916) that a linguistic sign (a word) is an arbitrary representation of some concept and so there is no reason for two languages to have the same/a similar sign to represent a common concept, therefore when this is the case it is reasonable to assume that the languages are related to some degree.

While not the main focus of this thesis, it would be a mistake to make no mention of the phonetics and phonology of Bantu languages (2.4). However, because there are so many and they can differ quite widely from each other it would take many volumes to give a true account. Thus this section is based on Meeussen (1967) and gives an overview of some of the more interesting features of Proto-Bantu which is the only way in which to generalise about the modern Bantu languages. Further is a discussion on the clicks that occur in some Bantu languages and a brief look at tone as far as can be generalised, particularly in Proto-Bantu, since there is an in depth discussion about tone in Setswana in section (3.2).

The next section (2.5) gives a sketch of the grammar and the more unique linguistic features of Bantu languages. This section is necessarily general because later

chapters involve a more in-depth account of certain aspects of Bantu grammar. One of the most distinguishing features of the Bantu languages is the noun class system. This is comparable to gender as found in Romance languages, where each noun is assigned to the feminine or masculine gender. However the 'genders' to which Bantu nouns belong differ from Romance genders in that there is no relation to masculine/feminine (even though this is a rather arbitrary system in Romance languages as well) as these genders are not marked in Bantu (there is no biological sex-based distinction even for people) and there is a greater number than the two genders found in Romance languages. Hence it is preferable to refer to the Bantu system as being of noun 'classes' rather than genders. Every noun belongs to a class and has a morphological 'class marker' which shows agreement with the noun on the verb form, both for subjects and objects, and every noun belonging to a particular class is represented by the same noun class marker. Since the noun class markers show agreement with the noun on the verb form, there is a discussion on the structure of the verb form following Bearth (2003) during which the number of arguments that can be represented on the verb form of different kinds of verbs (one/two/three-place verbs) is explored, as well as the different ways that arguments can occur. Following on from the previous is a discussion about word order variation, which is another interesting feature of the Bantu languages and particularly interesting when taken in context with the analysis chapter (chapter 6) in which the ordering of the object noun class markers in Setswana is shown to be surprisingly free.

1.2.3 Chapter 3

This chapter is an introduction to the Setswana (Guthrie's classification S31) language. Setswana is the national language of Botswana and one of the eleven national languages of South Africa. Setswana has a chapter to itself because it is the language that forms the main focus of this thesis and from which all of the data in the analysis chapter (chapter 6) comes.

The first section (3.1) is a discussion about Setswana at a macro level, talking about the number of speakers both in and outside of Botswana, as well as information regarding the different dialects of Setswana and some relevant phonological information relating to the distinction between the dialects, which leads to a discussion about my informants, their dialects and some information about data elicitation sessions and contexts. There is a brief discussion of the sentence structure of Setswana, brief because it is a Bantu language and as such does not deviate to a great extent from the structures

discussed in the Introduction to Bantu Languages chapter (chapter 2), and so the discussion is primarily about the semantics of the noun classes in Setswana.

The next section (3.2) is about tone in Setswana. While a number of Bantu languages exhibit tone, the system in Setswana is complex and so warrants a substantial discussion. This is particularly so for verbs which are associated with one of two lexical tone classes, if the root has a single high (henceforth 'H') tone or no tone at all.

H tone in Setswana is 'active' and so lends itself to H-tone spread (where a H tone on a prefix can spread to the low (henceforth 'L') tones of following verb stem, with L tones being 'inert') and the generation of H tone domains, which have certain limitations and are an interesting feature of the conjugation of Setswana tone. Other aspects of the conjugation of tone in Setswana that are covered in this section are the conjunctive/disjunctive distinction (which is also explored in more detail in a later section of this chapter (3.2.2)), grammatical H tone and the effects of orthography when looking at tone. Further to H tone spread there is also H tone retraction which occurs in cases where two underlying H tones occur adjacent to each other, each with its own H tone domain, which is disallowed by the Obligatory Contour Principle, and so one has to retract. Tone is also used on the subject marker as a means of differentiating between tenses, the paradigms for which are presented in this section. The H tone domains mentioned previously are a complex issue and so there is a substantial discussion of the effects of these included in this section.

The conjunctive/disjunctive distinction mentioned above is a good illustration of the effects of tone in Setswana and has been substantially explored by Dennis Creissels (1996) in which the conjunctive/disjunctive distinction is described in a variety of tenses, these being; the present positive, present negative, future positive and perfect positive. In this section there is an exploration of Creissels' findings, followed by a replication of his data using data gathered from my own informants. This was done because Creissels' data appeared to be very formulaic and I wished to see what would occur under my own elicitation circumstances. I was able to elicit data in all of the tenses as explored by Creissels as well as post verbal NPs in the present positive tense, presentational/locative post verbal NPs in the present positive tense. I also explored other environments not covered by Creissels (1996); relatives and subordinates.

1.2.4 Chapter 4

This chapter is where the discussion starts to narrow down into the main focus of the thesis. Agreement markers have been mentioned already in both of the previous chap-

ters, but it is in this chapter that the focus falls on the object markers that will play an important part of the analysis chapter. Initially, however, is a discussion on the subject of agreement itself (4.1), defining what grammatical agreement is and what it does: essentially agreement is one part of speech matching, or agreeing with, another in terms of certain syntactic categories, such as gender (or class in the Bantu languages), number, person and/or tense. This includes looking more specifically at pronominal agreement, and in particular in Bantu languages where there is what Corbett (2006) describes as alliterative agreement. This is where the noun class marker of the subject is 'repeated' across the remainder of the string, occurring in the same form on the target elements:

(1)	*ki-kapu*	*ki-kubwa*	*ki-moja*	*ki-lianguka*	[Kiswahili]
	SM-basket(7/8)	7-large	7-one	7-fell	
	'one large basket fell'				

It is not necessarily the case though, that if a language has examples of alliterative agreement it is completely alliterative.

The next section (4.2) provides a more detailed look at agreement specifically in Bantu languages. Of primary interest and importance is the verb-form structure, which has already been mentioned in previous chapters but is discussed here in more detail with examples from a variety of Bantu languages. Covered in this section are the subject markers, the verb form and the object markers that may (or may not) occur on the verb form. In particular the matter of multiple object markers and the language specific restrictions placed on the number of object markers allowed on the verb form and the order in which these markers can occur are of importance here. Some languages allow maximally one object marker (Kiswahili), some allow more than one (Setswana). For those that allow more than one object marker on the verb form, some have strict contexts in which these multiple object markers can occur (Chibemba) whereas others are more free (Setswana).

Next is another look at pronominal agreement, this time with relation to conjoined noun phrases, that is, with examples involving 'and' constructions. Initially however, Maho (1999) describes three methods for avoiding agreement with conjoined noun phrases in the first place; commitative constructions ('with'), verb repetition and impersonal constructions. Corbett (2006) argues that conjoined noun phrase agreement resolution occurs through a human/non-human distinction, whereas Maho (1999) distinguishes between syntactic, semantic and indefinite resolution. Syntactic resolution is where agreement is shown with the nearest conjunct to the verb in a conjoined noun phrase. Semantic resolution occurs when agreement is determined by the lexical se-

mantics of one or all of the nouns (this is Corbett's human/non-human distinction). Indefinite resolution is not common in the Bantu languages, but where it is found, an impersonal marker (such as the locative in Isizulu and Siswati) is used, that bears no relation to any of the noun phrases in the construction.

The next section (4.3) is a discussion of two seminal works on agreement markers in Bantu languages, Bresnan & Mchombo (1987) (henceforth B&M) and Demuth & Johnson (1989) (henceforth D&J). B&M argue that in Chichewa the object marker is an incorporated pronoun which is always in anaphoric agreement with its co-referential object NP, while the subject marker is ambiguous between being a grammatical agreement marker and an anaphoric pronoun. D&J argue that in Setawana both the subject marker and the object marker are incorporated pronominals, and that the subject marker is never a grammatical agreement marker. Both B&M and D&J use the Lexical Functional Grammar (henceforth LFG) framework in their analyses, but the results are relevant to the discussion in this thesis and transferable to DS. It is in this section that the notion of Topic is described.

1.2.5 Chapter 5

Chapter 5 is an introduction to the Dynamic Syntax (DS) framework. This is the framework within which the analysis is conducted and so it is introduced at this late stage so as not to interfere with the largely framework-free information contained within the preceding chapters and so that it is immediately followed by the analysis, within which the information from this chapter is particularly relevant. DS combines syntax and semantics to interpret a string of natural language with the aim to explain the interaction between the order in which words occur in the sentence and to explain how words are interpreted within the context in which they occur. DS builds a representation of an interpretation of a natural language string as it is uttered and parsed from left to right. DS uses tree structure to represent an interpretation of an utterance and these trees are akin to the trees used in formal logic (rather than syntactic trees).

Following the introduction of context (5.1), the next section (5.2) illustrates the building of a very basic DS tree structure in order to show how the elements of a natural language string are positioned in the tree and eventually combine up the tree to show the final interpretation. This section introduces the basic idea behind the DS model, that syntax drives a process of tree growth as a model of incremental construction of semantic representations.

In the next section (5.3) I introduce the language of DS. The language of DS is a formal method for decorating and describing logical trees and has unique elements to describe the relationships between concepts and elements of natural language, as well as inherent instructions as to how to build the trees and descriptions of the tree as it is built. It is through tree node decorations that information holding at particular nodes in the tree is described, along with a lexical representation of the concepts expressed through natural language elements (words). This section contains a description of the elements of the DS language that are most relevant to this thesis and which decorate the tree nodes. Further is a description of the *Logic of Finite Trees* (henceforth *LOFT*), through which it is possible to describe a tree, or a part of a tree, from the perspective of any node within the tree. This is done through modal statements that allow us to refer, from any given node, to other nodes and also to refer to what holds at those nodes (what the nodes are decorated with).

Section (5.3) also introduces some of the DS transition rules, through which it is possible to construct tree structure (the other method of tree construction is through lexical entries which will come presently). Transition rules are a set of basic rules that are involved with every successful construction of a DS tree and are assumed to be freely available. The rules covered in this section are; Introduction, Elimination, Prediction, Completion, Thinning and Merge. Not all are used in the analysis chapter, however all are relevant for giving a background to the DS framework and an understanding of how it works.

Following the transition rules the other method of constructing tree structure, lexical entries, is explored. In DS the parsing process is principally driven by the lexicon and so lexical items carry a lot of grammatical weight and play a central role in the syntax model. Lexical entries are the representation of the lexical information carried by a lexical item. Not only does the lexical entry contain information with which the tree nodes can be decorated, they can also serve to induce tree growth through a sequence of actions that are spelled out in the entry. Different lexical items have different instructions in the lexical entry, some can only decorate tree nodes (such as names), while others can carry instructions to create nodes, go to those nodes and decorate those nodes with information (such as verbs). The more 'complex' the verb (transitive verbs as opposed to intransitive verbs) the more instructions the lexical entry has contained within it.

In the next section (5.4) a fully specified tree is generated based on the basic tree introduced earlier on in the chapter, but this time involving all of the relevant DS tran-

sition rules and all of the relevant tree decorations as presented in the language of DS section. In addition to showing the generation of a simple yet fully specified tree, this section will demonstrate some of the tools available for more complex constructions. Initially there is a tree built using only the Introduction and Prediction transition rules, this is to show how these two rules in particular can be used to generate a full DS tree, but also to show that they are too generative on their own and so could never be the only tools used for tree generation in a DS parse. Next is an example of a LINK structure, which is not used in the analysis but is nevertheless a very important feature of DS and so presented here in order to add to the description of the DS framework.

The final section (5.5) is on concepts of underspecification in DS, looking first at pronouns and how these are modelled in the DS tree. This is relevant because the analysis revolves around pronouns and so they are introduced at this stage in order to be able to turn immediately to the analysis in the following chapter. Following is an introduction to various Adjunction rules that are available in DS. Adjunction rules serve to introduce nodes which carry descriptions, but which do not, as yet, have a fixed location in a tree that is still under development (i.e. unfixed nodes). Though the Adjunction rules introduced in this section are not used in the analysis, it is important that they be described because together they give an idea of the interaction between structural underspecification and locality in DS. These rules are Adjunction, *Adjunction (said 'star adjunction'), Local *Adjunction and Late *Adjunction.

1.2.6 Chapter 6

Though occurring towards the end of the thesis this is the central chapter comprising of the analysis of multiple object marking in Setswana using the tools as provided by the DS framework. But before the analysis is further essential background information that is directly (and some slightly more indirectly) relevant to the analysis.

First the pragmatics introduced in this chapter (section (1.1)) is revisited (6.1), specifically in relation to the agreement markers. Semantic roles of object arguments are established and then tied in to their syntactic role, either as direct or indirect object. Following is a discussion of contextual relevance using an English example which is then extended over to Setswana. Finally, the notion of pragmatic inference of tree structure is introduced in comparison to constructive case, which is often utilised in languages that have scrambling, such as Latin and Japanese.

The second section of this chapter (6.2) is the analysis. Beginning with the parse of a single object marker construction in Kiswahili, the DS tools that will be used

in the analysis of multiple object constructions (specifically Local *Adjunction) are introduced. The parse involves subject and object markers decorating locally unfixed nodes which are then updated into a fixed position in the DS tree. In the case of the subject marker this is done by the tense marker which builds a fixed relation from the unfixed node to the root node, and in the case of the object marker this is done after the parse of the verb which generates the full propositional tree structure including a fixed object relation with which the unfixed object node can merge. The same analysis is then applied to a single object marker construction in Setswana in order to illustrate how analyses can extend across languages and, in the case of the Setswana example, to serve as a comparison to the multiple object marker constructions in which tense marking occurs at the end of the verb (so cannot fix the subject marker) and where the object unfixed nodes cannot rely on the parse of the verb in order to find a fixed relation in the tree.

Having introduced the DS tools and parsing process using single object marker constructions, there follows a look at multiple object marker constructions in Setswana. Analysing the same sentence twice, with the object markers in reversed order in the second parse. The analysis in this section uses Local *Adjunction to introduce unfixed nodes that are decorated with the (subject and) object markers, but with recourse to pragmatic inference which enriches the underspefied relations to an appropriate position in the tree (in the examples presented the subject marker is fixed by the disjunctive marker, which, although functioning like tense marking in this case, is not a tense marker). Furthermore, the locally underspecified relation is enriched to the appropriate fixed relation for the object marker currently being parsed, no matter in what linear order they occur in the clause. A direct object will be enriched to the appropriate position in the tree structure even if it is parsed after the indirect object marker. This section includes a discussion about the function of the disjunctive marker, which is introduced in section (3.2.2), as it works in conjunction with the final vowel of the verb form to signal that the verb is clause final and to give the instruction to compile up the tree when it is parsed.

1.2.7 Chapter 7

This chapter is the concluding chapter and in it I will recap the main points of the thesis and illustrate how certain areas that were presented separately interact with each other, namely topic/function as introduced in chapter 4, the conjunctive/disjunctive distinction

and tone marking in chapter 3 and the analysis in chapter 6. I will discuss the achievements and limitations of the thesis as I see them and possible areas for future research.

1.3 Methodology

Though this thesis is primarily for the purpose of presenting possible analyses for multiple object markers in Setswana, a large proportion of it is taken up with introducing background topics that are of relevance to readers approaching this work from different disciplines. Those familiar with Bantu languages may not be so familiar with the syntax and the DS model presented here. Those approaching it from a syntactic direction may not be familiar with Bantu languages. As such I wished to accommodate all needs and so included the background information. The majority of this, however, is by necessity also an extended literature review, at the same time giving information for those who may need it and also detailing the present and past work that exists on the main themes of this thesis: the Bantu languages and syntactic agreement.

My own data, which is the main data in the analysis chapter, was gathered on a six-month fieldwork trip to Botswana. While in Botswana I was fortunate enough to find accommodation close to the University of Botswana (henceforth UB) in the capital Gaborone, where I was in contact with Professor Herman Batibo who is the head of the Linguistics department at UB. Through Professor Batibo I was put in contact with some of his students of linguistics, who came from different parts of the country and so removed my need to travel beyond Gaborone for the purposes of fieldwork. I met with a variety of students who spoke different dialects of Setswana and who were generally in their final year of their degree at UB. I worked with six informants in total, for a varying number of two hour sessions, the most being 12 two hour sessions and two full days, the least being four two hour sessions in total. Informants were paid per session, after every four sessions.

To recap, the main aim of this thesis is to provide an analysis of multiple object constructions in Setswana, focussing on agreement markers occurring on the verb-form and in particular accounting for the flexible ordering of the object markers as found in Setswana. This analysis can then be extended to other Bantu languages that allow multiple object marking on the verb form and provide an explanation for the phenomena of

flexible ordering of object markers, which is generally not considered a possibility in Bantu languages.

2 Introduction to the Bantu Languages

The term 'Bantu' was first used to describe a group of languages in the mid-1850s by Wilhelm Bleek while he was cataloguing the books in the library belonging to Sir George Grey (a British governor at Cape Colony in the early nineteenth century). It comes from the root for 'person' in Bantu languages (*-ntu* in Isizulu, *-tu* in Kiswahili, *-ndu* in Otjiherero) and the Isizulu plural prefix *ba-* and so deriving *Bantu*, meaning 'people'. (Maho 1999: 23.)

The term 'Bantu' has carried negative connotations in the past, especially during the apartheid era in South Africa, where it was used as a derogatory term. Since then, however, the term has regained acceptance and is widely used both in Africa and abroad. When used here and in modern linguistic literature, 'Bantu' refers only to a group of languages, and the 'Bantu speakers'/'Bantu speaking people' again refers purely to the users of that group of languages. It is confidently used here as nothing other than a linguistic term.

Bantu languages are part of the Southern Bantoid languages (from the Bantoid language group) which are from the Benue-Congo language group which is a sub-group of the Niger-Congo language phylum. The Bantu language family is the largest family in the Niger-Congo phylum. Bantu languages are spoken in an area of approximately nine million square kilometres (Maho 1999: 18) which stretches from the very bottom of the Nigeria/Cameroon border in the west, under the Central African Republic through Uganda to the south of Kenya in the east and then south to the Namib desert in Namibia and the Kalahari in Botswana and to the Eastern Cape in South Africa.

The precise number of Bantu languages that are spoken is not an easy figure to determine (this is due to the ever present difficulty in distinguishing between languages and dialects), but the figure has been estimated to be anywhere between 300 and 650 languages. The issue of how many is further exasperated by the difficulty in determining which languages can be classified as Bantu and which cannot. This is not a problem in the south where the Bantu speaking region is bordered by Germanic (e.g. Afrikaans) and Khoi-San (e.g. Khoekhoegowab) languages so it is easy to tell which is which, nor is it a problem in the north-east where the surrounding languages are Afro-Asiatic (e.g. Somali) and Nilo-Saharan (e.g. Maasai). However, in the north-west the surrounding languages are Niger-Congo languages (the language family that Bantu belongs to) and so deciding which languages are Bantu and which are from another sub-group of the Niger-Congo family can be difficult.

There have been numerous methods devised for classifying Bantu languages, the most predominant one being Guthrie's criteria for Bantuhood (reproduced here in Marten's (2004: 2) abbreviated form):

1) A system of grammatical genders of classes, indicated by a prefix, forming singular-plural pairs.
2) A vocabulary, part of which can be related to hypothetical common forms through regular rules.
3) A set of invariable CVC roots from which almost all words are formed by an agglutinative process.
4) A balanced vowel system with an open vowel *a* and an equal number of back and front vowels.

However, these criteria are not as useful in determining whether a language is Bantu or not as it is in describing the typical Bantu language. There are many Bantu languages which have some of the criteria but not all and non-Bantu languages that fit some of the criteria also. For a more detailed look at the classification of Bantu languages see section (2.2).

2.1 The Speakers of Bantu Languages

It is estimated that between 150-250 million people speak Bantu languages and it is believed (Greenberg 1972, Vansina 1989) that Bantu speaking people originated in the north-west of the present Bantu speaking area (somewhere along the Nigeria/Cameroon border) and that the migration taking the languages east and south began somewhere around 5000 years ago, settling down into its present spread around 2000 years ago (Ehret 1998, Vansina 1990).

The Bantu language with the most speakers is Kiswahili which has approximately 30 million speakers across the whole of eastern Africa, though this figure (from Maho 1999: 20) includes second language speakers, Maho cites the approximate number of first language speakers as around 5 million. Kinyarwanda and Isizulu are the languages with the highest number of mother tongue speakers, both having over 9 million. The top ten Bantu languages have a total number of 66 million mother tongue speakers and these languages are: Kinyarwanda (9.3 million), Isizulu (9.1 million), Chishona (8.3 million), Isixhosa (6.9 million), Luba-Kasai (6.3 million), Kirundi (6

million), Kikuyu (5.4 million), Kiswahili (5 million), Chinyanja/Chichewa (5 million), Kesukuma (5 million). When taking second language speakers into account the order (and numbers) is very different: Kiswahili (30 million), Kinyarwanda (9.3 million), Isizulu (9.1 million), Lingala (8.4 million), Chishona (8.3 million), Isixhosa (6.9 million), Luba-Kasai (6.3 million), Kirundi (6 million), Kikuyu (5.4 million), Chinyanja/Chichewa, Kituba and Kesukuma (5 million).[4]

2.2 Classification of Bantu Languages

Classification of languages is an important issue, and no less for Bantu than for any other language family and there are a number of different methods of classification. A lexico-statistical analysis of languages provides a shortcut to genetic classification by comparing a number of examples (generally around 200 lexical items) from different languages, if there are enough similarities in the lexical items the languages are considered to be related. A geographical/areal classification looks more at local distribution with a mind to finding the boundaries between languages. Typological classifications tend to be focussed more on grammatical traits and features such as the number of vowels in the language (5/7 vowel system).

The history of the classification of what is today known as the Bantu languages is traced by Maho (1999) back to the 18th Century where the first mention of a parent language for some of the (western) Bantu languages was by Catholic missionary Abbé Proyart in 1776. In 1808 Hinrich Lichtenstein said the same about some of the eastern and southern Bantu languages. In the early 19th Century William Marsden (in Tuckey, 1818) completed the first comprehensive cross regional Bantu study, comparing lexical items from a variety of Bantu languages. It was in 1847 that John Whittle Appleyard, a Wesleyan missionary, published what Doke (1960: 77) described as the first "serious detailed study" of the Bantu languages in a series of articles that appeared in *The South African Watchman and Missionary Magazine*. Appleyard's articles covered all the known Bantu languages and he classifies them as dialects of an "alliteral" class of languages, that is, languages in which grammatical agreement is shown by copying the noun class prefixes on to other target elements in the sentence. Appleyard groups the languages in to 5 groups: Congo (Kikongo, Mbunda, Ngangela); Damara (Otjiherero);

[4] Both top ten lists sited by Maho (1999: 20) and taken from *Ethnologue* (1996, Grimes) and are approximations only.

Sechuana (Setswana, Sesotho); Kaffir (Isizulu, Isixhosa and related languages and dialects); and the fifth category that contains largely unclassified languages as well as Ciyao, Kiswahili, Kauma and Kamba. Wilhelm Bleek (1862, 1869) compared twenty four Bantu languages with Isixhosa, through which he was able to group those twenty four into three branches of the languages: South-Eastern Branch (Isixhosa, Isizulu, the Setswana dialect Setlhaping, Sesotho, Xigwamba); North-Western Branch (Kɛlɛ, Benga, Duala, Isubu and Bobe); and the Middle Branch which is subdivided into four "general" (groups) which are the Mosambique Genus (Nyungwe, Sena, Emakhuwa, Yao), the Zangian Genus (Kamba, Kauma, Kiswahili, Shambaa), the Interior Genus (Siyeyi), the Bunda Genus (Otjiherero, Oshindonga, Umbundu, Kimbundu), and the Kongo Genus (Kikongo, Mpongwe).

The classification of Bantu languages by Malcolm Guthrie (1948; 1967-1971) is the standard reference still widely used today. An alternative that is not given much weight is that by Sir Harry Johnston (1919/1922). These are discussed in detail below.

2.2.1 Guthrie

Malcolm Guthrie (1948; 1967-1971) developed a widely used method of classifying the Bantu languages, that is still much used today. In many works, reference to a Bantu language will include the Guthrie classification to ensure that those unfamiliar with the language in question but familiar with the Bantu languages in general will be able to know to which group it belongs and thus to which languages it is similar.

Guthrie's final classification (1971) has the Bantu languages split into 15 zonal groups (the earlier 1948 had 16 groups) which are labelled with the letters A to S, missing out the letters I, J, O and Q. These zonal groups are subdivided into subgroups that are identified by numerals in tens (10, 20, 30, 40) with each language in the subgroup having a unique two digit number, the first of which identifies the subgroup and the second of which identifies that particular language. So, for example, the Nguni group of Bantu languages is represented by Guthrie is S40. Isixhosa is represented by S41, Isizulu is represented by S42, Siswati is represented by S43 and so on. Setswana is in the Sotho-Tswana group, S30, with Setswana being S31.

Guthrie himself conceded an element of typological bias (Guthrie 1948: 27) in his classification when describing his method for grouping the Bantu languages which began with one language and spread outwards from that starting point finding other languages with characteristics similar enough to that initial language to group them together.

Fig.1 Guthrie's classification of Bantu zones and groups.

Zone A Lundu-Balong Group (A10) Duala Group (A20) Bube-Benga Group (A30) Basa Group (A40) Bafia Group (A50) Sanaga Group (A60) Yaunde-Fang Group (A70) Maka-Njem Group (A80) Kaka Group (A90) **Zone B** Myene Group (B10) Kele Group (B20) Tsogo Group (B30) Shira-Punu Group (B40) Njabi Group (B50) Mbete Group (B60) Teke Group (B70) Tende-Yanzi Group (B80) **Zone C** Mgundi Group (C10) Mboshi Group (C20) Bangi-Ntumba Group (C30) Ngombe Group (C40) Soko-Kele Group (C50) Mongo-Nkundu Group (C60) Tetela Group (C70) Kuba Group (C80) **Zone D** Mbole-Ena Group (D10) Lega-Kalanga Group (D20) Bira-Huku Group (D30) Konjo Group (D40) Bembe-Kabwari Group (D50) Ruanda-Rundi Group (D60)	**Zone E** Nyoro-Ganda Group (E10) Haya-Jita Group (E20) Masaba-Luhya Group (E30) Ragoli-Kuria Group (E40) Kikuyu-Kamba Group (E50) Chaga Group (E60) Nykia-Taita Group (E70) **Zone F** Tongwe Group (F10) Sukuma-Nyamwezi Group (F20) Ilamba-Irangi Group (F30) **Zone G** Gogo Group (G10) Shambala Group (G20) Zigula-Zaramo Group (G30) Swahili Group (G40) Pogolo Group (G50) Bena-Kinga Group (G60) **Zone H** Kikongo Group (H10) Kimbundu Group (H20) Kiyaka Group (H30) Kimbala Group (H40) **Zone K** Chokwe-Luchazi Group (K10) Lozi Group (K20) Luyana Group (K30) Subiya Group (K40)	**Zone L** Pende Group (L10) Songe Group (L20) Luba Group (L30) Kaonde Group (L40) Lunda Group (L50) Nkoya Group (L60) **Zone M** Fipa-Mambwe Group (M10) Nyika-Safwa Group (M20) Konde Group (M30) Bemba Group (M40) Bisa-Lamba Group (M50) Lenje-Tonga Group (M60) **Zone N** Manda Group (N10) Tumbuka Group (N20) Nyanja Group (N30) Senga-Sena Group (N40) **Zone P** Matumbi Group (P10) Yao Group (P20) Makua Group (P30) **Zone R** Umbundu Group (R10) Ndonga Group (R20) Herero Group (R30) Yeye Group (R40) **Zone S** Shona Group (S10) Venda Group (S20) Sotho-Tswana Group (S30) Nguni Group (S40) Tswa-Ronga Group (S50) Chopi-Group (S60)

The point at when to distinguish between the boundaries of groups (when languages stop belonging to the group that has that initial language as its starting point and start belonging to another entirely), in Guthrie's words, has "an element of arbitrariness in it". It is this element of arbitrariness and the matter of the groupings being largely geographical in nature (which stems from moving outwards from an initial starting point language) which should be remembered when considering the nature of Guthrie's classification.

Though Guthrie's data is taken from around 200 languages, the geographical classification is largely based on twenty eight "test languages" (Maho 1999: 34), twenty

three of which are "Savannah languages" as opposed to five which are "spoken inside the tropical forest" (Möhlig 1979: 111).

2.2.2 Johnston

Sir Harry Johnston (1919/1922) compared the lexical and morphemic roots of over 200 Bantu languages, though his work is not considered linguistically sophisticated (Hamp 1970: 227). Johnston's classification grouped the Bantu languages into 46 major groups. Similarly to Guthrie, each group was identified by a letter, with double letters starting at the beginning of the Roman alphabet after the first 26 groups, and each language in the group identified by a number and sometimes a lower case Roman letter also. For example (from Maho 1999: 32) the 'Zulu-Kaffir Group' is group 'T' and contains the languages numbered 75-76 which include Isixhosa (75), Isizulu (75a), Siswati (75b) and Sindebele (75c).

Fig. 2 Johnston's classification of Bantu groups (1922: x2ff)

A	Nyanza Group [1-7]	AA	Luba-Lunda Group [104-111]
B	Nyamwezi Group [8-10]	BB	Upper Kwañgo Group [112-115]
C	British East Africa Group [11-16]	CC	Kwañgo-Kasai Group [116-121]
D	Kilimajaro Group [17-18]	DD	Central Congoland Group [122-139]
E	Usambara Group [19-20]	EE	Middle Lomami Group [139]
F	Swahili Group [21-22]	FF	Elila-Lowa-Lualaba Group [140-144]
G	Usagara-Ugogo Group [23-26]	GG	Ruwenzori-Semiliki Group [145-147]
H	Upper Rufiji Group [27-31]	HH	Upper Ituri Group [148-150]
I	Rufiji-Ruvum Group [32-34]	II	Ababua/Wele-Aruwimi Group [151-154]
J	N Ruvuma, N E Nyasaland Group [35-37]	JJ	Aruwimi-Lomami Group [155-158]
K	Ukiñga Group [38]	KK	North Central Congoland Group [159-174]
L	Tañganyika-Bañweulu Group [39-47]	LL	Kwa-Kasai-Upper Ogowe (Teke) Group [175-182]
M	N W Nyasa Group [48-53]	MM	Central Ogowe Group [183-190]
N	Yao-Ngindo Group [54-55]	NN	Ogowe Gaboon Group [191-193]
O	Moçambique Group [56-57]	OO	Spanish Guinea-West Cameroons Group [194-212]
P	South Nyasaland Group [58-62]	PP	Maneñguba Group [213-245]
Q	South Rhodesia-Puñgwe-Sabi Group [63-68]	QQ	Middle Sanagá Group [216]
R	şeñgwe-Roñga Group [69-71]	RR	'Fañg' Group [217-220]
S	Becuana-Transvaal Group [72-74]	SS	Kadei-Sañga-Lobai Group [221-225]
T	Zulu-Kafir Group [75-76]	TT	Fernandian Group [226]
U	West Central Zambezia Group [77-80]		
V	West Zambezia Group [81-83]		
W	North-West Zambezia Group [84-88]		
X	South-West Africa Group [89-94]	(SEMI-BANTU LANGUAGES)	
Y	Añgola Group [95-99]	(Groups A-N [227-274])	
Z	Koñgo Grouup [100-103]		

Johnston's criteria for including a language under the Bantu label was largely typological. He includes numerals, word roots with prefixes and suffixes. He also cited a common phonology as a defining characteristic though made exceptions for languages in the north-west of the Bantu speaking region. Some languages were grouped under the term "Semi-Bantu" if they did not meet all of the defining criteria for the Bantu languages. The Semi-Bantu languages numbered around 50 languages in 14 groups.

Johnston's classification of the Bantu languages is not as comprehensive as that by Guthrie, with fewer languages included (for a visual illustration of this compare figures (9) and (10) in Maho 1999: 26 and 31 respectively).

Along with grouping Bantu languages along largely geographical criteria, Guthrie and Johnston both used their classifications to develop an explanation for the large geographical area that Bantu languages came to be spoken in. Guthrie proposed that Bantu languages originated in central Africa, in the present day DRC, while Johnston proposed that Bantu languages were first spoken in the north-western region of the current Bantu speaking area, in Cameroon. Subsequent studies (particularly by Greenberg) have shown Johnston's hypothesis to be more plausible than Guthrie's.

2.2.3 Others

Further to Guthrie and Johnston (above) there have been a number of other classifications of the Bantu languages. Clement Doke's (1945) geographical classification was initially intended for use in a survey of literature relating to Bantu languages and linguistics, it was Desmond Cole who revised and republished it as a library tool (Cole 1951) before he published it as a language classification (Cole 1961). Doke developed a classification with seven major zones with subsidiary zones. The zones are numbered and dialects are indicated by the use of lower case Roman letters.

Though preceded by Doke's work (at least in terms of publication dates) Guthrie appears to have taken no influence or inspiration from the South African scholar. In 1971 Anthony Cope endeavoured to merge the two classifications into one. Throughout the process of consolidating the two works, Cope chose to "expect that Doke has to give way to Guthrie" (Cope 1971: 150) when it came to disagreements, rather than the other way around. The reasoning being that Doke's data was usually second hand, unreliable and somewhat incomplete. Guthrie, on the other hand, had predominantly first hand data, attempted to find first hand data for revisions, and where second hand data was used it was "good second-hand, through his colleagues" who were at the School of Ori-

ental and African Studies (Cope 1971: 150). The main disparity between the two classifications was in the number of zones, Doke had seven to Guthrie's fifteen.

The classification by Heine, Hoff & Vossen (1977) differs markedly from that by Guthrie. Heine *et al.* identify eight major branches, one of which is composed of eight major groups, and the majority of the Bantu languages are found in one of these eight groups. Furthermore, Heine *et al.* have different criteria for identifying a language as Bantu. This is because there are two branches (Tiv and Ekoid) in which languages are found that are not traditionally considered Bantu languages.

With so many varying classifications (and not all are presented here) it is not surprising that there is as yet no universally accepted classification of all the Bantu languages, but there are regional focussed classifications that are standard reference.

2.3 Proto-Bantu

There are three broad strategies used to find an internal classification of the Bantu languages relating to linguistic ancestry. Comparative Reconstruction is a strategy through which it is hoped to construct a comprehensive, genetically valid Bantu language family tree. The problem with Comparative Reconstruction is the mammoth size of the task, comparing up to 650 languages to the depth required for a valid, detailed genetic classification means that the work is still in progress (but see (2.3.1) below for a discussion of Meinhof's (1899, 1910) Comparative Reconstruction of Proto-Bantu).

The Stratificational Model of genetic tree development as in Möhlig (1981) involves phonological correspondences, similarly to Comparative Reconstruction, but instead Möhlig proposes several ancestral proto-systems which can also account for the present distribution of the Bantu languages, as opposed to just one from which the current Bantu languages descend (e.g. Proto-Bantu). The Stratificational Model recognises a distinction between the eastern ('savannah') and western ('rainforest') Bantu, but proposes eleven proto-systems (eight savannah systems and 3 rainforest systems) from which all of the Bantu languages can be derived through looking at regular phonological correspondences, but which cannot be derived from one another. A historical explanation for this is that the Bantu speaking people migrated through sub-Saharan Africa in periods of independent movement rather than as one long drawn-out migration period, thus there would be independent occurrences of language contact and transfer with the

different migrating groups resulting in the present differences found in the Bantu language family.

The most well known method of Bantu language classification is the Lexico-Statistical method. This takes 100-200 word list data samples from the test languages (of which there are usually a large number). Cognate (related) forms are found and established from these word lists, and the percentage of shared vocabulary between languages is calculated. The degree to which vocabulary is shared between two languages is reflective of the degree to which they are related, the more common vocabulary between two languages the closer the languages are related. However, this assumes that all of the languages in question would undergo any lexical changes at a similar rate. The word lists used for comparison are taken from a set of basic or core vocabulary that are not culturally related in order to minimise the chance of the data being compromised through borrowings, which would make a valid comparison difficult (core vocabulary includes items such as personal pronouns, body parts, food terms (milk, meat) and numbers). Lexico-Statistics are viewed not as an alternative to Comparative Reconstruction, but more as a short cut to develop/initially test hypotheses relating to language relations, which can subsequently be fully tested using Comparative Reconstruction.

2.3.1 Meinhof

The Ur-Bantu (or Proto-Bantu) model developed by Carl Meinhof (1899, 1910) was to become the most influential classification model for the Bantu languages. Meinhof used six languages for the first two editions of his publication; Northern Sotho, Swahili, Herero, Duala, Nyakyusa and Sango. He used the comparative method in order to reconstruct a hypothetical parent language from which all of the modern Bantu languages are descended, this hypothetical language is Proto-Bantu (PB).

Meinhof used Comparative Reconstruction to find the PB forms and followed the modelling of Proto Indo-European, in which the descendant Indo-European languages were grouped into different language families such as Romance and Germanic. The concept central to Comparative Reconstruction is that since a linguistic sign (e.g. a word) is arbitrary (Saussure 1916), there is no reason for two languages to have the same concept represented by the same (or very similar) word unless they had a common ancestor. It is possible to reconstruct hypothetical forms of the ancestral language, which, in the case of PB are prefixed with an asterisk (*) to indicate that it is a hypo-

thetical form. Below is a simplified illustration of Meinhof's procedure with examples from Kiswahili, Chibemba and Isizulu (from Marten 2006):

(2) Bantu Cognates and reconstruction

	Swahili	Bemba	Zulu	PB	Gloss
a.	*-lima*	*-lima*	*-lima*	**-lima*	'cultivate'
b.	*-tatu*	*-tatu*	*-thathu*	**-tatu*	'three'
c.	*n-goma*	*n-goma*	*isi-gubhu*	**-ɣoma*	'drum'
d.	*jiko*	*i-shiko*	*i-ziko*	**ɣîko*	'fire-place'
e.	*m-oto*	*umu-lilo*	*um-lilo*	**lilo / *-lota*	'fire' / 'burn'

Taking just this small sample of languages in (2) it is possible to get an idea of the process of comparative reconstruction for PB. In the case of the word 'cultivate', all of the sample languages have the same form, and so it is fairly safe to assume the PB form to be the same. With 'three', two out of the three sample languages have the same form *-tatu* while one has a slightly different form *-thathu*. The reconstructed form elected by Meinhof in this instance is **-tatu* which could be said to be due to a "majority wins" concept (Marten 2004: 3), but which gains weight when considering the fact that Isizulu has more examples of aspiration on voiceless 't's, suggesting a systematic innovation whereby PB /t/ becomes /t^h/ in Isizulu. Examples (2c. and d.) are an example of a more complex sound correspondence than that illustrated by the /t/-/t^h/ correspondence in (2b.). Meinhof's PB reconstructed fricative **ɣ* developed differently across different languages and in different phonological environments within those languages. In (2c.), Kiswahili and Chibemba have a velar stop /g/ where the PB form is **ɣ*, when preceded by a nasal and followed by a non-high vowel such as /o/ (as can be seen, the Isizulu word for drum is different and needs a separate explanation). In (2d.) **ɣ* is followed by a 'tense' high vowel **î* (the highest front vowel in Meinhof's PB 7 vowel system) which is realised as the affricate /dʒ/ in Kiswahili, the palatal fricative /ʃ/ in Chibemba and the alveolar fricative /z/ in Isizulu. These correspondences have to be systematic across the language in order for them to be valid and useful in the reconstruction. The variation found in (2e.) poses a more challenging case. The stem in Chibemba and Isizulu correspond with the PB stem **lilo* (as well as the class 3 prefix which Meinhof reconstructed as **umu-* which occurs without change in Chibemba, loses one vowel in Isizulu and both vowels in Kiswahili) whereas the Kiswahili stem *-oto* requires an innovation explanation that is either internal or external (borrowing, for example) since Kiswahili is a Bantu language. Most likely (Marten 2004: 4) is that the Kiswahili stem is a nominalisation of the PB verb root **-lota* 'burn', and so is an internal innovation.

As can be seen even by this very small sample of three languages and only five lexical items, it is possible to prove that languages are related and that they correspond – with varying degrees of regularity – to the reconstructed PB forms. Thus Meinhof demonstrated the genetic relation of Bantu languages by the end of the 19th century.

For more detailed studies involving Proto-Bantu see Meeussen (1967; 1980) and Schadeberg (2003).

2.4 Phonetics and Phonology

To adequately describe the phonetics and phonology of the Bantu languages would take many times the space available in this thesis, however it would be wrong to not mention anything at all about the sounds of the Bantu languages, as much as can be generalised. In order to generalise at all about the sounds of the Bantu languages, it makes sense to revert to Proto-Bantu for the main part, with divergences into the modern Bantu languages as necessary. For the PB sound system, I refer to Meeussen (1967).

Meeussen identifies a 7 vowel system for PB, the majority of the modern Bantu languages exhibit either a 5 or 7 vowel system, with the 5 vowels taken from the group of 7: /i e ɛ a ɔ o u/. Meeussen (1967: 82) states that it can be difficult to distinguish between a two vowel sequence (VV) and a sequence involving a palatal approximant occurring between two vowels (VjV). Long vowels can be interpreted as a sequence of two of the same vowels /aa/, /oo/, etc.

The reconstructed consonants as specified by Meeussen are nasals: /m n ɲ/, voiced: /b d j g/, voiceless: /p t c k/. The voiced consonants /b d g/ are sometimes realised as fricatives, and /d/ as /l/, however Meeussen says that this is probably an allophonic distinction as the contrast with /p t k/ is found almost everywhere as a voiced/unvoiced contrast, even where there is a contrast found between fricative and stop features. The consonants can occur in nasal complex sequences as follows (Meeussen 1967: 83):

(3)	mm	nn	ɲɲ	(ŋŋ)
	mb	nd	nj	ng
	mp	nt	nc	nk

As opposed to having four different nasals (/m n ɲ ŋ/) as the first in the nasal complex sequences it is possible that the initial nasal is an indeterminate nasal (/Nm Nb Np/, etc). In the case of double nasals in the nasal complex sequence, it is possible that these forms in the modern Bantu languages stem from a sequence that consists of a nasal + voiced consonant which is followed by a syllable with a nasal, either simply or in a sequence (from Meeussen 1967: 85):

(4)	n-bón-	mmón-	"I see..."
	n-dim-	nnim-	"I cultivate..."
	n-jong-	ɲɲong-	"I add..."
	n-gend-	ɲɲend-	"I go..."

In terms of phonological structure, the most common form for verb stems is -CV(N)C-, and while there is no real restriction on which consonants and vowels can occur though an NC sequence with a voiceless consonant is rare. There are a number of short stems with a -CV- structure, these take final vowels but there a few short forms that never take a final vowel and cannot be analysed into root and suffix. Thus the verbal "base" (Meeussen 1967: 89) can be of the form CV or CVC and the "expansion" or suffix is usually of the form |V(N)C-.[5]

Of further note, in Bantu languages, are the clicks. Clicks are found only in Bantu languages spoken in southern Africa and have entered these languages through language contact with Khoisan languages. Most well known in the languages of Isizulu and Isixhosa, each has three clicks: the dental, alveolopalatal and the alveolar lateral. Clicks are treated as plosive consonants and as such are subject to the same effects, aspiration and nasalization being prime examples. The clicks have phonemic status, meaning that when two words are the same and yet have different clicks in the same position, those clicks can change the meaning of the word. For example in Isizulu (from Ladefoged 2001: 264):[6]

(5) *The Zulu clicks*

Dental	Alveolopalatal	Alveolar Lateral
k|á:gà *to whitewash*	k!à:k!á *to undo*	k||á:gà *put into a fix*
k|ʰà:gá *to identify*	k!ʰà:k!ʰà *to rip open*	k||ʰá:gà *to link horses*
g|ò:ɓá *to grease*	g!ò:ɓá *to milk*	g||ò:ɓá *to beat*
̀sì:ŋ|é (*a kind of spear*)	̀sì:ŋ!é *rump*	̀sì:ŋ||é:lè *left hand*

[5] The symbol | here indicates the boundary between stem and suffix.
[6] The symbols in example (5) represent the following: | = dental click, ! = alveolopalatal click, || = alveoloar lateral click. The symbol : indicates a lengthening of the vowel.

The above example (5) also demonstrates the effects that the clicks can come under. In the first row the click is a voiceless unaspirated velar plosive click. In the second row the click is a voiceless aspirated velar plosive click. In the third row the click is a voiced velar plosive click. In the fourth row the click is a voiced velar nasal click.

2.4.1 Tone

The tonal system of PB as described by Meeussen (1967) has two tones, high and low, and the tonemes occur on either vowels or syllabic nasals. In cases where a single vowel appears to have two tonemes, Meeussen (1967: 84) states that this should be understood really as a sequences of two of the same vowels with different tonemes.

What Meeussen (1967: 96) terms "Flexion" is the subsystem of inflexion that covers agreement markers, those "aspects, which can be indicated by the following three catch words: class, prefix and agreement (or concord)." Class is shown predominantly through prefixes, though sometimes the class markers are more like suffixes or even separate words. It is through agreement with the noun that this flexion is most systematic, with five kinds of prefix that occur on defined classes of words. The nominal prefix is found with nouns, locatives and adjectives, the numeral prefix is found with the numbers one to five and with "how many" terms, the pronominal prefix is found with substitutives, connectives, possessives, demonstratives, determinatives and relative verb forms, the verbal initial prefix is found with the absolutive verb form and the verb "pre-radical" prefix (infix) is found with verb forms. These prefixes have four tonal types: the nominal prefix is low toned, the number and pronominal prefixes are high toned except for in classes 1 and 9, the verbal prefix is low when referring to persons and high for classes, and the infix is low toned for class 1 and high toned for all other classes and forms.

2.5 Outline of Bantu Grammar

The purpose of this section is to provide a sketch of the grammar of the Bantu languages. This is, naturally, a large topic and so the information provided here is necessarily general, exploring the common features across the Bantu languages and the more distinguishing features of the grammar. This section will primarily be based on Bearth (2003), and Maho (1999) and Katamba (2003) for the noun classes.

2.5.1 Noun Class System

In Bantu languages nouns are categorized into noun classes, based on the prefixes that they take. The canonical shape of the class prefixes is CV but there are some classes in some languages which consist of just a vowel or a vowel with syllabic consonants.

The origins of the noun class markers is not known with any certainty and is subject to hypothesising, but a likely explanation is that the prefixes were originally nouns that served to make an abstract idea more concrete. That is, nouns in their own right that could occur as the head in a compound and served to specify the following noun by referring to a more generic category. Over time the head nouns lost the ability to occur independently of a following noun and so the prefixes derived from independent nouns which have taken on a pronominal role.

Below is a table showing the noun classes of five Bantu languages. As demonstrated by figure 3 below, not all languages have all noun classes present. Katamba (2003: 108) states that the highest number of classes retained from the Proto-Bantu (see (2.3)) is 21 as found in Ganda. Maho (1999: 54) suggests that languages with three classes or less could be considered "reduced" (examples are Komo which has zero noun class prefixes, and Kako which has three), while languages with seven or more classes are "traditional" or canonical.

Fig.3: Noun classes in 5 Bantu languages.

	Swahili	Lozi	Herero	Zulu	Tswana
1	m-	mu-	omu-	umu-	mo-
1a		∅	∅	u-	∅
2	wa-	ba-	ova-	aba-	ba-
2a		bo-	oo-	o-	bo-
3	m-	mu-	omu-	umu-	mo-
4	mi-	mi-	omi-	imi-	me-
5	ji-/∅	li-	e-/∅	ili-/i-	le-
6	ma-	ma-	oma-	ama-/ame-	ma-
7	ki-	si-	otji-	isi-/is-	se-
8	vi-	bi-	ovi-	izi-/iz-	di-
9	N-	N-	oN-/o-	in-/im-	N-
10	N-	liN-/li-	ozoN-	izin-/izim-	din-
11	u-	lu-	oru-	ulu-/u-	lo-
12		ka-	oka-		
13		tu-	otu-	ubu-/u-	
14		bu-	ou-		bo-
15	ku-	ku-	oku-	uku-/ukw-	go-
16	pa-	(fa-)	pu-	(pha-)	fa-
17	ku-	ku-	ku-	uku-/ukw-	go-
18	mu-	(mu-)	mu-		mo-

An interesting feature of the noun class system is the singular/plural pairings that occur. Some languages demonstrate fairly straightforward pairings, for example Sesotho which has the following pairings:[7] 1/2, 3/4, 5/6, 7/8, 9/10 and the slightly unexpected pairing of 14/6. Lingala is slightly more complicated: 1/2, 3/4, 5/6, 7/8, 7/10, 9/10, 11/6, 11/10.

2.5.1.1 Semantics

Though the noun class system is predominantly arbitrary (in that there does not appear to be any clear semantic groupings to the classes), Maho (1999: 64) points out that there are regularities that occur. There is a tendency to differentiate between animates and inanimates which is fairly standard across Bantu languages, since animate classes are class 1 which contains nouns denoting human beings – this is true of all Bantu languages. If there is a class 1a, it contains nouns that denote kinship terms, personified animals (characters in a story or tale) and can include various other nouns. Trees and plants are most often found in class 3, and paired things in class 5. Class 7 tends to be for nouns denoting things, predominantly inanimate objects (such as tools), while class 9 tends to be the class in which nouns denoting animals are found. Class 11 often contains elongated things. Abstract nouns are generally found in class 14, though also sometimes in class 3, and infinitives are usually in class 15.

The irregularities in the class system of individual languages has often been put down to their development and distance from the PB noun class system, that was more regular in terms of semantic classes. Maho proposes a possible semantics for the PB classes (Maho 1999, 51) which it presented in figure 4 below. It is clear that there is semantic overlap between the classes and, as can be seen by comparing figure 3 with figure 4 below, not all of the Proto-Bantu noun classes are present in all Bantu languages.

Two influential analyses of the semantics of (Proto-)Bantu noun classes have been proposed from a cognitive linguistic perspective. According to Creider (1975) and Denny & Creider (1986) (both cited in Katamba, 2003) most PB noun class prefixes had meanings associated with shapes. There are two basic sets of PB noun classes, the first set contains "kinds of entities" (for example people and animals) and is formed from class pairings 1/2, 7/8 and 9/10. The second set contains spatial configurations, including shapes and qualities of shapes (for example roundness, length, size). This second

[7] In all cases the singular class is on the left of the pair and the plural class is on the right of the pair.

set can be further separated into those containing "solid shapes", such as would be found with classes 3/4 and 5/6, and "outline shape", such as would be found with classes 9/10 and 11/10. It would appear that boundaries play a large role in Denny and Creider's semantic model, with outline shapes having a clear distinction between inside and outside and solid shapes not possessing the same quality. Further, mass nouns were distinguished based on "cohesive" and "dispersive" qualities. An alternative semantic model for Proto-Bantu noun classes, on the other hand, argues that there can be a number of criteria through which the membership of noun classes can be justified, such as family resemblance and metaphor (Contini-Morova, 1997).

Fig.4: A possible set of noun classes and noun prefixes in Proto-Bantu.

Proto-Bantu forms	Noun Classes	Common semantics of the noun classes
*mù-	1	Humans
*ø	1a	Kin, personified animals
*βà-	2	Honorific, plural to classes 1 and 1a
*βà~βɔ̀-	2a	Honorific, plural to class 1a
*mù-	3	Trees, plants, inanimates
*mì-	4	Plural to class 3
*lɪ̀-	5	Miscellaneous, paired things, augmentatives
*mà-	6	Liquids, collectives, plural to classes 5, 9, 11, 14 and 15
*kì-	7	Inanimates, manner/style, diminutives, augmentatives
*βɪ̀-	8	Plural to class 7
*nì-	9	Animals
*lɪ̀- nì-	10	Plural to classes 9 and 11
*lù-	11	Long thin things, abstracts
*kà-	12	Diminutives
*tù-	13	Plural to class 12
*βù-	14	Abstracts, mass nouns, plural to class 12
*kù-	15	Infinitives
*pà-	16	Locatives, 'near' or 'explicit'
*kù-	17	Locatives, 'remote' or 'general'
*mù-	18	Locatives, 'inside'
*pì-	19	Diminutives
*ɤù-	20	Augmentatives, diminutives
*ɤì-	21	Augmentatives, pejoratives
*ɤà-	22	Plural to class 20
*ɪ-	23	Locative, unspecified

There does not seem to be any reason to expect PB to have been semantically regular, however, since no modern Bantu languages have easily defined noun class systems (save for reduced systems) and all have the essential problem that for every semantic analysis of a noun class system there is a counter-example from other languages rendering analyses either inconsistent or with frequent miscellanies.

2.5.2 Verb Form Structure

Bearth (2003: 122) states that "structural and semantic subclassification of verbs is a principal key to understanding elementary syntactic structure" when looking at Bantu languages. In particular it is the number of arguments that either necessarily or optionally occur with a given verb/class of verbs that is key when looking at the structure of particular languages.

The most simple case is of non-derived verbs, which can be of one-place, two-place or three-place predicate types. The arguments can be realised in a variety of ways, either as full nouns or nominal phrases, as pronominal elements that are incorporated into the verb-form (called clitics, concords, prefixes or subject/object markers – the latter of which is most prevalent in this thesis), as independent pronouns, or "as zero" (Bearth 2003: 122).

One-place predicates show grammatical agreement between the subject and the class marking prefix on the verb (the subject marker):

(6) ***ki**-tabu* ***ki**-me-anguk-a* [Kiswahili]
7-book SM7-PERF-fall-FV
'A/the book has fallen'

Subject agreement is obligatory, if the verb were to occur without the subject marker (SM) prefix it would be considered ungrammatical, however the lexical subject can be left out with the only representation of the subject being the marker on the verb form:

(7) *ki-me-anguk-a* [Kiswahili]
SM7-PERF-fall-FV
'It (book) has fallen'

In these cases, the hearer would have to infer from the context in which the natural language string is spoken that the SM *ki-* refers to a book, as opposed to another noun that takes a class 7 SM.

Two-place predicates take a subject and (generally) an object complement. In the following example (unless specified, the following examples are from Bearth 2003),

the SM on the verb agrees with the subject *mtoto* 'child' with *kitabu* 'book' as the object following the verb form:

(8) ***m**-toto* ***a**-na-soma* *ki-tabu* [Kiswahili]
1-child SM1-PROG-read 7-book
'The child is reading the book'

Where subject agreement on the verb is obligatory, object agreement on the verb is not. In the majority of Bantu languages, the verb form takes an object marker (OM) in two specific cases; where the object denotes a member(s) of the human class 1/2[8] (as in example (9)) and where the object has already been established in the context and so takes a "topic" interpretation, see section (4.3) for a discussion of topic, (as in example (10)):

(9) *mama* *a-na-**m**-penda* ***m**-toto* [Kiswahili]
mother(1) SM1-PROG-OM1-love 1-child
'The mother loves the child'

(10) *m-toto* *a-na-**ki**-soma* ***ki**-tabu* [Kiswahili]
1-child SM1-PROG-OM7-read 7-book
'The child is reading *that* book'

Similarly to example (7), the object marker can occur without the object noun (though the number of object markers that can occur on the verb form is dependent on the language, see section (4.2)):

(11) *m-toto* *a-na-**ki**-soma* [Kiswahili]
1-child SM1-PROG-OM7-read
'The child is reading it (book)'

The fourth option for arguments to occur with the verb stated above (occurring as "zero") is object underspecification. In some cases, dependent on the verb, the object can either be expressed or not. When not, the argument is not actually realised on the verb but is implied:

(12) *na-taka* *ku-oa* [Kiswahili]
1sg.PROG-want INF-marry
'I want to marry'

Bearth argues that the lack of overt object in object-zero cases is a reflection of the speaker conforming to Grice's (1975) maxims of communication, specifically that to do with quantity. The main focus of the utterance in (12) is that the speaker wishes to

[8] Where noun class numbers occur in pairs (e.g. 1/2) it denotes the singular/plural pair.

change his/her marital status, not that there is a specific person s/he wishes to marry. If the latter were the case the utterance would more likely be of the form in (13):

(13) *na-taka* *ku-mw-oa* [Kiswahili]
1sg.PROG-want INF-OM1-marry
'I want to marry her'

Three-place predicates (ditransitive) verbs generally denote relationships between an agent (the one that performs the actions of the verb), a beneficiary (the one that 'benefits' from the actions of the verb) and a patient (the one undergoing the actions of the verb). A typical ditransitive verb is 'to give':

(14) *mama* *a-li-m-pa* *m-toto ki-tabu* [Kiswahili]
mother(1) SM1-PAST-OM1-give 1-child 7-book
'Mother gave the child a book'

The two objects that occur with the verb form "are commonly distinguished on the basis of their semantic roles" (Bearth 2003: 124). The goal (beneficiary) is usually a human or an animate and these will, typically, occur immediately following the verb form. In Kiswahili, the goal also is obligatorily represented in the verb form by an object marker. The patient, however, typically occurs in a position following the verb but not immediately so. The patient of a ditransitive verb also does not show agreement in the verb form:

(15) *mama* *a-li-m-pa* *m-toto* [Kiswahili]
mother(1) SM1-PAST-OM1-give 1-child
'Mother gave (it) to the child'

Example (15) has only one object and one corresponding OM, though it is a ditransitive verb. Thus a second object is implied in the nature of the verb, even though it is not explicit it is recoverable from the context. This is another example of the object occurring as 'zero'. It is possible in some Bantu languages (one of them being Kiswahili) for the ordering of multiple full objects to be switched, so that the patient occurs immediately following the verb with the beneficiary following the patient:

(16) *mama* *a-li-m-pa* *ki-tabu m-toto* [Kiswahili]
mother(1) SM1-PAST-OM1-give 7-book 1-child
'Mother gave the book to a/the child'

As is illustrated by the translation of example (16), having the patient occur immediately following the verb changes the interpretation of the utterance, making the patient the focus though the object agreement remains with the beneficiary.

It has been shown how object agreement is marked on the verb form in Kiswahili, and also that even when there are two objects occurring with the verb, it is only with the benefactive that object agreement can be marked on the verb form itself. This is not true of all the Bantu languages. There is a three way distinction between those languages that do not allow object marking on the verb form (e.g. Lingala), languages that allow one object marker on the verb form (e.g. Kiswahili, Chichewa, Isixhosa) and languages that allow two or more object markers on the verb form (e.g. Setswana, Kichaga, Kinyarwanda).[9]

Further to arguments, adjuncts can occur with a verb, further expanding a natural language utterance to include information regarding where and when what is being talked about occurred, or to describe circumstances surrounding it. Adjuncts generally occur post-verbally, and follow the core arguments that relate directly to the verb. In the following Kiswahili example (Bearth 2003: 125), the construction is familiar up to *kitabu* 'book', after which there follows three adjuncts each of which adds additional information relating to the event of the sentence, but which could be argued to be additional information:

(17)	*mama*	*a-li-m-pa*	*m-toto*	*ki-tabu*	[Kiswahili]
	mother	SM1-PAST-OM1-give	1-child	7-book	
	kwa upesi	*nyumba-ni*	*leo*		
	with speed	house-LOC	today		

'Mother gave the child quickly the book at home today'

Adjuncts are not represented in verbal morphology and the order in which they occur tends to be variable to a degree not found with arguments. An exception to this is with locatives (in Kiswahili at least), which can have an agreement marker found in the verb form:

(18)	*Hamisi*	*a-li-**ku**-ingia*	*ndani ya nyumba*	[Kiswahili]
	Hamisi	SM1-PAST-OM16-enter	inside of house	

'Hamisi went inside the house'

Leaving adjuncts aside now, we return to arguments. As has been shown post-verbal full object ordering tends to follow certain rules (the beneficiary immediately follows the verb unless the patient is in focus, in which case the patient immediately follows the verb). However, this matter is not so clear cut when looking at the order of

[9] For a more detailed discussion of the issue of multiple object marking see section (4.2). Further, Marten *et al.* (2007) is a comprehensive typology of the morpho-syntactic variations across a number of Bantu languages.

OMs, as opposed to full objects, in languages that allow multiple OMs to occur on the verb form. The two following examples are from Bearth (2003: 126):

(19) *umugóre* *a-ra-hé-er-a* [Kinyarwanda]
woman SM1-PRES-give-BEN-FV
umugabo *imbwa ibíryo*
1 2 3
man(BEN) dog(IO)food(DO)
'The woman is giving food to the dog for the man'

(20) *umugóre* *a-ra-bi-yi-mu-he-er-a* [Kinyarwanda]
3 2 1
woman SM1-PRES-it(DO)-it(IO)-him(BEN)-give-BEN-FV
'The woman is giving it to it for him'

The arguments in (19) follow the verb in the order of benefactive, indirect object, direct object. When looking at the OMs occurring on the verb form in example (20), it can be seen that the ordering of the constituents is the 'mirror-image' from that of the objects in (19) by comparing the numbers beneath the constituents. Bearth cites Creissels (1992) for Setswana and Krifka (1995) for Haya as having similar examples as evidence that the mirror-imaging of constituents between proper and marker form is fairly regular.

In Kiswahili (see example (14)) animate arguments preferentially occur immediately following the verb (unless the inanimate argument is in focus). When it comes to the marker forms (which are as prefixes to the verb), the OM representing the animate argument occurs as close as possible to the verb stem, and so after the inanimate argument OM as the sentence is read from left to right. This leads to the question of what happens when both arguments are animate and in these such cases the ranking of argument roles comes into play. In the case of full object forms it is the beneficiary which takes precedence over the patient:

(21) *ndì-n-íkà* *úmfâzì* *úmntwánà* [Isixhosa]
1sg-PERF-give 1.woman 1.child
'I am giving a child to the woman'
*'I am giving a woman to the child'

There are a set of parameters as defined by Duranti (1979: 32) which assign the preferential order in which the arguments occur following the verb:

(22) *Hierarchy of Constituents According to the Following*
a. animacy of nominal reference: human > animate > inaminate

b. semantic role in relation to action as described by the verb: Beneficiary > Goal > Patient > Locative
c. participant category: first > second > third
d. number: plural > singular

Though there is a certain amount of ordering prescribed in the structure of the Bantu sentence with regards to the verb-external constituents, when there are object agreement markers occurring on the verb form, a far more free ordering of the constituents is permissible (this is discussed in detail in section (4.3)). The following example (Bearth 2003: 128) illustrates that in a sentence with three elements (the subject, the verb and the object) the presence of the object agreement marker on the verb form allows for all six possible constituent orders without changing the sentence meaning:

(23) *Constituent word order variation*

a. *ú-Sándìlè* *ú-á-**wù**-mémà* ***ú**-m-dùdò* [Isixhosa]
cl1-Sandile SM-PAST-OM3-call cl3-cl3-dance
'Sandile called it a dance'

b. *w-á-wù-mémà ú-Sándìlè ú-m-dùdò*

c. *ú-Sándìlè ú-m-dùdò ú-á-wù-mémà*

d. *ú-m-dùdò ú-á-wù-mémà ú-Sándìlè*

e. *w-á-wù-mémà ú-m-dùdò ú-Sándìlè*

f. *ú-m-dùdò ú-Sándìlè ú-á-wù-mémà*

It is possible that the different constituent orders with the object agreement markers are only possible when, as in the case illustrated above, the subject and object markers are of different classes. Because of this they serve to "resolve syntactic ambiguities resulting from word order variation" (Bearth 2003: 128). However there is evidence from different languages that this is not necessarily the case. In Kinyarwanda the ordering of object constituents is free, apart from the constraint that new information occurs last in the natural language string, even in cases where few or no OMs are used in the verb form. It is even possible, in Kinyarwanda, to invert the order of subject and object. Compare examples (24) and (25) below (Bearth 2003: 140):

(24) *umuhuûngu* *a-ra-som-a* *igitabo* [Kinyarwanda]
boy he-PRES-read-FV book
'The boy is reading the book'

(25) *igitabo* *cyi-ra-som-a* *umuhuûngu* [Kinyarwanda]
book it-PRES-read-FV boy
'The book is being read by the boy'

For the majority of Bantu languages it would appear that in cases where the argument constituents are of the same noun class, speakers resort to canonical word ordering in order to eliminate the possibility for ambiguity. The canonical word order has the subject occurring pre-verbally and the object occurring post-verbally.

Word order plays an important role in understanding the intended interpretation of the sentence, for example topic and focus information is reflected in the constituent order. Focus expressions can be tested with wh-questions. The following example is perfectly grammatical:

(26) *Ali* *a-li-fika* *jana* [Kiswahili]
Ali SM1-PAST-arrive yesterday
'Ali came yesterday'

But it is not a suitable answer to the question in (27):

(27) *jana* *a-li-fika* *nani?* [Kiswahili]
yesterday SM1-PAST-arrive who
'Who came yesterday?'

The person who came yesterday (Ali) must be in focus in order for it to serve as an answer to the question in (27):

(28) *jana* *a-li-fika* *Ali* [Kiswahili]
yesterday SM1-PAST-arrive Ali
'Ali came yesterday'

In Kiswahili focus constituents must occur after the verb, even if it is the subject which ordinarily occurs pre-verbally.

2.6 Summary

The purpose of this chapter was to give an overview of Bantu languages before talking specifically about Setswana in the next chapter. This is for the benefit of readers who may not be familiar with Bantu languages and to show the similarities that exist across languages in so far as can be generalised.

The history of the classification of Bantu languages is interesting and presented here in a much summarised form leading to a discussion about the reconstruction of Proto-Bantu, the ancestral language from which all Bantu languages are descended. The discussion of PB gives an insight into how the generalisations in the following

phonetics and phonology section can be made. Since Bantu languages number anywhere between 300 and 650, generalisations regarding the sound structure across languages is challenging at best and beyond the scope of this thesis. So the reconstructions of the PB sound system are presented in this chapter as an account of the sound systems that can occur in Bantu languages. The brief sub-section on tone is as an introduction for the more in depth discussion that will be in the next chapter (chapter 3), as not every Bantu language is a tone language, but Setswana (the main Bantu language of the analysis chapter) is a tone language.

One of the most distinguishing features of Bantu languages is the noun class system. This is particularly evident on the verb form which incorporates noun class markers as agreement with the nouns. Though the nouns that fall into each of the classes appears to be largely arbitrary, there is a level of semantic regularity evident in the PB class system and which can be seen in the modern Bantu languages. Leading on from the discussion of the noun classes is a discussion of the structure of the verb form as can be generalised across Bantu languages, with a particular focus on the agreement markers that occur on the verb form.

The following chapter is a narrowing from looking at Bantu languages in general to looking specifically at Setswana which is the language from which the primary examples of chapter 6 are taken.

3 Introduction to Setswana

This chapter follows from the preceding Bantu chapter but with the focus on the Setswana language as it is Setswana that is the language under consideration and from which the examples in the analysis chapter (chapter 6) are drawn.

First is a look at some background information about Setswana, where the language is spoken and the number of speakers, the dialects spoken in Botswana and some primary dialectal differences as illustrated by Batibo (1999). There is a brief discussion of some features of the sentence structure, as well as of the semantics of the noun class system as particular to Setswana.

Next is a lengthy discussion of tone, as this is an important feature of the language and Setswana has a complex tone system, beginning with a look at tone on the verb, as this is where the complexity of the tonal system is particularly apparent. The discussion includes both the conjugation of tone on the verb and high tone domains. Both of these aspects provide relevant background information to the following discussion about conjunctive and disjunctive forms in Setswana, the distinction between which is primarily shown through tone and illustrates the important role tone plays in the language. The conjunctive/disjunctive discussion here is largely based on Creissels' (1996) paper, and a summary of his findings precedes the discussion of a replication of his data using my own informants and a look at some other environments that are not covered in Creissels (1996).

3.1 Setswana

Setswana (S31) is the national and majority language of Botswana where it is spoken by approximately 1 million people, worldwide there are approximately 4 million speakers. It is one of the 11 national languages of South Africa with approximately 3,300,000 speakers, and is also spoken in Zimbabwe (30,000 speakers) and Namibia (6,000 speakers). Batibo (1999) cites nine dialects of Setswana as spoken in Botswana: Setawana which is spoken in the extreme north; Sengwato which is north central; Sekwena also north central; Serolong in the south east; Sengwaketse which is also in the south east; Setlharo in the south west; Sekgatla in the east; and Setloka also spoken in the east.

Customarily, it is the northern and southern varieties that are distinguished from each other as the main groupings, due to a distinctive phonological difference that is the presence vs. absence of a [+lateral] feature. This is illustrated in figure 5 below:

Fig.5: Phonological distinction between northern and southern Setswana dialects (from Batibo 1999: 8)

	Northern dialects	Southern dialects	Gloss
1	tou	tlou	elephant
2	tala	tlala	famine
3	ta	tla	come
4	nt^{h}a	ntl^{h}a	edge
5	lɪ-it^{h}o	lɪ-itl^{h}o	eye
6	-ot^{h}e	-otl^{h}e	all

However, another distinctive phonological difference distinguishes the western and eastern dialects: the distinction between /h/ and /f/. According to Batibo (1998) in the western dialects the PB */p/ went through a process of change from an aspirated plosive [p^h] to a bilabial fricative [ɸ] and very recently to a glottal fricative [h]. In the eastern dialects PB */p/ followed the same process of change as in the western dialects but in the last stage became a labiodental fricative [f]. The distinction is illustrated in figure 6 below:

Fig.6: Phonological distinction between eastern and western Setswana dialects (from Batibo 1999: 8)

	Western dialects	Eastern dialects	Gloss
1	-hohu	-fofu	blind
2	ma-hatlha	ma-fatlha	twins
3	-hola	-fola	cool down/heal
4	pheho	phefo	wind
5	-hisa	-fisa	burn

3.1.1 Informants

Two of my informants spoke the Sengwato dialect, one spoke the Sengwaketse dialect, one spoke the Selethe dialect, one spoke the Sekurutse dialect and one spoke the Sekgatla dialect. The data in this thesis is predominantly from one of the Sengwato speakers and the Sekgatla speaker. This is primarily due to the data from these two speakers being the most relevant for the purposes in this thesis. Having worked with these speakers last, the experience of working with the previous informants made me more proficient in data elicitation. I believe the data from these two informants to be

the most trustworthy due to their reliability and the lack of prompting used to generate data. Finally, the data from these two informants is more thoroughly tone-marked. Examples are marked as to which dialect they are from.

Data elicitation sessions were undertaken at my accommodation with only myself and the informant present, with each session recorded onto mini-disk through a microphone and with me taking notes throughout the sessions. The data itself was elicited through two means, to begin with translations from English into Setswana were used for specific data samples, then as my grasp of the language increased and both my informants and I became more comfortable with the elicitation itself we moved on to the setting up of contexts, in English, and exploring how situations would be described in Setswana. For example I would tell my informants that they are in the kitchen making the morning meal for their younger brothers and sisters, I would then ask them how they would answer (in Setswana) if someone came into the kitchen and asked them what they are doing, what they are cooking or who they are cooking for. In some cases the responses would be discussed and in some cases I would ask whether it would be possible to say a certain construction is Setswana, what the translation into English would be and what the differences, if any, there are between saying an utterance one way or another. The contexts were set up in this way for two main reasons, firstly because of my own lack of proficiency in Setswana and secondly because I believed my informants to be sufficiently bilingual in English and Setswana to be able to transfer a context mentally established from one language into another. Had I more time and experience in data elicitation I would have worked more with story contexts and free speech, though this also would have necessitated by knowledge of Setswana to be greater than it is.

3.1.2 Sentence Structure

This section introduces the main features of Setswana sentence structure. However the discussion will be concise as the structure of Setswana has been covered in chapter 2 in the context of the introduction of Bantu languages. Setswana is essentially a SVO language and words consist of the root and information carried by prefixes, suffixes or both.

Nouns and all parts of speech grammatically related to nouns have prefixal information attached showing agreement with the appropriate noun class. Presented in figure 7 are the noun class prefixes found in Setswana together with examples of words typically found in each class:

Fig.7: Noun classes in Setswana

	Noun class prefix	Example
1	mo-/m-/ngw-	motho – *person*, mosadi – *woman*
1a	∅	mma – *mother*, rra – *father*
2	ba-/b-	batho – *people*, bosadi – *women*
2a	bo-	bomma – *mothers*, borra – *fathers*
3	mo-/m-/ngw-	moana – *baobab tree*, mmala – *colour*
4	me-	mewana – *baobab trees*, mebala – *colours*
5	le-	leitlho – *eye*, lentswe – *stone/mountain*
6	ma-	matlho – *eyes*, mantswe – *stones/mountains*
7	se-	setlhare – *tree*, seatla – *hand*
8	di-	ditlhare – *trees*, diatla – *hands*
9	N-	nama – *meat*, thipa – *knife*
10	din-	dinama – *meats*, dithipa – *knives*
11	lo-	lorato – *love*, lofoka – *the scent of rain*
14	bo-	boammaaruri – *truth*, bobenyana – *ugliness*
15	go-	go reka – *to buy*
16	fa-	ngwana yo **fa** go ke wame – *the child who is here is mine*
17	go-	godimo – *above*
18	mo-	**mo** ntung go na le nonyane – *on the house there is a bird*

As has been said in section (2.5.1.1), the assignment of a given word to a particular noun class is, semantically, predominantly arbitrary, however there are regularities and in Setswana this is also the case. Presented above in figure 7 is a table illustrating the noun class prefixes and some examples of the words that fall into those classes but further generalisations can be made. Class 1/2 is the people class which is fairly straightforward, though "God" also appears in class 1 (*modimo* - God) – there is no plural for "God". The 1a/2a class are generally for family relations of kinship terms as illustrated in figure 7 above. One clear semantic group for class 3/4 is body parts: *molomo/melomo* – mouth/mouths, *mmele/mebele* – body/bodies, *meno* – teeth is in class 6 but the singular is in class 5, *leino* – tooth. Class 5/6 holds paired things (including body parts, though hand/hands is in class 7/8), round things and mass nouns (which are in class 6 as they generally do not have a singular): *leitlho/matlho* – eye/eyes, *lee/mae* – egg/eggs, *metsi* – water. Class 7/8 could be said to house loan words: *setlhare/ditlhare* – tree/trees, *sekole/dikole* – school/schools. Class 9/10 appears to be made up of items to do with nature: *tshese/ditshese* – flower/flowers, *kgwedi/dikgwedi* – moon(month)/moons(months), *nonyane/dinonyane* – bird/birds. Class 11 generally has no plural and contains abstract concepts: *lodule* – peace, *lofoka* – the scent of rain, *lorato* – love (which, oddly, has a plural in class 6: *morato* - loves). Class 14 contains more abstract concepts, again without a plural: *botlhale* – wisdom, *bobelo* – generosity, *bobududu* – blueness. Class 15 contains the infinitive and the equivalent of the English

lexicalised expletive 'it': *go reka* – to buy, *go go nte mo ten ga nto* – it is beautiful inside the house. Classes 16-18 are the locative classes and as such the discussion is not concerned with agreement with nouns, but with the semantics and function of agreement markers. Class 16 is for locatives indicating proximity to the speaker: *ngwana yo* ***fa*** *go ke wame* – the child who is here is mine. Class 17 is for locatives indicating a place other than where the speaker is: *godimo* – above, *gole* – long ago/far away. Class 18 is for locatives that indicate a specific place in relation to something: ***mo*** *ntung go na le nonyane* – on the house there is a bird.

In its simple form, the verb typically has a final vowel suffix *-a* though this is replaced by other suffixal elements when the verb is conjugated. Derivational information is realised as a suffix on the verb stem, for example the passive suffix is realised as either *-wa* or *-iwa*, while the applicative suffix is realised as either *-ela* or *-etsa*. Tense information can be carried by a suffix to the verb but often it is a prefix of the verb stem.

Finally, and as it is the main focus of this thesis, the subject and object markers occur as prefixes to the verb, and show agreement with the appropriate full noun in terms of the relevant noun class. Setswana is unusual amongst the Bantu languages in that it allows multiple OMs within the verb form, and in particular that the order in which the multiple OMs can occur is flexible. This is explored thoroughly in chapter 6.

3.2 Tone in Setswana

There is a section devoted to tone in Setswana because, while it is not a part of the focus of this thesis, Setswana exhibits a complex tone system. This section is an opportunity to introduce tone in Setswana, how it works and what influence it has on certain grammatical phenomena.

At this stage, before embarking upon a discussion of tone, it is important to make a mention of the issue of orthography and how data is presented in this thesis. The standard orthography of Setswana is a disjunctive system. This means that a number of morphemes (e.g. subject markers and tense morphemes) are written separately, even though they form part of the phonological word, and despite the fact that it makes clause boundaries harder to identify. Tonal variations do not only affect individual elements or words but necessitate looking at an entire verb form or clause. Creissels (1996, 1998, 1999), for example, represents verb forms as a single word (e.g.: *difula,*

diafula – see examples (73) and (74) for contrast with this). In the relevant paper for section (3.2.2) of this chapter Creissels (1996) presents his examples without morphological glosses, but with a full phonetic transcription. I have chosen not to follow in his example and have omitted the phonetic transcription from the data presented in this thesis, but have provided a morphological gloss. These glosses are my own, even for Creissels' data, and any mistakes in the glossing are my own. Furthermore, only the surface tones have been marked in this thesis (underlying tones are discussed in section (3.2.1)).

First is a look at tones on the Setswana verb, including the conjugation of tones and tonal domains, in particularly high tone domains, which also covers high tone spread. Secondly, there is a section on conjunctive and disjunctive verb forms in Setswana. This section illustrates the effect of tone in the language.

3.2.1 Tone on the Verb

The reason for having a section devoted to tone on the verb in Setswana is that, as Chebanne, Creissels & Nkhwa (1997: 1) state, "the interaction between tonal elements belonging to individual morphemes constituting a word is particularly complex in verbal words."

There are two lexical tone classes associated with verbs; the root has a single high (H) tone associated with the first syllable, or the root has no tone at all. These two lexical tone classes are irrespective of the length of the verb root. The first type of verbs (lexically H toned verbs) cannot have forms that are entirely low (L) toned, there must be at least one H tone present. The second type of verbs (lexically L toned verbs) can have a melody that is entirely L toned, namely if no H tone is induced by a morphological rule or an affix being added that contains an underlying H tone. The distinction between the two lexical classes is not always clear due to H tone spread (which is covered in detail in section (3.2.1.1)).

In addition to H and L tones, Setswana has surface contour tones. However, following Chebanne *et al.* (1997), I assume that these result from underlying sequences of two tones. In Setswana, as in other Bantu languages, the penultimate syllable of a word is lengthened when it occurs before a pause. Chebanne *et al.* (1997: 15) state that a sequence of two H toned syllables does not occur immediately before a pause. Therefore, the only possible tonal sequences in a prepausal position are: LL; FL[10]; and LH. The falling tone that occurs on the lengthened penultimate syllable can be analysed as a

[10] F = falling

representation of the H toneme because it contrasts with the L tone (LL vs. FL) and is in complementary distribution with the H tone (since HL never occurs). However, in non-prepausal position there is no lengthening of the penultimate syllable, and there is no lengthening of other syllables within a word whether prepausal or not, though there does appear to be complex (rising or falling) tones on single syllables within the word. Chebanne *et al.* (1997: 15) explain that a complex tone actually marks a dissyllabic sequence, each syllable with its own tone, consisting of either an empty onset (in the case of vowels) or a syllabic nasal. With this being said, it seems that there are no complex tones in Setswana, and so neither rising nor falling tones are marked.

3.2.1.1 Tone Conjugation

The structure of a simple verb form in Setswana is made up of a sequence of a minimal two and a possible seven positions, with the numerical order representing the linear order of the elements as they can/must occur from left to right (Creissels 1999: 113):

1	=	negative
2	=	subject marker
3	=	TAM (tense, aspect, mood)
4	=	object marker/reflexive prefix
5	=	root
6	=	"derivative morphemes"; extensions
7	=	inflectional ending (final vowel)

Positions 5 and 7 are obligatory and form the minimal occurrence. The subject marker (position 2) is always present except for imperatives.

High tones in Setswana tend to spread. This is because they are "active" while low tones are "inert" (Creissels 1998: 136). An underlying H tone, or sequence of several underlying H tones, generates a high tone domain. (For a discussion of H tone domains see section (3.2.1.2)) Example (30), below, shows how a H tone subject marker influences the tonal melody of a low toned verb stem. This is clear when compared with example (29) which has a L toned subject marker (Creissels 1999: 118):

(29) *lò* *bàlà* *sèǹtlè*
SM2pl read.FIN Cl7.good
'You (pl) are reading properly'

(30) *bá* *bálá* *séǹtlè*
SMCl2 read.FIN Cl7.good
'They are reading properly'

The verb *-bala* has a L toned verb stem and so when preceded by a SM with a L tone the tonal melody will not be affected and will remain low. When it is preceded by a H toned SM the verb stem will undergo phonological effects and the tone melody will change. The following two examples (also Creissels 1999: 118) illustrate how a L toned SM does not affect a verb stem with a H tone:

(31) *bá* *kwálá* *sénlé*
SMCl2 write.FIN Cl7.good
'They are writing properly'

(32) *rè* *kwálá* *sénlé*
SM1pl write.FIN Cl7.good
'We are writing properly'

The above examples suggest that a L tone is not part of the underlying tonal representation, but rather is the default tone where there is no underlying H tone or a H tone generated by a H tone domain.

In order to match the proposed underlying H tones with the boundaries of the H tone sequences that are found in the surface forms there is a requirement for rules or constraints regarding the "expansion" and "retraction" processes of the H tone domains mentioned earlier.

As mentioned above, Setswana verbs fall into one of two lexical tone classes – those with an underlying H tone on the root and those where the root has no tone at all. Which of these tone classes a verb belongs to can be seen by looking at the infinitive form (as long as nothing comes between the infinitive prefix and the stem). The infinitive prefix *go* (Cl 15) is toneless and so there will be no H tone spread or H tone domain effects on the stem. Therefore, verbs that have no lexical H tone will have a L tone melody. Lexically H tone verbs already have a H tone associated with them and this H tone can spread as far as the third syllable of the stem, even if that syllable is word final (though when the stem is in phrase final position H tone spread is affected by H tone domain retraction rules).

Disjunctive verb forms typically occur in the sentence final position due to their use implying the verb to be clause final (if a disjunctive verb form is followed by some element, such as a noun phrase or adverb, that element is interpreted as a postclausal topic), but tonal distinctions are eliminated in this position because of the following retraction rule:

H domain retraction before a pause:

The right edge of a non-monosyllabic H domain which coincides with a pause shifts one syllable to the left.

It is due to the above rule that words underlyingly ending with a final H tone occur with a final L tone in sentence final or prepausal position. However, it is not the case that that word final L tones occur as H when in sentence internal or non-prepausal positions (Creissels 1999: 143):

> ...the tone patterns of the stem of disjunctive verb forms in the individual tenses may differ by the fact that, in some tenses, the general rules of expansion and retraction of H domains are sufficient to predict the tone of the last syllable of the stem, whereas in some other tenses (for example in the present negative), a special H domain retraction rule must be posited.

The use of this retraction rule cannot be predicted through features of the tenses themselves. Nor is there a way of causing it to be used in the underlying representation of the tenses through a phonological element. Therefore it must be a morphological rule that ascribes a "weak" feature to the ending of certain tenses. This feature has no phonetic content but allows for the retraction rule to operate.

Conjunctive verb forms are opposed to disjunctive verb forms in that their use indicates that the verb is not clause final and there will be a following element that provides new information to the clause (for a full discussion of conjunctive/disjunctive forms see section (3.2.2)). Conjunctive verb form endings do not have the same tonal realisation in all tenses. The same issues as with the disjunctive verb forms apply here also. Some tenses allow for the tone of the stem final syllable to be predicted through general rules of H domain expansion and retraction, and other tenses need a special retraction rule on the H domain. Once again it is a morphological "weak" feature that is accountable for cases where the tonal melody varies. The conjunctive and disjunctive forms vary from tense to tense in terms of the weak feature, so each tense in each form must be independently specified.

Certain tenses in Setswana have a grammatical H tone. This H tone cannot be predicted by formal or semantic features of the verb tenses. An example of the use of grammatical H tone is in the conjunctive/disjunctive distinction in the present positive tense (for a further discussion of conjunctive and disjunctive verb forms see section (3.2.2)). In monosyllabic stems the H tone neutralizes the distinction between H tone and toneless stems. In pollysyllabic stems the H tone surfaces on the second syllable and spreads rightwards. It can spread either to the final or the penultimate syllable of a stem, no matter how long the stem may be. Furthermore, in non monosyllabic stems that have a lexical H tone, the grammatical H tone merges with the lexical H tone into a

single H tone domain that begins with the first syllable of the stem. This H domain has different properties from the lexical H tone domain – if there are three or more syllables in the stem this "co-generated H domain" (Creissels 1999: 125) absorbs the following syllables up to the final or the penultimate syllable of the stem.

Setswana orthography can be confusing when it comes to tonal effects. Morphemes that are prefixed to the verb stem are necessarily analysed, linguistically, as being part of the same phonological domain as the verb stem due to tonal interactions between the prefix and the stem. This is an important fact to note when it comes to the influence of a H toned prefix on the following syllables of a stem (examples from Creissels 1999: 129-130):

(33) *rè* *lèbògǐlè*
SM1pl thank.PERF
'We have thanked'

(34) *bá* *lébògǐlè*
SMCl2 thank.PERF
'They have thanked'

(35) *rè* *lèbògà* *ká* *màítsèó*
SM1pl thank.FIN with Cl6.politeness
'We are thanking politely'

(36) *bá* *lébógà* *ká* *màítsèó*
SMCl2 thank.FIN with Cl6.politeness
'They are thanking politely'

Examples (35) and (36) illustrate tone shift from the SM. There is also tone shift from the OM. This can occur when the OM is H toned and that H tone is retained in the surface form. The domain created with this H toned OM can extend to the first two syllables of the stem. Example (37) below is neutral, it has no underlying H tone and so the verb stem is realised as a L tone, and serves as a contrast to example (38) which shows the effect of the OM:

(37) *lò* *mò* *tlhàlògànyà* *sèǹtlè*
SM2pl OMCl1 understand.FIN Cl7.good
'You (pl) understand him/her well'

(38) *lò* *ré* *tlhálógànyà* *sèǹtlè*
SM2pl OM1pl understand.FIN Cl7.good
'You (pl) understand us well'

If the OM is L toned in the surface form, the (lexically toneless) stem can still show H tones that have come from the OM:

(39) *bá* *rè* *tlhálógànyà* *sèǹtlè*
SMCl2 OM1pl understand.FIN Cl7.good
'They understand us well'

When a lexically toneless stem is preceded by a H toned SM the H tone spreads to the first syllable of the stem (which would usually remain L toned):

(40) *bá* *dúmèdìsìtsè*
SMCl2 greet.PERF
'They have expressed their greetings'

In the perfect positive tense, when a H toned SM is followed by a lexically H toned stem the first syllable of the stem appears with a H tone rather than a L tone. A H toned SM followed by a lexically H toned stem causes the lexical H tone to appear on the second and third syllables of the stem, but skips the first one:

(41) *bá* *bèrékélànyè*
SMCl2 work.APPL.RECIPR.PERF
'They have worked for each other'

The tonal pattern in example (41) illustrates another tonological process of Setswana, namely that there are exceptions to the general rule that within words the "underlying H tones associated to adjacent syllables fuse into a single H tone domain." The exceptions operate like in example (41) above where "two underlying H tones generate two distinct domains, in spite of the fact that the syllables to which they are underlyingly associated are adjacent, and a constraint of non-adjacency of H domains leads to the retraction of the second domain". (Creissels 1999: 132.)

In order to account for this H tone retraction we have to look at the underlying phonological representation of the tones of Setswana. One possibility is that there are empty syllables in the underlying representation. These empty syllables occur between two seemingly adjacent syllables, both of which contain underlying H tones and so create two distinct H tone domains. The two underlying H tones cannot be included in the same H domain which leads to the deletion of the empty syllable and the retraction of one of the H domains. The H domain non-adjacency constraint (the Obligatory Contour Principle, which disallows identical elements in a representation to be adjacent to each other) is thus satisfied. This claim is supported by the rule operating in certain tenses (e.g. the present participle positive) which causes the neighbouring vowel to be copied

into the empty nucleus and so appears as an extra syllable (this is covered in more detail in section (3.2.1.2)).

The tone on the SM is a means for identifying different tenses. There are four tonal paradigms for SM, and each of these has different tonal properties according to the tense. These four paradigms are due to the effects of neither the neighbouring morphemes nor the formal or semantic features of the verb forms with which they occur – thus the only conclusion to be drawn is that they are due to tense differences. The four paradigms according to tense are as follows:

a. *indicative present positive tense* – the SM for the 1st and 2nd person are toneless while all other SM have a H tone.
b. *indicative present negative tense* – all subject markers have a H tone.
c. *e-consecutive*[11] – all SM are toneless.
d. *a-consecutive*[12] - all SM may be toneless, but there is a tonal variant in which 1st person singular, 2nd person singular and Cl.1 are toneless while all others have a H tone.

In addition, the subjunctive positive tense is the only tense in Setswana in which the tonal structure of the verb is dependent on the presence/absence of an OM. When there is an OM there is a grammatical H tone on the second syllable of the stem and a weak final vowel. When there is no OM the verb has a unique and invariable tone pattern; HL…H on stems comprising of three or more syllables, and with no distinction between lexically H toned and lexically toneless stems. To account for this data, Creissels (1996) proposed a morphological rule that assigns the surface tonal melody directly to the stem of forms such as the subjunctive positive verb, as opposed to attempting to derive the tonal melody by applying phonological rules to an abstract phonological representation.

Tonal variation in verb forms (apart from in the subjunctive positive) is regular enough such that the surface forms may be predicted when underlying representations hold the following information (Creissels 1999: 147):

- the presence vs. absence of a lexical H tone (underlyingly associated with the first syllable of the stem);

- the presence vs. absence of a grammatical H tone associated to the second syllable of the stem by a morphological rule in certain tenses;

- the presence of H tones underlyingly associated with the vowels of certain prefixed morphemes;

[11] The e-consecutive is often found when sequences of clauses refer to sequences of future or habitual events.
[12] The a-consecutive is often found when sequences of clauses refer to sequences of past or conditional events

- the presence of empty syllables in the underlying representation of certain prefixed morphemes;

- the distinction between "weak" finals (that undergo special H domain retraction rules) and "strong" finals (that undergo general H domain retraction rules only).

Having explored the conjugation of tone on the verb, I turn now to the H tone domains mentioned at the beginning of this subsection.

3.2.1.2 High Tone Domains

Creissels (1998: 135) defines a H tone domain as "a maximal sequence of successive H toned syllables". This domain can grow and expand over following syllables, causing them to be high toned. Remaining low tones tend to be those of syllables that do not come under the H tone domain.

(42) *gò* *bùà*
INF skin
'To skin'

(43) *gò* *búá*
INF speak
'To speak'

Examples (42) and (43) are the infinitive forms of two verbs that can only be distinguished in terms of meaning by the tonal melody. It is in the infinitive that the underlying tones can be seen due to the infinitival marker (*gò*) having a L tone. Compare the infinitive forms in examples (42) and (43) with the examples in (44) and (45) below, which demonstrate H tone spread as opposed to an underlying H tone.

(44) *bá* *búá* *ǹkú*
SM3pl skin 9.sheep
'They skin/are skinning the sheep'

(45) *bá* *búá* *sèbúrù*
SM3pl speak 7.Afrikaans
'They speak/are speaking Afrikaans'

The H tone on the second syllable of example (44) (***búa***) comes from the spreading of the H tone on the subject marker (*bá*). The H tone on the second syllable of example (45) (***búa***) is from an underlying H tone as can be seen by comparing with examples (46) and (47) below, both of which have a L toned SM and so are not subject to H tone spread:

(46) *rè* *bùà* *ǹkú*
SM1pl skin 9.sheep
'We skin/are skinning the sheep'

(47) *rè* *búá* *sèbúrù*
SM1pl speak 9.Afrikaans
'We speak/are speaking Afrikaans'

As has already been mentioned (section (3.2.1.1)) the H tone in Setswana is active and the L tone is inert. This means that there can be entirely H tone melodies on verb forms coming from a L tone verb root but there cannot be entirely L tone melodies on verb forms coming from a H tone verb root.

The expansion of H tone domains is limited by language-specific constraints and the Obligatory Contour Principle. When a H tone domain reaches its spread limit (as imposed by the above constraints) a L tone is introduced and is a default tone for all syllables that do not come under a H tone domain.

In an example like (48) below the H tones of the SM and the root are adjacent and so form one H domain.

(48) *bá* *kwálá* *lòkwálò*
SM3pl write 11.letter
'They write/are writing a letter'

(49) *rè* *ká* *kwàlá* *lòkwálò*
SM1pl can[13] write 11.letter
'We can write a letter'

But in (49) there are two H tone domains. This is due to the formative [ka] having an underlying empty syllable {ká<>} which separates the H tones of the verb and of the formative. Empty syllables cannot be realised as being empty: "at the surface phonemic level, nuclei must have some segmental content: if the underlyingly empty syllables do not undergo a rule associating their nucleus with some segmental phoneme, they must be deleted." (Creissels 1998, 138.) The occurrence of empty syllables can account for cases where H toned syllables which are separated by a word internal boundary are not in the same H domain.

In cases where the empty syllable is deleted, adjacency of H domains is avoided by the retraction of the second H domain as illustrated by the following (Creissels 1998: 139):

[13] Aux in potential mood.

(50) re + ká<> + kwál + a → re $[_{H}ka_{H}]$<> $[_{H}kwa_{H}]$la
→ re $[_{H}ka_{H}]$<> $[_{H}kwala_{H}]$
→ re $[_{H}ka_{H}]$ kwa$[_{H}la_{H}]$

Where the retraction of H domains is not possible (when the H domains are monosyllabic) the empty syllable is filled by a copy of the vowel of the first H domain and so avoids violation of the OCP:

(51) re + ká <> + j + a → re $[_{H}ka_{H}]$ <> $[_{H}ja_{H}]$
→ re $[_{H}ka_{H}]$ a $[_{H}ja_{H}]$
→ rè káà já
'We can eat'

The penultimate syllable of each speech sequence is lengthened when it occurs between two successive pauses. This is intonational because it does not happen with sentence internal words with no pause between a word and the one following. This kind of speech sequence cannot end with two successive H tones. As already mentioned earlier, there are only 3 tonal melodies possible in a two syllable sequence (as an illustration); LL, FL, and LH. HL is not a possible sequence. The falling tone can be analysed as representing the H toneme because it contrasts with the L tone and is in complementary distribution with the H tone (with the HL sequence not occurring). Therefore the lengthening of penultimate syllables as well as falling tones in sentence final positions can be ignored.

This lengthening and the falling tone both disappear when the word is not immediately followed by a pause. Some Setswana words appear to have falling/rising tones (complex tones) in all contexts, but these can always be analysed as a sequence of two syllables in which one is either a syllable with an empty onset or is a syllabic nasal. In slow speech these two syllables are clear.

The following rule illustrates the principle of avoiding monosyllabic H domains, which explains many tonal processes of Setswana (Creissels 1998: 146):

> *If two H domains are brought into contact by the concatenation of words, and if the H domain at the beginning of the second word is monosyllabic, they fuse into a single H domain.*

If the H domain at the beginning of the second word is not monosyllabic there will be a downstep to separate the two H domains brought into contact. At boundaries between words a downstep automatically occurs if the first word ends with a H toned syllable

and the second word begins with at least two successive H tones syllables. At word internal boundaries, downstep never occurs.[14]

Downstepped H tones that are not in free variation with L tones have a "demarcative value" (Creissels 1998: 147). This is a useful assumption because whether or not a downstep can be used is indicative of whether a morpheme boundary is word internal or not.[15] The occurrence of downstep can be predicted by applying the following:

> *A downstep automatically occurs whenever a boundary between two adjacent words is immediately preceded by a H toned syllable and immediately followed by at least two successive H toned syllables.*

Due to the occurrence of downstep now being predictable, when it does occur at the boundary between two words it does not need to be transcribed when the word boundaries are properly indicated.

In certain contexts progressive H tone spreading is limited to one syllable, e.g. between predicative *ké* (he/she/it is, they are) and a following nominative unit:

(52) bàtswáná → ké bàtswánà
PRED[16] 2.batswana
'They are Batswana

(53) bàfòrá → ké báfòrá
PRED 2.French
'They are French'

---

[14] The occurrence of what appear to be mid tones in Setswana should really be treated as downstep of the H tone. Sequences such as ó!óó are found in free variation with sequences óòó and so are a possible realisation of the sequence óoó. This downstep has been found only in the participle form of the present negative, the perfect negative and the potential positive. Downstep has to be considered to be phonological because the ó!óó variant is only possible for certain óòó sequences, those which have a H tone associated with their first syllable when it is not influenced by the preceding context. Further, downstep can occur no matter what the nature of the syntactic boundary between the words in question, nor does it matter what is the morphological structure of those words provided that there is a H tone associated to the final syllable of the first word and also to the first two syllables of the following word, which is a result of word-internal tonal processes. It is the number of successive H toned syllables at the beginning of the second word that is relevant.

[15] The words that are separated out by this kind of distinction are not the same as those found through the Setswana disjunctive orthography system. For example both the prefix *lé* (with (commitative)/and/too) and the preposition *ká* (with (instrumental)/by) are written as separate words though only *ká* can really be considered as such. Cole (1979) writes them both as prefixes, and the present "tonal criterion" shows *lé* and whatever follows to be one word while *ká* is a separate word.

[16] Predicative, 'they are'.

In (52) there is no H tone spread because the initial L tone of *bàtswánà* is immediately followed by a H tone and if L tones are considered default on toneless syllables if and only if they are not affected by the H tone spread rules, the absorption of the first L tone into preceding H domain would bring two H domains into contact – violating the OCP. This is not the case for nouns with two initial L tones, as in (53), where the H tone spreads only to the first syllable, no matter how many L tones there are.

When preceded by the prefix *lé* ('with (commitative)/and/too') the same as with *ké* above applies, unless the noun has three or more L tones in which case the first two L tones become H tones. At this point it is important to specify how many successive toneless syllables are subject to the spreading of a H tone when there are more than two following it. Recognising the downstep as being the primary marker for distinguishing between word internal and cross word boundaries allows for the following generalisation to be made regarding H tone spread (Creissels 1998: 149):

> When words are concatenated, a H domain...whose end coincides with a word boundary automatically annexes a toneless syllable at the beginning of the following word, provided this does not lead to a violation of the OCP, but the expansion of a H-domain across a word-boundary never affects more than one toneless syllable ... By contrast, at a boundary between adjacent morphemes belonging to the same word, the spreading of the H tone may lead to the annexation of two successive toneless syllables.

The rule causing the spread of a H tone from the last syllable of one word to the first syllable of the following word only operates *after* the rule causing the spread of the tone of a word-internal H tone syllable to the following syllables within the same word.

In the following examples there is a comparison between subject markers with and without an underlying H tone:

(54) *ò* *bàtlà* *lòbònè*
SM2sg seek 11.lamp
'You(sg) are looking for a lamp'

(55) *ó* *bátlá* *lóbònè*
SM3sg seek 11.lamp
'S/he is looking for a lamp'

Example (55) has a H tone that spreads to the two following toneless syllables inside the verb form, causing both syllables of the verb to have a H tone which means that the H tone can spread further, and does so from the final syllable of the verb form to the first syllable of the following word. Compare with:

(56) *ò* *dìrèlà* *ngàkà*
SM2sg work.APP 9.doctor
'You(sg) work for the doctor'

(57) *ó* *dìrélà* *ngàkà*
SM3sg work.APP 9.doctor
'S/he works for the doctor'

In example (57) the H tone on the SM spreads to the two following toneless syllables of the verb form but not to the third and final syllables, showing that there can be no further tone spread to the following word, this is because word boundary rules are in operation.

There is a correlation between the occurrence of downstep and H tone spreading. At the boundaries between words a H tone cannot spread to more than one syllable of the following word, and it is possible for there to be an occurrence of downstep. However, word internal morpheme boundaries never occur with a downstep. Further, word internal morpheme boundaries generally allow a H tone to spread to two successive L toned syllables. This can be illustrated by returning to the distinction between the prefix *lé* ('with (commitative), and, too') and the preposition (and therefore separate word) *ká* ('with (instrumental), by'). In the following examples, the two morphemes are combined with both a word with two successive L toned syllables and another of two successive H toned syllables to illustrate the tonal effects of a prefix (which is a word internal boundary) and a preposition (a boundary between words):

(58) ká + lòbònè → ká lóbònè
'lamp' H tone spreads to 1 syllable

lé + lòbònè → lélóbónè
'lamp' H tone spreads to 2 syllables

(59) ká + lwágágò → ká ˡlwágágò
'yours (cl.11)' downstep

lé + lwágágò → lélwágágò
'yours (cl.11)' no downstep

In light of the previous discussion, the generalisation made above regarding H tone spread can be strengthened into a rule (Creissels 1998: 149):

(60) $[_{H}\ldots o_{H}]\#oo\ldots \rightarrow [_{H}\ldots o\#o_{H}]o\ldots$

This rule has no exceptions and applies with no regard to the grammatical relationship between two successive words, with the proviso that they are uttered without a pause between them. Further, it operates at the boundary between two successive clauses and not just within the clause.

Progressive H tone spread within verb forms is generally limited to affecting the two toneless syllables that follow the H toned syllable, even if this means spreading to the first syllable of another word after the verb form:

(61) *rè* *gò* *bàtlà* *gòngwè lé góngwè*
SM1pl OM2sg look.for everywhere
'We look/are looking for you(sg) everywhere'

(62) *bá* *gó* *bátlà* *gòngwè lé góngwè*
SM3pl OM2sg look.for everywhere
'They look/are looking for you(sg) everywhere'

As can be seen by comparing examples (61) and (62) when the verb form is L toned and a H tone SM is introduced it spreads beyond the 'word' boundary of *gò* to the first syllable of the following word *bàtlà*. If the initial syllable of the verb form were L toned and the H tone occurred on the second syllable of the verb form, the H tone domain initiated by that H tone would include the following two L toned syllables, even if that meant a word ending with a H tone:

(63) *rè* *ló* *bátlá* *gòngwè lé góngwè*
SM1pl OM2pl look.for everywhere
'We look/are looking for you(pl) everywhere'

In this circumstance, the spreading of the H tone can be blocked if there is a H tone on the syllable that immediately follows the syllable on which the final H tone of the domain would occur. This is due to the OCP. Compare examples (61) and (62) above with (64) and (65) below:

(64) *rè* *gò* *bóná* *góngwè lé góngwè*
SM1pl OM2sg see everywhere
'We see you(sg) everywhere'

(65) *bá* *gò* *bóná* *góngwè lé góngwè*
SM3pl OM2sg see everywhere
'They see you(sg) everywhere'

In examples (61) and (62) the verb stem *bàtlà* is L toned, and so the H tone domain from the H toned SM *bá* in example (62) spreads to the first syllable of the verb stem, via the L toned OM *gò*. In example (65) the H tone domain from the SM *bá* is blocked by the H tone on the first syllable of the verb stem *bóná*. The OM *gò* remains L toned rather than becoming H toned in order to prevent violation of the OCP.

Creissels (1998: 168) cites an example where local H tone spread can extend to three successive syllables within a verb form. But this is only possible if and only if the second toneless syllable is an OM:

(66) *rè* *à* *gò* *tlhàlògànyà* *lé* *ròná*
SM1pl DISJ OM2sg understand CONJ 1pl
'We too understand you(sg)'

(67) *bá* *á* *gó* *tlhálògànyà* *lé* *bòné*
SM3pl DISJ OM2pl understand CONJ 3pl
'They too understand you(sg)'

Creissels states that this is an isolated exception, and further that in the dialect of the speaker from whom the data was elicited allowed for toneless OM which is not standard across Setswana dialects.

As well as spreading, H tone domains can retract. Creissels (1998: 186) generalises to say that words with a final HH tonal melody, in cases where there is a contrast between ...HH and ... HL melodies, have final HH as the basic tonal melody. The final H tone in the domain can be retracted, and this retraction is an automatic occurrence that has no relation to the grammatical nature of the word upon which it occurs when the word is in prepausal position. This section, so far, has been devoted to tone on the verb, but since all parts of speech have tone and are subject to tonal effects I will illustrate H tone domain retraction by looking at nominals. When a non-monosyllabic H tone domain occurs on a noun that is the head of a noun phrase the final H tone in the domain retracts when the noun is immediately followed by certain modifiers, for example a demonstrative:[17]

(68) *mòsádí*
1.woman

[17] For a breakdown of the specific modifiers that apply in this case see Creissels (1998: 187).

(69) *mòsádì* *yó*
1.woman this
'This woman'

The modifiers that trigger H domain retraction on the noun all begin with a H toned syllable, though not all modifiers with a H toned syllable trigger H domain retraction on the noun:

(70) *bàsádí* *bótlhé*
2.women 2.all
'All the women'

The same H domain retraction occurs when the noun is followed by *máńg* – 'which/who', a 'who' reading is most applicable when in isolation but following a noun the most appropriate interpretation of *máńg* is 'which':

(71) *phólògóló*
9.animal

(72) *phólògólò* *máńg*
9.animal which
'Which (kind of) animal?'

From the examples in this section it is fairly clear that Setswana shows tone spreading over more than one syllable. There is one cited case of the H domain spreading the three following syllables (example (67)), and spreading to two subsequent syllables (under the right conditions) is fairly common.

This purpose of this discussion of tone on the verb was to illustrate the complexity of tone in Setswana both through illustrating the conjugation of tone in verbs and the effects of the H tone domain as identified by Creissels (1998; 1999). The following section discusses how tone is used to distinguish between conjunctive and disjunctive verb forms as an illustration of a function of tone in Setswana.

3.2.2 Conjunctive Vs. Disjunctive[18]

Creissels (1996) finds that there are several tenses in Setswana in which a distinction between conjunctive and disjunctive verb forms can be found and that they are realised only through tonal differences, apart from one exception (the present positive) where

[18] This section is based on a previous article, McCormack (2006), which is adapted here as the content is relevant to this chapter and illustrative of the effects of tone in Setswana.

the distinction is also expressed by a segmental morpheme *a*. The "conjunctive" form is the equivalent to Meeussen's *conjoint* verb in Kirundi, or the "strong" link as found in Sharman (1956). Its use suggests that the verb is not in clause final position and anything following is "new" information. The "disjunctive" verb form is equivalent to Meeussen's *disjoint* verb, or Sharman's "weak" link. The disjunctive verb form occurs when the verb *is* in clause final position and anything that may follow it is a 'postclausal topic' (Creissels 1996: 109).

3.2.2.1 Summary of Creissels[19]

3.2.2.1.1 Present Positive

I will begin with the present positive tense because the conjunctive/disjunctive distinction can be seen easily – without having to look at tone, as the disjunctive is marked by *a*.

In this tense the distinction between conjunctive and disjunctive can be seen through the use of the disjunctive marker *a* between the SM and the verb, as can be seen in example (74).[20] It is important to note that the disjunctive marker is found only in disjunctive verb forms. However, disjunctive examples are not only marked through the use of the disjunctive marker, but also through distinct tonal patterns – we will come to these examples later on.

Short form – conjunctive:

(73) *dî-kgòmó* ***dî*** ***fúlà*** *kwá* *nòké-ńg*
CL10-cow SM10 graze LOC river-LOC
'The cows graze/are grazing at the river' Creissels 1996: 109, ex. (2)

Long form – disjunctive:

(74) *dî-kgòmó* ***dî*** ***á*** ***fúlà***
CL10-cow SM10 DISJ graze
'The cows graze/are grazing' Creissels 1996: 109, ex. (1)

In these first two examples the short form of the verb does not occur in sentence final position whereas the long form does. In terms of the conjunctive/disjunctive distinction, in sentence final or prepausal position only the disjunctive form can be used, whereas both the conjunctive and disjunctive forms can be used in the non-prepausal position (though the conjunctive form is found here more often).

[19] All of the examples in this section are from Creissels (1996).
[20] Creissels calls this a 'formative [a]'. It should not be confused with a SM. An [a] is found in examples both as a disjunctive marker (in which case it will be glossed 'DISJ') and as a subject marker (in which case it will be glossed 'SM').

Examples (73) and (74) illustrate the disjunctive and conjunctive forms in cases where the verb either is or is not followed by a complement. Examples (76) and (77), and others which follow in this section, are within a frame used to eliminate the effects of the prepausal position on the basic tonal melody. The frame is: the subject marker preceding the verbal base, and a conjunction and full pronoun following the verb. It is illustrated in (75):

(75)	*kè*	*bînà*	*lé*	*èné*
	Subject Marker	Verb-'dance'	Conjunction	Full Pronoun-3SG
	I dance/am dancing with him/her'			Creissels 1996, 110, ex. (4)

Short form – conjunctive:

(76)	***bá***	***bînà***	*lé*	*bòné*
	SM3pl	dance	CONJ	3pl
	'They dance/are dancing with them'			Creissels 1996, 110, ex. (6)

Long form – disjunctive:

(77)	***bá***	***à***	***bîná***	*lé*	*bòné*
	SM3pl	DISJ	dance	CONJ	3pl
	'They too dance/are dancing'				Creissels 1996, 110, ex. (5)

With examples (76) and (77), the formal difference between the two forms is the conjunctive/disjunctive distinction. Therefore the difference in interpretation must be a result of the syntactic difference expressed through the conjunctive/disjunctive distinction. Furthermore, due to the conjunction *lé* introducing a pronoun that can either refer to the subject or not, the actual intended meaning can only be seen through the use of the conjunctive form or disjunctive form: when the pronoun introduced by *lé* does not refer to the subject, the verb is in the conjunctive form but when the pronoun introduced by *lé* does refer to the subject, the verb is in the disjunctive form.

Creissels argues that the tonal differences in these last two examples reflect the conjunctive/disjunctive distinction (rather than the postverbal boundary) because otherwise the long form would have the same tonal melody in all contexts (which would be with a L final tone, the same as if immediately followed by a pause), whether followed by a pause or not, and that the melody found in the long (disjunctive) form (with two final H tones) actually represents the short (conjunctive) form.

3.2.2.1.2 Present Negative

The present negative tense supports the arguments raised above (that differences in the tonal melody reflect the conjunctive/disjunctive distinction), the only difference being

that the distinction between the conjunctive and disjunctive forms can *only* be seen through the tonal differences. These examples do not have a segmental disjunctive marker.

Conjunctive:

(78) ***gà*** ***bá*** ***bîné*** *lé* *bòné*
NEG SM3pl dance CONJ 3pl
'They do not dance/are not dancing with them' Creissels 1996, 110, ex. (14)

Disjunctive:

(79) ***gà*** ***bá*** ***bînè*** *lé* *bòné*
NEG SM3pl dance CONJ 3pl
'They do not dance/are not dancing either' Creissels 1996, 110, ex. (13)

Conjunctive:

(80) ***gà*** ***ké*** ***bîné*** *lé* *èné*
NEG SM1sg dance CONJ 3sg
'I do not dance/am not dancing with him/her' Creissels, 1996, 110, ex. (12)

Disjunctive:

(81) ***gà*** ***ké*** ***bînè*** *lé* *ǹná*
NEG SM1sg dance CONJ 1sg
'I do not dance/am not dancing either' Creissels, 1996, 110, ex. (11)

Examples (78) and (80) are in the conjunctive form. The verb forms have a final H tone. Compare these with (79) and (81), which are in the disjunctive form and have a final L tone. All other tones within these examples are the same, it is the final tone of the verb form that distinguishes between conjunctive and disjunctive.

3.2.2.1.3 Future Positive

The tonal differences between pairs of examples across tenses are not always the same. This supports the earlier case for tonal differences being related to the conjunctive/disjunctive distinction.

Compare the pairs of examples in the present negative tense (section (3.2.2.1.2)) with the ones below. In the present negative the conjunctive/disjunctive pairs show the same tonal variation in the different forms: conjunctive has two final H tones (...HH) on the verb, disjunctive has final HL tones (...HL). In the future positive tense the example pairs show that the conjunctive form has ...HL tones and the disjunctive form has ...HH tones – the reverse of what is found in the present negative.

Conjunctive:

(82) ***kè*** ***tlàà*** ***bînà*** *lé* *ènè*
SM1sg shall dance CONJ 3sg
'I shall dance with him/her' Creissels 1996, 110, ex. (8)

Disjunctive:

(83) ***kè*** ***tlàà*** ***bîná*** *lé* *ànná*
SM1sg shall dance CONJ 1sg
'I too shall dance' Creissels 1996, 110 , ex (7)

Conjunctive:

(84) ***bá*** ***tláà*** ***bînà*** *lé* *bòné*
SM3pl shall dance CONJ 3pl
'They will dance with them' Creissels 1996, 110, ex. (10)

Disjunctive:

(85) ***bá*** ***tláà*** ***bîná*** *lé* *bòné*
SM3pl shall dance CONJ 3pl
'They too will dance' Creissels 1996, 110, ex. (9)

Examples (82) and (84) are in the conjunctive form as is illustrated by the verb forms having final ...HL tones, as compared with (83) and (85) which are both in the disjunctive form and have final ...HH tones on the verb forms.

Within the example pairs in this section both have the same tones, apart from verb finally. Between the pairs, however, looking at the relevant verb form (in bold), it is evident that the pairs have very different tones. The H tones on the second syllable in (84) and (85) are due to H tone spread from the (H toned) SM *bá* on to an underlyingly L toned syllable immediately following the SM. It can be seen that there is H tone spread rather than the second syllable having an underlying H tone, by comparing (84) and (85) (which both have a H tone SM) with (82) and (83). Both (82) and (83) have a L-toned SM. As discussed earlier, H tones in Setswana are "active" and L tones are "inert", this means that an underlying L tone will become H if there is any H tone that can extend its domain to cover that L tone. Because of the L tones following the SM in (82) and (83) we know that the H tones following the SM in (84) and (85) are due to H tone spread. This is the reason for the tonal variation between these example pairs.

3.2.2.1.4 Perfect Positive

So far in the examples we have looked at, where the conjunctive/disjunctive distinction can be seen tonally, the distinctive tone can be found on the final syllable of the verb.

In the perfect positive tense the distinction is found on syllables towards the end of the verb stem and on the syllable immediately following the SM. Therefore the conjunctive and disjunctive forms have very different tonal realisations.

Conjunctive:

(86) ***bá*** ***jélè*** *lé* *bòné*
SM3pl eat.PFTCONJ 3pl
'They have eaten with them' Creissels 1996, 111, ex. (22)

Disjunctive:

(87) ***bá*** ***jèlé*** *lé* *bòné*
SM3pl eat.PFTCONJ 3pl
'They too have eaten' Creissels 1996, 111, ex. (21)

Example (86) is in the conjunctive and has HL tones on the (short) verb form. Compared with example (87), the tonal realisations are very different. Example (87) is in the disjunctive and has LH tones on the verb form.

Contrary to the examples found in the future positive tense, the tonal differences on the verb form are not to do with H tone spread. This can be seen by looking at the tone immediately following the SM in (87). If H tone spread were involved in these examples there would not be a L tone on the second syllable of (87), due to the reasons given at the end of section (3.2.2.1.3) above.

Conjunctive:

(88) ***bá*** ***tsàmáîlè*** *lé* *bòné*
SM3pl go.PFT CONJ 3pl
'They have gone with them' Creissels 1996, 111, ex. (26)

Disjunctive:

(89) ***bá*** ***tsámàìlè*** *lé* *bòné*
SM3pl go.PFT CONJ 3pl
'They too have gone' Creissels 1996, 111, ex. (25)

Unlike in other tenses, the verb final syllables of (88) and (89) are the same in both examples, but it is the syllables immediately following the SMs and the penultimate and antepenultimate syllables of the verb forms which carry the conjunctive/disjunctive distinction in this tense. Example (88) is conjunctive and has LHHL tones on the verb form while (89) has HLLL tones on the verb form (with the final L tones not being distinctive).

The purpose of this subsection was to summarise Creissels (1996), illustrating that in the present negative, future positive and perfect positive tenses the conjunctive/disjunctive distinction is seen through tonal differences on the verb form. In the following subsection I present my own data under the same criteria as that used by Creissels (1996).

3.2.2.2 Further Data

I elicited Creissels' data from my own Setswana speaking informants. I elicited language samples that were as spontaneous as possible to see what would happen without using Creissels' frame (example (75) in section (3.2.2.1.1)). Therefore I did not ask informants what they understood by the sentences presented in section (3.2.2.1), but rather elicited data as close in the conjunctive/disjunctive interpretation as possible to that presented above. The examples here are from a Sekgatla dialect speaker. The informant from which Creissels' data was elicited spoke a different dialect, Sengwaketse. I mention this to account for any lexical differences between Creissels' data and my own.

3.2.2.2.1 Present Positive

In this tense it is a disjunctive marker that distinguishes between the conjunctive and the disjunctive (section (3.2.2.1.1)).

Short form – conjunctive:

(90) *dî-kgòmó* ***dî*** ***fúlà*** *kó* *nòké-ng* [Sekgatla]
CL10-cow SM10 graze LOC river-LOC
'The cows graze at the river'

Long form – disjunctive:

(91) *dî-kgòmó* ***dî*** ***á*** ***fúlà*** [Sekgatla]
CL10-cow SM10 DISJ graze
'The cows graze'

The conjunctive form is not phrase final and has no disjunctive marker, while the disjunctive form *is* phrase final and has a disjunctive marker.

Conjunctive:

(92) ***kè*** ***bînà*** *lé* *èné* [Sekgatla]
SM1sg dance CONJ 3sg
'I am dancing with him'

Disjunctive:

(93) *lé* *ǹná* ***ké*** ***à*** ***bínà*** [Sekgatla]
CONJ 1sg SM1sg DISJ dance
'I too dance'

In (92) we find the exact same tone markings for the present positive conjunctive as found by Creissels (example (75)). Example (93), however, is not as expected. It is a disjunctive example, primarily because it has the disjunctive marker. It is also in phrase final position, which, though different from Creissels (see example (77)), is perfectly acceptable (see example (74)). However the tones are not what is expected. Firstly, the SM has a H tone where it is ordinarily L toned. This is due to H tone spread from the preceding pronoun. Secondly, the verb has a final L tone where a final H tone is expected in the disjunctive. The final L tone may be to do with the fact that the verb is in clause final position and is subject to the tonal effects brought about by that (and which Creissels was avoiding through his use of a frame for the verb form).

3.2.2.2.2 Post verbal NPs

The following postverbal NP examples are all in the present positive tense and so should show the conjunctive/disjunctive distinction through a segmental disjunctive marker, as well as tonally.

Conjunctive:

(94) ***kè*** ***rátá*** *Mphó* [Sengwato]
SM1sg like Mpho
'I like Mpho'

Disjunctive:

(95) ***kè*** ***à*** ***mó-rátà*** [Sengwato]
SM1sg DISJ OM1-like
'I like him'

Example (94) is conjunctive. The verb is not phrase final and there is no disjunctive marker. However, the tones are not the same as those that have been found by Creissels (whose conjunctive example has a L final tone, see example (76)). Example (95) is disjunctive. The verb form is phrase final and there is a disjunctive marker. However, the tones are not the same as those found by Creissels (whose disjunctive example has a H final tone, see example (77)), but this verb is in phrase final position (unlike in example (77)) and so subject to the tonal effects that come from that.

(In the following example 'I.B.' stands for Intonation Break.)

Disjunctive:

(96) ***kè*** ***à*** ***mó-rátà*** (I.B.) *Mphó* [Sengwato]
SM1sg DISJ OM1-like Mpho
'I like him Mpho'

Example (96) is disjunctive. The verb is phrase final and there is a disjunctive marker. In spite of the verb being followed by a noun, the reading is still disjunctive due to the intonation break between the verb form and the noun, making *Mpho* an after-thought topic and thus not changing the disjunctive reading.

3.2.2.2.3 Present Negative

In this tense the conjunctive/disjunctive distinction can only be seen through tonal variation, where conjunctive forms have a final H tone while disjunctive forms have a final L tone (section (3.2.2.1.2)).

Conjunctive:

(97) ***gà*** ***bá*** ***bíné*** *lé* *bòné* [Sekgatla]
NEG SM3pl dance CONJ 3pl
'They are not dancing with them'

Disjunctive:

(98) ***gà*** ***bá*** ***bînè*** *lé* *bòné* [Sekgatla]
NEG SM3pl dance CONJ 3pl
'They too are not dancing'

Example (98) corresponds to the sentence elicited by Creissels. It is interesting in terms of my data, however, because the relevant verb form is not phrase final, which I have found to be the preferential structure of disjunctive examples elicited from my informants (this structural preference is also noted by van der Wal (2006) for the Bantu language Makhuwa (P30)).

Conjunctive:

(99) ***gà*** ***ké*** ***bíné*** *lé* *èné* [Sekgatla]
NEG SM1sg dance CONJ 3sg
'I am not dancing with him'

Disjunctive:

(100) *lé* *ǹná* ***gà*** ***ké*** ***bînè*** [Sekgatla]
CONJ 1sg NEG SM1sg dance
'I too do not dance'

Examples (97) and (99) correspond with what Creissels found in example (78). The conjunctive verb form is not phrase final and has a final H tone. Example (100) also

corresponds, tonally, with what Creissels found, although the relevant clause is phrase final whereas in his corresponding example (see (79)) it is not phrase final. I do not see this as being a problem as the disjunctive form is comfortably used phrase finally (unlike the conjunctive form). The only issue raised with this example is whether the verb final (and also phrase final) L tone is due to the example being disjunctive or due to the verb being phrase final and the resulting tonal effects.

3.2.2.2.4 Future Positive

In this tense conjunctive verb forms have a final ...HL tonal melody on the verb, while the disjunctive forms have a ...HH tonal melody (section (3.2.2.1.3)).

Conjunctive:

(101) ***kè*** ***tlà*** ***bînà*** *lé* *ènè* [Sekgatla]
SM1sg FUT dance CONJ 3sg
'I shall dance with him'

Disjunctive (?):

(102) *lé* *ànà* ***ké*** ***tlà*** ***bínà*** [Sekgatla]
CONJ 1sg SM1sg FUT dance
'I too shall dance'

Example (101) corresponds to what Creissels found (example (82)), the relevant verb form is not phrase final and has a ...HL tonal melody on the verb.

Structurally (102) is fine because it is in the disjunctive position, but the tones are not what is expected here. Disjunctive forms in the future positive tense should have a ...HH tonal melody, but here we find a ...HL – the same as in the conjunctive form. This could be because the verb is in phrase final position in addition to being clause final. The SM is H toned where a L tone is expected, possibly due to H tone spread from the preceding pronoun as in example (93).

Conjunctive:

(103) ***bá*** ***tlà*** ***bínà*** *lé* *bòné* [Sekgatla]
SM3sg FUT dance CONJ 3pl
'They will dance with them'

Disjunctive (?):

(104) *lé* *bòné* ***bá*** ***tlà*** ***bínà*** [Sekgatla]
CONJ 3pl SM3sg FUT dance
'They too shall dance'

Example (103) corresponds with what Creissels found (see example (84)). The conjunctive verb form is not phrase final and has a final ...HL tonal melody.

Both (102) and (104) have a disjunctive interpretation though the tones do not reflect this. If looking purely at tone then this is not a disjunctive form, but if an allowance is made for the distinction to be seen structurally in other tenses as it is in the present positive, and also take into account the possibility of phrase boundary tonal effects, then these examples could still be interpreted as being in the disjunctive. The conjunctive/disjunctive markings serve, primarily, to give the hearer information about the phrase being spoken, whether there will more following the verb phrase (in the case of conjunctive forms) and to disambiguate ambiguous examples where it is not necessarily clear if the information outside of the verb phrase is given or new information.

I conclude that in tenses where the conjunctive/disjunctive distinction is seen purely through tone (i.e. without a disjunctive marker *a*, as in the present positive tense) this is used when the structure of the phrase leads to ambiguity between the two readings, such as in the cases in section (3.2.2.1) that are within a frame utilised by Creissels to eliminate the effects of the prepausal position on the basic tonal melody. Where the structure of the phrase leads to a disjunctive reading (the verb form occurs phrase finally), this overrides the information provided by the tonal melody.

3.2.2.2.5 Perfect Positive

In this tense Creissels observes that the tonal difference is found on the syllable immediately following the SM and on the syllables towards the end of the verb stem (section (3.2.2.1.4)). While my examples are like Creissels' in terms of tone on the verb form, they differ with respect to the tone of the SM. In these examples the SM itself has a different tone depending on whether it is conjunctive or disjunctive.

Conjunctive:

(105) ***bà*** ***jélè*** *lé* *bòné* [Sekgatla]
SM3pl eat.PFTCONJ 3pl
'They have eaten with them'

Disjunctive:

(106) ***bá*** ***jèlé*** *lé* *bòné* [Sekgatla]
SM3pl eat.PFTCONJ 3pl
'They too have eaten'

Example (106) corresponds to the disjunctive form found by Creissels. It also has the expected H tone on the SM.

In the following examples the SMs, again, have different tones in the conjunctive and disjunctive. My Sekgatla speaking informant was consistent in the SM tones. In both conjunctive examples in this tense the SM has a L tone and in both disjunctive

examples the SM has a H tone. Example (107), apart from the wayward SM, corresponds to the conjunctive as found by Creissels. The syllable immediately following the SM is L toned and the penultimate and antepenultimate syllables are both H toned.

Conjunctive:

(107) ***bà*** ***tsàmáîlè*** *lé* *bòné* [Sekgatla]
SM3pl go.PFT CONJ 3pl
'They have gone with them'

Disjunctive (?):

(108) ***bá*** ***tsámáîlè*** *lé* *bòné* [Sekgatla]
SM3pl go.PFT CONJ 3pl
'They too have gone'

The only tonal variation in (108) is on the syllable immediately following the SM (compare with example (89)). The sentence elicited should have a disjunctive reading as is clear from the syntactic context and the interpretation. The tone immediately following the SM is fine and is as expected (see example (89)) but the rest of the verb is the same as the conjunctive form in (88) and (107). The final L tone cannot result from phrase finality effects because it is not phrase final, it could be due to dialectal differences.

It is possible that the L toned SM is a dialectal difference because (106) and (108) have a H toned SM, with (105) and (107) in the conjunctive having a L toned SM. These data suggest the SM may be part of the conjunctive marking in the perfect positive tense in the Sekgatla dialect, which differs from the data described by Creissels (section (3.2.2.1.4), examples (86) – (89)) where the conjunctive/disjunctive marking occurs only on the verbal base and does not extend to the SM. This is an interesting outcome of the research around the conjunctive/disjunctive distinction and is worth pursuing at a later date.

3.2.2.2.6 Presentational/Locative

The examples in this section are all postverbal NPs but are to do with presentational or locative structures in the perfect positive tense.

Conjunctive:

(109) ***gó*** ***tsîlé*** *Mphó* [Sekgatla]
LOC.SM[21] come.PFT Mpho
'There came Mpho'

[21] [gó] fulfils different functions in Setswana. For example it is the class 15 infinitival marker as in 'to write a letter…' – *go kwala lekwalo*. Here it is used as a locative subject marker.

Disjunctive:

(110) *Mphó ó tsîlè* [Sekgatla]
Mpho SM2sg come.PFT
'Mpho came'

Example (109) appears to be in the conjunctive because the verb is not phrase final. In (110) the verb is in phrase final position and has a markedly different tone melody from (109), this would suggest a tonally marked conjunctive/disjunctive distinction. However, there is a problem with the perfect positive in that the tones are subject to phonological rules within Setswana, making any predictions about tonal distinctions difficult without further research.

This section has shown it is largely the case that the replicated data matches the original data from Creissels. The differences that are evident could be attributed to the replicated data not making use of Creissels' frame and thus being open to phonological boundary effects, or could be due to dialectal differences between speakers (such as with the SM in the perfect positive tense as seen in section (3.2.2.2.5)).

3.2.2.3 Other Environments

The following are environments not in the data presented by Creissels in the referenced works. I look briefly at them here to see if there *is* a conjunctive/disjunctive distinction and whether it fits in with Creissels' generalisations regarding which tonal melodies are expected within tenses to show a conjunctive/disjunctive distinction. The data in this section are from speakers of the Sekgatla and Sengwato dialects of Setswana. I mention this in order to account for any lexical differences between Creissels' data and my own, and also within my data.

In the following data it is difficult to asses the phonological evidence for a conjunctive/disjunctive distinction because a full tonal paradigm and systematic analysis using the tonal processes operating in Setswana would be required and while there is the time and space available within a thesis for a thorough discussion of such, it is not the main focus of this thesis and so I leave that task to one side for the purposes here and present the data as found and within the environments as used by Creissels (1996) and within the rest of this section above (3.2.2).

Looking at the data presented so far, and that from Creissels, there is a syntactic correlation between the conjunctive and the disjunctive which can be formulated as saying that a conjunctive is followed by a complement, or at least is never phrase final,

while the disjunctive predominantly occurs phrase finally but not always.[22] Taking this into account I have assigned labels to examples (either conjunctive or disjunctive) within this section having considered both the phonological and (surface) syntactic evidence. However, conjunctive and disjunctive are, predominantly, phonological terms, and so without an analysis of the syntax it is only through tone marking on the verb forms that the distinction can be seen. The examples in this section (particularly with subordinate clauses (3.2.2.3.2)) show that there is no obvious conclusion to the matter of the conjunctive/disjunctive distinction outside of the frame eliminating phrase boundary tonal effects, and thus more testing of different environments than those performed by Creissels (1996) and by myself here is required.

3.2.2.3.1 Relatives

Setswana has a specific relative marker that occurs on the verb form: *-ńg*,[23] which always carries a H tone. This H tone means that relative forms "have no tonal alternation" (Chebanne *et al.* 1997: 199), excepting phonological rules that are to do with H tone domains. Furthermore, Chebanne *et al.* (1997: 199) observe that there is no conjunctive/disjunctive distinction with the relative, and this is what I hope to discover with my own data.

The following examples are in the past (as can be seen from the past tense marker) and there is no mention of the past tense with the relative clause in the referenced works. I was hoping to see what would happen in the past and there does seem to be a difference with the relative.

Conjunctive (?):

(111)	*kókò*	*é*	*Mphó*	*á*	*nè-ńg*		***á***	***é***	[Sekgatla]
	chicken	REL9	Mpho	SM1	PST-REL		SM1	OM9	
	àpéílé	***mààbánè***	*énè*	*é*	*lé*	*tónà*			
	cook.PFT	yesterday	3sg	SM9	COP	big			

'The chicken which Mpho cooked yesterday was big'

In (111), the relative clause could have a conjunctive interpretation because the verb is not final within the clause (being followed by *maabane*, 'yesterday') and the verb form has a final H tone, which contrasts with (112).

[22] For the present purposes there is no full syntactic analysis of this as it is a matter for further investigation.

[23] This marker is not to be confused with the locative marker found earlier on. The difference between the two is found tonally. The locative marker has a low tone *-ǹg* while the relative marker has a high tone *-ńg*.

Disjunctive (?):

(112)	*kókò*	*é*	*Mphó*	*á*	*nè-ńg*	***á***	***é***	[Sekgatla]
	chicken	REL9	Mpho	SM1	PST-REL	SM1	OM9	
	àpéîlè	*énè*	*é*	*lé*	*tónà*			
	cook.PFT	3sg	SM9	COP	big			

'The chicken which Mpho cooked was big'

In (112), the relative clause could be disjunctive because, within the clause, nothing follows the verb and the verb form has a final L tone (which contrasts with (111)). However, there is no disjunctive marker between the SM and the verb form. In this instance the tonal differences are most likely due to postverbal boundary effects, rather than a conjunctive/disjunctive distinction.

3.2.2.3.2 Subordination

This section looks at the effects of subordinate clauses on the preceding verb form in two contexts. Firstly, when the subordinate clause is fronted in two different tenses and, secondly, when the verb form is not immediately followed by the subordinate clause.

The two following examples are in the future positive. In (113) the subordinate clause follows the main clause, but in (114) it is fronted.

Conjunctive:

(113)	***ó***	***tá***	***m̀-phîthélà***	*fá*	*ó-tà*	[Sengwato]
	SM2sg	FUT	OM1sg-find	if	SM2sg-come	

'You will find me if you come'

Disjunctive (?):

(114)	*fá*	*ó-tá*	*ò*	*tà*	***m̀-phîthèlà***	[Sengwato]
	if	SM2sg-come	SM2sg	FUT	OM1sg-find	

'If you come you will find me'

According to Creissels, the conjunctive form in the future positive tense has a verb final tonal melody ...HL, see section (3.2.2.1.3). That is what is found in (113). Structurally (114) is disjunctive but this is not supported by the tonal melody. The disjunctive form in the future positive tense should have a verb final tonal melody ...HH. The final L tone could be L instead of H because the verb is phrase final and subject to the effects of that position, but the penultimate syllable of the verb form is also L which is different from what is predicted. This could be a dialectal difference, in particular with the penultimate L tone in example (114), but further examples in the same tense would be required to come to a conclusion.

In the following two examples, the clause that is of interest is in the perfect positive (the *bò* in both changes the interpretation of the entire sentence, but we are looking at a specific clause which is in the perfect positive):

Conjunctive (?):

(115) *ò* *ká* *bò* ***ó*** ***ń-phîthétsé*** [Sengwato]
SM2sg TNS COP SM2sg OM1sg-find.PFT
fá *ó* *né* *ó-tsǐlé*
if SM2sg PST SM-come.PFT
'You would have found me if you had come'

Disjunctive (?):

(116) *fá* *ó* *né* *ó-tsǐlé* [Sengwato]
if SM2sg PST SM2sg-come.PFT
ò *ká* *bò* ***ó*** ***ń-phîthétsè***
SM2sg TNS would SM2sg OM1sg-find.PFT
'If you had come you would have found me'

Example (115) is structurally conjunctive due to the content following the clause in bold type. Example (116) is structurally disjunctive. It is difficult with this tense to know what tonal melodies show a conjunctive/disjunctive distinction. The examples cited by Creissels (see examples (86) – (89)) all have different tonal melodies. There does not seem to be an obvious pattern as to which tones correspond to a conjunctive form and which to a disjunctive form and so I believe that the tones are subject to the phonological rules that already exist in Setswana, as discussed in section (3.2.1).

The following examples are in the past progressive. There is no mention of the past progressive tense interacting with subordinates in the referenced works and so the interpretation of the examples below is still sketchy.

Conjunctive:

(117) ***kè*** ***nè*** ***ké*** ***àpéîlè*** *kókó* [Sengwato]
SM1sg PST SM1sg cook.PFT chicken
fá *á* *górògà*
when SM1 arrive
'I was cooking chicken when he arrived'

Example (117) is conjunctive because the verb form is not clause final within the relevant clause. The present positive tense (as well as having a disjunctive marker) and the present negative tense both show the conjunctive/disjunctive distinction on the final syllable of the verb form (see examples (76) and (77) for the present positive), so it can be suggested that the verb form in (117) is in the conjunctive because it has a final L

tone, which differs to that found in (118) which is in the disjunctive and has a final H tone.

Disjunctive:

(118) ***kè*** ***nè*** ***ké*** ***àpéîlé*** *fá* *á* *górògà* [Sengwato]
SM1sg PST SM1sg cook.PFT when SM1 arrive
'I was cooking when he arrived'

Example (118) is in the disjunctive because the verb form is clause final within the relevant clause. Furthermore, compared with (117), there is a tonal distinction on the final syllable of the verb form.

There are two issues that come out of this section. Firstly there is the question of whether there actually is a conjunctive/disjunctive distinction with subordinates, and secondly, whether subordinate clauses count as being relevant postverbal material and so have an effect on the conjunctive/disjunctive distinction in the first place. Within this last point there are further questions that arise as to the nature of the different subordinate clauses and whether this may make a difference. At the beginning of this section (examples (113) – (116)) we find the subordinate clause is an 'if' clause. The differing tonal melodies could indicate that 'if' clauses do count as following the verb, especially if we compare with (117) and (118) which have 'when' clauses in the subordinate clause. These data seem to show that 'when' clauses do not count as postverbal material in the relevant sense. These are matters that require more data and investigation in order to come to a conclusion.

3.3 Summary and Conclusion

This chapter has been concerned with introducing the language of Setswana in detail, but with the preceding Bantu chapter firmly in mind. The main point of interest in this chapter is the discussion of tone which I have demonstrated to be a complex system with lexical tone classes associated with verbs, those with a H tone associated with the first syllable of the root and those with no tone at all in the same. H tones are also found on other elements of the phrase, such as the subject and object markers, and H tones in Setswana are considered 'active' and so are prone to spread across a finite number of following elements in the phrase. Underlying H tones also generate H tone domains which are "a maximal sequence of successive H toned syllables" (Creissels

1998: 135) which can spread over to following syllables causing them to be H toned if they were previously L toned.

The discussion of the conjunctive/disjunctive distinction (section (3.2.2)), following Creissels (1996), is not only an illustration of the effects of tone in Setswana and a further example of the complexity of the system, but is also relevant for the analysis chapter to come. On one hand the conjunctive/disjunctive distinction is somewhat opaque due to surface tonology and the complex system of tone conjugation (see section (3.2.1)), on the other hand the function of the conjunctive/disjunctive distinction is straightforward – to determine if the verb occurs last in the clause or not. If the verb is conjunctive then it is not clause final and is followed by some new information. If the verb is disjunctive then it is clause final and so should have nothing following. Anything that does occur after the verb is analysed as a 'postclausal topic' (Creissels 1996: 109) which means that it is given information that is mentioned again, and so is linked to the clause though is not a part of it. This concept of 'given' and 'new' information is akin to the notion of Topic and Focus, as will be discussed in section (4.3) in the following chapter, however both of these are problematic for the analysis of multiple object constructions in Setswana. This will be more appropriately and better explained in chapter 6, so I leave the discussion to one side for the time being and conclude by saying that this chapter raises a number of interesting issues that fall out of the scope of this thesis but which would be matters for further research, namely dialectal differences in the conjunctive/disjunctive through tone and looking beyond the tenses explored by Creissels (1996) and replicated in this thesis - relative and subordinate clauses for example, which are touched upon in this chapter but are not analysed fully.

4 Agreement Markers

This chapter is concerned with one of the primary topics of this thesis, agreement markers. Both subject and object agreement markers are discussed in this chapter, but the main focus lies with object markers as it is these that are of foremost interest in the analysis in chapter 6. First, however, is a brief literature review on the subject of grammatical agreement in general and what it actually is which leads to a discussion on pronominal agreement with a focus on Bantu languages.

From this platform there is a narrow look at agreement in Bantu, concentrating on a discussion of the verbal morphology including another look at pronominal agreement, this time specifically with regards to conjoined noun phrases and methods of agreement resolution in different languages.

The next section summarises and compares two works on agreement markers in Bantu languages, Bresnan & Mchombo (1987), and Demuth & Johnson (1989). Both of these explore the function of both subject and object agreement markers, in Chichewa and Setawana respectively.

4.1 Agreement

A good place to begin is with defining and exploring how agreement has been characterised in the relevant literature. Ferguson & Barlow (1988) propose that the phenomenon of grammatical agreement can be defined as "a grammatical element X matches a grammatical agreement Y in property Z within some agreement configuration" (1988: 1). Corbett (2006: 4) quotes Steele (1978: 610) saying: "The term *agreement* commonly refers to some systematic covariance between a semantic or formal property of one element and a formal property of another", carrying on to explain that it is the notion of covariance that is most important, that the sharing of properties between two items must be systematic (rather than chance) which can be seen through elements varying in the same way.

Essentially what these approaches agree on is that agreement is one part of speech matching, or agreeing with, another in terms of certain syntactic categories such as gender (or class), number, person and/or tense. There is more to it, however. Ferguson & Barlow propose eight "points of inquiry" to which we should look to further understanding of what agreement is, and which I will summarise here:

1) Domain – refers to which kinds of elements agree with which kinds of elements in a language. The parts of grammar that most commonly show agreement are morphology, syntax, logical or semantic representation and elements at a "discourse level". An illustration of agreement at the discourse level is in the sentence 'The old man left, didn't he?' where the 'he' refers back to 'the old man' and so the agreement is extended from one word to an entire clause.

2) Features – refers to which grammatical categories are involved with agreement. Person, number, case, definiteness/indefiniteness, numeral classifiers and gender (or class, and which would include shape, size and function categories).

3) Directionality – refers to what is the starting point of agreement (controller) and what is the target. Nichols (1985) investigated the direction of agreement and found that it spreads downwards from head to non-head (or from higher to lower head) or upwards from non-head to head. Agreement is upwards between verb-subject and preposition-noun constructions and either up or down within noun phrases.

4) Strictness – refers to how exact agreement is. And further, if it is possible to have agreement mismatches, what these might be.

5) Conflict – refers to the possible resolutions when there is conflict between agreement patterns (e.g. syntax vs. semantics). Conflicts tend to occur in situations such as coordination, commitative phrases, marking of respect, semantic vs. syntactic agreement, quantifier phrases/numerals, lexical idiosyncrasies, syntactic distance. A classic case of conflict is where there are conjoined pronouns of different person features which then leads to conflicting agreement in the predicate or the modifiers. The linguistic factors involved in these situations include feature hierarchies, the distance of the noun phrase from the target and whether the controller precedes or follows the target.

6) Variation – refers to circumstances for alternative agreement options. Variation results from the situations used to illustrate Conflict above. They can reflect user preference (which results from, e.g., age, sex and/or class) or can be to do with issues surrounding communication needs.

7) Function – refers to which syntactic, semantic or pragmatic functions can be served by agreement, and the conditions of such.

8) Change – refers to where agreement systems come from, how they arise and how they change over time. It could be that a system of agreement arises when

free-standing pronouns become cliticised to the verb (an anaphoric copy) and then become incorporated as agreement markers.

In his 1988 paper Lehmann gives an outline of the function of agreement, which I will summarise here. To begin with, Lehmann gives the following explanation of what agreement is (1988: 55):

> agreement is referential in nature. It helps identify or reidentify referents. It does this by giving information on grammatical properties of its referent and, thus, of the NP representing it if one is around. The functions of agreement in the marking of syntactic relations derives from this primary function.

Lehmann defines agreement as below:

(119) Constituent *B* agrees with constituent *A* (in category *C*) if and only if the following three conditions hold true:
  a. There is a syntactic or anaphoric relation between *A* and *B*.
  b. *A* belongs to a subcategory *c* of a grammatical category *C*, and *A*'s belonging to *c* is independent of the presence or nature of *B*.
  c. *c* is expressed on *B* and forms a constituent with it.

This definition is useful as a "decision procedure" with which to make a judgement about agreement, which may be necessary in cases where there are differing "conceptions" of agreement such as between different syntactic theories.

According to Lehmann there are two "radically" different types of agreement. One type can involve case, but never involves person. This form of agreement is found in all adnominal modifiers (articles, possessive pronouns, nominal appositions, determiners, numerals, adjective attributes, possessor noun phrases and relative clauses). The second type involves person, but never case. This form of agreement is found in situations where a noun phrase is dependent on an agreeing term, though not including those in which the noun phrase involves a semantic relation. These two forms of agreement are in complementary distribution (the first form has modifiers agreeing with their heads and the second form has governing terms agreeing with their dependent noun phrases) and it is the case that something always agrees with a noun phrase in all constructions, which is something that would be expected for person agreement but not for case agreement. Lehmann generalises to say that "*all agreement refers to an NP*" because adnominal modifiers can agree with their noun phrases rather than their head nouns (1988: 58). A constituent that is agreed with, whether or not it is actually present or realised, is always a noun phrase. Therefore, the first form of agreement (agreement of adnominal modifiers with the noun phrase) is "*internal agreement*" and the second

form of agreement (agreement of a noun phrase outside of the "agreeing term") is "*external agreement*" (1988: 59).

In an agreeing relation the agreeing word (or carrier of agreement) always has something to which it refers, but what the referent is varies depending on whether it is external or internal agreement that is in action (Lehmann 1988: 59):

> Internal agreement expresses *coreference* of the agreeing word with other words belonging to the same NP. External agreement expresses *reference* to an NP which specifies the meaning of the agreeing word. More generally: the designation of words connected by internal agreement apply to the same referent. The designation of words connected by external agreement do not apply to the same referent (even if the words displaying external agreement – verbs, relational nouns and adpositions – were said to refer).

Lehmann continues with the issue of where agreement comes from. Due to person and case being involved only with external and internal agreement, respectively, there are different morphological forms that result from these two forms of agreement. Generally, according to Lehmann, agreement markers develop from pronouns, and internal and external agreement markers result from different kinds of pronouns. Internal agreement markers come from "weakly deictic demonstrative pronouns" while external agreement markers come from personal pronouns. The internal agreement pronoun serves as a "dummy head" for attributes that cannot stand on their own, and it does this by attaching to an attribute that refers back to something already mentioned. The external agreement pronoun serves to fill in a syntactic position that is opened up by a future syntactic relation (and so will also announce this future syntactic relation) which will apply to a referent either in the speech situation or the linguistic context.

Finally, we get to the function of agreement. In a discourse, repeated reference to referents is usually made not explicitly (by mentioning all of its characteristics each time) but by using some of the characteristics of that referent, such as person, number, case and gender/class. It is pronouns that are used to show that the referent has been mentioned elsewhere in the speech situation and this reference (or re-reference) is the primary function of the agreement markers that stem from the pronouns.

Johnson (1977: 156) describes a Relational Hierarchy of grammatical relations:

(120) subject > direct object > indirect object > other object

This hierarchy reflects the priority, in order, of grammatical relations. If there is only one agreement relationship, it will be with the subject. If there are two they will be with the subject and with the direct object, and so on.

Corbett (2006: 71) discusses two approaches to morphology: Lexical and Inferential. In lexical theories morphological elements have their own lexical entry which specifies its type and the information that it carries (person, number, tense, case). Inferential theories involve rules or formulas that allow for an inflected form to be inferred from a stem by associating the appearance of the morpheme with the information it carries.

4.1.1 Pronominal Agreement

Corbett (2006: 15-17) discusses alliterative marking as the ultimate form of agreement. Languages fall along a scale of alliteration, with some instances of agreement being opaque at the far end of the scale. Alliterative agreement has two main characteristics: 1) the agreement marker on the target is identical to a formant of the controller, 2) the same agreement marker is used for different agreement targets. As an illustration, the following Kiswahili example (Corbett's ex.(28) from chapter 1) is from Welmers (1973: 171) and is an example of fully alliterative agreement in the NP:

(121)	*ki-kapu*	*ki-kubwa*	*ki-moja*	*ki-lianguka*	[Kiswahili]
	SM-basket(7/8)	7-large	7-one	7-fell	
	'one large basket fell'				

The *ki-* marker is found on every target in the sentence and thus it is fully alliterative. This is not always the case, however, since Kiswahili is not a fully alliterative system as the following example shows:

(122)	*m-shale*	*u-lianguka*	[Kiswahili]
	SG-nail(3/4)	3-fell	
	'a nail fell'		

In this case the agreement marker on the verb (*u-*) does not match the class marker *m-* on the noun. English has an opaque system "as having *-s* and allomorphs as the marker of the plural on controllers, but as the markers of the singular on verb targets." (Corbett 2006: 16).

With regards to the second characteristic stated above, in what Corbett terms a "fully canonical system" (meaning a system with perfectly consistent and efficient agreement), all targets would be marked using the same morpheme as in example (121) above. Many Bantu languages show a high level of alliterative agreement, though the system may not be fully alliterative.

It is accepted that pronouns are a considerable source of agreement morphology in all guises from full pronouns to clitics and inflections. However, their morphology

varies and this can be seen as being independent from their syntactic value. Clitics are an interesting syntactic puzzle because their status comes somewhere between full words and inflectional affixes bound to the target. They cannot stand alone (as full words, such as full pronouns, can) but at the same time they can attach to different targets (which inflectional affixes cannot). One of the major questions regarding clitics is whether they function as pronouns, agreement markers or both. The issue of OMs as agreement markers is investigated thoroughly by Bresnan & Mchombo (1987) for Chichewa and Demuth & Johnson (1989) for Setawana, there is a discussion of these in section (4.3) below.

Another question is that of where clitics actually come from. According to Corbett (2006: 264) they develop from full pronouns along a "grammaticalization path". There are two different processes; one is that words change their form to become clitics and then become bound inflections, the other is that referential pronouns change their function and become agreement markers. That being said, clitics can also function as agreement markers and pronouns can be obligatorily bound to a verb while at the same time maintaining their pronominal function as pronominal affixes. Corbett (2006: 265) cites "renewal" as the main evidence for this process. Agreement systems are renewed through the development of clitics from free pronouns, and of agreement affixes from clitics.

Givón (1976: 68) says that for Bantu languages it is beyond a doubt that agreement markers find their origins in pronouns, because, as he observes, if the noun phrase is left out agreement markers function as pronouns which links back to their older function.

The basic function of agreement is to show co-reference between appropriate parts of a natural language string. While there may be disagreement regarding the morphosyntactic coding of agreement, the purpose and function of it does not change.

4.2 Agreement in Bantu

The noun class system is at the heart of the agreement system in Bantu. Thus this section is primarily concerned with the noun class system as found in Bantu languages, though an initial explanation of the verb-form structure is necessary.

4.2.1 Verb Form Structure

Prefixation, and the system of noun class prefixes in particular, is perhaps the most well known feature of Bantu languages. The noun class system was covered in detail in section (2.5.1), and now we will look more generally at verbal morphology structure in Bantu languages.

Look at the following Isizulu example:

(123) *Ngi-zo-ba-sebenz-el-a* [Isizulu]
SM1sg-FUT-OM3pl-work-APPL-FV
'I will work for them'

The morphological order in this example is fairly standard for the structure of a complex verb form in the Bantu languages. Beginning from the left there is the SM *ngi-*, this is the first person singular marker (in Isizulu). While Bantu languages are predominantly SVO in structure, when it comes to the verb form, the OM occurs before the verb-stem. However, in example (123) there is an intervening morpheme between the SM and the OM. This morpheme carries tense information (in this case future tense). Following the tense marker is the OM *-ba-* which is the third person plural marker. Next is the verb root *-sebenz-* from the verb *sebenza* – 'work'. Immediately following the verb stem is the applicative marker *-el-* which signifies that the action denoted by the verb is being done for the benefit of somebody (it can also signify the action denoted by the verb is being done on behalf of somebody, to detriment of or with somebody or some place in mind), and finally there is the final vowel, completing the verb form. Not all verb forms involve the same formants as that in example (123), for example there may not be an OM, nor is it strictly necessary to have a derivation on the verb stem.

In many Bantu languages, there is a further formative that precedes the noun class prefix, known as the augment. The augment does not fulfil a single function and can occur as a single vowel or as a consonant-vowel compound. The possible functions of the augment can be pragmatically or semantically driven. Pragmatically, the augment can indicate definiteness, specificity (topic) or focus. Semantically, the augment typically occurs on the nouns, adjectives and numerals in constructions where the noun is in a main clause and does not follow a negative verb:

(124) *u-Sipho* *u-bhema* *kakhulu* [Isizulu]
AUG-Sipho SM-smoke a lot
'Sipho smokes a lot'

As mentioned above, it is not necessary for an OM to occur in the verb form. In cases where it does occur, languages vary as to the restrictions that are placed on the number of OMs that may occur.[24] Kiswahili allows only one OM on the verb form:

(125) *ni-li-m-p-a* [Kiswahili]
SC1sg-PAST-OC1-give-FV
'I gave him (it)'

(126) **ni-li-i-m-p-a* [Kiswahili]
SM1SG-PST-OM9-OM1-give-FV
Intd: 'I gave him it'

(127) **ni-li-m-i-p-a* [Kiswahili]
SC1sg-PAST-OC1-OC9-give-FV
Intd: 'I gave him it'

Whereas Setswana allows more than one:

(128) *kè à mó è ápéélà* [Setswana-Sengwato]
SC1 DISJ OC1 OC9 cook.APPL
'I am cooking it for him'

(129) *kè à é mò ápéélà* [Setswana-Sengwato]
SC1 DISJ OC9 OC1 cook.APPL
'I am cooking it for him'

Some languages freely allow more than one OM to occur on the verb form, other languages allow more than one OM only in restricted contexts – otherwise only one OM is permitted. Chibemba is one such language. Generally only one OM is allowed:

(130) **ni-ali-mu-ya-peel-a* [Chibemba]
SM1SG-PAST-OM1-OM6-give-FV
Intd: 'I gave him it (e.g. water)

However, two OMs are allowed if both OMs are from class 1/2 (animates) (e.g. example (131)) or if the second marker is 1st person singular (the first can be of any class) (e.g. example (132)):

(131) *mù-kà-bá-ndj-éb-él-á-kò* [Chibemba]
SM2PL-FUT-OM2-OM1SG-tell-APPL-FV-17POSTFINAL
'You will tell them for me'

[24] For a comprehensive study of variation in the south-eastern group of Bantu languages refer to Marten *et al.* 2007.

(132) *à-chî-m-péél-é* [Chibemba]
SM1-OM7-OM1SG-give-SUBJV
's/he should give it to me'

Further, languages that allow only one OM usually have rules that specify which object (in a construction that involves more than one object) can be incorporated as a marker. Sesotho and Kiswahili, for example, will favour the incorporation of objects denoting humans, whether or not that is the direct or indirect object. Languages that allow more than one OM often have similar rules because the actual use of multiple OMs is not always realized or favoured. Maho (1999: 113) cites the following Kinyarwanda example in which it is the "non-direct" objects that are favoured for incorporation:

(133) *y-a-cy-andik-iish-ijé-ho* [Kinyarwanda]
3SG-PAST-**OC7**-write-INSTR-PERF-LOC
imibáre *íngwa*
maths chalk
'He wrote maths on it (the blackboard, Cl.7) with chalk.'

Thus it can be seen that though the Bantu languages have certain agreement features in common, such as the noun class system, there is a certain amount of variation amongst them which makes it impossible to generalise too far across the languages and also makes it an interesting area to investigate. For a thorough look at the parameters of morpho-syntactic variation across a number of Bantu languages see Marten *et al.* 2007.

4.2.2 Pronominal Agreement 2 – Conjoined Noun Phrases

As has already been mentioned (section (4.1.1)) Bantu languages show a strong tendency towards alliterative agreement with regards to the agreement markers. They are not completely alliterative though, and this can cause issues when dealing with conjoined noun phrases. The matter here is between semantic agreement and what Katamba (2003: 113) calls "mechanical" agreement, which is not semantically motivated. Bantu languages exhibit examples of both kinds of agreement and utilise the different types under different circumstances.

Before exploring the agreement methods of resolving conjoined noun phrases, Maho (1999: 114) describes three methods of avoiding agreement with conjoined noun phrases in the first place. The first is commitative constructions (which appears to be the most preferred), as illustrated by example (134) below, in which the non-commitative interpretation would be " the servants and the wagons have come":

(134) *ba* *tlhanka* *ba* *tsilê* *le* *di* *kôlôi* [Setswana]
NP.2 servant SC.2 have.come COM NP.10 wagon
'The servants have come with the wagons.'

The second method of avoiding agreement with conjoined noun phrases involves a repetition of the verb (also Setswana) by using sentential conjunction:

(135) *ba* *tlhankaba* *tsilê,* [Setswana]
NP.2 servantSC.2 have.come
le *di* *kôlôi* ***di*** *tsilê*
CON NP.10 wagon **SC.10** have.come
'The servants have come, and the wagons have come."

The third method of avoiding agreement with conjoined noun phrases is the "impersonal construction" which involves the use of a locative in subject position (once again Setswana):

(136) *gô* *tsilê* *ba* *tlhanka* [Setswana]
SC.17 have.come NP.2 servant
le *di* *kôlôI*
CON/COM NP.10 wagon
'There have come servants and/with wagons.'

Corbett (2006: 250) claims that most Bantu languages resolve the issue of conjoined noun phrases through a human/non-human distinction. However, Maho (1999) distinguishes between syntactic, semantic, number and indefinite resolution. Kiswahili shows agreement with the nearest conjunct in a conjoined noun phrase, in which the noun class of one of the conjoined noun phrases is agreed with. This is syntactic resolution as shown in the following examples (Bokamba 1985: 45):

(137) *ki-ti* *na* ***m-guu*** *wa* [Kiswahili]
NP.7-chair and **NP.3**-leg of
meza ***u-me-vunjika***
table **SC.3**-PERF-broken
'the chair and the leg of the table are broken'

(138) *m-guu* *wa* *meza* *na* *ki-ti* [Kiswahili]
NP.3-leg PC.3 table and NP.7-chair
ki-me-vunjika
SC.7-PRF-broken
'the leg of the table and the chair are broken'

In example (137) the NP headed by *mguu* 'leg', which is of class 3/4, is the only NP that the verb agrees with because the verb shows singular agreement – which means that

it is not reflecting the full interpretation of the utterance, since there are two things that are broken. Example (138) reverses the order of the constituents and so brings a change in agreement on the verb form. In example (138) the verb shows class 7 agreement, illustrating that agreement is with the nearest conjunct to the verb. In Oshindonga, it is the first noun that is taken into account with conjoined noun phrases, but only if it is plural:

(139) ***óma**-úsiku* *n-omi-ténya* *otá-**gé*** *ya* [Oshindonga]
NP.6-night and-NP.4-day TMA-**SC.6** come
'The nights and the days are coming.'

(140) ***ómi**-tenyá* *n-óma-usíku* *o-**dhí*** [Oshindonga]
NP.4-day and-NP.6-night TMA-**SC.4**
vúlathane
not.be.equal
'The days and the nights are not equal.'

If the first noun is not a plural, number resolution occurs instead and the noun class of the singular noun is reanalysed to the corresponding plural class, such as in example (141) below where the plural of the singular class 9 is class 10:

(141) ***om**-bete* *e-mbó* *n-oshi-táafula o-**dhi*** [Oshindonga]
NP.9-bed NP.5-book and-NP.7-tableTMA-**SC.10**
lí *megumbo*
be in.the.house
'The bed, the book and the table are in the house.'

When semantic resolution occurs, the agreement is determined due to the lexical semantics (certain properties) of all or one of the nouns. In example (142) below (Corbett 2006: 249), in Luganda it is the class 2 agreement marker that is found on the verb-form even though none of the conjuncts belong to the class 1/2 gender, however all are humans:

(142) *ek-kazi,* *aka-ana* *ne* [Luganda]
SG-fat.woman(5/6) SG-small.child(12/14) and
olu-sajja *ba-alabwa*
SG-tall.man(11/12) 2-were.seen
'The fat woman, the small child and the tall man were seen'

In example (143) (Corbett 2006: 249), also Luganda, none of the conjuncts are humans and the agreement form is of class 8:

(143) *en-te,* *omu-su,* *eki-be* *ne* [Luganda]
SG-cow(9/10) SG-wild.cat(3/4) SG-jackal(7/8) and
ely-ato *bi-alabwa*
SG-canoe(5/6) 8-were.seen
'The cow, the wild cat, the jackal and the canoe were seen'

Indefinite resolution involves a "neutral, indefinite or impersonal" (Maho, 1999: 120) marker, meaning that the noun class(es) of the noun phrases in question do not play any part. It is not commonly used across the Bantu languages but is found in Isizulu and Siswati where a locative is used for this purpose, and in Tshivenda where it is the subject concord of class 8 that can be used with the conjoined noun phrases of any class.

There is a distinct problem when it comes to conjoined noun phrases that involve both humans and non-human conjuncts. The result is often ungrammatical or questionable, as the following two Luganda examples illustrate (Corbett 2006: 249-250):

(144) ?*omu-sajja* *ne* *em-bwa-ye* *bi-agwa* [Luganda]
SG-man(1/2) and SG-dog(9/10)-his 8-fell
'The man and his dog fell down'

(145) **omu-sajja* *ne* *em-bwa-ye* *ba-agwa* [Luganda]
SG-man(1/2) and SG-dog(9/10)-his 2-fell
'The man and his dog fell down'

While example (144), utilising the standard agreement form for non-human conjuncts, is questionable, example (145) with the human agreement marker is completely unacceptable. Thus, Corbett (2006: 250) states the following as solutions for the resolution of conjoined noun-phrases in Luganda:

a. If all the conjuncts are semantically human, agreement is gender 1/2.
b. If none of the conjuncts is semantically human, agreement is gender 7/8.
c. If the conjuncts are semantically mixed, the commitative construction is preferable; if gender resolution is forced, the form will be as for non-humans.

An important issue to note at this point is that of the conjunctive/commitative marker (*na* in examples (137) and (138), and *ne* in examples (144) and (145)). In many contexts a correct translation of this marker into English would be as a joint 'and/with' since the same marker can serve both functions. Maho (1999: 121) argues that it is only when this marker is restricted to its conjunctive ('and') interpretation that a discussion of conjoined noun phrases is possible. If there is a commitative ('with') interpretation

of the marker, there is usually a rearranging of the noun phrases so that those which are not the first subject noun phrase occurs after the verb.[25]

Having determined the function of the agreement markers, I turn, in the next section, to a discussion on how the agreement markers in Bantu languages can be analysed – either as incorporated pronouns that always show anaphoric agreement with a co-referential NP, or as a grammatical agreement marker.

4.3 Bresnan & Mchombo and Demuth & Johnson

Two seminal works on the agreement markers in Bantu languages are Bresnan & Mchombo (1987) (henceforth B&M), and Demuth & Johnson (1989) (henceforth D&J). B&M argue that in Chichewa the OM is an incorporated pronoun which is always in anaphoric agreement with its co-referential object NP, while the SM is ambiguous between being a grammatical agreement marker and an anaphoric pronoun. According to B&M (1987: 741) an incorporated pronoun will have a semantic attribute in the lexical content of the affix and a grammatical agreement marker will not.

D&J, in comparison to B&M, argue that in Setawana both the SM and the OM are incorporated pronominals and the SM is never a grammatical agreement marker.

Chichewa is spoken in East Central Africa, mainly in Malawi, Mozambique, Zambia and Zimbabwe (and here is also known as Chinyanja). According to Guthrie's classification (1948), Chichewa (or as he calls it Chinyanja) belongs to Zone N, Group 30, and is classified as N31. Setawana is a northern dialect of Setswana, which is spoken mainly in Botswana. According to Guthrie's classification, Setawana belongs to Zone S, group 20, and is classified as S21.

Both B&M and D&J use the Lexical Functional Grammar (LFG) framework for their analyses and both invoke a notion of Topic and Focus which deserves some attention here. A constituent is considered a Topic if it has already been mentioned in the discourse, whereas a constituent that is new to the discourse is said to be in Focus. According to B&M, and explained also in D&J, grammaticalized topics will function in the discourse as Topic but not all discourse topics will be grammatically marked. The same applies to constituents in Focus. Both Topic and Focus have to be functionally

[25] For a Dynamic Syntax account of conjoint noun phrase resolution, see Cann *et al.* (2005: Chapter 7).

identified with or anaphorically linked to an argument in the predicate argument structure, and so satisfy the Extended Coherence Condition.

4.3.1 Topic, Pronoun and Agreement in Chichewa

In Bantu languages the verb can morphologically agree with different clausal NPs (subject, direct object, indirect object), different Bantu languages have differing restrictions on subject and object markers. B&M state that (from a lexical-functional perspective) the verbal affixes in Chichewa mark either grammatical or anaphoric agreement (1987: 741). When grammatical and anaphoric agreement are both found in the same language they can be distinguished by interrelated discourse, syntax, and phonology effects. Several typological studies have claimed that grammatical agreement systems arise from pronouns being morphologically incorporated into verbs/nominal heads. In the case of Bantu, Givón (1976) argues that subject and object pronouns that are used for the purpose of referring to a topic became cliticised and bound to the verb morphologically, and that this cannot be diachronically or synchronically differentiated from the anaphoric relationship between a morphologically bound pronoun and a discourse topic. However, B&M state (1987: 742) that since the same verbal form classes are used in Chichewa for anaphoric and grammatical agreement this typological explanation is inadequate.

At this stage some important terminology needs explaining; grammatical agreement and anaphoric agreement. Grammatical agreement involves an NP having an argument relation to the verb with the verbal affix redundantly expressing person, number, and gender classes of the NP. Anaphoric agreement involves the verbal affix being an incorporated pronominal argument of the verb with the NP having a non-argument function as an adjunct of the pronominal argument or topic or focus function in the clause/discourse structure.

B&M argue that Chichewa is a configurational language[26] (the subject and object functions are encoded in the phrase structure) but in simple sentences the same structural form can be used for anaphoric agreement with a topic and for grammatical subject agreement, so the difference between anaphoric and grammatical agreement cannot result from of the structural typology of sentence forms.

[26] Baker, in his (2001) article on non-configurationality in languages does not mention Bantu languages even though he has worked extensively on them. This would imply that he believes Bantu languages to be configurational. However, more recently, Mchombo *et al.* (2005) have suggested that Bantu is not as configurational as has been believed.

4.3.1.1 Object Marker as Incorporated Pronoun

Chichewa has subject and object agreement in verbal morphology and the finite verb forms have an obligatory SM with an optional OM, as can be seen from the following two examples:[27]

(146) *Njûchi* *zi-ná-lúm-a* *alenje*
bees SM-past-bite-INDIC hunters
'The bees bit the hunters'

(147) *Njúchi* *zi-ná-wá-lum-a* *alenje*
bees SM-past-OM-bite-INDIC hunters
'The bees bit them, the hunters'.

In Chichewa (as with most Bantu languages) the SM and OM show person, number and gender.[28] In simple transitive sentences the object immediately follows the verb while the subject is 'free' even without an OM. This interaction between word order and morphology is illustrated by the following sentences:

(148) a. SuVO: *Njûchi* *zi-ná-lúm-a* *alenje*
bees SM-past-bite-INDIC hunters
'The bees bit the hunters.'
b. VOSu: *Zinálúma alenje njûchi*
c. OVSu: **Alenje zinálúma njûchi*
d. VSuO: **Zinálúma njûchi alenje*
e. SuOV: **Njûchi alenje zinálúma*
f. OSuV: **Alenje njûchi zinálúma*

But with an OM all of the word orders are possible, as illustrated by the examples below. However B&M argue that when there *is* an OM it blocks the use of an object NP in a VP (due to functional uniqueness),[29] and so the NP is actually "free-floating", linked to the OM and is a topic rather than an object,[30] as illustrated by example (149 a.-f.) below:

(149) a. Su[VPV]TOP: *Njûchi zi-ná-**wá**-lum-a* *alenje*
bees SM-past-OM-bite-INDIC hunters
The bees bit them, the hunters

[27] Unless otherwise indicated, all examples, including gloss and translations, are as given in the original texts.
[28] Bantu languages vary in terms of what features the SM and OM include. They may have all, one or some of the given features (for example Lingala SMs and OMs only have number feature). It is important to note here that the terminology used is that used by B&M, because in many Bantu studies the term "class" is used instead of "gender".
[29] Functional Uniqueness is a function whereby each attribute in f-structure has a unique value.
[30] B&M gloss the object as "topic" and I have recreated this here.

b. [VPV]TOPSu: *Zináwáluma alenje njûchi*
c. TOP[VPV]Su: *Alenje zináwáluma njûchi*
d. [VPV]SuTOP: *Zináwáluma njûchi alenje*
e. SuTOP[VPV]: *Njûchi alenje zináwáluma*
f. TOPSu[VPV]: *Alenje njûchi zináwáluma*

B&M (1987: 746) give account for the flexibility in word order, as demonstrated above, using a number of arguments:

a. The SM can be used for both grammatical and anaphoric agreement, thus it is ambiguous in its use.
b. The OM is only (and therefore unambiguously) used for anaphoric agreement and agrees with an NP which fulfils the Topic function, as mentioned above.
c. Object NPs occur in a fixed, postverbal position in a VP constituent, these postverbal objects can only occur in the VP if there is no OM on the verb.
d. There are six possible orders of the combination of: optional subject NP, VP, optional topic NP.
e. Topic and Focus functions have to satisfy the Extended Coherence Condition[31] (ECC), that is they must be linked to the semantic predicate argument structure of the sentence in which they occur by functionally/anaphorically binding an argument. "The apparent co-occurrence of OM with an object NP is thus explained as the anaphoric binding of an object pronoun, incorporated in the verb, to a topic NP in S."

When there are restrictions on word order (such as found in example (148) above), B&M cite the following reasons; Firstly, there is a transitive verb but no OM. Second, the verb's subcategorisation for object is satisfied by the postverbal NP generated by argument c) above – that is that the object has a fixed position in the VP. Third, subject NPs generated by argument d) above can be reordered before or after the VP but not inside it,[32] if a topic is also generated by argument d) the ECC would require it to be linked to the semantic predicate argument structure (which is accomplished in Chichewa through the generation of an incorporated anaphoric object in the verb (OM) which the topic NP then anaphorically binds). Finally, an OM prevents the use of object NPs inside the VPs through functional uniqueness.

The NP *alenje* – 'hunters' in the free word order examples in (149) above is described by B&M as a topic, not an object, as it can be freely ordered with respect to the subject and the VP. This raises two essential questions: 1) why is gender class agree-

[31] The Extended Coherence Condition states that all functions in f-structure must be bound – an argument function (subject, object, oblique) is bound if it is the argument of a predicator, an adjunct is bound if it occurs in an f-structure containing a predicate, a topic/focus is bound when it is functionally identified with, or anaphorically binds, a bound function.
[32] This is because B&M assume that the subject in Chichewa is base-generated without any ordering with respect to the VP.

ment required between the topic NP and the incorporated object pronoun? and 2) why must the topic NP be anaphorically linked to an incorporated pronoun (resembling an agreement marker) rather than to an independent pronoun in object NP position?

In answer to the first question, B&M argue that person, number and gender are pronominal categories which universally show agreement in anaphoric relations.[33] Chichewa shows gender class agreement in discourse anaphora and deixis. Gender class agreement in discourse anaphora is illustrated in example (150) below, with the class 7 OM *-chî-* in *ánákáchîgulîtsá* referring back to *chipéwá* - 'hat' which is of class 7:

(150) *Fisi* *anagúlá* ***chipéwá*** *ku* *San Francîscó dzulo.*
hyena bought hat(7) in San Francisco yesterday
Madzŭlo *anapîtá* *ku* *San Jose* *kuméné*
evening he-went to San Jose where
*á-ná-ká-**chî**-gulîtsá* *kw'á* *mlóndá* *wá* *á* *mêya.*
he-PAST-go-it(7)-sell to guard of hon. Mayor
'The hyena bought a hat in San Francisco yesterday. In the evening he went to San Jose, where he went to sell it to the mayor's guard.'

An important point to note here is that anaphoric relations (such as the one between *chipéwá* and *-chî-* in (150) above) cross sentence boundaries in discourse and so cannot be analysed as grammatical agreement between a verb and its argument. Another example B&M use to show the presence of person, number and gender features in deixis is the Chichewa word *mkângo* 'lion' belonging to noun class 3 and requiring any referring (deictic) words to be class 3 – even in cases where the actual noun is not present, the deictically used demonstrative has to be of the same class as the word that would be used, even though it is not there (for example, *iwo* when pointing to a lion). This does not come from syntactic agreement, the choice of agreement features (person, number, gender) in the anaphoric use of pronominals is independently motivated, and not solely due to syntactic agreement mechanisms.

In answer to the second question, B&M argue that independent pronouns are used for the introduction of new topics or for contrast (as opposed to demonstrative pronouns, and as *iwo* mentioned above) so if they are used it appears as though they are referring to topics not mentioned in a previous sentence, as exemplified in the following:

[33] Categories of grammatical agreement are pronominal in nature because grammatical agreement systems are said to evolve from incorporated deictic and anaphoric pronominal systems, as discussed earlier.

(151) *Fìsi* *anadyá* *chîmanga.* *A-tá-chî-dya,* *anapîtá* *ku*
Hyena ate corn(7) he-SER-it(7)-eat he-went to
San Francîsco.
San Francisco.
'The hyena ate the corn. Having eaten it, he went to San Francisco.'

(152) *Fìsi* *anadyá* *chimanga.* *A-tá-dý* ***icho*** *anapîtá* *ku*
hyena ate corn(7) he-SER-eat(7) it he-went to
San Francîsco.
San Francisco.
'The hyena ate the corn. Having eaten it (something other than the corn), he went to San Francisco.'

(153) *Fìsi* *anadyá* *ḿkângo.* *A-tá-ú-dya,* *anapîtá* *ku*
hyena ate lion(3) he-SER-it(3)-eat he-went to
San Francîsco.
San Francisco.
'The hyena ate the lion. Having eaten it he went to San Francisco.'

(154) *Fìsi* *anadyá* *ḿkângo.* *A-tá-dyá* ***îwo,*** *anapîtá* *ku*
hyena ate lion(3) he-SER-eat it(3) he-went to
San Francîsco.
San Francisco
'The hyena ate the lion. Having eaten it (something other than he lion), he went to San Francisco.'

The use of *icho* 'it' and *îwo* 'it' in sentences (152) and (154) have to be interpreted as referring to something that has been mentioned in a previous sentence (though that something does not exist as there are no previous sentences) even though they agree in gender, number and person with the objects of the sentences.

According to the LFG analysis the Extended Coherence Condition requires a floating topic to be anaphorically bound to an argument, independent pronoun objects cannot be used in this way because they are contrastive as these sentences show:

(155) **?Mkángó* *uwu* *fisi* *a-na-dy-á* *îwo.*
Lion(3) this hyena SM-REC.PAST-eat-INDIC it(3)
'This lion, the hyena ate it.'

(156) **Fìsi* *a-na-dy-á* *îwo* *mkángó* *uwu.*
hyena SM-REC-PAST-eat-INDIC it(3) lion(3) this
'The hyena ate it, this lion.'

The use of *uwu* in the above sentences is contrastive because it points out a specific lion that is being talked about, however, the use of *îwo* causes ungrammaticality because

there is nothing for it to be in contrast with. Non-contrastive anaphora to a topic is achieved through the use of incorporated object pronouns.

B&M argue that the OM is an incorporated pronoun and provide evidence for this from phrase final tonal change. Some necessary issues to know at this point are that tonal change is connected to lengthening of the penultimate syllable and that a final H tone retracts to a L tone when in the penultimate syllable – yielding a rising tone. For example: subjunctive -*é* has a H tone when followed by the object of a subjunctive verb but when the same verb is spoken in isolation or followed by something lying outside VP the -*é* has a L tone and the preceding syllable has a high/rising tone, as illustrated by comparing the following sentences:

(157)	*Ndikufúná*	*kutî*	*ána*	*ánga*	*[a-pitiriz-é*	*páng'ónó*
	I-want	that	children	my	SM-continue-SUBJN	a.little
	páng'ôno]					
	a.little					
	'I want my children to continue slowly.'					

(158)	*Ndikufúná*	*kutî*	*[a-pitiřiz-e]*	*aná*	*ánga*
	I-want	that	SM-continue-SUBJN	children	my
	'I want my children to continue.'				

Sentence (157) has an adverbial complement of the form Su[V Adjunct], so there is no tonal change on the verb because the adverb (*páng'ónó páng'ôno* 'slowly') is a constituent of the VP and cannot occur before or after the subject NP (*áná ánga* 'my children'). In contrast, sentence (158) has no complement [V]Su as the inverted subject is outside of the VP ([V]Su) allowing tonal retraction on the verb – showing that "a postverbal constituent inside the verb phrase prevents the tonal retraction but those outside the VP do not." (1987: 750)

According to B&M a postverbal NP in anaphoric agreement with an OM is really a topic. Therefore, a verb containing an OM and followed by an agreeing NP shows the same tonal effects as a VP-final verb – the H tone retracts to the preceding, lengthened, vowel as can be seen by comparing examples (159) and (160). An OM is not the cause of L tone on the final syllable of a subjunctive, as can be seen by inserting a phrase in the VP following the verb (as in (159)) causing the verb to be non-phrase-final, a H tone reappearing on final -*é* and the penultimate syllable to be short:

(159) *Ndikufúná* *kutî* *áná* *ánga* *[a-pitiriz-é* *phúnziro].*
I-want that children my SM-continue-SUBJN lesson
'I want my children to continue the lesson.'

(160) *Ndikufúna* *kutî* *áná* *ánga* *[a-li-pîtîrĭz-e]*
I-want that children my SM-OM-continue-SUBJN
phunziro
lesson
'I want my children to continue it, the lesson.'

(161) *Ndikufúná* *kutî* *áná* *ánga*
I-want that children my
[a-li-pîtîriz-é *ndî* *inu]* *phunziro.*
SM-OM-continue-SUBJN with you lesson
'I want my children to continue it with you, the lesson.'

A further example can be seen by using a double-object verb in the subjunctive. Adding an OM to the verb causes the first object in a double-object construction to move outside the VP but the second object remains, and since the verb is still not in phrase-final position there is no tonal retraction:

(162) *Ndikufúná* *kutî* *[mu-pats-é* *alenje* *mphâtso].*
I-want that you-give-SUBJN hunters gift
'I want you to give the hunters a gift.'

(163) *Ndikufúná* *kutî* *[mu-wa-páts-é* *mphâtso]* *alenje.*
I-want that you-OM-give-SUBJN gift hunters
'I want you to give them a gift, the hunters.'

In summary, the interaction between word order and verbal agreement morphology, and between tone and phrase structure show that the OM is not an object agreement marker but an incorporated object pronoun that can be anaphorically linked to a floating topic NP in a sentence. This pronominal anaphora to topic resembles agreement for a number of reasons: Firstly, discourse-anaphoric relations (and deixis) show agreement in categories of person, number and gender/class which are also categories of grammatical agreement between a verb and its arguments which shows that many agreement systems historically result from pronominal systems. Second, independent object pronouns in Chichewa have a contrastive discourse use making them incompatible with topic anaphora in sentences or discourse, and finally, incorporated pronouns are the only pronominal objects capable of linking topic NPs to predicate argument structure.

The SM, however, is different from the OM as it only sometimes functions as a pronoun. The reason for analysing them differently is due to B&M's theory of argument functions and discourse functions, which I will outline below.

4.3.1.2 Grammatical vs. Anaphoric Agreement

4.3.1.2.1 Locality

B&M argue that only anaphoric agreement relations can be non-local to the agreeing predicator (a local agreement relation holds between elements of the same simple clause, non-local holds between elements of different clauses) because only argument functions can be directly governed by predicators and these argument functions must be expressed syntactically within phrasal structures headed by predicators or expressed morphologically on the head itself, else remain unexpressed to satisfy completeness and coherence conditions. Further, a government relation between a verb and its non-controlled arguments must be local to the verb while verbs can agree grammatically only with their governable arguments.

An incorporated pronoun is a referential argument governed by the verb and an external referential NP cannot also serve as that argument (by functional uniqueness), that is, an external NP cannot be related to that argument position of the verb by government, only by an anaphoric relation with an agreeing incorporated pronoun.

B&M predict that because only anaphoric agreement relations can be non-local, the relation between the Chichewa OM and the floating NP it agrees with is anaphoric agreement because it can be non-local – this is supported by the following example:

(164) *Chigawéngá* *ichi* *asilikálî* *á* *gânyu*
terrorist(7) this soldiers of temprorary.work
a-na-úz-á *mtsogoleri* *wâthu* *kutî* *s-a-ngath-é*
SM-REC.PAST-tell-INDIC leader our that not-SM-can-SUBJN
ku-chî-gwîr-a.
INF-OM(7)-catch-INDIC
'This terrorist, the mercenaries told our leader they cannot catch him.'

The sentence in example (164) is grammatically correct even though the OM *-chi-* and the NP it agrees with *chigawéngá* 'terrorist' are very far from local within the sentence. Furthermore, a floating topic NP can be non-locally linked to the OM.

A SM is a non-referential marker of grammatical agreement (unlike the OM) as well as having referential use as an incorporated pronoun. This means that SV sentences are functionally ambiguous with the subject NP being either a true subject with

which the verb shows grammatical agreement or a topic NP related to the subject pronominal in the verb by anaphoric agreement.

The SM can be used in the same way as the OM for non-local anaphora to topic, but it can either be an incorporated pronominal or a true grammatical agreement marker (which the OM cannot) so there should be asymmetries between subject agreement and object agreement.

4.3.1.2.2 Subject vs. Topic

When a SM is used as a grammatical agreement marker it agrees with a nominal subject, when it is used for anaphoric binding its antecedent has a topic function in the sentence.

In LFG grammatical functions are split into Argument Functions and Non-Argument Functions. Argument Functions are subjects, objects and obliques. These are directly mapped onto semantic/thematic roles in lexical predicate-argument structures, they provide a uniform way of designating participants in events/actions/situations which are depicted by various subclasses of lexical predicators and must be unique in clauses. Non-argument Functions are topics, focus and adjuncts. These must be linked to other grammatical functions (ECC) and are only indirectly associated with predicate-argument structure, they serve to structure information content of an utterance in order to aid communication between speaker and hearer and can have multiple instances.

B&M adopt three principles relating to the role of topic and focus in grammars of natural language: The first principle is that in relative clauses the relative pronoun/relativized constituent bears topic function. The second is that in interrogative clauses the interrogative pronoun/questioned constituent universally bears focus function. And the third is that the same constituent cannot be both focus and topic at the same level of functional clause structure (but in cleft constructions the same phrase is interpreted as both focus and topic but at different levels of embedding).

Since topic designates what is under discussion, and so is presupposed, and focus designates what is not presupposed, having them both expressed by the same constituent leads to inconsistent presuppositions.

This all leads to B&M making five predictions about Chichewa:

1) Questions are formed with the question word in place within a clause. In non-cleft interrogative clauses there should be agreement asymmetry between subjects and objects and it should be possible to question the subject with the SM but not objects with

the OM. This is because the OM is an incorporated object pronoun and so an object question word in the same clause has to be a floating topic NP that is anaphorically linked to the OM. This means that the question word will be in topic and focus of the same clause (which is a violation of argument c) in section (4.3.1.1) above):

(165) ??*[(Kodî)* *[mu-ku-chî-fún-á]* *chîyâni?]*
Q you-PRES-OM(7)-want-INDIC what(7)
SUBJ OBJ FOCUS
TOPIC
anaphoric binding
'What do you want (*it)?'

The SM is a non-referential agreement marker for grammatical subjects and can be used as a referential incorporated pronoun – so that the question word can be the subject of the verb without being interpreted as the topic:

(166) *[(Kodî)* *chîyâni* *chi-ná-ónek-a?]*
Q what(7) SM(7)-PAST-happen-INDIC
SUBJ SM
FOCUS
grammatical agreement
'What happened?'

2) Non-local subjects should not allow questioning in place (as opposed to local subjects). Only subjects locally governed by the verb can be questioned in non-cleft constructions.

3) There is an alternative question construction in Chichewa where the question word is clefted and the content of the question expressed in a relative clause. The relative clause may contain an OM to which a relative pronoun is anaphorically bound. Clefting splits the topic and focus into two different clauses causing the subject/object asymmetry to disappear and allowing both a SM and an OM within the same embedded clause, as illustrated by the examples below:

(167) *[Kodî* *ndî* *chiyâni* *[chi-méné* *mú-kú-chî-fún-a?]]*
Q COP what(7) 7-REL you-PRES-OM(7)-want-INDIC
FOCUS TOPIC OBJ
'What is it that you want?'

(168) *[Kodî ndî chiyâni [chi-méné chî-ná-ónek-a?]]*
Q COP what(7) 7-REL SM(7)-PAST-happen-INDIC
FOCUS TOPIC SUBJ
'What is it that happened'?

(169) *(Kodî) ndî chiyâni chi-méné mú-kú-fún-á*
Q COP what(7) 7-REL you-PRES-want-INDIC
kutî chi-oněk-e?
that SM(7)-happen-SUBJN
'What do you want to happen?'

4) The asymmetry between subject and object agreement in questions is not found in relative clauses, as shown by the examples below:

(170) *Munthu [a-méné ndî-ná-mú-yénděra]*
person(1) 1-REL I-PAST-OM(1)-visit
TOPIC OBJ
'The person that I visited.'

(171) *Munthu [a-méné á-ná-ndî-yénděra]*
person(1) 1-REL SM(1)-PAST-me-visit
TOPIC SUBJ
'The person that visited me.'

5) NPs with a definite and indefinite interpretation can be used to represent information previously mentioned in the discourse and so can be anaphorically linked to the SM and the OM as topics. However idiomatic objects and cognate objects are not used in this way (they elaborate on the meaning of the verb) and so the NPs are difficult to topicalise.

4.3.1.3 Typology

Chichewa has two anaphoric pronouns: OMs which are used for anaphora to a topic and independent object pronouns that introduce new topics or are used for contrast of arguments.

Kameyama (1985) argues that all languages have two kinds of pronominals that can be used anaphorically; those used for reference recoverable in discourse and those for contrast, emphasis or focus, with the former having less phonetic content than the latter. Following this idea, B&M introduce the Pronominal Incorporation (PI) property: Chichewa morphologically incorporates pronominal arguments into the lexical categories that govern them. Some of the results of this are that any language that has PI must

be pro-drop due to functional uniqueness (and though the prefix actually *is* the pronoun and so cannot really be dropped, the term is kept as it is so widely used); incorporated pronominal arguments are incompatible with the corresponding syntactic NP arguments, and so can only be used when the NP arguments are omitted (by functional uniqueness); Chichewa has subject and object pro-drop because the SM is sometimes, and the OM is always, an incorporated pronoun. The agreement categories involved in these relations are person, number, gender (animacy), but not case.

In languages with PI a head cannot govern the case of referential nominals with which incorporated pronouns agree. If the incorporated pronoun is a referential argument governed by the verb (head), an external referential NP cannot also be that argument (by functional uniqueness). So, an external NP can only be related to the argument position of the verb by anaphora with the agreeing incorporated pronoun and not by government.

In their discussion of case B&M predict that all PI languages have no case marking on anaphorically linked lexical NPs because they argue that case is assigned under government from the verb and it is the SM and OM that are governed by the verb since the SM and OM are incorporated pronouns.

In summary, pronominal incorporation can be distinguished typologically from grammatical agreement by a cluster of at least three properties: 1) The contrastive discourse role of the independent pronouns; 2) the presence of pro-drop; 3) the lack of verbally governed grammatical case-marking on the nominal that is anaphorically linked to the incorporated pronoun.

4.3.1.4 Sentence and Discourse Topics

At this stage it would be useful to address Topic: How do we know the topic is a grammaticized discourse function? And, how do we know the topic gets its properties from discourse topics? It is important to remember the difference between OMs (anaphora to topic) and independent object pronouns (introduce new topics/contrast arguments), and that only incorporated pronouns are used to pick up references to discourse topics. (The 'properties' of the topic are that a topic NP is used for information that has been previously mentioned in the discourse that can be specific/non-specific or definite/indefinite.)

Wherever a contrast exists between topic-anaphoric and contrastive pronominals in discourse it will also appear in sentences in the following constructions all of which involve anaphoric binding to grammaticalized topics:

Floating topic:

(172) *Mkángó* *uwu* *fisi* *a-ná-ú-dy-a*
lion(3) this hyena SM-PAST-OM(3)-eat-INDIC
'This lion, the hyena ate it.'

(173) *?*Mkángó* *uwu* *fisi* *a-ná-dy-á* *ĭwo*
lion(3) this hyena SM-PAST-eat-INDIC it(3)
'This lion, the hyena ate it.'

Relative clauses:

(174) *Ndi-ku-lîr-îr-a* *mkángó* *u-méné fisi*
I-PRES-cry-APPL-INDIC lion(3) 3-REL hyena
á-ná-ú-dy-a
SM-PAST-OM(3)-eat-INDIC
'I'm crying for the lion that the hyena ate.'

(175) *?*Ndi-ku-lîr-îr-a* *mkángó* *u-ménéfisi*
I-PRES-cry-APPL-INDIC lion(3) 3-REL hyena
á-ná-dy-á *ĭwo*
SM-PAST-eat-INDIC it(3)
'I'm crying for the lion the hyena ate.'

Subordinate clause of cleft constructions:

(176) *Sî* *ḿkángó* *uwu* *u-ménéfisi* *á-ná-ú-dy-a*
NEG.COP lion(3) this 3-REL hyena SM-OM(3)-eat-INDIC
'It's not this lion that the hyena ate.'

(177) *?*Sî* *ḿkángó* *uwu* *u-ménéfisi* *á-ná-dy-á*
NEG.COP lion(3) this 3-REL hyena SM-PAST-eat-INDIC
îwo
it(3)
'It's not this lion that the hyena ate.'

Chichewa also has a pronominal preposition object combining *na-* (which is a contracted form of the preposition *ndi* 'with/by') with bound pronominals (which are reduced forms of independent pronouns). Contracted forms are synthetic prepositional phrases where the pronominal object is incorporated into the preposition and used for anaphoric reference to topics. Anaphoric binding of a topic NP to an incorporated prepositional object pronoun occurs under the same syntactic conditions as between a topic NP and an OM, and with an NP subject and an NP topic all six orders of subject, VP, and topic are grammatically possible.

As occurs in English, where there are not two different pronominal forms for topic anaphora or introduction/contrast, the same pronominal form can be used and the difference is indicated by intonation. This applies to Chichewa prepositions that do not have contracted forms.

Another important point to note is that in Chichewa the SM is functionally ambiguous. As an incorporated pronoun it should be like the OM in terms of its topic-anaphoric use, but as an agreement marker (without pronominal function) it does not provide a topic-anaphoric counterpart to the independent subject pronoun. In this situation the independent pronoun is expected to serve both functions and when it is a subject it can be used for anaphora to the topic, as illustrated by the examples below:

(178) *Mkângo* *u-na-gúmúla* *khólá* *lá* *mbûzi* *koma*
lion(3) SM-REC.PAST-pull.down corral of goats but
îwo *u-ma-fúná* *ku-gúmúla* *nyumbá* *yá* *mfûmu*
it(3) SM-PAST.HAB-want INF-pull.down house of chief
'The lion has pulled down the goats' corral, but it really wanted to pull down the chief's house.'

(179) *Mkángó* *uwu,* *ndi-ku-gánîza* *kutî* *îwó* *u-ma-fúná*
lion(3) this I-PRES-think that it(3) SM-PAST.HAB-want
ku-gúmúla *nyumbá* *yá* *mfûmu*
INF-pull.down house of chief
'This lion, I think that it wanted to pull down the house of the chief.'

Furthermore, the communicative function of the anaphoric pronominal system in discourse is systematically related to the role of the subject and object prefixes as grammatical agreement markers or incorporated pronouns, respectively. With a true agreement marker (such as the Chichewa SM) the corresponding independent pronoun will be topic-anaphoric in discourse and grammaticalized topic constructions, while with a true incorporated pronoun (such as the Chichewa OM) the corresponding independent pronoun will be non topic-anaphoric

If the topic function gets its properties from discourse topics, a grammatical topic must have a discourse topic as its referent – but sentences can have discourse topics that are not necessarily marked as such. What this means is that not all discourse topics are grammaticalized *and* bear the topic function in f-structure.

4.3.1.5 Sources of Variation

The minimal difference between an incorporated object pronoun and a grammatical object agreement marker in B&M's analysis is the presence or absence of a semantic attribute in the lexical content of the affix. When an incorporated pronoun (SM/OM) loses its pronominal reference (PRED) it no longer blocks the co-occurrence of an NP subject/object; the features of the subject/object marker (person, number, gender) must merge with those of the subject/object NP (functional uniqueness).

Some Bantu languages are undergoing grammaticalization of their pronominal OM into an object agreement marker (as happened with the SM). This occurs when the pronominal OM loses its PRED feature; functional uniqueness no longer prevents the co-occurrence of the OM with an object NP within the VP, and functional uniqueness stipulates only that the remaining pronominal features (number, gender, class, person) are consistent with the features of the NP object.

4.3.2 Interaction Between Discourse Functions and Agreement in Setawana

In contrast to B&M, Demuth & Johnson argue that both the SM and the OM are incorporated pronominals and the SM is not ambiguously a grammatical agreement marker in Setawana (as B&M show it is in Chichewa). D&J look at seven factors in order to demonstrate their argument: the discourse properties of the Setawana SM and OM, question words, relative clauses and cleft constructions, questions in cleft constructions, adverbials, tonal retraction, and present tense forms.

The first factor to be addressed by D&J is the discourse properties of the OM and SM. In Setawana, as in Chichewa, the OM and SM are both anaphoric agreement markers, and a lexical NP that fills the object function has to immediately follow the verb.

Setawana exhibits pro-drop in both subject and object argument NPs so the SM and OM are optionally/obligatorily incorporated elements (hence the pro-drop ability). This is illustrated in following example:

(180) *ó-e-bîdîtse*
SM-OM-lashed
'He/she lashed it.'

The same word order distribution/variation is shown for Setawana as B&M did for Chichewa in examples (148) and (149) in section (4.3.1.1). Without an OM the object must immediately follow the verb – with the subject being relatively free, as illustrated below:

(181) a. Thabo ó-bidîtsé ntsá
Thabo SM-lashed dog
'Thabo lashed the dog.'

b. *ó-bidîtsé ntsá Thabo*

c. **ntsá ó-bidîtsé Thabo*

d. **ó-bidîtsé Thabo ntsá*

e. **Thabo ntsá ó-bidîtsé*

f. **ntsá Thabo ó-bidîtsé*

- but with an OM all of the possible combinations, given the elements, are allowed:

(182) a. *Thabo ó-e-bidîtsé* *ntsá*
Thabo SM-OM-lashed dog
'Thabo lashed it, the dog.'

b. *ó-ebidîtsé ntsá Thabo*

c. *ntsá ó-e-bidîtsé Thabo*

d. *ó-e-bidîtsé Thabo ntsá*

e. *Thabo ntsá ó-e-bidîtsé*

f. *ntsá Thabo ó-e-bidîtsé*

This shows that the object marker is an optional anaphoric agreement marker and a lexical NP object must immediately follow the verb.

Since B&M argue that question words obligatorily fill the focus function (see examples (167) – (169)), which means that question words cannot also be antecedents for anaphoric agreement markers, D&J also look at the role that question words play in Setawana.

A question word can be an object, as in:

(183) *Thabo ó-bónye* *máng?*
Thabo SM-saw who
'Who did Thabo see?'

D&J assume, along with B&M that question words fill the focus function. So if an OM is inserted (**Thabo o-**m**-monye mang?*), which (also) fills the object function and cannot anaphorically link to the question word (because question words obligatorily fill focus and cannot be the antecedent for anaphoric agreement) the sentence becomes ungrammatical.

Question words also cannot functionally identify (nor be anaphorically linked – as above) with the subject, so the following word orders are ungrammatical:

(184) **mang o-bonye* *Thabo*
who SM-saw Thabo
'Who saw Thabo?'

(185) **o-bonye* *Thabo mang*
SM-saw Thabo who
'Who saw Thabo?'

This only applies if it is assumed that the SM is like the OM and is purely anaphoric in its agreement properties. But if the SM *is* purely anaphoric, the SM would be the subject of every tensed sentence (because there is a morphological requirement that every tensed verb has to have a SM) as opposed to a lexical NP as subject. This, they say, is strange and so look for alternative evidence which could have a bearing on this hypothesis, relative clauses, cleft constructions, question words in clefts, adverbs, tonal retraction and present tense forms.

The relative marker in relative clauses fills the topic function (as it is proposed in B&M, see examples (170) and (171)) and can act as the antecedent of an anaphoric agreement marker inside relative clauses. Both SMs and OMs can anaphorically link to the relative marker in the relative clause (when they are functioning as so called resumptive pronouns). If they are left out, the resulting sentence is ungrammatical since the relative clause is incomplete, as illustrated by the examples below:

(186) a. *mońna yó* *ó-kóbîle-ńg* *ntsá* *ó-lié* *ngak-éng*
man RM SM-chased-REL dog SM-went doctor-LOC
'The man who chased the dog went to the doctor.'

b. **monna yo kobile-ng ntsa o-ile ngak-eng*[34]

c. *mońna yó* *ntsá* *é-mo-kóbîle-ńg* *ó-ilé* *ngak-éng*
man RM dog SM-OM-chased-REL SM-went doctor-LOC
'The man who the dog chased went to the doctor.'

d. **monna yo ntsa e-kobile-ng o-ile ngak-eng*

In cleft constructions the relative marker is the topic of the sentence and the SM and OM can anaphorically link to it.

(187) a. *ké* *mońna yó* *ó-kóbîle-ńg* *ntsá*
be man RM SM-chased-REL dog
'It was the man that chased the dog.'

b. *ké* *mońna yó* *ntsá* *é-mo-kóbîlé-ng*
be man RM dog SM-OM-chased-REL
'It was the man that the dog chased.'

On the subject of cleft constructions, D&J look at the occurrence of question words in clefts. SMs and OMs can link to a question word in the focus of a cleft construction, even if indirectly (as in the examples B&M discuss above, (172)-(177), where

[34] The ungrammaticality of this example could also be put down to morphological level constraints, as opposed to sentence level constraints, in that the verb form here appears to be morphologically ill-formed because there is no SM.

a focus cannot link to an anaphoric agreement marker in an embedded clause but can link to a topic relative marker which functionally identifies with focus in cleft):

(188) a. *ké* *máng* *yó* *ó-kóbîle-ńg* *ntsá?*
be who RM SM-chased-REL dog
'Who was it that chased the dog?'

b. *ké* *máng* *yó* *ntsá* *é-mo-kóbîle-ńg?*
be who RM dog SM-OM-chased-REL
'Who was it that the dog chased?'

Ungrammaticality results from an adverb coming between a verb and its lexical NP object if there is no OM. This is because the object must be adjacent to the verb. If there is an OM this is the object and the lexical NP is the topic (topics do not have adjacency requirements).

(189) a. **ke-bonye* *maabane* *Thabo*
SM-saw yesterday Thabo
'I saw Thabo yesterday.'

b. *ke-m-mónyé* *maabáne* *Thabo*
SM-OM-saw yesterday Thabo
'I saw Thabo yesterday.'

Tone lowering in phrase final position exists in Setawana. The fact that in the following examples there is lowering of the final L tone on the verb shows that the verb is phrase final (in these examples, compare b. with c.):

(190) a. *ke-bátá* *góre* *bóngwánaké* *bá-ithúte*
SM-want COMP children.POSS SM-study
'I want my children to study.'

b. *ke-bátá* *góre* *bóngwánaké* *bá-sé-ithúte* *Setswána*
SM-want COMP children.POSS SM-OM-study Setswana
'I want my children to study it, Setswana.'

c. *ke-bátá* *góre* *bóngwánaké* *bá-ithúté* *Setswána*
SM-want COMP children.POSS SM-study Setswana
'I want my children to study Setswana.'

d. *ke-bátá* *góre* *bá-sé-ithúte* *bóngwánaké*
SM-want COMP SM-OM-study children.POSS
'I want them to study it, my children.'

There are two present tense forms; one with an *-a-* immediately after the subject marker, and one without. An *-a-* appears when a present tense indicative verb is phrase

final in a VP (this is for intransitive and "potentially" transitive verbs) and if the verb has an OM. There is no *-a-* if the verb is not phrase final. These points are illustrated by the examples below:

(191) a. *ke-a-sîáná*
SM-PRES-run
'I am running.'

b. *ke-a-réka*
SM-PRES-buy
'I am buying.'

c. *ke-a-é-réka* *kólói*
SM-PRES-OM-buy wagon
'I am buying a wagon.'

d. *ke-réka* *kólói*
SM-buy wagon
'I am buying a wagon.'[35]

e. *ke-bátá* *góre* *bóngwánaké* *ba-réke*
SM-want COMP children.POSS SM-buy
'I want my children to buy.'

In conclusion, D&J say that the SM is a pure anaphoric agreement marker. However, this (combined with the fact that a SM is obligatory on tensed verbs) means that a lexical NP is never the subject of tensed verbs in Setawana.

A solution to this problem (proposed by Bresnan) is that the SM is ambiguous as to whether it is a grammatical or an anaphoric agreement marker, and that the subject function is merged with the topic function with the f-structure equation (SUBJ) = (TOP) (which is in the lexical entry of the SM), or as part of the rule introducing the subject NP. This, however, involves either introducing a new type of agreement marker into the typology or introducing further annotation on the phrase structure rules. The lexical entry would fall between that of a purely grammatical agreement marker and a purely anaphoric agreement marker that is unambiguously pronominal but optionally links to topic. The examples given by D&J support their agreement with B&M that OMs are incorporated pronominals.

[35] The translation for this example is from the original D&J text – it is worth mentioning because D&J have assigned the same translation to this example as they have to c. above, even though in d. there is no overt "tense marking" as exists in c.

4.4 Summary and Conclusion

This chapter has been concerned with exploring the issue of agreement in Bantu languages, with a specific look at pronominal agreement. We saw, initially, what grammatical agreement actually is – that it is one part of speech matching another in terms of syntactic features such as gender (or class in the case of Bantu languages), number, person, and/or tense – and took this explanation from work by Corbett and Lehmann, primarily.

There followed a discussion of agreement as particular to Bantu languages. Initially looking at the verbal morphology since it is on the verb form that agreement is found, and with particular concentration on the OM. Further, we saw that there is variation amongst Bantu languages on the number of OMs allowed on the verb form, and the ordering of those markers. One of the interesting 'puzzles' of agreement in the Bantu languages is that of conjoined NPs, and there are a number of resolution methods (after the more common strategy of avoiding the use of conjoined NPs all together).

The final section in this chapter compares two seminal works on agreement in Bantu; Bresnan & Mchombo (1987) and Demuth & Johnson (1989). These focus on the function of subject and object agreement markers in Chichewa and Setawana, respectively. Both argue that OMs are incorporated (or anaphoric pronouns) using evidence from word order variation combined with verbal agreement morphology, along with tonal effects combined with phrase structure to support their argument. The SMs are a different matter with B&M arguing that the SM is ambiguous between being an incorporated pronoun, like the OM, and being a grammatical agreement marker and can serve both functions (though not in the same sentence). When a SM has a grammatical agreement function it agrees with a nominal subject, when it is an incorporated pronoun its antecedent fulfils the topic function in the clause. In contrast, D&J argue that the SM is not ambiguous in function and is only ever an incorporated pronoun, never a grammatical agreement marker, using evidence showing that both the SM and the OM behave in the same way in different circumstances (such as relative clauses, cleft constructions and question words in cleft constructions).

Though the focus of these articles is on the function of agreement markers, there are other factors mentioned which tie in fairly closely with other chapters of this thesis. In particular, the notion of topic and focus reflects the conjunctive/disjunctive distinction discussed in the preceding chapter (section (3.2.2)). In the present chapter it was established that a postverbal lexical object NP which is anaphorically linked to an OM

occurring on the verb form is analysed as being a topic, which provides 'given' information (as opposed to 'new' information, which is focus). The notion of 'given' and 'new' is invoked in chapter 3 (section (3.2.2)) to describe the effect of the conjunctive form, that the use of the conjunctive implies that the verb is not clause final and so anything following it will be 'new' information and thus in focus, whereas the disjunctive form indicates that the verb is clause final and anything following it will be analysed as "a topicalized phrase linked to the clause without being strictly speaking a part of it." (Creissels 1996: 112) In other words it is not new information but 'given' and so is a "postclausal topic" (Creissels 1996: 109). Buell (2006) attempts the establishment of a direct correlation between focus and the conjunctive/disjunctive distinction in Isizulu and finds that if there is a correlation it is weak and indirect, concluding that the "conjoint/disjoint alternation in Zulu can be accounted for without direct reference to focus". (Buell 2006: 29)

Finally, I wish to flag the status of the lexical object NPs analysed as topic when there is an OM on the verb form, and thus the lexical object NP obligatorily occurs postverbally. This will become relevant in chapter 6, where it lends weight to the non-configurational qualities of Bantu syntax without having to recourse to the notions of topic and focus, which as yet remain largely unanalysed in terms of features (cf. Marten 2007).

5 Dynamic Syntax

In this chapter I will introduce the syntactic theory within which the analysis in the following chapter is carried out. It is presented at this late stage so as to ensure that the information presented in this chapter stays clear and relevant and does not get buried under the information contained in the preceding chapters.

Dynamic Syntax (DS) is a theory that combines syntax and semantics to interpret a string of natural language. This combination becomes apparent through two central aims: to explain the interactions between the order in which words occur in a sentence; and to explain how words are interpreted within the context in which they occur (for more on context see section (5.1)). Traditionally the former has been an issue for syntax and the latter an issue for semantics and pragmatics. DS shows that there is indeed an interaction between the two in that sentences which are dependent on context are processed and given a structure in a number of ways.

The purpose of DS is to give a representation of an interpretation of an utterance as it is parsed from left to right, as each word is processed and interpreted, and then combined to give a representational structure, which is modelled in DS by using decorated tree structures. The aim of DS is to assign a logical semantic tree to a natural language string and to give a definition and description for all the non-final stages of tree growth.

The tree structure used in DS is more akin to trees used in formal logic than to syntactic trees because instead of having syntactic categories such as V or NP and words decorating the nodes of the tree, DS has logical types and formula values as representations of concepts decorating the nodes of the tree – it uses the *Logic Of Finite Trees* (*LOFT*) which will be covered in more detail in section (5.3.1.1) below.

Particular to DS is the ability to model underspecification which is covered in section (5.5), beginning with pronouns and moving on to adjunction rules which demonstrate the interaction between structural underspecification and locality in DS.

5.1 Parsing and Context

The question of what it means to know a language can be answered simply in that it means being able to understand a person when they speak. At a deeper, more linguistic level, however, it is a little more complicated.

Cann *et al.* (2005: 5) put forward the argument that knowing a language means the "capacity to process language input", the ability to process and understand a string of natural language as it is heard by the listener and spoken by the speaker. It is through processing the language input that hearers are able to assign interpretations to strings of natural language. This means that knowing a language means knowing how to process it – or how to parse it. In turn, the same process is used in producing language as is used in parsing it but the stages are slightly reversed because the speaker already has a concept in mind that s/he wants to impart to the hearer while the hearer does not. This idea differs from the more conservative and traditional beliefs in the field, that knowledge of language is essentially static and does not relate to the use of that language.

Context (as referred to above) is very important in parsing because the context that a sentence, phrase or word occurs in can alter or effect the final interpretation. An example of context being an issue is with the use of pronouns (for a discussion of how DS processes pronouns in a tree see section (5.5)). When a pronoun is used, the context in which the sentence containing the pronoun is uttered is vital for the interpretation of who or what the pronoun refers to. To illustrate this I will use an example from Cann *et al* (2005: 8) in which they give the example of the sentence *he upset her*. The context in which this sentence is spoken can change the parties that are represented by the pronouns:

(192) Though John and Mary adored each other, he married Sue.
Any time **he upset her** subsequently, she would remind him that it was Mary that he should have married.

(193) Though John and Mary adored each other, he married Sue.
The only time they subsequently met, **he upset her** so badly that she was glad he had married Sue, not her.

Examples (192) and (193) above contain two examples of the string *he upset her* and the contexts are very similar. In both, *he* is interpreted as John (at least in the most likely interpretation), however in (192) *her* is interpreted as Sue and in (193) *her* is interpreted as Mary. In example (192) we know that *her* refers to *Sue* because *Mary* is mentioned by name a second time and because since *Sue* is already married to *John*, it is not possible for it to be *Sue* who he should have married again. In example (193) we know that *her* refers to *Mary* because *Sue* is mentioned by name a second time and it would be very odd if the married couple only met once following their marriage. This illustrates how context effects the meaning and is necessary in the processing (parsing) of pronouns.

Through parsing a DS tree is built to represent the intermediate steps of the parsing process as well as to give a representation of the final proposition. The following section introduces the process of constructing a DS tree.

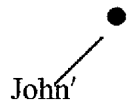
5.2 Basic Tree

In order to give a very basic example of how DS works it is best to look at a simple sentence and give an illustration of how DS processes this sentence resulting in an increasingly more complex tree and finally an interpretation of the sentence without any formal language or rules (these will come later in section (5.3)). The sentence in question is:

(194) *John loves Mary*

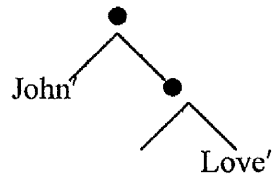
When building a very simple DS tree, such as for the above sentence, the first thing that is heard (and parsed) is *John* which gives the following structure and starting off point (the root node to which the concept addressed by *John* attaches is introduced by the *Axiom* rule, for an explanation of this see section (5.3.2)):

(195)



Then *loves* is parsed which, because it lexically requires both a subject and an object (it is a two place predicate), adds another layer to the tree rather than completing it immediately (as a verb such as *smokes* would do, since *smokes* is a one place predicate that requires only a subject):

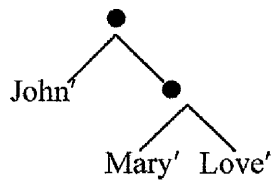
(196)



The tree is decorated with'Love'' rather than 'loves' because tree nodes are not actually decorated with words, rather the apostrophe in conjunction with the node decoration (the formula value, this will be explained further below) is an instruction for the hearer to construct the contextually appropriate concept addressed by the word that is parsed.

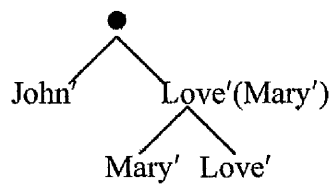
Next *Mary* is parsed and the spoken sentence is complete yielding the following structure:

(197)



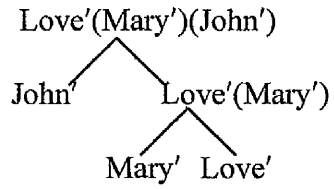
All that is left for the parser to do now is to combine all of the elements of the tree together so that there are no empty nodes in the tree. The first step here is to combine *Love* and *Mary*:

(198)



Then *John* completes the proposition – that 'John loves Mary' – and so completes the tree, representing the interpretation of the sentence:

(199) Love′(Mary′)(John′)



It is useful to note at this point that DS trees do not actually represent surface word order (the way that Government and Binding Theory trees would do), rather they represent the semantic mode of the combination of concepts. The simplified example discussed here shows the basic idea behind the DS model, that syntax drives a process of tree growth as a model of the incremental construction of semantic representations. In the following sections I will develop this idea in more detail and introduce various formal tools which are employed in DS to make this basic idea more precise.

5.3 Language of Dynamic Syntax

DS uses a formal language when decorating and describing trees – this language is used to describe logical trees and has unique elements to describe relationships between concepts and elements of natural language as well as inherent instructions as to how to build the trees (which is based on the interpretation of the concepts and natural elements).

5.3.1 Tree Node Decorations

Along with the lexically represented concepts that decorate the nodes in the DS tree, there is other information which is used to further describe information holding at a particular tree node. This information is imparted through the use of a specific formal language.

Described below are some of the standard and most often used elements of the language and those which are relevant to this present work:

? – Query; represents the necessity of or a requirement for an element at the node at which it stands, it is deleted when the requirement is fulfilled.

Ty – Type; this is the type of expression that is holding or required at that particular node.

(e) – Stands for "entity" and represents a person or a thing (as opposed to an action or an event). This is a 'type' in the DS system and is represented as $Ty(e)$.

(t) – Stands for "truth" and represents a proposition. This is a 'type' in the DS system and is represented as $Ty(t)$

($e \rightarrow t$) – Could be interpreted as "an entity for which a truth applies". Shown left is a one place predicate (with $(e \rightarrow (e \rightarrow t))$ being a two place predicate and $(e \rightarrow (e \rightarrow (e \rightarrow t)))$ being a three place predicate, etc). This is a type in the DS system and is represented as $Ty(e \rightarrow t)$

Fo – Formula; This is followed, in brackets, by a lexical representation of a concept, e.g. *Fo*(John), *Fo*(Walk). Technically, this is interpreted as 'an instruction to the hearer to construct a contextually appropriate conceptual representation based on the concept the word addresses'.

◊ - Pointer; indicates which node in the tree is being worked on.

Tn(X) – Tree node address; what appears in the brackets following *Tn* indicates the position in the tree in relation to the root node (which is signified as *Tn*(0)). *Tn*(01) indicates that the node is the right branching (functor) daughter of the root node, (00) indicates that the node is the left branching (argument) daughter of the root

node. Next level addresses are more complex and describe the path between the root node and the decorated node: *Tn*(010) is the argument daughter node to the functor daughter of the root node, *Tn*(000) is the argument daughter node to the argument daughter of the root node, and so on.

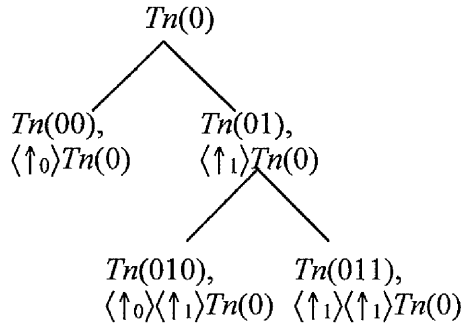
5.3.1.1 Logic of Finite Trees

Using *LOFT* (Blackburn & Meyer-Viol 1994, Blackburn *et al.* 1996) it is possible to describe a tree, or part of a tree, from the perspective of any node within that tree using modal statements. For example, from any given node in a tree it is possible to refer to other nodes and also to what holds at those other nodes (what those nodes are decorated with). It is possible to look both up and down along a mother-daughter node relation, whether the relation involves an argument daughter, a functor daughter or an (as yet) unspecified daughter. It is also possible to refer down to nodes that are dominated by the given node, and to refer up to nodes a given node is dominated by. In order to do this certain modalities are required.

The most common *LOFT* modalities in use in this thesis involve up/down arrows within angled bracket (angled modalities, $\langle X \rangle$, are existential – picking out at least one node, square modalities $[X]$ are universal – referring to all nodes). The up/down arrows indicate the mother/daughter relation. For example, $\langle \downarrow \rangle X$ can decorate a node if X is true at a daughter node. The modality $\langle \downarrow_0 \rangle$ indicates the argument daughter of the node it decorates and $\langle \downarrow_1 \rangle$ indicates the functor daughter of the node it decorates. The modality $\langle \downarrow_* \rangle$ indicates 'somewhere below' the node it decorates and its inverse $\langle \uparrow_* \rangle$ indicates 'somewhere above' the node it decorates, similarly $\langle \uparrow \rangle$ indicates at the mother node. Further decoration onto the mother modality ($\langle \uparrow_0 \rangle$, $\langle \uparrow_1 \rangle$) confirms the mother daughter relation and is useful when the relation mapped by the modalities is further than an immediate mother/daughter relation, for example $\langle \uparrow_0 \rangle \langle \uparrow_1 \rangle$ decorating a node refers to a higher node connected by one argument relation and one functor relation.

In the tree in example (200) below, the modal decorations at the four daughter nodes illustrate the relationship of those daughter nodes to the root node (*Tn*(0)), rather than to each daughter's mother node:

(200)



Where above was shown the tree node address of a node in relation to the root node, the modalities shown here are the directions from one node to another. *LOFT* is also particularly useful in allowing for nodes to be introduced, annotated and decorated while at the same time having an as yet unfixed relation to the rest of the tree. The matter of unfixed nodes will be addressed in detail in section (5.5). For the most part, however, I will leave out the modalities in the tree decorations unless they are of particular necessity. This is to make the trees more readable and to give focus to the information that is particularly relevant.

5.3.2 Dynamic Syntax Rules

There are two ways to go about constructing Dynamic Syntax trees; through lexical actions, which will be defined below (in section (5.3.3)), or through a set of transition rules, which will be covered in this section and is a generalisation from Cann *et al*, 2005.

Transition rules are a set of basic rules which are involved with every successful construction of a DS tree and which are assumed to be freely available. They allow for the building and completing of the tree structure on which the decorations presented above can occur and, as will be seen when we come to the actual building of the trees, in Dynamic Syntax it is the process of building and the intermediate trees that are important, not just the final tree.

The formal method for stating transition rules is as tree descriptions, with the input tree description (the tree before the effect of the transition rule) and the output tree description (the tree after the effect of the transition rule) schematically shown below:

(201) Input Tree Description

Output Tree Description

Though they are freely available, transition rules do not arbitrarily apply at any point in the DS tree, they apply to the specific node under construction at the point of their use and so always involve the use of the pointer $\Diamond$.

Before embarking on the transition rules, I will first introduce *Axiom*. *Axiom* is not a transition rule, rather it is the minimal element of a DS tree and is the starting point of every parse:

(202) *Axiom* $\{Tn(a), ?Ty(t), \Diamond\}$

$Tn(a)$ is the tree node address and gives the location of the node in the tree, since this is the *Axiom* the (a) will be replaced by (0) because as the starting point of every parse *Axiom* is necessarily the root node. $?Ty(t)$ represents the requirement for an expression of type (t) to hold at the node. The pointer $\Diamond$ tells us that this is the current node. Kempson *et al.* (2001: 76) state: "The *Axiom* is the initial state of the initial task." Since there is only one node, the top node of the (potential, future) tree, the initial task is associated with the description of that top node and this is confirmed by the presence of the pointer.

A parse that begins with *Axiom* has the purpose of creating a tree, and the parse ends when the final word in a natural language string has been processed and successfully integrated into the tree. The parse of a grammatical natural language string is considered successful only if the result is a logical form decorating the root node, with all requirements fulfilled, and a tree that has all of its tasks in their final state, i.e. all requirements on all nodes fulfilled.

5.3.2.1 Introduction

The rule of Introduction takes a requirement that an initial node be annotated with a particular type (a goal), and licenses the expansion of that requirement into two subtasks (or subgoals) which are to generate the requirement for two further types, the fulfilment of which allow for the fulfilment of the requirement at the initial node by Modus Ponens[36] (Kempson *et al.* 2001: 80).

(203) INTRODUCTION RULE

$$\frac{\{\ldots\{\ldots ?Ty(Y)\ldots, \Diamond\}\ldots\}}{\{\ldots\{\ldots ?Ty(Y), ?\langle\downarrow_0\rangle Ty(X), ?\langle\downarrow_1\rangle Ty(X\rightarrow Y), \ldots. \Diamond\}\ldots\}}$$

[36] Modus Ponens = *If X then Y. X, therefore Y.*

More specifically, Introduction takes a requirement at an initial node and "unpacks it" (Cann *et al.* 2005: 42) to find requirements to have daughter nodes which need to be decorated by expressions of different types which, when combined by functional application, give an expression which fulfils the requirement at the initial node. This can be illustrated further by the following example (204) which shows the initial node with a requirement for an expression of a type expanding (after $\rightarrow$) to a node with a requirement for an expression of a type as well as the requirements for two daughters that are of specific types, one of type X and one of type $(X \rightarrow Y)$:

(204) $?Ty(X), \Diamond \quad \rightarrow \quad ?Ty(Y), ?\langle\downarrow_0\rangle Ty(X), ?\langle\downarrow_1\rangle Ty(X \rightarrow Y), \Diamond$

This is all still at the same initial node. Introduction does not generate new tree structure, it only licenses the generation of tree structure and sets all the pieces in place for an application of Prediction (5.3.2.3). An application of the Introduction rule takes (for example) a requirement for a type t proposition, analyses it to find two more requirements for the satisfaction of the original requirement that are a requirement for a type e and a requirement for a type $(e \rightarrow t)$. The pointer will go, initially to the type e requirement (at least in English).

5.3.2.2 Elimination

The rule of Elimination occurs after the rule of Completion (see below (5.3.2.4)) and takes completed sub-tasks (subgoals) and combines them (by functional application) to fulfil the requirements at the mother node. In this way, it is the inverse of the rule of Introduction.

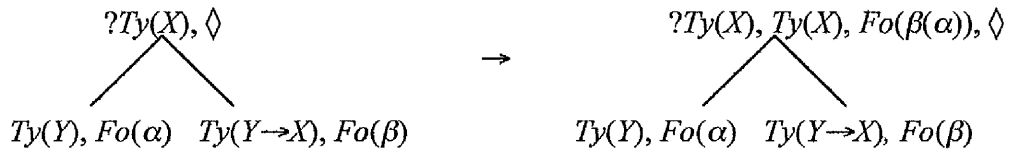
(205) ELIMINATION RULE

$$\frac{\{\ldots\{Tn(n)\ldots ?Ty(X), \langle\downarrow_0\rangle(Fo(\alpha), Ty(Y)), \langle\downarrow_1\rangle(Fo(\beta), Ty(Y \rightarrow X))\ldots, \Diamond\}\ldots\}}{\begin{array}{c}\{\ldots\{Tn(n)\ldots ?Ty(X), Fo(\beta(\alpha)), Ty(X),\\ \langle\downarrow_0\rangle(Fo(\alpha), Ty(Y)), \langle\downarrow_1\rangle(Fo(\beta), Ty(Y \rightarrow X))\ldots, \Diamond\}\ldots\}\\ \text{Condition: } \langle\downarrow_i\rangle ?\phi,\ i \in \{1, 0\}, \text{ does not hold}\end{array}}$$

The condition on $Tn(n)$ states that no daughter node can have any outstanding requirements.

Elimination does not introduce any new nodes, it changes the annotations that hold at existing nodes:

(206)



Where there is a node that immediately dominates an argument daughter node and a functor daughter node, which both have their requirements for a formula and type value satisfied, the rule of Elimination combines the two type values by Modus Ponens and combines the two formula values by function-application in order to satisfy the outstanding requirement at the mother node.

5.3.2.3 Prediction

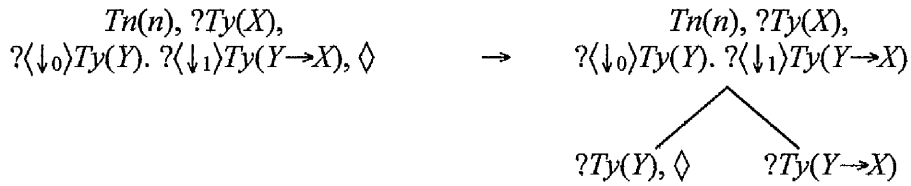
Prediction is the first of two rules (the second being Completion) that can license the creation of new tree node descriptions (or more simply tree nodes) and can license the transfer of information from one node to another.

(207) PREDICTION RULE

$$\frac{\{\ldots\{Tn(n), \ldots, ?\langle\downarrow_0\rangle\phi, ?\langle\downarrow_1\rangle\psi, \Diamond\}\ldots\}}{\{\ldots\{Tn(n), \ldots, ?\langle\downarrow_0\rangle\phi, ?\langle\downarrow_1\rangle\psi\}, \{\langle\uparrow_0\rangle Tn(n), ?\phi, \Diamond\}, \{\langle\uparrow_1\rangle Tn(n), ?\psi\}\ldots\}}$$

Prediction allows for modal requirements to be turned into tree structure with simpler requirements. So where Introduction took a single requirement at an initial node and found the requirements that would satisfy that initial requirement (introduced the modal requirements that there be new nodes with requirements), Prediction builds the nodes for the new requirements and decorates them with requirements of their own:

(208)



The Prediction rule is applied to the output of the Introduction rule.

5.3.2.4 Completion

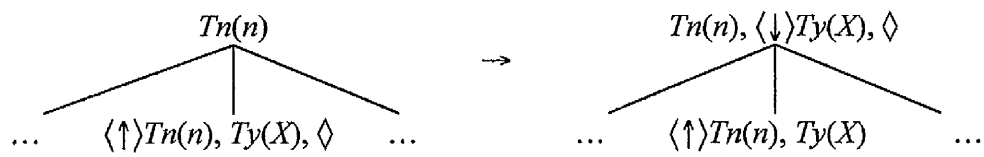
The rule of Completion moves the pointer ◊ from a node that has its type requirements fulfilled, so contributing to the satisfaction of the requirements introduced by Introduction. Completion could be seen as being the inverse of Prediction.

(209) COMPLETION RULE

$$\frac{\{\ldots\{Tn(n)..\},\ \{\langle\uparrow_i\rangle Tn(n),\ \ldots,\ Ty(X),\ \ldots,\ \Diamond\}\ldots\}}{\{\ldots\{Tn(n),\ \ldots,\ \langle\downarrow_i\rangle Ty(X),\ \ldots\ \Diamond\},\ \{\langle\uparrow_i\rangle Tn(n),\ \ldots,\ Ty(X),\ \ldots\}\ldots\}}$$
$$i \in \{0, 1, *\}$$

Completion moves the pointer node from a daughter node to a mother node and annotates that mother node with the information that it has a daughter with certain type and formula values:

(210)



The example trees in (210) show that as input there is some daughter node at which $Ty(X)$ holds and upon which the pointer $\Diamond$ holds, this daughter node is also defined as having a mother node $Tn(n)$ above it. The application of Completion licenses the pointer $\Diamond$ to move from the defined daughter node to its specified mother node ($Tn(n)$) and then when at that mother node, to decorate it with the information that it has a daughter at which $Ty(X)$ holds.

5.3.2.5 Anticipation

The rule of Anticipation is like Completion but in reverse.

(211) ANTICIPATION RULE

$$\frac{\{\ldots\{Tn(n),\ \ldots,\ \Diamond\}.\ \{\langle\uparrow\rangle Tn(n),\ \ldots,\ ?\phi,\ \ldots\}\ldots\}}{\{Tn(n),\ \ldots\},\ \{\langle\uparrow\rangle Tn(n),\ \ldots,\ ?\phi,\ \ldots,\ \Diamond\}\ldots\}}$$

It moves the pointer down from a mother node to a daughter node upon which there are outstanding requirements remaining in order for those outstanding requirements to be filled.

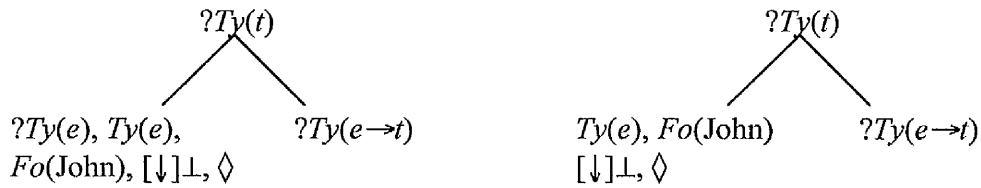
5.3.2.6 Thinning

During the parse, tree nodes get decorated with requirements, for example, types and formulas. When a requirement on a node is fulfilled, the node will be decorated with the type and formula values along with the requirements for those, though the requirement decoration is no longer necessary because the requirement is fulfilled. The rule of Thinning deletes the requirement decoration.

(212) THINNING RULE

$$\frac{\{\ldots\{\ldots, \phi, \ldots, ?\phi, \ldots, \Diamond\}\ldots\}}{\{\ldots\{\ldots, \phi, \ldots, \Diamond\}\ldots\}}$$

(213)



After an application of Thinning, the pointer remains at that node. Application of either Completion of Anticipation, or further lexical input, are required to move the pointer on to another node.

5.3.2.7 Merge

The rule of Merge comes into use primarily with unfixed nodes. At a very basic level, Merge unifies two node descriptions. At a more complex level, Merge allows for node descriptions with an underspecified address (an unfixed node) to find and join to a fixed location in the DS tree by 'merging' with the fixed node.

(214) MERGE RULE[37]

$$\frac{\{\ldots\{\ldots\mathbf{DU}, \mathbf{DU}'\ldots\}\ldots\}}{\{\ldots\{\ldots\mathbf{DU} \cup \mathbf{DU}'\ldots\}\ldots\}}$$
$$\Diamond \in \mathbf{DU}'$$

Merge serves to fix what has as yet remained unfixed in the DS tree. The rule often applies in cases where a fixed node is introduced with a requirement for some type while there exists an unfixed node that is decorated with a formula of that same type and so would satisfy the requirements at the fixed node. In a case such as this, the two node descriptions would collapse together forming the description of a single node in a fixed position in the tree.

Technically, it is possible to merge two fixed nodes, but this will usually lead to conflicting information and to inconsistency at the end of the parse, and so it is ruled out in most parses. Similarly for nodes containing more than one specification, unless one specification entails another problems will emerge towards the end of the parse and so this is generally impossible in the model.

[37] Where '**DU**' stands for 'Declarative Unit' and '**DU**, **DU**'' represents a pair of declarative units.

5.3.3 Lexical Entries

There are two ways to go about constructing a DS tree, using transition rules as defined above (section (5.3.2)), or through lexical actions which will be covered in this section.

In DS, the process of parsing is principally driven by the lexicon. As such, lexical items carry a lot of grammatical weight and play a central role in the syntax. Further, lexical information in DS serves to induce tree growth through a sequence of actions as spelled out in the lexical entry. It is not simply terminal nodes that are decorated by the processing of lexical information, the parsing of words can contribute information for the decoration of non-terminal nodes in the tree. It can also add additional requirements to the tree, even build partial trees to the extent of initiating the construction of full propositional structures.

As has been mentioned above, lexical information supplies the decoration on the nodes in the tree, it also specifies the role a lexical item plays in the construction of tree structure. The latter is represented in the format of the lexical entry as a conditional statement, as can be seen in example (215) below (Cann *et al.* 2005: 45):

(215) FORMAT OF LEXICAL ENTRIES

IF	?*Ty*(*X*)	Trigger
THEN	make(...)	Actions
	go(...)	
	put(...)	
ELSE	...	Elsewhere Statement

The initial condition is the Trigger. This states the context in which the particular word to which the particular lexical entry applies can be successfully parsed and the effects of its actions can be entered into the tree structure. This is predominantly of a *type* requirement, but it is possible for other information to be triggers. If the initial condition is met, a sequence of Actions is initiated. These actions serve to generate and decorate tree structure. The 'make' action creates a new node and specifies the relation of the new node to the trigger (e.g. functor/argument daughter node). The 'go' action moves the pointer to a node specified by that action (this node is not necessarily the node created by the 'make' action). The 'put' action annotates a node with the information specified by that action. Finally, the Elsewhere Statement serves to induce further actions in the case of the initial Trigger not being met, this is usually an instruction to abort the current parse.

Below is the lexical entry for a proper noun (John):

(216)				
	John	IF	$?Ty(e)$	Trigger
		THEN	put($Ty(e)$, Fo(John), $[\downarrow]\bot$)	Annotation
		ELSE	Abort	Failure

A proper noun is of type e and it is necessary for there to be a requirement for a $Ty(e)$ expression existing at the point the lexical entry is scanned. In example (216) this is the case and is the appropriate trigger. The THEN statement lists the actions to be carried out in the case of the IF condition being met. In this instance the actions are to decorate the node at which the pointer holds when the lexical entry is being scanned with the information listed concerning the type value and formula. There is a further decoration ($[\downarrow]\bot$), this is the 'bottom restriction' and is covered in more detail below in section (5.3.3.1).

The order of the actions in the THEN statement is paramount. Having a 'put' action before a 'make' action in the THEN statement gives the instruction to decorate the current node with the required information and then to make a new node. Having a 'make' action before a 'put' action gives the instruction to make and new node and then to decorate that node with the required information This is not easily demonstrated with proper nouns, but is more clear with verbs:

(217)				
		IF	$?Ty(e \rightarrow t)$	Predicate Trigger
		THEN	go($\langle\uparrow_1\rangle ?Ty(t)$);	Go to propositional node
	cooked		put($Tns(PAST)$);	Add tense information
			go($\langle\downarrow_1\rangle ?Ty(e \rightarrow t)$);	Go to predicate node
			put($Ty(e \rightarrow t)$, Fo(Cook), $[\downarrow]\bot$)	Add content
		ELSE	Abort	

The verb in example (217) illustrates the minimum actions that are induced upon parsing a verb. These are to decorate the propositional (root) node with tense information and to decorate the predicate node with a type value and formula. In (217) the Trigger states that there must be a node decorated with a requirement for a type ($e \rightarrow t$) (a one-place predicate). If the current node is annotated with that requirement the parse of the lexical entry can continue and there comes the first action of the THEN statement. This is a 'go' action and it gives the instruction to go up along a functor relation to the mother node at which there is a requirement for a type t (a proposition). Following that is the 'put' action which gives the instruction to decorate the type t requiring node with the information $Tns(PAST)$, which is to say that the event to be constructed from the lexical information from the verb being parsed has to be constructed as having occurred

in the past (at least in a simplified analysis of tense, I will not go into temporal interpretation in the remainder of this thesis). There follows a second 'go' action which gives the instruction to travel from the type t requiring node along a functor relation to the predicate daughter node at which there is a requirement for a predicate of type $(e \rightarrow t)$. A second 'put' action gives the instruction to decorate the current node with a type value and formula information, and adds the bottom restriction. The only possible action following is in the Elsewhere Statement which is to Abort.

The minimum actions as shown above for intransitive verbs are greatly increased for the lexical entries of transitive verbs. Transitive verbs add tense to the proposition but they also create new tree structure. Below is the lexical entry for a transitive verb (Cann *et al.* 2005: 48):

(218)			
	IF	$?Ty(e \rightarrow t)$	Predicate trigger
	THEN	$go(\langle\uparrow_1\rangle ?Ty(t))$;	Go to propositional node
		$put(Tns(PAST))$;	Tense information
		$go(\langle\downarrow_1\rangle ?Ty(e \rightarrow t))$;	Go to predicate node
		$make(\langle\downarrow_1\rangle)$;	Make functor node
		$go(\langle\downarrow_1\rangle)$	Go to functor node
upset		$put(Ty(e \rightarrow (e \rightarrow t)), Fo(\text{Upset}), [\downarrow]\bot)$;	Annotation
		$go(\langle\uparrow_1\rangle)$;	Go to mother node
		$make(\langle\downarrow_0\rangle)$;	Make argument node
		$go(\langle\downarrow_0\rangle)$;	Go to argument node
		$put(?Ty(e))$	Annotation
	ELSE	Abort	

The first three actions of the THEN statement are the same as for the intransitive verb *cooked*, but then there is a new action encountered, 'make', which gives the instruction to create a functor relation to a new node. Following the 'make' action, there is a 'go' action which gives the instruction to travel along the functor relation and then the familiar 'put' action, which gives the instruction to annotate the new node created by the previous 'make' action with the type value of a two-place predicate and the formula information, as well as the bottom restriction. The following 'go' action gives the instruction to return back up along the functor relation to the node from which there began the parse of the lexical entry from which second 'make' action in this lexical entry creates an argument relation to a new daughter node. Then there is a further 'go' action to travel down the newly created argument relation, and finally the 'put' action gives the instruction to decorate the new argument node with a requirement for a type e expression which eventually will be filled by the (logical) object. Any other action would be to Abort due to the Elsewhere Statement.

5.3.3.1 Bottom Restriction

As mentioned previously, there is a further decoration found on some nodes in the DS tree that is not described in the section on tree node decorations (5.3.1). This is the 'bottom restriction' as represented by ([↓]⊥). The ⊥ part of the bottom restriction is the "falsum" (Kempson *et al*, 2001: 38) or universal falsehood meaning holding at no node of any tree. When used in conjunction with the *LOFT* modalities (5.3.1.1) it can be used to express the non-existence of mother and daughter nodes.

It is possible to use the falsum as a method for signifying the root node of the tree by closing off any further upward development through the use of the modality [↑]⊥ which signifies 'up of me falsum holds', there can be no more nodes above that which is decorated by this modality. The only point at which this would be used would be after all words in a string have been parsed, at that point whichever node is the top node is decorated by [↑]⊥ and it signifies that top node to be the root node.

Most commonly the falsum is used in the bottom restriction [↓]⊥. Similarly to the use of the falsum with the top node in a tree, the bottom restriction is used to signify that a bottom node is in fact a terminal node in the tree, and there can be no further development of tree structure from that node. As such the bottom restriction decorates the terminal nodes in a tree and carries with it the stipulation that the node it decorates will have no daughters that have any properties whatsoever. In practice, I will often leave out the bottom restriction so as to make trees more readable.

5.4 Tree Structure

Tree building in DS is a goal-directed process of utterance interpretation that involves building a proposition. This goal is realised when there is a type expression of *Ty*(*t*) decorating the root node of the tree and all of the words in an utterance have been processed. The building of trees involves creating nodes in the tree which are introduced with requirements that must be fulfilled. A node is complete when all of the requirements holding at it have been fulfilled.

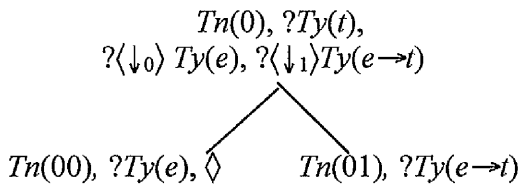
The example I will be using here to illustrate the building of a full Dynamic Syntax tree is the same as example (194) used earlier (*John loves Mary*), but I will be using more detail to illustrate the more formal aspects of the Dynamic Syntax framework. The building a Dynamic Syntax tree always begins with the *Axiom*. This is al-

ways the starting point (minimal element) and is a root node that requires a type t, it is also where the pointer holds (as this is the only node in the tree and it must hold at a node):

(219) $Tn(0),\ ?Ty(t),\ \Diamond$

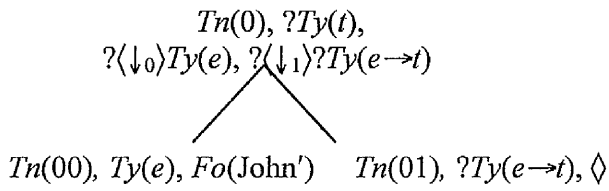
Then, through Introduction and Prediction two more nodes are made, one requiring a type e and one requiring a type $(e \rightarrow t)$ with the pointer now at the node that requires $Ty(e)$ (a detailed explanation of how this occurs is below in section (5.4.1)):

(220)



At this stage the parsing of the utterance begins through a process of 'Scanning'. Next parsed is *John*, and because that is of a type e it fits into the node at which the pointer is sitting. Because the word *John* lexically encodes the formula value $Fo(John)$ as well as the type information $Ty(e)$, there is no further need for the $?Ty(e)$ decoration because the requirement (?) is fulfilled and so by a process of 'Thinning' the $?Ty(e)$ is deleted and replaced by $Fo(John)$, $Ty(e)$, and the pointer can move to the rightmost daughter node to carry on with the parse:

(221)



At this point there is scanning again and the next word to parse is *loves*. The verb *loves* is transitive and so has a similar lexical entry to that found in the example (218) with *upset*. Below is the lexical entry for *loves*:

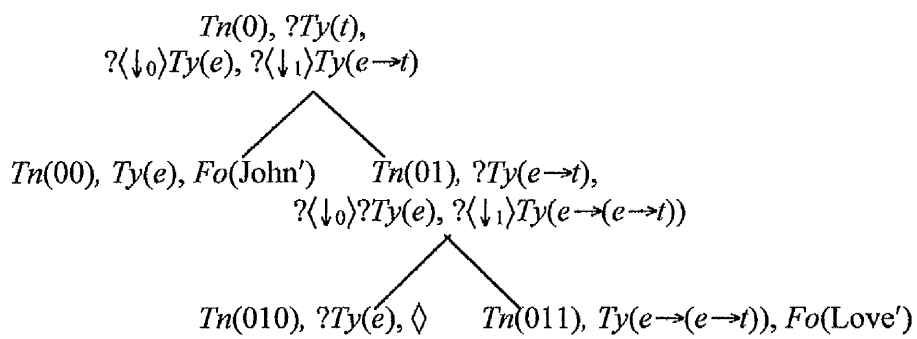
(222)

loves

IF	$?Ty(e \rightarrow t)$
THEN	go($\langle\uparrow_1\rangle ?Ty(t)$);
	put($Tns(PRES)$);
	go($\langle\downarrow_1\rangle ?Ty(e \rightarrow t)$);
	make($\langle\downarrow_1\rangle$);
	go($\langle\downarrow_1\rangle$);
	put($Ty(e \rightarrow (e \rightarrow t))$, Fo(Love), $[\downarrow]\bot$);
	go($\langle\uparrow_1\rangle$);
	make($\langle\downarrow_0\rangle$);
	go($\langle\downarrow_0\rangle$);
	put($?Ty(e)$)
ELSE	Abort

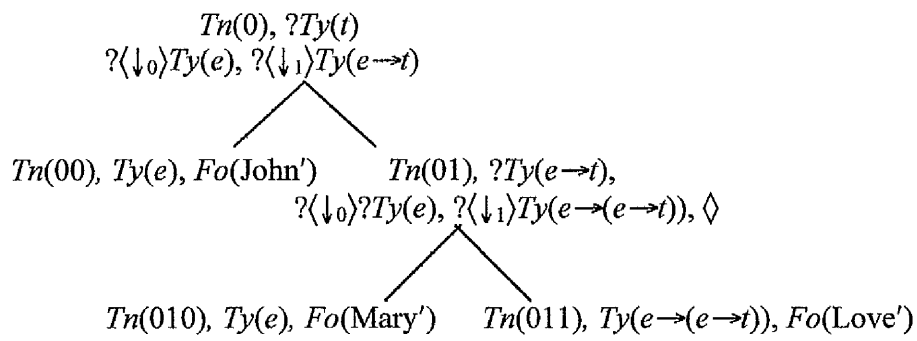
Following the instructions contained in the lexical entry, the result is the tree in example (223) below (for the time being I will ignore the instruction to add tense to the root node and to decorate the terminal functor node with the bottom restriction):

(223)



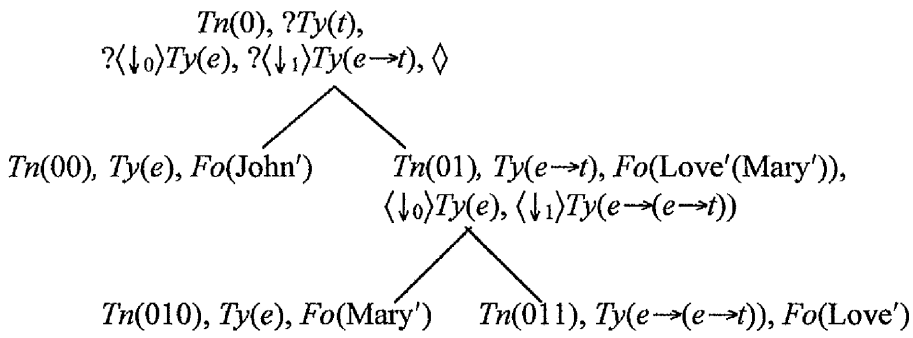
There is Scanning again and finally the parse of *Mary* which is of type *e*, and this is required at the pointed node. *Mary* enters the tree eliminating the requirement for a $?Ty(e)$ and so the pointer moves up in the tree to the next node that has requirements:

(224)



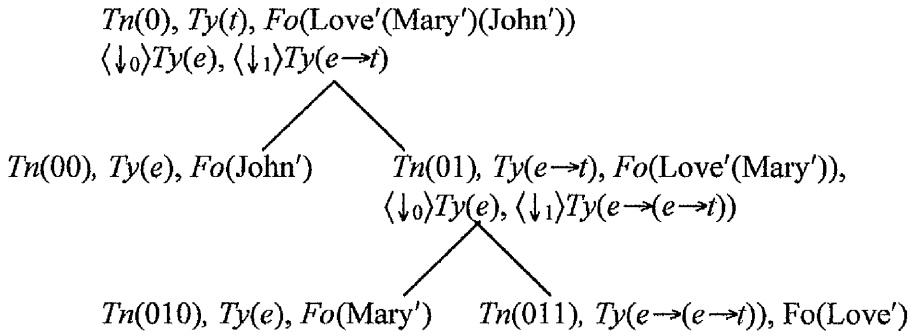
With the last word in the utterance having been parsed and so the terminal nodes in the tree filled it is now a case of evaluating the tree. Through two steps of completion the formula value of one of the terminal daughter nodes is applied to the formula value of the other terminal daughter node and the result is *Fo(Love(Mary))* which satisfies the requirements of their mother node, this is the rule of 'Completion':

(225)



By the same processes as the step above the two daughter nodes are merged together to result in an expression of $Ty(t)$ which satisfies the mother (root) node, thus giving a representation of the proposition of the utterance:

(226)



The example discussed here serves to illustrate the parse of DS as it acts to build tree structure. Though more complex than the basic parse presented in section (5.2), the example in this section is still basic in that I have not described each application of each rule or action that applies. This will come in the following sections.

The following sections will introduce some essential concepts that serve to illustrate how the construction of trees in Dynamic Syntax can be used for modelling different types of natural language constructions. Firstly the initial construction transition rules, Introduction and Prediction, will be explored. Next, will be a look at how left dislocated sentences are parsed into a DS tree. Thirdly will be a look at LINK structures, used, for example, for relative clauses, and finally is an illustration of how DS models pronouns in English.

5.4.1 Introduction and Prediction

Though the rules of Introduction and Prediction have already been introduced and illustrated, in this section I take the two transition rules as a pair and use them alone, ignoring lexical entries for the time being, to construct a propositional tree structure. This is not a common structure building strategy, the two transition rules are generally used

only for the building of the subject and initial predicate node, however in this section I will show the nature of the rules of Introduction and Prediction as an iterative construction process.

As mentioned earlier, transition rules are one method of constructing tree structure, and Introduction and Prediction are a pair of transition rules which, together, initiate and drive the process of tree growth by breaking one goal (a requirement) into subgoals (further requirements). That is, the DS tree is developed by taking one type requirement on a node and growing, from that initial node, daughter nodes with requirements of their own which, when satisfied, together satisfy the requirement at the initial (mother) node.

To illustrate the process of Introduction and Prediction I will use the, by now familiar, *John loves Mary* as in example (194) at the beginning of this chapter. As with every parse, we begin with *Axiom* which is the root node:

(227) $Tn(0), ?Ty(t), \Diamond$

In order to get a formula of type t we need two more formulae, one of type e and one of type $(e \rightarrow t)$ which have function application applied over them and combine to satisfy the requirement for a formula of type t as decorating the root node. The first step then is to expand the initial goal at the root node into two more goals and this is where Introduction comes in. Repeated here in example (228) is the formal representation of the rule of Introduction as found in example (204):

(228) INTRODUCTION RULE

$$\frac{\{\ldots\{\ldots ?Ty(Y)\ldots, \Diamond\}\ldots\}}{\{\ldots\{\ldots ?Ty(Y), ?\langle\downarrow_0\rangle Ty(X), ?\langle\downarrow_1\rangle Ty(Y \rightarrow X), \ldots. \Diamond\}\ldots\}}$$

Recall that Introduction does not itself generate any tree structure (new nodes), it simply decorates the root node with the requirements that the root node have daughters with requirements of their own. In this case, because we wish to satisfy a requirement for a formula of type t, the daughter nodes must be of types e and $(e \rightarrow t)$ and so that is reflected in the decoration of the root node after the application of Introduction. Compare example (227) above, before the application of Introduction, to example (229) below, after the application of Introduction:

(229) $Tn(0), ?Ty(t), ?\langle\downarrow_0\rangle Ty(e), ?\langle\downarrow_1\rangle Ty(e \rightarrow t), \Diamond$

Note that there is no new structure generated. The modalities $\langle\downarrow_0\rangle$ and $\langle\downarrow_1\rangle$ reflect the relationship to the mother node that the nodes bearing the type value requirements will have. The node bearing the requirement for a formula of type e will have an argument relation to its mother node (as indicated by the subscript '0' following the downward arrow, indicating an argument daughter relation) and the node bearing the requirement for a formula of type $(e \rightarrow t)$ will have a functor relation to its mother node (as indicated by the subscript '1' following the downward arrow, indicating a functor daughter relation).

Introduction makes it possible for Prediction to be applied. Repeated here in example (230) is the formal representation of the Prediction rule as found in example (207):

(230) PREDICTION RULE

$$\frac{\{\ldots\{Tn(n), \ldots, ?\langle\downarrow_0\rangle\phi, ?\langle\downarrow_1\rangle\psi, \Diamond\}\ldots\}}{\{\ldots\{Tn(n), \ldots, ?\langle\downarrow_0\rangle\phi, ?\langle\downarrow_1\rangle\psi\}, \{\langle\uparrow_0\rangle Tn(n), ?\phi, \Diamond\}, \{\langle\uparrow_1\rangle Tn(n), ?\psi\}\ldots\}}$$

Prediction takes the two new requirements decorating the root node, due to the application of Introduction, and introduces the descriptions of an argument daughter node and a functor daughter node which the appropriate requirements can decorate. Thus, the Prediction rule is applied twice (technically following a further application of the steps of Introduction and Completion after the first application of Prediction) and the result is two daughter nodes from the root node, example (231) shows the expansion of the tree from a root node to a tree with two daughter nodes:

(231)

$$\begin{array}{c} Tn(0), ?Ty(t), \\ ?\langle\downarrow_0\rangle Ty(e), ?\langle\downarrow_1\rangle Ty(e\rightarrow t) \end{array} \quad \rightarrow \quad \begin{array}{c} Tn(0), ?Ty(t), \\ ?\langle\downarrow_0\rangle Ty(e), ?\langle\downarrow_1\rangle Ty(e\rightarrow t), \\ \begin{array}{cc} ?Ty(e), \Diamond & ?Ty(e\rightarrow t) \end{array} \end{array}$$

The pointer here is placed at the subject node. This is convenient because English is an SVO language and so we expect the subject to be parsed first, thus we require the first node to be fulfilled to be one which the subject can fill. This is a language specific issue, and different languages with different word order can specify that the pointer be located at the predicate node first.

The next step is the parse of the subject and the formula *John* is updated into the tree and the pointer moves (by completion and introduction) to the predicate node via the root node where it removes the requirement for an argument daughter node that has

a requirement of type e and updates it to say that it has an argument daughter node of type e:

(232)

$$\begin{array}{c} Tn(0), \langle\downarrow_0\rangle Ty(e) \\ ?\langle\downarrow_1\rangle ?Ty(e\rightarrow t), ?Ty(t) \\ \swarrow \quad \searrow \\ Ty(e), Fo(John) \qquad ?Ty(e\rightarrow t), \Diamond \end{array}$$

With the pointer now at the predicate node, a further application of Introduction and Predication can be applied, this time with respect to the $Ty(e\rightarrow t)$ requirement. First Introduction is applied and expands the decoration on the predicate node to include the information that it requires two daughter nodes, one an argument daughter with a requirement for a formula of type e, and the other a functor daughter node with a requirement for a formula of type $(e\rightarrow(e\rightarrow t))$:

(233)

$$\begin{array}{c} Tn(0), \langle\downarrow_0\rangle Ty(e) \\ ?\langle\downarrow_1\rangle ?Ty(e\rightarrow t), ?Ty(t) \\ \swarrow \quad \searrow \\ Ty(e), Fo(John) \qquad \begin{array}{l} ?Ty(e\rightarrow t), ?\langle\downarrow_0\rangle Ty(e), \\ ?\langle\downarrow_1\rangle Ty(e\rightarrow(e\rightarrow t)) \end{array} \end{array}$$

A second double application of Prediction occurs and generates two nodes, the requirements for which decorate the predicate node, and this time the pointer stays at the functor daughter because, in English, the verb is parsed after the subject and so we expect that a verb will come next in the language string. The instruction on where to place the pointer following the parse of the subject is a language specific matter and can vary depending on the order of constituents in the language:

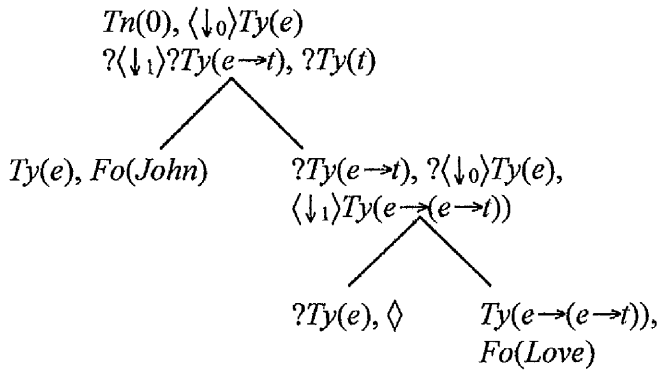
(234)

$$\begin{array}{c} Tn(0), \langle\downarrow_0\rangle Ty(e) \\ ?\langle\downarrow_1\rangle ?Ty(e\rightarrow t), ?Ty(t) \\ \swarrow \quad \searrow \\ Ty(e), Fo(John) \qquad \begin{array}{c} ?Ty(e\rightarrow t), ?\langle\downarrow_0\rangle Ty(e), \\ ?\langle\downarrow_1\rangle Ty(e\rightarrow(e\rightarrow t)) \\ \swarrow \quad \searrow \\ ?Ty(e) \qquad ?Ty(e\rightarrow(e\rightarrow t)), \Diamond \end{array} \end{array}$$

We do next parse the verb, *loves*, which is a transitive verb and so decorates the node at which the pointer holds with type and formula information, the pointer then moves to the argument daughter node via the predicate mother node, removing the requirement

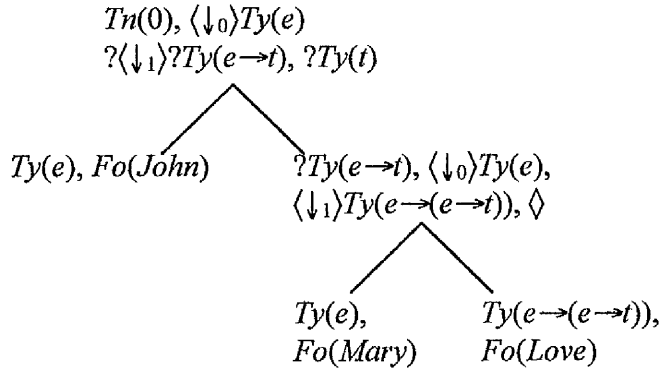
for a functor daughter that is of type $(e \rightarrow (e \rightarrow t))$ and updating the predicate node with the information that it has such a daughter:

(235)



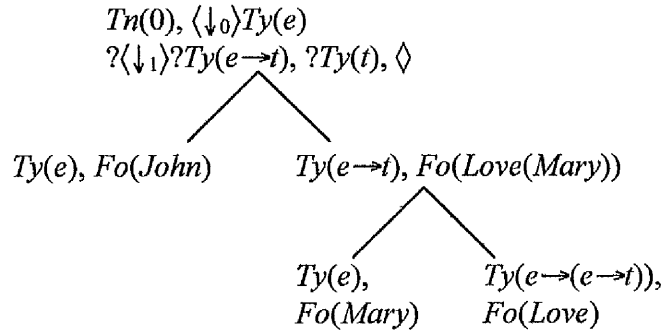
The final word in the string (*Mary*) is parsed in the same way that the subject *John* was parsed. With the information found in the lexical entry matching the requirement at the object node, the formula *Mary* is updated into the tree and the pointer moves to the predicate node where it removes the requirement for an argument daughter that requires a formula of type *e* and updates that node with the information that it has such a daughter:

(236)



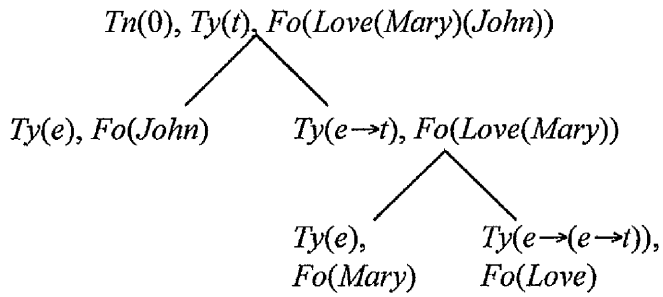
With the terminal nodes of the tree fulfilled, we collate the information from the terminal nodes up in tree by Modus Ponens, thus satisfying the requirement at the predicate node and removing any outstanding requirements and daughter node information:

(237)



The same process applies a second time on the nodes that are daughters to the root node, yielding the final tree structure:

(238)



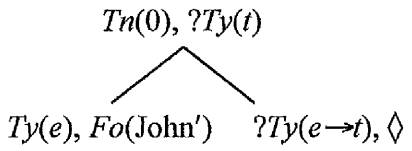
Introduction and Prediction is a purely iterative mechanism, that can apply at any node where there is some form of type *t* requirement. Thus it is possible to model two place predicates and, in theory, there is no reason to prevent the modelling of three place predicates and further, language permitting.

5.4.2 LINK

A LINK Structure is used, for example, for relative clause sentences such as *John, who smokes, loves Mary* and gives a method for managing the *who smokes* part of the sentence. LINK structures involve separating out the two elements of a relative clause sentence and building two tree structures which are associated with the same sentence and are joined or linked together. In English, LINK imposes a requirement on the LINKed structure that it contain a copy of the formula that decorates the node from which the LINK relation is projected, but does not specify where it the copy should occur in the LINKed tree. This requirement "encapsulates the idea that the latter tree is constructed in the context provided by the first partial tree" (Cann *et al.* 2005: 89), and further it necessitates that the LINK structure be projected from a node that is fulfilled and has no outstanding requirements. A pair of modal operators is necessary for the modelling of LINK: $\langle L \rangle$ and $\langle L^{-1} \rangle$. The first of the pair points to a tree linked to the current node, while the latter is the inverse of the former and points back from the linked tree to the node from which it came.

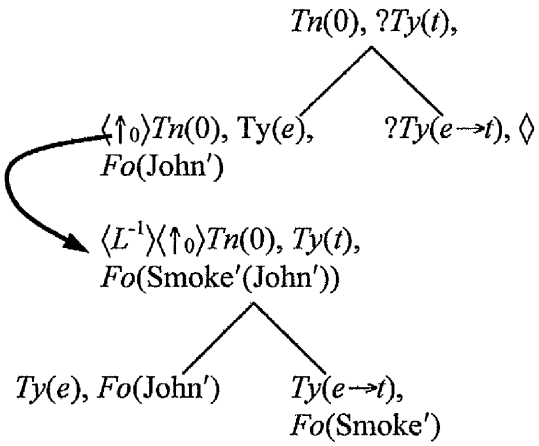
We begin, as always, with the top node and up until the point where *John* has been parsed (221):

(239)



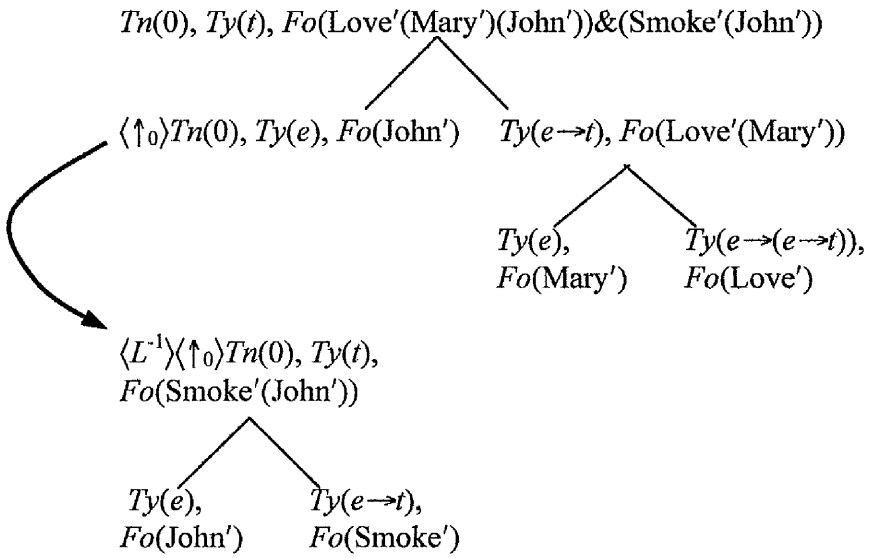
At this point, instead of coming across the verb that is expected, *who* is parsed. What happens then is that the lexical information from *who* takes the representation and all the meaning projected from *John* and copies it into another tree, keeping a link between the two trees through the formula that they share, this shared formula will take the form of an unfixed node in the second, or linked, tree until enough of the relative clause has been parsed:

(240)



The parser then carries on with the rest of the sentence until the result is a fully processed utterance and two complete tree structures joined by a LINK relation.

(241)



This subsection has illustrated the use of LINK in modelling a relative clause in a DS tree. For a more detailed discussion of LINK see Kempson *et al.* (2001) and Cann *et al.* (2005: Chapter 3).

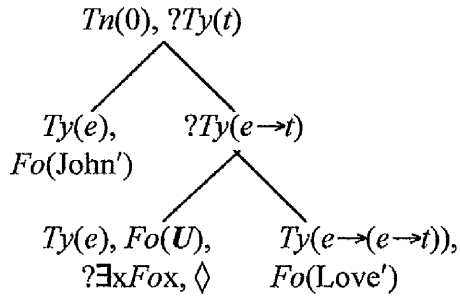
5.5 Concepts of Underspecification

Underspecification in DS can refer to content and/or structure. An example of content underspecification would be the use of pronouns, while structural underspecification refers to instances where an expression has a position in the semantic representation being constructed but this position is not yet specified, and so is under-specified, until a permanent position for that expression in the semantic representation is found. DS is able to account for both kinds of underspecification using an extended vocabulary of *Formula* values to reflect the underspecified nature of pronouns (and to model the necessity for a full *Formula* value to be found for those pronouns), and unfixed nodes along with Adjunction rules to model and update structural underspecification.

In DS, pronouns are considered to be place-holders "for some logical expression which has been constructed within the context of utterance", so that even though they refer back (or in some cases forward) to words, they cannot be considered words themselves and attempts to model them as such repeatedly fail (Cann *et al.* 2005: 68). This matter finds resolution in the assumption that while only words can provide the lexical actions with which representations of content are built up within a context, pronouns can pick out a logical expression to which it is the antecedent as long as that expression exists in the discourse context.

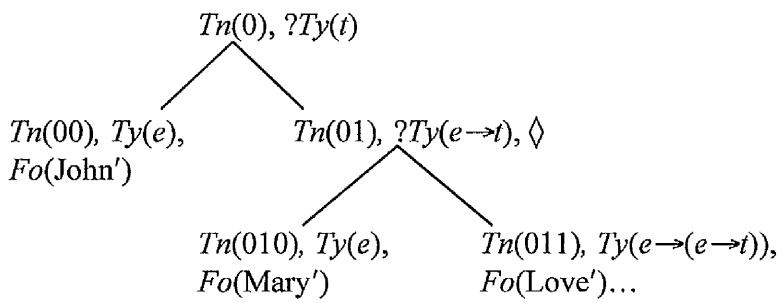
So far it has been shown how DS models the construction of trees for sentences in which the nouns have full formula values, however pronouns cannot be treated in the same way as proper nouns. When the sentence to be parsed involves a pronoun it is scanned in the same way as a proper noun would be but it has a metavariable (***U***, ***V***) as formula value, as for example in *John loves her*. However, in Dynamic Syntax it is not possible to have an unresolved variable at the level of the propositional form. Each node must have a full value in order to be fulfilled and so an appropriate formula value (one of type *e*) must be found to replace the metavariable, the requirement for which is represented by the decoration ?∃x*Fo*(x) as can be seen on the object node in the tree below:

(242)



This is where the use of context in DS comes in. *Fo*(John′) is not a suitable replacement in this sentence because it cannot take the role of both the subject and the object in the same sentence, and it also cannot be a replacement for the pronoun *her* because it is specifically female. In this case someone else must be chosen (e.g. Mary) and if the parse does not fail at *Mary* being the replacement for *her*, then by a process of 'Substitution' ***U*** is replaced by *Mary* and the parse continues as previously:

(243)



The natural language in question cannot determine what is a suitable replacement for the metavariable, but rather pragmatic principles must be applied. However, the language can *restrict* the pragmatic choices for replacements for the metavariable, such as ensuring that the full formula value matches the pronoun (and so the metavariable) in number and sex (in the case of English), gender, or noun class (in the case of the Bantu languages).

As has been seen, at the heart of DS is the concept that syntactic mechanisms can be seen in terms of tree growth and update of those trees. The DS model also allows for the concept of underspecification, particularly in relation to pronouns (which project meta-variables that are later updated from context). Structural underspecification here refers to nodes which, at the point of introduction, do not have their relation fixed, and DS allows for the construction of these nodes. The fixing of underspecified (or unfixed) nodes is delayed until the parsing process has progressed further.

In DS, a natural language string is considered "wellformed" as long as the outcome of the parse is at least one complete logical form that has no outstanding requirements. There can be any number of sequences of words leading to an individual logical form, similarly there can be any number of sequences of partial trees. Following immediately from the concept of partial trees is the restriction that there can never be more than one unfixed node in a tree structure at any one time. Every node in the DS tree is identified by its tree node value. In the case of unfixed nodes, this identification is by the dominance relations that define the node. However, due to the weak nature of

dominance relations as identifiers (the underspecified nature of a decoration such as $\langle\uparrow^*\rangle Tn(0)$ for example), any further node introduced that is decorated by the same formula would not be distinguishable from the initial unfixed node and so would have to be one and the same node, causing the two to collapse.

The process of constructing an unfixed node is theoretically possible at any point in the parse, but the point of construction can be associated with different stages of tree growth. Early application is found with a "radically underspecified" tree (Marten *et al.* to appear: 9), late application is found in one that is almost complete (Late *Adjunction, see (5.5.1.4)). Unfixed nodes cannot remain unfixed in the final tree structure, and so are decorated with a requirement to be updated into a fixed position within the tree during the building process: $?\exists x.Tn(x)$. This is along with the modal relations which also decorate the node and indicate the place that the unfixed node temporarily holds in the tree. Underspecified modal relations (as discussed in section (5.3.1.1)) are formally expressed using $\langle\uparrow^*\rangle$ and $\langle\downarrow^*\rangle$. $\langle\uparrow^*\rangle$ points to *some* node that dominates the node at which the decoration holds. The obverse $\langle\downarrow^*\rangle$ points to *some* daughter node of the node it decorates. For example, the expression $\langle\uparrow^*\rangle ?Ty(t)$ holds to cover the possibility that the current node *or* some node that dominates the current node is decorated with $?Ty(t)$. It is these types modalities that allow underspecified tree locations to be expressed by modelling the underspecified relation between the node the modalities decorate and further tree structure. The expression $\langle\uparrow^*\rangle Tn(0)$ indicates that the node it decorates holds at some point within the tree structure along an unspecified set of daughter relations from the top node.

During the course of building a tree, the unfixed node is decorated and then the verb is parsed, the actions of which (from the lexical entry) can project a full template of the propositional structure. When the subject is parsed (and updated from the context, if necessary) the pointer then moves on to the object node in order to develop that. Marten *et al.* (2007: 8) state: "This move provides the necessary input for fixing the unfixed node, with this update also solving the subcategorisation requirement of the two-place predicate projected by the verb." The only restriction on this process of unification is that there is an update outcome, it can also apply with a pronoun decorating an object node, as long as the pronoun does not have a bottom restriction (as the bottom restriction states that the node it decorates is a terminal node in the tree, and so can have no daughters).

Generally it is said that the pointer cannot move up a constructed tree relation until at least a type value has been provided, in addition, formula values cannot be de-

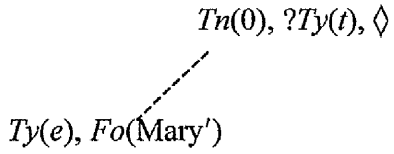
rived at a mother node until of the requirements holding on its daughter nodes are fulfilled. However, with pronouns there is a type value that is assigned to the node from the lexical entry as well as formula values that take the form of a meta-variable, meaning that the parse can continue on the assumption that the full formula value will be assigned at a later time (the relevant node is 'type-complete'). Though the assignment of a meta-variable allows the pointer to move on from the underspecified node, it cannot move far (only to a node that is under the same c-command relation) without having to return to find a fixed value for that node, otherwise it will not be possible to derive a full formula value at the mother node. The construction of a subtree involves building an unfixed node of a type that is the same as the node from which it is launched. The parse can then continue on to the verb and the post-verbal string before returning to complete the unfixed node by decorating it with the appropriate decoration as found and then merging the unfixed node with the fixed node from which is was originally constructed.

An unfixed node is used in circumstances such as left-dislocation, a sentence such as *Mary, John loves*, which has the purpose of emphasising who it is that John loves or could be used for purposes of distinction such as in the sentence; *Mary, John loves, but Sue he hates*. We begin as with the sentence in (194) with the top node:

(244) $Tn(0), ?Ty(t), \Diamond$

But when *Mary* is parsed first (with *John* to follow) it is not known straight away what role the information projected from the noun *Mary* will take – whether *Fo(Mary), Ty(e)* will decorate the subject or object node – so the information from *Mary* is put into an unfixed node[38] (represented by the broken line):

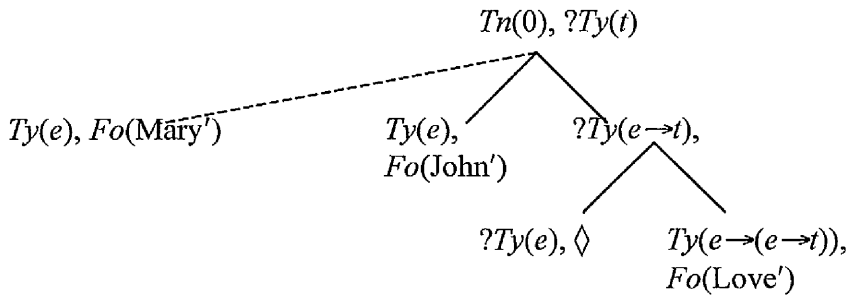
(245)



After this the rest of the sentence is parsed as usual with the unfixed node still unfixed until the parse has developed as in (246):

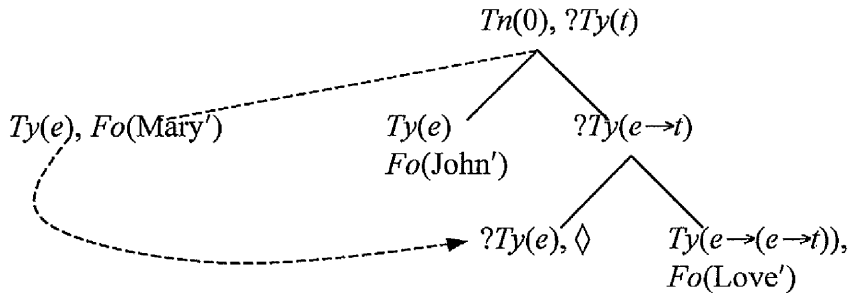
[38] This is licensed by *Adjunction which is addressed in section (5.5.1.2).

(246)



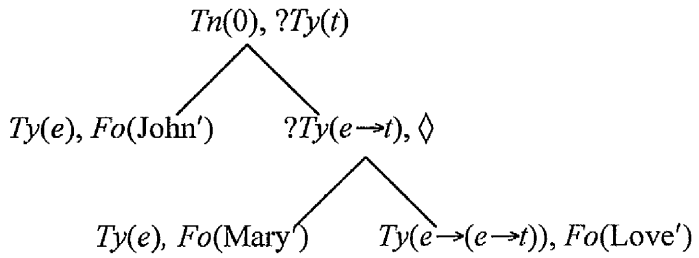
Where there is one terminal node that requires a formula of type *e* and a floating node that has a formula of type *e* and so the floating node goes through a process of 'Merge' with the pointed node:

(247)



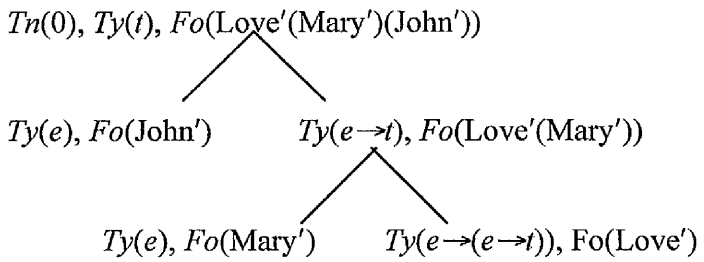
This yields the tree structure found in (248):

(248)



The pointer now shifts up to the next node with requirements and the process continues as for a non-dislocated sentence resulting in exactly the same final proposition representation as in (226):

(249)



It can now be seen that in Dynamic Syntax, the process of building the tree and getting to the final representation is as important as the final representation itself. The two final

trees above (in examples (226) and (249)) are identical even though the utterances from which they are derived are not. Their different pragmatic status is shown through the different derivational processes through which the final interpretation is developed.

Unfixed nodes are introduced under different circumstances by Adjunction rules, which are outlined in section (5.5.1) below.

5.5.1 Adjunction Rules

Adjunction rules serve to introduce nodes which carry descriptions but which, as yet, do not have a fixed location in a tree which is still under development, these are unfixed nodes.

In this section I will present an overview of three adjunction rules – Adjunction, *Adjunction and Late *Adjunction – which together provide an idea of the interaction between structural underspecification and locality in DS.

Adjunction is the basic rule used to introduce a duplicate node. *Adjunction allows for the introduction of an unfixed *Ty*(*e*) expression into the parse where the final position of this expression within the semantic representation is not yet known and will be resolved at a later stage. A node introduced by *Adjunction will be fixed within the same *Ty*(*t*) domain in which it was initially introduced when the appropriate predicate has been built. Late *Adjunction allows for indirect development of a node that is already fixed and is utilised primarily for the analysis of right-periphery phenomena.

5.5.1.1 Adjunction

The Adjunction rule is set out formally as follows (Kempson et al. 2001: 85):

(250) ADJUNCTION RULE

$$\frac{\{\ldots\{X, \ldots, ?Ty(x), \Diamond\}\ldots\}}{\{\ldots\{X, \ldots, ?Ty(x)\}\ \{\langle\uparrow^*\rangle X, \ldots, ?\exists x.Tn(x), ?Ty(x), \Diamond\}\ \ldots\}}$$

Adjunction introduces a node that is a duplicate of the node at which the pointer currently holds, and moves the pointer to this duplicated node. The address of the node states that the duplicate node occurs somewhere below the original in the tree, and so is underspecified, Kempson *et al.* (2001: 85). Adjunction allows for the construction of adjuncts, where Introduction and Prediction do not. Introduction and Prediction (see section (5.4.1)) generate basic tree structure, essentially allowing for a node to have daughters and so expand the tree structure beyond the stage of a having a node with a

requirement to allow for the requirement of that node to be fulfilled through the daughter nodes.[39]

*5.5.1.2 *Adjunction*

The *Adjunction rule is set out formally as follows (Kempson *et al.* 2001: 85):

(251) *ADJUNCTION RULE

$$\frac{\{\{Tn(a), \ldots, ?Ty(t), \Diamond\}\}}{\{\{Tn(a), \ldots, ?Ty(t)\}\ \{\langle\uparrow^*\rangle Tn(a), \ldots\ \exists x.Tn(x), ?Ty(e), \Diamond\}\}}$$

*Adjunction introduces an unfixed node that requires a formula of $Ty(e)$ and is dominated by a node which has a requirement for a formula of $Ty(t)$. Using the rule of *Adjunction, the processing of a sentence-initial noun phrase is possible even if there is no argument role projected yet. Utilising this rule, left-dislocated expressions (as in (252)) or fronted question pronouns (as in (253)) can be analysed as projecting their content onto an unfixed node:

(252) John, I like

(253) What did John write?

One of the areas that the adjunction rules are paramount is with left and right periphery effects. In Bantu languages it is possible to introduce an object argument node at the left-periphery without a co-referring OM, although it is more common for there to be an OM present. An example of a left-dislocated object without a co-referring OM is the following Tumbuku example in (254) (Downing 2006: 62, cited in Marten *et al.* 2007: 15), where the initial NP is focused:

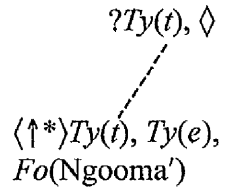
(254) *Ngóoma* *ti-zamu-limilîr-a* *namchéero* [Tumbuku]
9.maize SM1pl-FUT-weed-FV tomorrow
'Maize we will weed tomorrow'

I assume that the Bantu verbal inflectional morphemes (such as the subject and object markers as well as the tense markers) each have their own lexical entries which provide information leading to an incremental step in the parsing and constructing process. The example in (254), and others like it, can be analysed in DS using *Adjunction. In this

[39] Different types of adjunction are modelled in DS in different ways, so that in addition to the Adjunction rule, analyses involving LINK structures and structural type underspecification have been proposed (see e.g. Marten, 2002.). However, the topic is beyond the scope of the present work.

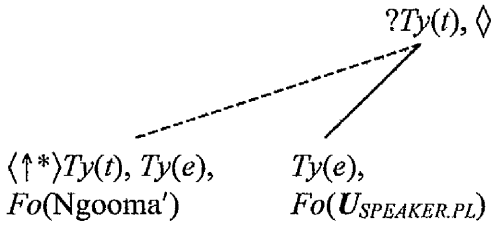
case, the left-dislocated NP *ngóoma* is parsed first, and is projected onto an unfixed node which is introduced by *Adjunction:

(255) Parsing *ngóoma*



Next the 1st person plural subject marker *ti-* is parsed. Further, at this stage I assume that the information provided by *ti-* is projected directly onto a fixed subject node. The formula value projected by *ti-* is the meta-variable $Fo(\boldsymbol{U})$, which carries with it (from the lexical entry) the restriction that it represents a group consisting of the speaker + others.[40]

(256) Parsing *ngóoma ti-*

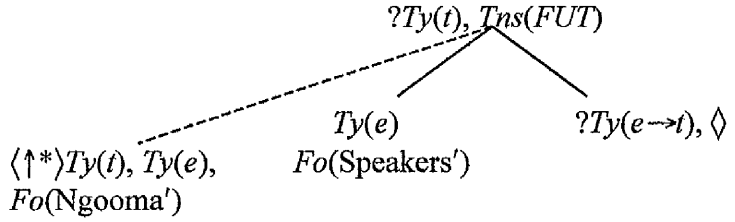


After the subject node is built and a replacement for the metavariable $Fo(\boldsymbol{U}_{SPEAKER.PL})$ is found in the context, the pointer returns to the root node and the next element to be parsed is the tense marker *-zamu-* which leads to two updates of the parse: First, the root node is annotated with the tense information carried by the tense marker ($Tns(FUT)$ – which I will leave unanalysed here); second, a functor node is introduced in anticipation of the verb being parsed.[41] As can be seen from this example, information provided by the tense marker has a direct bearing on the structure building process:

[40] This is formally expressed by encapsulating the information in a subscript as shown: $Fo(\boldsymbol{U}_{SPEAKER.PL})$.

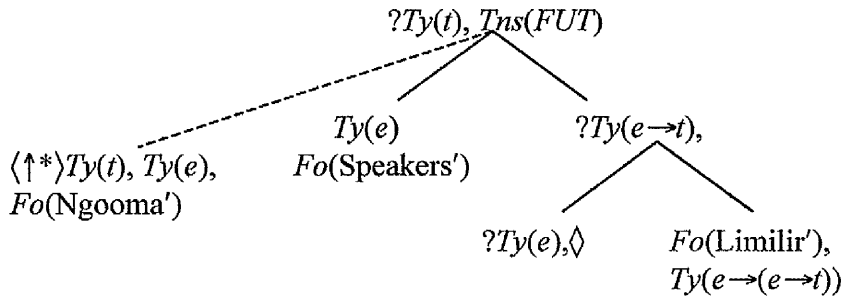
[41] This can be seen as a historical reflex from the origin of many Bantu tense markers as verbs (see Marten *et al.* 2007).

(257) Parsing *ngóoma ti-zamu-*



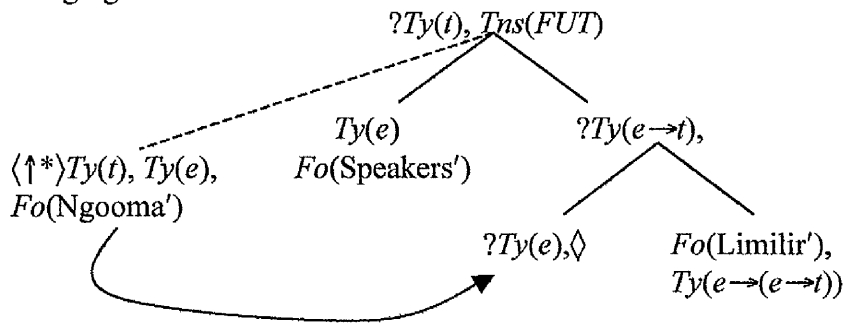
At this point, the pointer is at the predicate node in anticipation of the verb being parsed which is then projected on to the predicate node:

(258) Parsing *ngóoma ti-zamu-limilîr-*



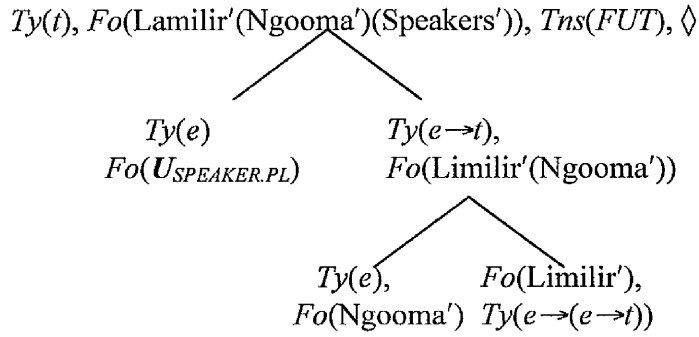
Returning to the original underspecified node introduced at the outset by *Adjunction, this is resolved by assigning a fixed position in the tree to the unfixed node. It is relevant to note here that the fixed position occurs within the domain as set by the original ?*Ty*(*t*) task at the root node. After the unfixed node is merged into its fixed position, there is no remaining trace of the underspecified relation represented in the tree structure:

(259) Merging of unfixed node



The final step in the derivation is to combine the accumulated information, starting at the bottom of the tree and working upwards through a process of elimination and completion, so that all outstanding requirements are fulfilled in the final tree and a complete formula value is projected at the root node:

(260) Parsing *ngóoma ti-zamu-limilîr-a*



Thus the use of *Adjunction in the analysis of left-dislocated information can be seen, left-dislocated NPs can be built into the parse at an unfixed node, the position of which is only resolved once an appropriate fixed node is introduced.

In Bantu languages, left-dislocated NPs are often paired with a co-referential OM, the importance of which leads to a discussion of the lexical information that they carry and project (in particular with regards to whether or not they project a bottom restriction). Before tackling this question, I will introduce the final DS adjunction rule to be discussed in this section.

*5.5.1.3 Local *Adjunction*

The Local *Adjunction rule is set out formally as follows (following Cann *et al.* 2005: 236):

(261) LOCAL *ADJUNCTION RULE

$$\frac{\{\ldots\{Tn(a), \ldots, ?Ty(t), \Diamond\}\ldots\}}{\{\ldots\{Tn(a), ?Ty(t)\ldots\}\ldots\{\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle Tn(a), ?Ty(e), ?\exists x.Tn(x), \Diamond\}\ldots\}}$$

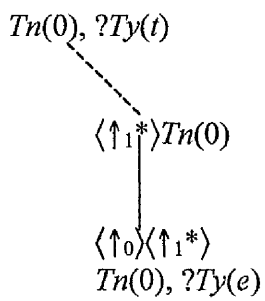
Local *Adjunction creates an unfixed node that is relative to a local type *t* requiring node, but which does not yet have its position in the tree fully determined. A locally unfixed node can be constructed whenever the pointer is at a type *t* requiring node, as long as the predicate node is not already decorated. This implies that it must precede the parsing of the verb. However, all underspecified relations within a partial tree structure must be unique – this means that there can be no further construction of locally unfixed nodes until the existing underspecified relation is updated.

Local *Adjunction utilises the operator $\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle X$ (which could translate as "somewhere above me across an argument relation and an unspecified number of functor relations is some node 'X'") which allows for the repeated application of an apparent sequence of unfixed nodes due to the underspecified relationship it defines between

$Tn(X)$ and another node which is dominated by $Tn(X)$. $Tn(X)$ has a limited range of dominance relations: one defined from an argument daughter node *and* zero or more defined from functor daughter nodes. The node introduced by Local *Adjunction has to be a local argument node. This is disallowed for *Adjunction because *Adjunction introduces a new node from a node specifically identified as $Tn(a)$, with the new node being identified as $\langle\uparrow^*\rangle Tn(a)$. There are no restrictions on the resolution of the dominance relation between the unfixed node and $Tn(a)$. Any further application of *Adjunction will introduce a tree relation that is the same as the one that has just been introduced into the partial tree. A relation that is characterised in the exact same way and which is satisfied in the model in the exact same way, which will simply collapse together since they are, essentially, the exact same relation. However, it is possible to have one unfixed node and one locally unfixed node since the particular kind of structural underspecification they express is different.

The Local *Adjunction operator allows for the definition of a construction step introducing a node with the identifier $\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle Tn(a)$). This is the construction from a tree node $Tn(a)$ decorated with a requirement for a type t ($?Ty(t)$) to a locally unfixed node decorated by a requirement for a type e ($?Ty(e)$):

(262)



This construction process allows each individual noun phrase in a "locally scrambled NP-sequence" (Cann *et al.* 2005: 236) to decorate an unfixed node, provided that before each new step of Local *Adjunction any locally unfixed nodes are fixed by (for example) case information: the eventual position of these scrambled NPs will be determined jointly by case information and information from the verb within the domain set out by the propositional template induced by the actions of a verb.

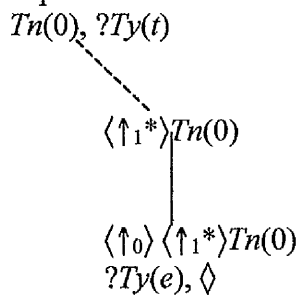
I will now briefly turn to Latin (as found in Marten *et al.* 2007: 11-12) to illustrate the constructive use of case with Local *Adjunction when applied to languages that have scrambling, that is, flexibility in the ordering of noun phrases. The case specification found in Latin serves to immediately update any unfixed node into a fixed position in the DS tree. This allows Local *Adjunction to occur again and introduce a

further unfixed node, whilst maintaining the precept that there be only one unfixed node at a time. Thus it is possible, as will be seen, to license the building of structure from the following sequence, despite the verb occurring finally:

(263) *Serv-um* *Xerx-es* *cecidit* [Latin]
Slave-ACC Xerxes-NOM killed.3SG
'Xerxes killed the slave'

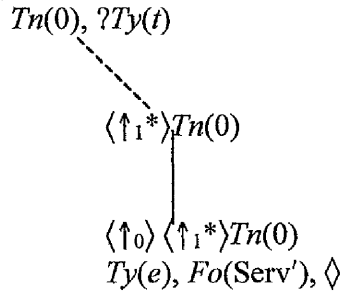
The effect of case in examples such as (263) is as a mechanism for immediately fixing underspecified tree relations, allowing for several applications of Local *Adjunction and therefore the construction of a different unfixed node for each new NP within the same tree and parsing free word order examples. We begin with the construction of a locally unfixed node (264):

(264) Outset of parse:



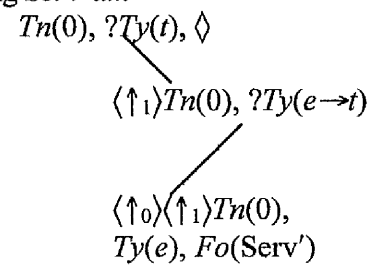
The locally unfixed node is fixed into the tree at the object node upon the parse of *serv-um*, with the accusative case marker assigning the appropriate placement in the tree. Initially *serv-* is parsed which decorates the unfixed node:

(265) Parsing *Serv-*



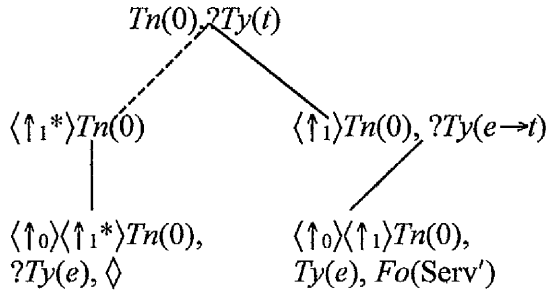
Next the accusative case marker *-um* is parsed, which serves to fix the unfixed *Ty*(*e*) node into a fixed position in the tree:

(266) Parsing *Serv-um*



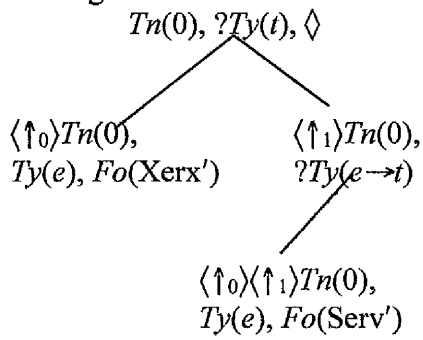
Upon the fixing of the first unfixed node, a second can be introduced by a second application of Local *Adjunction:

(267) Introducing a second locally unfixed node



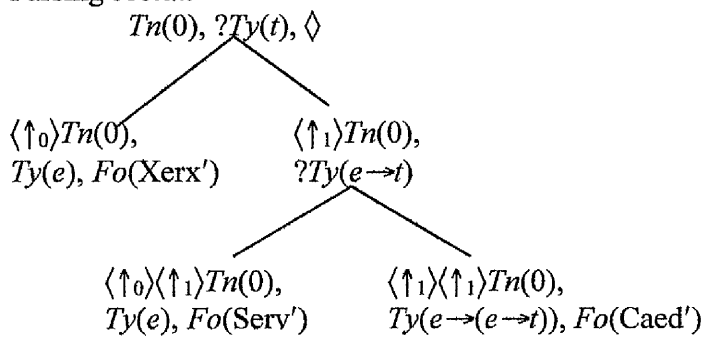
It is at this second unfixed node that the subject *xerx-es* fixes, with *xerx-* decorating the node and the nominative case marker *-es* fixing the node into the tree, yielding a partial tree that contains argument nodes, but as yet does not have a predicate node with which they can combine:

(268) Parsing *Xerx-es*



Finally the verb is parsed, completing the propositional structure and finishing the tree:

(269) Parsing *cecidit*



Any subject or object nodes induced by the actions of the verb will collapse with the nodes introduced initially as unfixed and then updated through constructive case. Marten *et al.* (2007: 12) state that in "the modern Romance languages, with case no longer being expressible on full NPs, the effects of the actions of Local *Adjunction are now arguably restricted to its use with clitic pronouns." This is the direction in which I will turn when looking at Setswana (section (6.2)), by applying the notion of Scrambling to multiple OMs. If OMs are viewed as being place markers for NPs awaiting enrichment, with the NPs in turn being representations of individuals that are constructed as interpretations of preceding NPs are uttered, it is possible to view multiple OMs a phenomenon parallel to scrambling and to apply the same methods for the purposes of analysis and structure building.

The building of unfixed nodes reflects the underspecification of an agreement marker's semantic role within the resulting tree structure. The underspecified relation defined by the Local *Adjunction operator allows for restricted forms of tree development: one dominance relation between $Tn(a)$ and an argument daughter (a subject relation ($\langle\uparrow_0\rangle Tn(a)$); and zero or more dominance relations between $Tn(a)$ and a functor daughter (object relations ($\langle\uparrow_0\rangle\langle\uparrow_1\rangle Tn(a)$), ($\langle\uparrow_0\rangle\langle\uparrow_1\rangle\langle\uparrow_1\rangle Tn(a)$, etc). The functor relations allow for the introduction of multiple arguments that are not the subject of the verb and it is these object relations which are relevant. Multiple applications of the Local *Adjunction rule is disallowed because it would introduce the self same tree relation twice, which would collapse. This causes a problem with multiple OMs, which could find a solution with case marking. For example case can serve to define filters on output – meaning that it imposes a requirement on the OM to decorate a node whose position in the final tree has a mother node which is of predicate type (illustrated as $?\langle\uparrow_0\rangle Ty(e\rightarrow t)$ on a term node). Case can also be constructive and induce the building of tree structure as part of the building process. In the example of Latin scrambling with

Local *Adjunction, an essential role was played by case markers, the information from which was analysed as serving to fix locally unfixed nodes into the tree structure immediately upon the decoration of these nodes with the information from the noun. Through this, a further application of Local *Adjunction was possible after each $Ty(e)$ node was fixed. However, in Setswana there are no case markers to fix the unfixed nodes.

*5.5.1.4 Late *Adjunction*

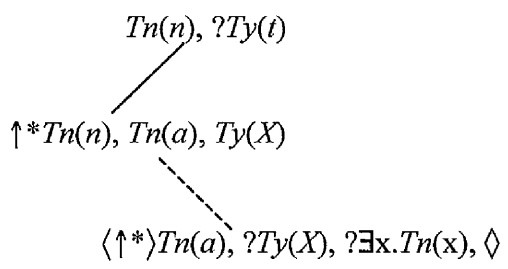
The Late *Adjunction rule is set out formally as follows (Cann *et al.* 2005: 196):

(270) LATE *ADJUNCTION RULE

$$\frac{\{Tn(n), \ldots, \{\uparrow^*Tn(n), Tn(a), \ldots, Ty(X), \Diamond\}, \ldots\}}{\{Tn(n), \ldots, \{\uparrow^*Tn(a), Tn(a), \ldots, Ty(X)\}, \{\langle\uparrow^*\rangle Tn(a), ?Ty(X), ?\exists x.Tn(x), \Diamond\}, \ldots\}}$$

Late *Adjunction projects an unfixed node that has a requirement for the same type as the node from which it is projected:

(271)



This allows for further, indirect, development of a node that is already fixed (as it is not possible to directly develop a fixed node) by decorating the unfixed node projected by Late *Adjunction with the appropriate information and then applying a process of Merge and thus updating the fixed node.

Late *Adjunction occurs at a late stage in the parse and allows for the analysis of a right-peripheral expression. Later stages of the parsing process do not allow for the type of underspecification as found on the left-periphery, in that after some structure has been built and all of its terminal nodes have been decorated, it would seem that there can be no construction of new nodes – the position of which is underspecified. This is where Late *Adjunction is utilised.

Expressions which have anaphoric reference are analysed as projecting a meta-variable as a formula value and the rule of Substitution, being optional, is not required to apply immediately if there is no immediate substitution for the meta-variable available, that is, if an appropriate possible value cannot be found in the context. Further, if

a node is decorated with type information it is possible for there to be an application of Completion and for the parse to continue. However, the requirement for a full formula value at the node decorated by the meta-variable dictates that the pointer will have to return to that node at a later point in order to fulfil the requirement for a full formula value and complete the tree. Further, Late *Adjunction can only apply where one out of two daughter nodes does not have a full formula value, and so the mother node cannot be decorated appropriately.

The aim of the discussion of these Adjunction rules is to map out the conceptual and formal space of the DS model. The rules in this section (with the exception of *Adjunction which is necessary in the process of Local *Adjunction) are not employed to a great extent in the analysis of multiple OMs in Setswana, however they are relevant for setting up a foundation for the structure building processes particular to unfixed nodes, and as a background for the processes that will be employed in the analysis (Local *Adjunction and Complex Unfixed Nodes).
As ever, it is important to recognise that, rather than the final tree structure, it is the process of building that is of primary importance in DS.

5.6 Summary

The purpose of this chapter was to introduce and give an overview of Dynamic Syntax, the syntactic theory that will be used in the analysis in chapter 6. The parsing process is central to DS and it is through this process that the syntactic representations of utterances (in the form of trees) are constructed. Central to the parsing process is the notion of context which is essential when parsing utterances involving pronouns, in particular.

The initial tree construction given in section (5.2) shows, at a very basic level, the process by which elements of a natural language string are turned into a DS tree through the parse. The purpose of this (in light of following sections which give a detailed description of the process of tree construction) was to introduce the concept of tree structures and the way in which the concepts decorating nodes combine up in the tree to yield the final propositional structure representing the natural language string being parsed.

Having already gone through a basic parse and given an idea of how trees are constructed it is then easier to see the relevance of the formal language used to describe

the trees and their construction. With the concept of nodes in place, it is easier to conceptualise the decoration of those nodes with the formal tree node decorations. Similarly, the *LOFT* modalities are easier to conceptualise with a basic tree structure in mind to which to relate when talking about mother/daughter node relations.

Having introduced the concept of the DS tree and the formal language used to describe those trees, the next step is to introduce the transition rules through which the tree structure itself is generated. Beginning with the minimal element of a tree, *Axiom*, the rules of Introduction, Elimination, Prediction, Completion, Anticipation, Thinning and Merge work together (though not all rules in all constructions) to initiate, drive the construction and construct the DS tree.

Transition rules are not the only method of generating tree structure, lexical actions can be used independently or alongside a number of transition rules to construct a DS tree. Lexical actions are contained within lexical entries, and each word of a language has a lexical entry. The lexical actions contained within a lexical entry give instructions to search for an appropriate place for a word of that entry's type within the tree, and if there is a place for the 'word' to either decorate the appropriate node and nothing more, or to decorate the appropriate node and perform further actions which are specific to that lexical entry. Through further actions further tree structure can be generated and decorated with certain information which is then updated upon the parse of further words in the natural language string and the results of the actions contained in the lexical entries of those further words.

With the basic DS tree concept and the formal descriptive language in place, it is then possible to apply the DS rules to describe the construction of a full DS tree. This was done in two stages, first a basic parse and construction which illustrated the combination of transition rules and lexical entries to construct a full propositional tree for the sentence *John loves Mary*. Following that, there were four more constructions to demonstrate the scope of DS. First an example using the transition rules of Introduction and Prediction to construct a full propositional structure (this is in anticipation of the following chapter in which Introduction and Prediction are proposed as a method for analysing multiple object markers in Setswana). Second was a parse of a left-dislocated example (*Mary, John loves*) to introduce the concept of unfixed nodes before they are discussed in detail in chapter 6. The third DS structure building concept illustrated was a LINK construction, which is not utilised in the analysis in chapter 6, but is an important feature of DS and can be used to model constructions such as left-dislocated topics, right-dislocation and relative clauses. Finally concepts of underspecification are ex-

plored, the DS account of pronouns is introduced briefly here, before chapter 6 in which pronouns play an integral role, explaining that pronouns serve as a place-holder for a full formula value to be updated into the tree from the context, which allow the parse to continue on to the rest of the utterance and the rest of the tree to be constructed. Further, the adjunction rules described in section (5.5.1) provided an idea of the interaction between structural underspecification and locality in DS as a background to the analyses to be presented in chapter 6. The three adjunction rules (Adjunction, *Adjunction and Late *Adjunction) account for the majority of possible occurrences of underspecification and, though not used directly, feed into the analyses of multiple OMs in Setswana to follow.

This is all in preparation for the following chapter (chapter 6) which is the central chapter of this thesis and uses the tools as provided by Dynamic Syntax (most of which were introduced in this chapter) to propose three possible methods of analysing multiple object constructions as found in Setswana.

6 Multiple Object Constructions

Though occurring towards the end of this thesis, this is the central chapter in which I present my analysis for multiple object constructions in Setswana. As a starting off point I present a parse of a Kiswahili single object construction, modified from Cann *et al* (2005: 303-307), taking that same parse and extending it to a structurally similar Setswana single object construction, both having a linear order of SM-tense-OM-verb. This is important to note because the multiple object constructions analysed later on have tense marking at the end of the verb-form, rather than following the subject marker, which causes complications in the building of tree structure and fixing of unfixed nodes, as we will see.

The multiple object constructions in Setswana are analysed utilising Local *Adjunction, as introduced with single object constructions in Kiswahili and Setswana earlier on in this chapter, including a discussion of the disjunctive marker, while employing a notion of pragmatics to fix the locally unfixed nodes in the absence of case marking (as discussed in section (5.5.1.3) with Latin) and with the tense marker occurring at the end of the verb-form.

Initially, however, the pragmatics as defined in chapter 1 is here brought in to a specific focus with Bantu languages in mind, and more specifically with agreement markers.

6.1 Pragmatics Revisited

As mentioned in section (1.1), it is primarily Extent Condition 2 of the Definition of Relevance, repeated below, that is principal with regards to the agreement markers in the Bantu languages. At this stage I can clarify the meaning and implications of this.

> *Definition of Relevance*
> *Extent condition 1*: an assumption is relevant in a context to the extent that its contextual effects in this context are large.
> *Extent condition 2*: an assumption is relevant in a context to the extent that the effort required to process it in this context is small

With the definition of relevance in mind, we now consider the thematic roles of the arguments of an utterance. A transitive verb minimally takes a subject and an object, but it can take further objects as adjuncts. Thematically, the subject argument is typically the agent (the one performing the actions of the verb) and the object is typically the pa-

tient (the one that has the actions of the verb done to it). With applicative transitive verbs, which are primarily used in the Bantu examples of the following sections, there is a second object which is typically the benefactive (the one for which the actions of the verb are undertaken – the one which benefits from the verb). Bearth (2003: 124) describes these as the "semantic roles" of the objects, which is discussed in more detail in section (2.5.2), and this is the term I will adopt here. Typically, the patient is the direct object and the benefactive is the indirect object. So in cases where there is no unambiguous encoding of direct and indirect object in a given construction (such as the cases of Setswana multiple object marker constructions discussed in more detail below) it is possible to refer to the context and the knowledge of the semantic roles and find an interpretation which best fits with regards to relevance. This is in particular the case in constructions where the semantic difference between the two noun phrases favours a particular assignment of each noun phrase to a semantic role. These are typical cases with one animate and one non-animate noun phrase, which are most naturally interpreted as benefactive and patient object respectively, it is these cases which are the most common examples of multiple object constructions in Setswana in the sample underlying this thesis.[42] It is not so simple, however, in examples where both OMs denote humans, where one OM is of class 1 and the other denotes another animate entity or where both denote inanimates. While these cases are important I do not undertake the task of analysing them in this thesis, leaving them aside for the time being as a matter for further research

The above is particularly relevant with regards to pronouns. If a context is established in which Mary has arrived home late from work and John tells her that he fed their children, Mary then enquires about a chicken in the fridge and John tells her *I cooked it for them*, it is fairly clear that *I* refers to the John (the speaker) through lexical encoding, and that *it* refers to the chicken in the fridge and *them* refers to the children who have been fed, partly due to the number distinction, but also partly due to pragmatic inference about likely scenarios regarding what can be cooking and who is likely to eat it. If John is very tired and distracted, however, and instead says *I cooked them for it* there are two possible interpretations that Mary can infer, either that John cooked the children for the benefit of the chicken in the fridge, or that he is tired and distracted and meant to say *I cooked it for them* in which case she should filter the information into its most likely semantic roles and so interpret the utterance to mean that John

[42] I leave to one side the question of whether this reflects, at least in part, the elicitation design. My impression is that it is likely that textual studies, or corpora of spoken texts, would confirm this.

cooked the chicken for the benefit of the children. While this would appear to require more effort on Mary's part, keeping in line with Extent Condition 2 of the definition of relevance it would take more effort to process the concept that John cooked the children for the benefit of the chicken in the fridge than that John cooked the chicken for the benefit of the children: while in the former case, Mary's effort consists, among other things, in overriding apparently encoded information, in the latter case, the interpretation would have to lead to large-scale (and costly) belief revision, including that the children are dead and that dead chickens eat children. The latter interpretation is thus ruled out on relevance grounds.

An utterance such as *I cooked them for it* in English in the above defined context would, unless overridden, lead only to an interpretation wildly inconsistent with what know about what gets cooked and for whom, however in Setswana to say the equivalent is perfectly acceptable (though not the preferred construction) and in fact yields the same interpretation as the equivalent for *I cooked it for them* as seen in examples (272) and (273) where what is glossed as OM1 is the benefactive and what is glossed as OM9 is the patient:

(272) *kè* *à* *mó* *è* *ápéélà* [Setswana-Sengwato]
SM1 DISJ OM1 OM9 cook.APPL
'I am cooking it for him'

(273) *kè* *à* *é* *mò* *ápéélà* [Setswana-Sengwato]
SC1 DISJ OM9 OM1 cook.APPL
'I am cooking it for him'

With Setswana, the context and semantic role evidence is paramount in interpretation, rather than the order of the elements in an utterance, and so even when an OM that, contextually, *should* occur in the direct object position actually occurs in the indirect object position, it is still interpreted as the direct object and vice-versa.[43] One vital difference between English (and case marking languages like Latin) and Setswana is the noun class system. While there is no clear semantics of the noun classes (as shown in section (2.5.1.1)) there is certain inherent semantic information, such as the human/non-human distinction. It is this semantic information that can be utilised for on-line hypothesis anticipation.

Recall from section (5.5.1.3) the discussion about the constructive use of case in Latin whereby case markers fix locally unfixed nodes in the DS tree, Cann *et al* (2005:

[43] I do not make any claims as to the how this interpretation is encoded at this stage. This is a matter for further research.

236-240) describe the constructive use of case as "inducing a structure-building action" by ruling out all but one of the possible argument relations (out of subject, object and indirect object) allowed by the Local *Adjunction operator ($\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle X$). Using the Japanese accusative case marker *-o*, which is an object-marking suffix, they illustrate how the case marker builds its relation to the root node by specifying the intermediate relation (i.e. the particular predicate node) between the locally unfixed node that the case marker decorates and the root node. This is shown on the locally unfixed node by way of the requirement $?\langle\uparrow_0\rangle Ty(e\rightarrow t)$ and is specified in the lexical entry for the case marker.

What I propose for Setswana object marking is similar to constructive case, though instead of case markers encoding structure (since there is no case marking in Setswana) it is the interaction between pragmatics and the lexical specification of the OMs through which structure is enriched between the root node and the locally unfixed node, fixing the argument node into the appropriate position in the tree structure. Unlike case markers, there are no lexical instructions for structure building involved with Setswana OMs. This has benefits and disadvantages. With no explicit encoding of the structural relation to be built, the relation of the argument nodes decorated with information from the OMs and the predicate nodes are subject to a certain level of ambiguity and while this is a potential structural weakness it is not problematic in parsing because pragmatic led enricment of structure can occur at any point as long as the OM to be fixed has been parsed. Furthermore, for those cases mentioned above where both OMs denote humans, where one OM is of class 1 and the other denotes another animate entity or where both denote inanimates it allows for the necessary changing of semantic roles of the OMs depending on the context in which they occur. The multiple object examples used in this chapter involve one human entity and one inanimate entity, which makes the establishing of semantic roles, and hence object status (whether direct or indirect), fairly straightforward when taking the above discussion about semantic roles into account. There is also a level of ambiguity in the relation between semantic roles and objects in that while there is a typical relation, this is not definitional. Direct objects are not always the semantic patient and indirect objects are not always the semantic benefactive. The issue of semantic roles becomes more complicated in multiple object examples where, for example, both objects are animates, or both are inanimates.

During the parse in the multiple object constructions below (section (6.2.2)), when an OM is parsed and the metavariable is projected onto a locally unfixed node (as instructed in the lexical entry for the OMs) the pointer returns to the root node (also as

instructed in the lexical entry). It is at this point that the pragmatics and checking of the context comes into effect in order to appropriately enrich what is otherwise an underspecified tree relation in order for the parse to continue and allow for a second application of Local *Adjunction for the second OM.

The main theoretical claim developed in this thesis is, thus, that structural underspecification introduced by Local *Adjunction can be resolved pragmatically. This is in contrast to previous cases analysed in DS using Local *Adjunction in, such as scrambling in Latin or Japanese, where underspecified structure is fixed by lexical information from case markers. The pragmatic resolution argument supports the more general claim made by DS that pragmatic inference is available throughout the parse, and that pragmatic, contextual information interacts closely and immediately with the process of structure building.

I turn now to presenting the analysis of multiple object marker constructions in Setswana. Beginning with a single object construction in Kiswahili, I extend the analysis to a single object construction in Setswana to illustrate that analysis can extend across languages. Following that is the analysis for the multiple object constructions which differs markedly from that for the single object constructions and invokes pragmatic inducing of tree structure in order to fix locally unfixed nodes before the verb is parsed.

6.2 Analysis

First I would like to recap some information from the previous chapters that has particular relevance for the analysis to be presented.

The verbs in Bantu languages show morphological agreement with the different NPs of the clause, the subject, object or indirect object. Different languages differ in the number of OMs that they allow in the verb-form, for example Kiswahili allows only one OM on the verb-form while Setswana allows more than one. Languages also differ in the restrictions placed on the co-occurrence of objects and OMs.

The principal agreement patterns of the agreement markers (subject, object, indirect object) can be expressed through two DS structure building processes. The first is that of two structures linked together (LINK as discussed in section (5.4.2)). The second is the construction of unfixed nodes within a single tree structure. It is the second structure building process that is the most appropriate for object agreement.

When looking at agreement, DS takes linear surface word order more into account than the grammatical status of NPs as subjects and objects. And so following from the discussion of Bresnan & Mchombo (section (4.3.1)) the "verbal agreement markers" as found in Bantu languages are better analysed as pronominal elements. These pronominal elements provide only a partial characterization for a term, requiring further development in the DS tree. Contrastingly, formula values that are lexically supplied (such as from full content words) decorate terminal nodes in the DS tree because once a full formula value is supplied the node it decorates is fulfilled and can have no further development on it. Pronominal elements utilise the formula value $Fo(U/V)$ which has an accompanying requirement for a full formula value: $?\exists x.Fo(x)$.

Despite the underspecified nature of the nodes the agreement markers introduce, the agreement markers are constructive in that they induce structural relations within the tree. It is the agreement markers together with the verb that provide a full template of the final tree structure, with the verb producing whatever structure is not done so by the markers.

6.2.1 Single object constructions

Before embarking on the analysis of multiple object constructions I go through a parse of single object constructions, one in Kiswahili and one in Setswana, to illustrate the use of the tools of DS used in the analysis of multiple object constructions.

As has already been said, lexical information in DS is dynamic and induces tree growth with a sequence of actions which may extend beyond the annotation of terminal nodes in a tree. Parsing a word can add information to non-terminal nodes, add further requirements, or build partial trees – even to the point of inducing the construction of full propositional structure. Thus trees constructed within the DS framework are representations of content. When a transitive verb-form contains both subject and object markers, the only task required of the verb is to fill the predicate node in the syntactic tree, since both of the argument nodes have already been built to accommodate the agreement markers by the time the verb is introduced into the parse, since Bantu OMs occur before the verb-stem. Then when the verb is parsed, the basic predicate-argument structure of the clause in question is fixed in place and the only information missing is that regarding the predicate (which binds the arguments together) provided by the verb-stem.

We begin with a Kiswahili example (274), the parse of which follows that set out for the same example in Cann *et al* (2005: 303-306) with alterations made in order

to conflate the analysis of the Kiswahili system of allowing only one object to be marked on the verb form with the Setswana system which allows multiple object markers.

(274) *zi-* *li-* *zi-* *harib-* *u* [Kiswahili]
SM10 PAST OM10 destroyFV
'They destroyed them.'

Example (274) is the verb form extracted from the following example (Cann *et al.* 2005: 303):

(275) *sabuni* *hizi* *zi-li-zi-harib-u* [Kiswahili]
10.soaps these SM10-PAST-OM10-destroy-FV
ngoma
10.drums
'These soaps destroyed the drums.'

Every parse begins with *Axiom*:

(276) *Tn*(0), ?*Ty*(*t*)

It is at this point that the first alteration occurs. Cann *et al* build tree structure through instructions in the lexical entry, and so the locally unfixed node that will be constructed is done so upon the parse of the class 10 SM *zi-*. I, however, invoke the ability for adjunction rules to apply at any time and construct a locally unfixed node by Local *Adjunction before the parse of the SM. The need for allowing temporary structure to be built independent of lexical entries will become clearer when we come to parsing multiple object markers, especially those found in Setswana which are flexible in the linear order in which they can occur in a natural language string, and yet which are not flexible in terms of the nodes they decorate in the DS tree.

A locally unfixed node is introduced by Local *Adjunction which, as discussed in section (5.5.1.3), can only apply before a predicate node is decorated and in this case there is no predicate node yet built, furthermore, a locally unfixed node is obligatorily fixed locally to the type *t* requiring node from which it is built. The locally unfixed node is represented by a broken line:

(277)

$$
\begin{array}{c}
Tn(0),\ ?Ty(t) \\
\langle\uparrow_1{}^*\rangle\, Tn(0) \\
\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle Tn(0), \\
?Ty(e),\ \Diamond
\end{array}
$$

The class 10 SM *zi-* is parsed and has the following lexical entry:

(278)

$$
zi \quad \left|\begin{array}{l}
\text{IF} \quad ?Ty(e) \\
\text{THEN IF } \langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle\ ?Ty(t) \\
\qquad \text{THEN IF} \quad \langle\downarrow\rangle\top \\
\qquad\qquad \text{THEN Abort} \\
\qquad \text{ELSE} \quad \text{put } (Ty(e), Fo(\boldsymbol{U}_{10}), ?\exists x.Fo(x), ?\exists x.Tn(x)); \\
\qquad\qquad \text{go } (\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle\ ?Ty(t)) \\
\text{ELSE} \quad \text{Abort}
\end{array}\right.
$$

The lexical entry in (278) says that if the pointer is at a type *e* requiring node, then if that node is locally unfixed to a type *t* requiring node and if there is anything else in the tree (as indicated by the simple tree modality $\langle\downarrow\rangle$ along with the verum $\top$) the parse must abort. This is because the subject marker must occur before the verb and in DS the verb projects a full propositional tree structure. In the case where there is not anything else in the tree, the ELSE statement gives the instruction to decorate the locally unfixed node with type information, a metavariable and the information that a full formula value must be found to replace the metavariable along with a requirement for tense information. There is also the instruction for the pointer to return to the type *t* requiring root node. Anything else and the parse should abort. Example (279) shows the decorated locally unfixed node following the parse of the SM:

(279) Parsing *zi-*

$$
\begin{array}{c}
Tn(0),\ ?Ty(t),\ \Diamond \\
\langle\uparrow_1{}^*\rangle Tn(0) \\
\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle Tn(0),\ Ty(e),\ Fo(\boldsymbol{U}_{10}), \\
?\exists x.Fo(x),\ ?\exists x.Tn(x)
\end{array}
$$

Underspecified relations are updated locally within the predicate-argument structure. Assuming that there is an appropriate full formula value available to replace the metavariable (which there is; *sabuni* - soap) the parse can then continue:

(280)

$Tn(0), ?Ty(t), \Diamond$

$\langle\uparrow_1{}^*\rangle Tn(0)$

$\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle Tn(0),$
$Ty(e), Fo(\text{Sabuni}')$

In Kiswahili, and other Bantu languages, tense markers provide a fixed subject relation. This can be put down to their origins as verbs, which have since been grammaticalised, and so Cann *et al* (2005: 303) identify the actions of the tense marker as marking a type *t* requiring node with the relevant tense information and inducing a subject relation when there is a locally unfixed node. The tense marker *-li-* is parsed:

(281)

	IF	$?Ty(t)$	
	THEN IF		$\langle\downarrow_0\rangle\langle\downarrow_1{}^*\rangle Ty(e)$
li		THEN	go $(\langle\downarrow_0\rangle\langle\downarrow_1{}^*\rangle Ty(e))$; put $(\langle\uparrow_0\rangle Tn(0), ?Ty(t))$;
			go $(\langle\uparrow_0\rangle Tn(0), ?Ty(t))$; put $(Tns(PAST))$
		ELSE	Abort
	ELSE	Abort	

The lexical entry for the tense marker *-li-* says that if the pointer is at a type *t* requiring node and there is a type *e* expression along a Local *Adjunction relation go to that locally unfixed node and build a fixed argument relation to the type *t* requiring root node, then go back to the type *t* requiring root node and decorate it with past tense information. Anything else and the parse should abort. The reason for specifying that there already be a locally unfixed node relation is to ensure that the tense marker does not occur first in the language string. The result is the partial tree in example (282):

(282) Parsing *zi-li-*

$Tn(0), ?Ty(t), Tns(PAST), \Diamond$

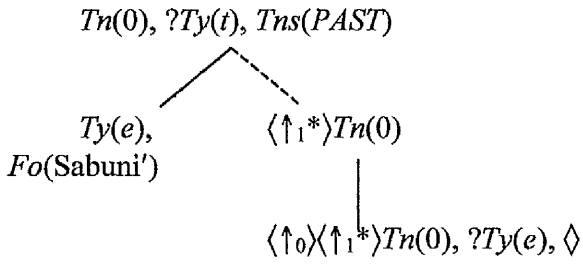
$\langle\uparrow_0\rangle Tn(0), Ty(e),$
$Fo(\text{Sabuni}')$

At this point, a second application of Local *Adjunction creates another locally unfixed node is built. Lexical NPs in Bantu languages cannot decorate a locally unfixed node nor a fixed node, only LINKed nodes or unfixed nodes, therefore it is important that this node is built by Local *Adjunction to ensure that a lexical NP does not occur between the subject and the verb while allowing the node to be updated into a fixed position that

is still local to the type *t* requiring node.[44] That lexical NPs in Bantu cannot decorate a locally unfixed node nor a fixed node poses a problem for this analysis when it comes to examples that involve a post-verbal lexical object NP (such as those analysed by Bresnan & Mchombo and Demuth & Johnson in section (4.3) as a postclausal topic, which corresponds to anything parsed after verb in the disjunctive), since the full propositional structure is built by the verb and this includes fixed argument relations. I will return to this in chapter 7.

The tree below shows the locally unfixed node projected from the root node:

(283)



At this point the class 10 OM *-zi-* is parsed. Though the class 10 subject and object markers have the same form, the lexical entries are different since the subject marker necessarily carries the information that it obligatorily occurs before the verb, and so must be in the subject argument position in the DS tree, whereas the object marker carries no such stipulation:

(284)

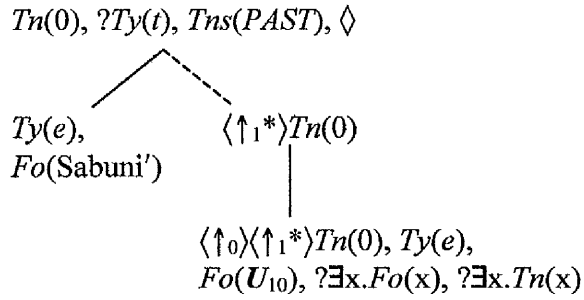
zi

```
IF      ?Ty(e)
THEN IF     ⟨↑0⟩⟨↑1*⟩?Ty(t)
        THEN put (Ty(e), Fo(U10), ?∃x.Fo(x), ?∃x.Tn(x));
             go (⟨↑0⟩⟨↑1*⟩?Ty(t))
        ELSE Abort
ELSE Abort
```

The lexical entry for the class 10 OM simply states that if the pointer is at a type *e* requiring node which is dominated by a type *t* requiring node along a local unfixed relation, decorate that node with a metavariable and the requirement for a full formula value for that metavariable along with the requirement for tense information and the instruction for the pointer to return to the type *t* requiring root node, which results in the partial tree found in example (285):

[44] That lexical NPs in Bantu cannot decorate a locally unfixed node nor a fixed node poses a problem for this analysis when it comes to examples involving a post-verbal lexical object NP, since the parsing of the verb generates full propositional structure including fixed argument nodes. This is discussed in more detail in the concluding section to this chapter (6.3).

(285) Parsing *zi-li-zi-*



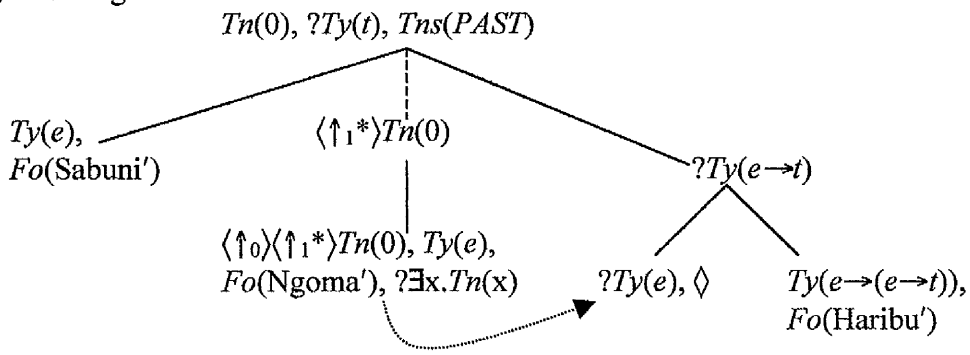
With a full formula value found for the metavariable (in this case *ngoma* - drums) the final element to be parsed is the verb *-haribu*, which has the following lexical entry:

(286)

haribu	IF		$?Ty(t)$
	THEN	IF	$\langle\downarrow_0\rangle Ty(e)$
		THEN	make ($\langle\downarrow_1\rangle$); go ($\langle\downarrow_1\rangle$); put ($?Ty(e\rightarrow t)$);
			make ($\langle\downarrow_1\rangle$); go ($\langle\downarrow_1\rangle$); put ($Ty(e\rightarrow(e\rightarrow t))$, Fo(Haribu));
			go ($\langle\uparrow_0\rangle ?Ty(e\rightarrow t)$); make ($\langle\downarrow_0\rangle$); go ($\langle\downarrow_0\rangle$); put ($?Ty(e)$)
		ELSE	Abort
	ELSE	Abort	

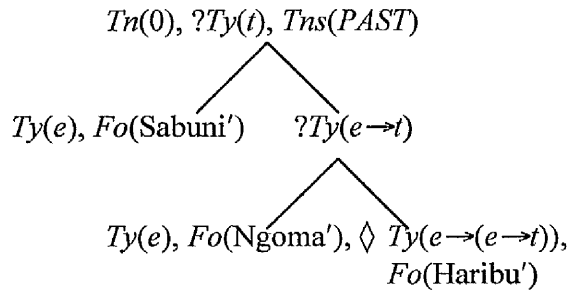
The lexical entry for *-haribu*, like all verbs, generates the full propositional tree structure relevant for that verb. Any structure that has already been built during the parse harmlessly collapses with that generated by the verb, yielding one complete and appropriate DS tree. There is one notable part of the structure that is not constructed by the verb however, and that is the subject relation (which was built by Local *Adjunction and then fixed by the tense marker at the outset of the parse, examples (272)-(282)). This is because the subject marker has to have been parsed and fixed into the tree before the verb is parsed and so instead of instruction to build the subject relation there is a requirement that there be a subject relation already present in the structure. With the parse of the verb, the remaining structure of the tree is generated, including the object node, with a requirement for a $Ty(e)$ expression, into which the unfixed node that is of $Ty(e)$ can merge, as illustrated by the dotted arrow line:

(287) Parsing *zi-li-zi-haribu*



The final stage in the construction of the tree is now complete:

(288)



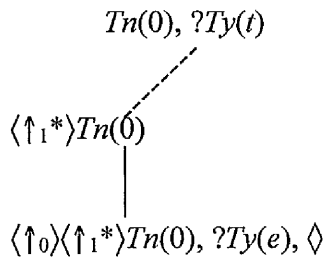
All that remains is for the information decorating the terminal nodes to be compiled up the tree to yield a full prepositional phrase satisfying the type *t* requirement at the root node.

The same method of construction can be extended to Setswana verb-forms with one OM. For example the parse of example (289) would generate the same tree structure in the same manner as the parse of example (274) above:

(289) *ó* *tlà* *dí* *tlhátswà* [Setswana-Sekgatla]
SM3sg FUT OM11 wash
'He will wash them (clothes)'

Beginning with *Axiom* (the step of which I will leave out in this instance), there is an application of Local *Adjunction creating a locally unfixed node from the root node:

(290)



The 3rd person singular subject marker is parsed which has the lexical entry shown below in example (291) and decorates the locally unfixed node as in example (292):

(291)

ó

```
IF      ?Ty(e)
THEN IF ⟨↑0⟩⟨↑1*⟩ ?Ty(t)
        THEN IF     ⟨↓⟩⊤
                THEN Abort
        ELSE put (Ty(e), Fo(U), ?∃x.Fo(x), ?∃x.Tn(x));
                go (⟨↑0⟩⟨↑1*⟩ ?Ty(t))
ELSE Abort
```

(292) Parsing *ó*

$Tn(0), ?Ty(t), \Diamond$

$\langle\uparrow_1{}^*\rangle Tn(0)$

$\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle Tn(0), Ty(e), Fo(\boldsymbol{U}),$
$?\exists x.Fo(x), ?\exists x.Tn(x)$

Assuming that there is an appropriate full formula value available to replace the metavariable (which in this case would be the name of a person) the parse can then continue:

(293)

$Tn(0), ?Ty(t), \Diamond$

$\langle\uparrow_1{}^*\rangle Tn(0)$

$\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle Tn(0),$
$Ty(e), Fo(\text{Dumedi}')$

The tense marker *tlà* is parsed which has the lexical entry shown in example (294) below and which fixes the subject relation resulting in the partial tree in example (295):

(294)

	IF	$?Ty(t)$	
	THEN	IF	$\langle\downarrow_0\rangle\langle\downarrow_1{}^*\rangle Ty(e)$
tlà		THEN	go $(\langle\downarrow_0\rangle\langle\downarrow_1{}^*\rangle Ty(e))$; put $(\langle\uparrow_0\rangle Tn(0), ?Ty(t))$;
			go $(\langle\uparrow_0\rangle Tn(0), ?Ty(t))$; put $(Tns(FUT))$
		ELSE	Abort
	ELSE	Abort	

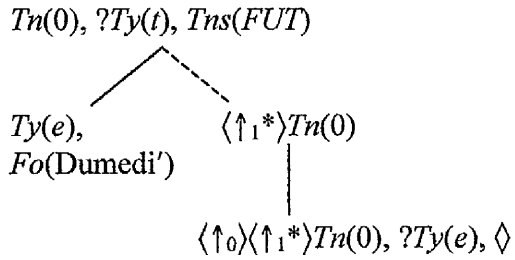
(295) Parsing *ó tlà*

$Tn(0), ?Ty(t), Tns(FUT), \Diamond$

$\langle\uparrow_0\rangle Tn(0), Ty(e),$
$Fo(\text{Dumedi}')$

At this point there is a second application of Local *Adjunction which creates another locally unfixed node from the type *t* requiring node:

(296)



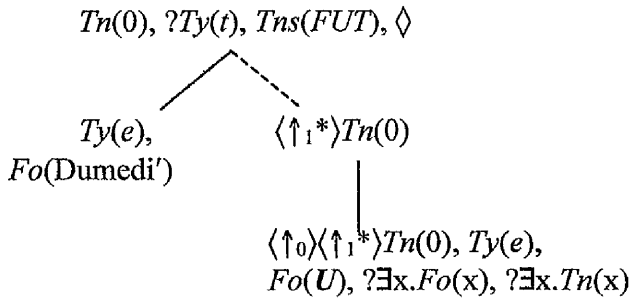
The class 11 OM *dí* is parsed, which has the lexical entry shown in example (297) below and which decorates the unfixed node with a metavariable and requirement for update as shown in example (298):

(297)

dí

```
IF      ?Ty(e)
THEN IF     ⟨↑0⟩⟨↑1*⟩?Ty(t)
        THEN put (Ty(e), Fo(U), ?∃x.Fo(x), ?∃x.Tn(x));
             go (⟨↑0⟩⟨↑1*⟩?Ty(t))
        ELSE Abort
ELSE Abort
```

(298) Parsing *ó tlà dí*



Assuming that a full formula value can be found for the metavariable the parse can continue. The final element to be parsed is the verb *tlhátswà* which has the lexical entry shown in example (299) below and which generates a full propositional tree structure, with the exception of the subject relation since the subject obligatorily occurs before the verb and so must be parsed and fixed before the parse of the verb:

(299)

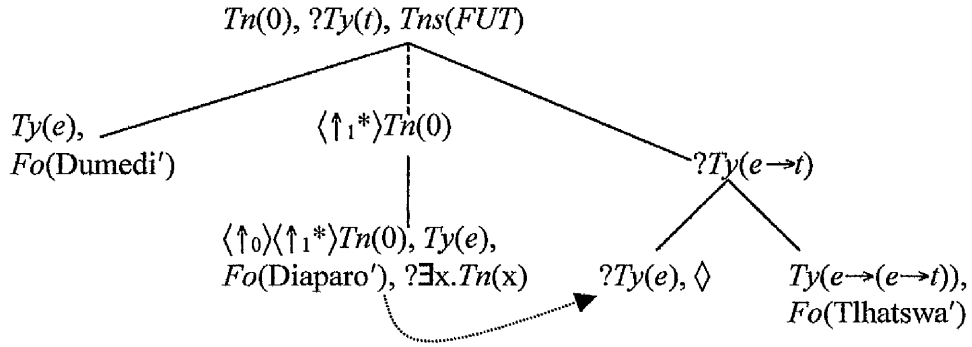
tlhátswà

```
IF      ?Ty(t)
THEN IF     ⟨↓0⟩Ty(e)
        THEN make (⟨↓1⟩); go (⟨↓1⟩); put (?Ty(e→t));
             make (⟨↓1⟩); go (⟨↓1⟩); put (Ty(e→(e→t)), Fo(Tlhatswa));
             go (⟨↑0⟩?Ty(e→t)); make (⟨↓0⟩); go (⟨↓0⟩); put (?Ty(e))
        ELSE Abort
ELSE Abort
```

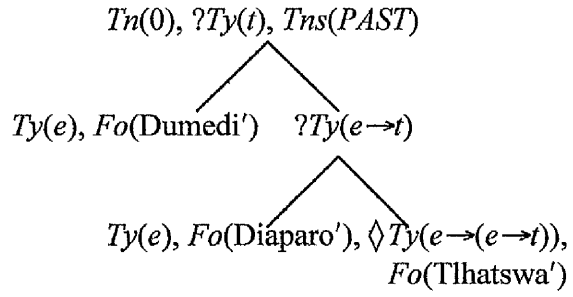
The propositional tree structure is built including the object node that has a requirement for a type *e* expression into which the unfixed node which is of type *e* can merge, as il-

lustrated by the dotted line in example (300) below, with the completed tree structure in example (301):

(300) Parsing *ó tlà dí tlhátswà*



(301)



All that remains is for the information decorating the terminal nodes to compile up the tree to yield a full propositional phrase satisfying the type *t* requirement at the root node.

There are verb forms in Setswana where the tense marking comes at the end of the verb as opposed to following the SM, as has just been seen above in example (289), and so the analysis presented above for Kiswahili and Setswana examples cannot be assumed to hold for Setswana, though it appears to given example (300). For example the past tense marking in Setswana is the *–ile* ending on the verb:

(302) *ó* *góróg-ìlè* [Setswana-Sengwato]
SM3pl come-PST
'He came'

This means that the SM is immediately followed by the OM and has implications for unfixed nodes, particularly subjects. If it is assumed that tense serves to fix the unfixed subject relation, and so allow for a further unfixed node to be generated, an OM occurring between the SM and the tense marker blocks that fixing of the subject relation and so blocking the construction of any further unfixed nodes and causing the parse to fail. The problem of fixing the subject relation could be resolved by suggesting that a fixed

subject relation is generated from the *Ty(t)* requiring node by an application of Introduction and Prediction and this fixed subject relation is updated with the conceptual representation of the subject, however this is not necessary when there is a disjunctive marker which, when it is present, obligatorily occurs after the subject and which fulfils the same subject relation fixing function as tense, though it does not provide any tense information as we will see shortly

Bantu languages differ in the number of object markers which are found on the verb form. For example, in Kiswahili either the direct or indirect object may induce agreement marking on the verb, but not both. However, in Setswana there is more than one OM on the verb, and further, the order of OMs is flexible. As has already been seen in section (4.2.1), some Bantu languages allow only one OM on the verb (examples (125) – (127) repeated here):

(303) *ni-li-m-p-a* [Kiswahili]
SC1sg-PAST-OC1-give-FV
'I gave him (it)'

(304) **ni-li-i-m-p-a* [Kiswahili]
SM1SG-PST-OM9-OM1-give-FV
Intd: 'I gave him it'

(305) **ni-li-m-i-p-a* [Kiswahili]
SC1sg-PAST-OC1-OC9-give-FV
Intd: 'I gave him it'

While Setswana allows more than one:

(306) *kè à mó è ápéélà* [Setswana-Sengwato]
SC1 DISJ OC1 OC9 cook.APPL
'I am cooking it for him'

(307) *kè à é mò ápéélà* [Setswana-Sengwato]
SC1 DISJ OC9 OC1 cook.APPL
'I am cooking it for him'

Multiple OMs are not only found in Setswana, but also, for example, in Kichaga which allows two and sometimes more than two OMs on the verb (Moshi, 1998):

(308) *mangí n-á-lé-í-kú-ḿ-zrúm-a* [Kichaga]
Chief FOC-SM1-PAST-OM9-OM16-OM1-send-FV
'The chief sent him there with it'

What is of note and which can also be seen in examples (306) and (307) is that the order of the OMs is flexible. Compare examples (306) and (307) with (309) and (310) below (Marten *et al.* 2007):

(309) *á-chí-m-péél-é* [Chibemba]
SM1-OM7-OM1sg-give-SBJV
'S/he should give it to me.'

(310) **a-m-chi-peel-e* [Chibemba]
SM1-OM1sg-OM7-give-SBJV
Intd: 'S/he should give it to me.'

These pairs of examples serve to illustrate the flexibility of object marking that occurs in Setswana, but not in many other Bantu languages.

6.2.2 Multiple Object Marker Constructions

To re-cap briefly, the construction of unfixed nodes is a reflection of the underspecification of a marker's semantic role within a tree structure and the underspecified relation as defined by Local *Adjunction allows for a number of possible forms of tree development (introducing, e.g., subject, object and indirect object) with case markers (as demonstrated for Latin) allowing for the construction of multiple unfixed nodes, in order to account for free word orders.

If there were case markers in Setswana, it would also rule out all but one of these possible developments for each OM being parsed, allowing it to be fixed into the tree and a second application of Local *Adjunction to occur. But there are no case markers in Setswana and so this causes a problem when there are multiple OMs because without case available to fix the OMs at the appropriate tree relation (direct/indirect object position) there is no way to determine in which position in the tree structure they should be fixed, nor is it possible to allow for more than one OM since there cannot be two unfixed nodes at any one time in the tree.

A possible solution to this problem of lack of case markers is that of pragmatic constraints on the OMs, constraints derived from the context. For example, an OM of class 1 or 2 in a multiple object construction such as those here is assumed to be the indirect object, because any other analysis would yield a bizarre interpretation at best. Take the following Setswana examples:

(311) *kè á sé bà àpéélà* [Sekgatla]
SM1sg DISJ OM7 OM3pl cook.APPL
'I cook it (breakfast) for them (children)'

(312) *kè* *á* *bá* *sè* *àpéélà* [Sekgatla]
SM1sg DISJ OM3pl OM7 cook.APPL
'I cook it for them'

Both orders of the OM yield the same interpretation. If it were not the case that the class 1 OM carries with it the pragmatic constraint that it is the indirect object, example (312) would have the strange interpretation that the children are being cooked for the breakfast.

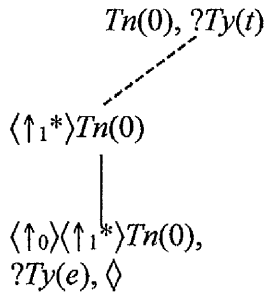
Unfixed nodes are constructed, with a probable relation to the type-*t*-requiring node being imposed by the pragmatic constraints as provided by the context, and so being updated into the structure. With the parse of the verb, a full propositional template is projected containing the predicate node and argument nodes. If any of the argument nodes have already been introduced they will simply duplicate, causing no further decoration on the tree.

The parse begins, as always, with *Axiom*:

(313) $Tn(0), ?Ty(t), \Diamond$

From here there are two different strategies by which the next step in the parse (that of parsing and updating the subject marker into the tree) can be initiated; either by assuming there is an application of Introduction and Prediction (which perhaps is available only for the case of the subject), or by assuming that the information from the SM is projected onto a locally unfixed node which is then fixed in subject position. For my analysis here, I apply Local *Adjunction to generate an unfixed node local to the type *t* requiring node:

(314)



The subject marker *kè* is parsed. The lexical entry for *kè* (in example (315)) has the same form as the lexical entries for the subject agreement markers in examples (278) and (291) above:

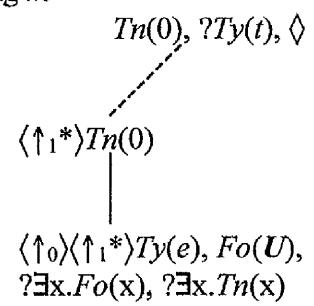
(315)

kè

```
IF      ?Ty(e)
THEN IF ⟨↑0⟩⟨↑1*⟩ ?Ty(t)
        THEN IF     ⟨↓⟩⊤
                THEN Abort
        ELSE put (Ty(e), Fo(U), ?∃x.Fo(x), ?∃x.Tn(x));
                go (⟨↑0⟩⟨↑1*⟩ ?Ty(t))
ELSE Abort
```

The lexical entry above says that if the pointer is at a type *e* requiring node, and then if that node is dominated along a local unfixed relation to the type *t* requiring node *and* if there is anything else in the tree then the parse should abort. The first ELSE statement ensure that if there is nothing else in the tree the parse continues and decorates the locally unfixed node with a metavariable and the requirement for a full formula value for that metavariable, then instructs the pointer to return to the root node. This results in the following tree:

(316) Parsing *kè*



Assuming that a full formula value is found for the metavariable the parse can continue to the disjunctive marker, as introduced in section (3.2.2), and it is at this point that the first deviation from the Kiswahili parse occurs. After the parse of the class 10 SM *zi-* in the Kiswahili parse, the tense marker follows (see example (281)), but here the disjunctive marker is parsed following the SM, with the tense marking occurring at the end of the verb form. The disjunctive marker occurs after the SM and before the OM. The use of the disjunctive marker signifies that the verb form is the last thing to be parsed in the clause, anything that follows a verb form in a disjunctive marked example has to be a postclausal topic. The disjunctive marker occurs only with intransitive predicates or with transitive predicates that have an OM, a disjunctive marker occurring on a transitive predicate without an OM would be ungrammatical.

Looking at the lexical entry for the disjunctive marker (in example (317) below) it is very similar to the lexical entries for the tense markers in examples (281) and (294) above, particularly with the regards to building the fixed subject argument relation and decorating the root node with tense information, indicating that it could be viewed as a

tense marker. However, it is not a tense marker. It has a +DISJ feature which imparts the instruction that when the verb has been parsed there is nothing more expected and the next step is to compile up the tree:

(317) *á*

IF ?*Ty*(*t*)
THEN IF $\langle\downarrow_0\rangle\langle\downarrow_1{}^*\rangle$*Ty*(*e*)
THEN go ($\langle\downarrow_0\rangle\langle\downarrow_1{}^*\rangle$*Ty*(*e*)); put ($\langle\uparrow_0\rangle$*Tn*(0), ?*Ty*(*t*));
go ($\langle\uparrow_0\rangle$*Tn*(0), ?*Ty*(*t*)); put (*Tns*(*PRES*), +DISJ)
ELSE Abort
ELSE Abort

Though the disjunctive marker only occurs in the present tense, and imparts tense information in its lexical entry, the fact that it is not present with conjunctive verb forms in the present tense, and also that it does not occur in either disjunctive or conjunctive verb forms in the present tense when there is a negative marker, as illustrated by examples (78) – (81) in section (3.2.2.1.2) all serve to support the argument that the disjunctive marker is something other than a tense marker. I repeat examples (78) and (79) here:

Conjunctive:

(318) ***gà*** ***bá*** ***bîné*** *lé* *bòné*
NEG SM3pl dance CONJ 3pl
'They do not dance/are not dancing with them'

Disjunctive:

(319) ***gà*** ***bá*** ***bînè*** *lé* *bòné*
NEG SM3pl dance CONJ 3pl
'They do not dance/are not dancing either'

As is illustrated in examples (318) and (319) above, it is still possible to determine a conjunctive/disjunctive distinction in Setswana without a segmental disjunctive marker (the *á* in example (311)), referring instead to the tones on the verb form. Section (3.2.2) of this thesis is devoted to exploring this distinction in a number of different tenses. The conclusion is that for the cases where there is no segmental disjunctive marker, the distinction is marked through prosodic tone on the verb forms.[45]

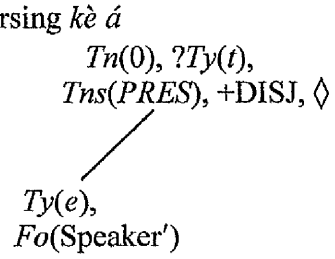
Though the essential nature of the disjunctive marker is to instruct the parser that the verb is final in the clause and that following the parse of the verb the only remaining step is to compile up the tree, this is not explicitly described in the lexical entry for the

[45] The matter of prosodic tone in Setswana is not explored in this thesis outside of chapter 3, specifically section (3.2.2), and no DS analysis is proposed. However Kula & Marten (fcmg) investigate prosody and relative clauses in Bemba from a DS perspective.

disjunctive marker. It is, however, when combined with the lexical entry for the final vowel of the verb form. The final vowel will be discussed in more detail below when it comes to being parsed, but in the meantime when the final vowel is parsed it checks for the occurrence of the +DISJ feature in the tree. If there is no +DISJ feature then the parse knows to continue after the final vowel, however if there is a +DISJ feature the parse compiles up the tree.

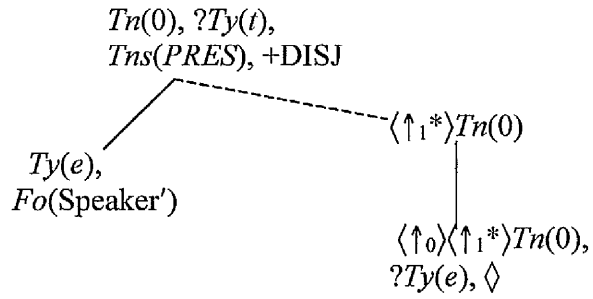
Returning now to the Setswana multiple object construction, the disjunctive marker is parsed with the lexical entry stating that if the pointer is at a type *t* requiring node and if there is a node that is of type *e* along a local yet unfixed relation, to go to that node and build an argument relation between that node and the root node. Then to return to the root node which is then decorated with present tense information and the +DISJ feature indicating that the final proposition is disjunctive and so when the verb is parsed the parser knows there is nothing further coming and can compile up the tree. At this stage the tree looks as follows:

(320) Parsing *kè á*



As has already been said (but which bears repeating) a node built by Local *Adjunction cannot be decorated with a lexical NP since they can decorate neither locally unfixed nodes nor fixed nodes, only LINKed or unfixed nodes, and the use of Local *Adjunction at this point ensures that a lexical NP does not occur between the subject marker and the verb while still allowing for the locally unfixed node to be fixed in the tree local to the type *t* requiring node. Furthermore, having the number of functor relations unspecified reflects the Local *Adjunction operator which does not restrict the order in which the unfixed nodes are fixed into the tree (this becomes relevant with the object markers below). Therefore, a second application of Local *Adjunction introduces a locally unfixed node:

(321)



At this point the OM *sé* is parsed. The lexical entry for the OM differs from that of the subject marker in particular in that it does not specify the verb has not yet been parsed, but is the same as that found in example (284) for the Kiswahili parse:

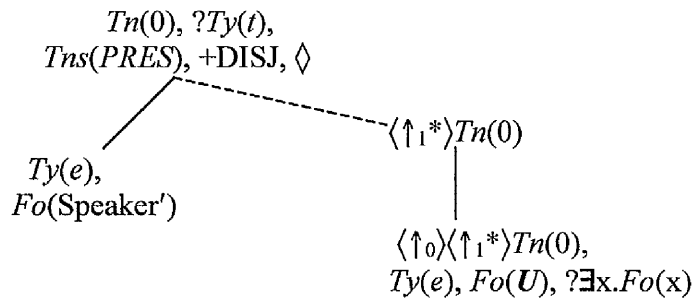
(322)

sé

IF ?$Ty(e)$
THEN IF $\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle ?Ty(t)$
THEN put ($Ty(e)$, $Fo(\boldsymbol{U})$, ?∃x.Fo(x))
go ($\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle$?$Ty(t)$)
ELSE Abort
ELSE Abort

The locally unfixed node is decorated with type information, a metavariable and a requirement for a full formula value to be found to replace the metavariable:

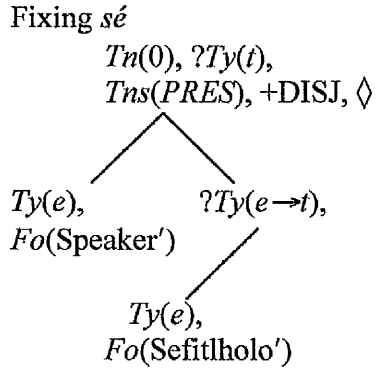
(323) Parsing *kè á sé*



So far the parse has followed the Kiswahili parse and the tree looks essentially the same, apart from the +DISJ feature decorating the root node. However, at this point the process of the parse changes with the introduction of pragmatic inference. Recall section (6.1) in which is it discussed that tree structure is inferred through the interaction between pragmatics and the lexical specification of the OMs. In this case a class 7 OM has been parsed, so taking into account the substitution restrictions determined by the class information encoded in the OM (that the replacement for the metavariable be a lexical NP of class 7) a hypothesised anticipation can be made that the inanimate object will fulfill the patient semantic role, while the patient, in turn, is typically the direct object. Once a contextually relevant replacement is selected for the metavariable (and

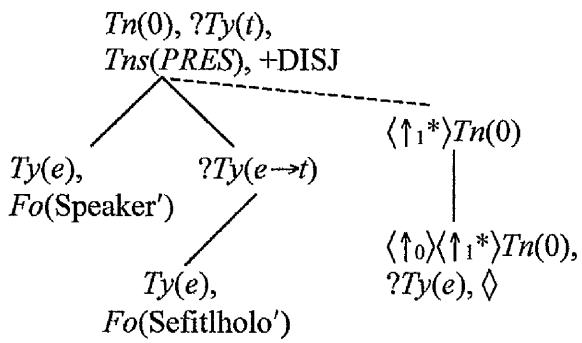
which replaces it by substitution) there is then sufficient information avaible by hypothesis to allow for the locally unfixed relation to be enriched into the direct object position in the tree:

(324) Fixing *sé*



With this structural relation enriched, a further locally unfixed node is constructed through Local *Adjunction:

(325)



The second OM *bà* is parsed and has the lexical entry shown below. This lexical entry is identical to that of the first OM parsed (example (322)):

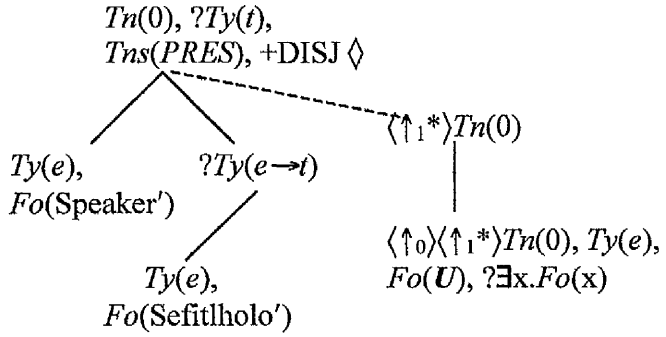
(326)

bà

IF $?Ty(e)$
THEN IF $\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle\ ?Ty(t)$
THEN put ($Ty(e)$, $Fo(\boldsymbol{U})$, $?\exists x.Fo(x)$)
go ($\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle\ ?Ty(t)$)
ELSE Abort
ELSE Abort

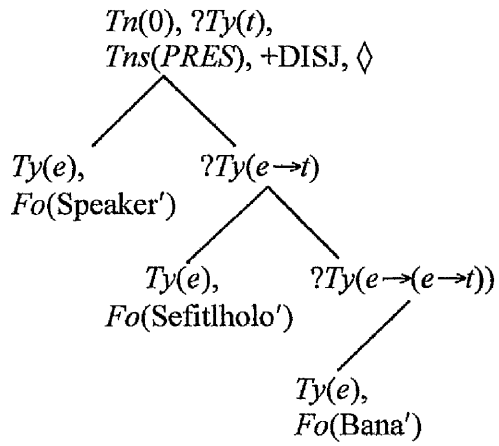
The locally unfixed node is decorated with type information, a metavariable and the accompanying requirement for a full formula value:

(327) Parsing *kè á sé bà*



Again, there is a locally underspecified tree relation that requires a fixed relation in the tree, but in this case it is the OM is of class 2 (the plural human class) with the substitution restriction, as determined by the class information encoded in the OM, that the replacement for the metavariable be a lexical NP of class 2. This combined with a notion of contextual relevance that implies that an animate object will fulfil the benefactive semantic role, which is typically the indirect object, and so a human-denoting full formula value is selected to replace the metavariable and the locally unfixed relation can then, by hypothesis, be enriched to the indirect object position in the tree. The assumption made by the hypothesis is confirmed by the existent tree structure, which already has a one place predicate node in place. An indirect object decorates the argument daughter node of a two place predicate node (a type $(e \rightarrow (e \rightarrow t))$ node) and so this is the structure generated in the tree:

(328) Fixing *bá*



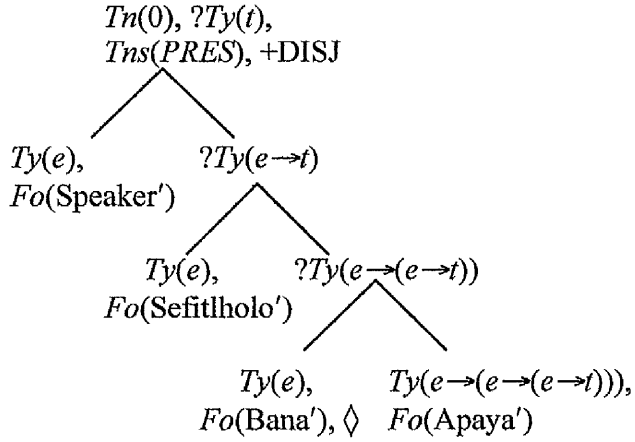
With the pointer at the root node the parse can continue on to the verb (minus the final vowel which has a separate lexical entry) which has the following lexical entry:

(329) *àpéél-*

IF $?Ty(t)$
THEN IF $\langle\downarrow_0\rangle Ty(e)$
THEN make $(\langle\downarrow_1\rangle)$; go $(\langle\downarrow_1\rangle)$; put $(?Ty(e\rightarrow t))$;
make $(\langle\downarrow_0\rangle)$; go $(\langle\downarrow_0\rangle)$; put $(?Ty(e))$; go $(\langle\uparrow_0\rangle\ ?Ty(e\rightarrow t))$;
make $(\langle\downarrow_1\rangle)$; go $(\langle\downarrow_1\rangle)$; put $(?Ty(e\rightarrow(e\rightarrow t)))$;
make $(\langle\downarrow_1\rangle)$; go $(\langle\downarrow_1\rangle)$;
put $(Ty(e\rightarrow(e\rightarrow(e\rightarrow t))), Fo(\text{Apaya}'))$;
go $(\langle\uparrow_1\rangle\ ?Ty(e\rightarrow(e\rightarrow t)))$; make $(\langle\downarrow_0\rangle)$; go $(\langle\downarrow_0\rangle)$;
put $(?Ty(e))$
ELSE Abort
ELSE Abort

The lexical actions in the lexical entry give instructions which build the full propositional tree structure, with those nodes already constructed harmlessly collapsing with the nodes generated by the verb. Because *àpéélà* is an applicative verb, and so takes two objects, the lexical entry ensures that enough structure is built to satisfy the need for those objects. In this case, the majority of the structure has already been built through pragmatic inference, though there is still the final predicate node outstanding which is built through the actions stated out in the lexical entry. Furthermore, as specified in the lexical entry, the pointer finishes at the indirect object node in the tree (this is important for the parse of the final vowel, which will be discussed shortly):

(330) Parsing *kè á sé bà àpéél-*



The last thing to be parsed is the final vowel of the verb form. As discussed above (under example (319)), the main function of the disjunctive marker is to instruct the parser that the verb is final in the clause and once the verb has been parse to compile up the tree. However, this is not spelled out through the lexical actions in the lexical entry of the disjunctive marker, instead relying on the lexical entry of the final vowel which works in conjunction with the disjunctive marker to signal the end of the parse and initiate the compiling up the tree. The lexical entry for the final vowel is as follows:

(331)

```
-à  | IF      ?Ty(e)
    | THEN IF      ⟨↑*⟩ Tn(0), ?Ty(t) ∧ +DISJ
    |        THEN Abort
    | ELSE  Abort
```

The lexical entry for the final vowel states that if the pointer is at a type *e* requiring node, then if somewhere above that node there is the root node which still has a type *t* requirement *and* there is a +DISJ feature on that root node then the parse should abort. What this means is that if the verb has been parsed in a disjunctive verb form (recall that in the disjunctive the verb is clause final and the final vowel can only be parsed if the verb has since it occurs on the end of the verb) and there is still an outstanding type *e* requirement then there must be some element following the verb and the parse fails because it is no longer disjunctive. This is why the structure built by the lexical actions of the verb finishes with an argument node, specifically the indirect object node.

To illustrate how Local *Adjunction works with the flexible order of multiple OMs, below is the parse of the same Setswana sentence with the order of the OMs reversed – as in example (312). The parse begins in the same way as for example (311) with *Axiom* (I will leave out this step) and an application of Local *Adjunction, it is at this point that the tree in (332) illustrates:

(332)

```
        Tn(0), ?Ty(t)
        /
⟨↑1*⟩Tn(0)
|
⟨↑0⟩⟨↑1*⟩Tn(0),
?Ty(e), ◊
```

The SM *kè* is parsed with the following lexical entry:

(333)

```
    | IF      ?Ty(e)
    | THEN IF ⟨↑0⟩⟨↑1*⟩ ?Ty(t)
    |        THEN IF      ⟨↓⟩⊤
kè  |                THEN Abort
    |        ELSE  put (Ty(e), Fo(U), ?∃x.Fo(x), ?∃x.Tn(x));
    |                go (⟨↑0⟩⟨↑1*⟩ ?Ty(t))
    | ELSE  Abort
```

The subject marker projects onto the locally unfixed node a metavariable and the requirement for an update of that metavariable to a full formula value:

(334)

$Tn(0), ?Ty(t)$

$\langle\uparrow_1{}^*\rangle Tn(0)$

$\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle Tn(0),$
$Ty(e), Fo(\boldsymbol{U}), ?\exists x.Fo(x), \Diamond$

Assuming that a full formula value can be found for the metavariable, next to be parsed is the disjunctive marker which has the same lexical entry as found in example (317) above:

(335)

á

```
IF      ?Ty(t)
THEN IF ⟨↓0⟩⟨↓1*⟩Ty(e)
        THEN go (⟨↓0⟩⟨↓1*⟩Ty(e)); put (⟨↑0⟩Tn(0), ?Ty(t));
                go (⟨↑0⟩Tn(0), ?Ty(t)); put (Tns(PRES), +DISJ)
        ELSE Abort
ELSE Abort
```

The disjunctive marker fixes the locally unfixed node containing the updated and fulfilled formula in the subject argument relation to the root node and decorates the root node with tense information along with the +DISJ feature, indicating that the verb form is disjunctive and so when the verb is parsed there will be nothing further in the clause and the parse can compile up the tree. As with the previous example (the parse of example (311)), the disjunctive works in conjunction with the final vowel to indicate the end of the parse and initiate the compiling up of the tree. The parse of the lexical entry is shown in the following tree:

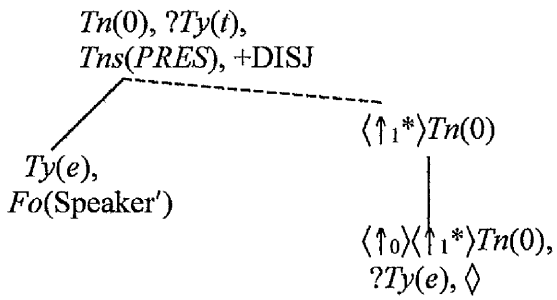
(336) Parsing *kè á*

$Tn(0), ?Ty(t),$
$Tns(PRES), +DISJ, \Diamond$

$Ty(e),$
$Fo(\text{Speaker}')$

A locally unfixed node is constructed through Local *Adjunction from the root node:

(337)



In this case, the first object marker to be parsed is the class 2 OM *bá*, which projects a metavariable and requirement for a full formula value onto the locally unfixed node. Though the actions are essentially the same as for the parse of example (311), the tree structure inferred and generated is different due to the reversed order of the OMs:

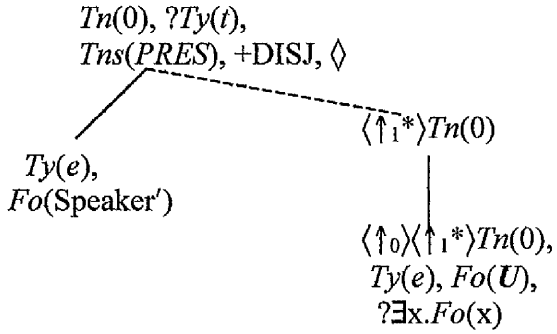
(338)

bá

IF ?*Ty*(*e*)
THEN IF ⟨↑0⟩⟨↑1*⟩ ?*Ty*(*t*)
THEN put (*Ty*(*e*), *Fo*(***U***), ?∃x.*Fo*(x))
go (⟨↑0⟩⟨↑1*⟩ ?*Ty*(*t*))
ELSE Abort
ELSE Abort

The locally unfixed node is decorated with a metavariable and a requirement for a full formula value to be found to replace that metavariable:

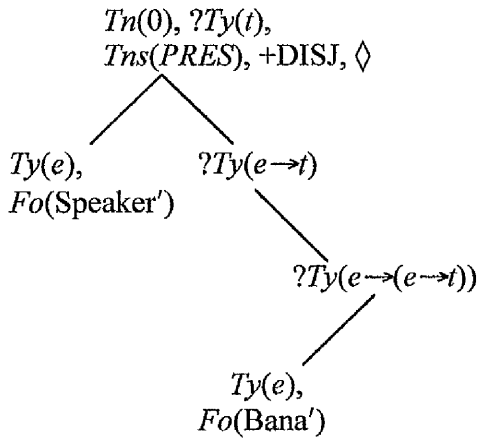
(339) Parsing *kè á bá*



With the pointer at the root node, pragmatic inference takes effect. In this case, the class 2 OM has been parsed. It has the same lexical specifications and fulfils the same semantic role as in the parse of example (311), the class information encoded in the OM imposes the substitution restriction and that the replacement for the metavariable be of class 2 and since the OM is animate it will, by a hypothesised anticipation, fulfil the benefactive semantic role in order to conform with contextual relevance. Thus the typical position this OM will occur in the DS tree is the indirect object position and it is into this position that the locally unfixed relation is enriched by hypothesis once a contextu-

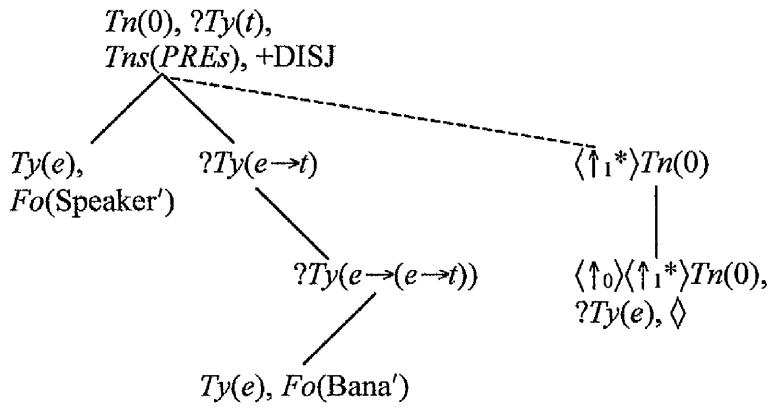
ally relevant full formula value has been found to substitute for the metavariable, in this case a human-denoting formula value:

(340) Fixing *bá*



With this structural relation enriched, the parse can continue and another locally unfixed node is constructed from the root node by Local *Adjunction:

(341)



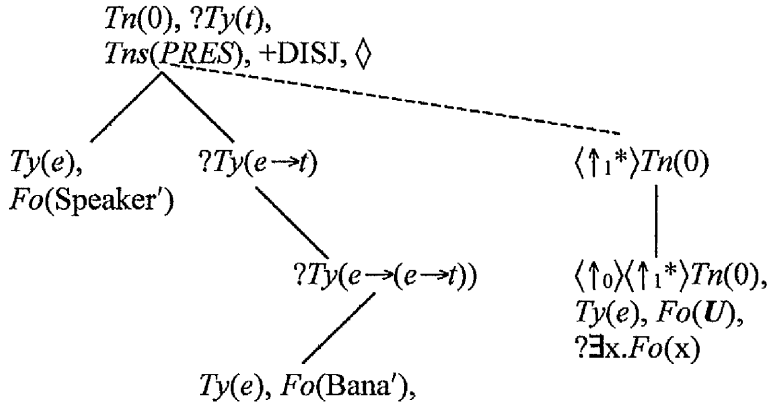
The OM *sè* is parsed and projects a metavariable and requirement for full formula value onto the unfixed node introduced by Local *Adjunction:

(342)

sè

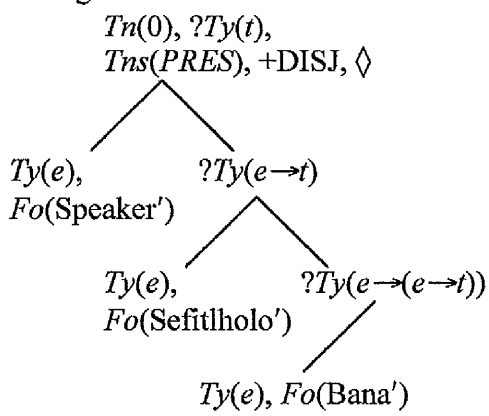
IF ?*Ty*(*e*)
THEN IF ⟨↑$_0$⟩⟨↑$_1$*⟩ ?*Ty*(*t*)
THEN put (*Ty*(*e*), *Fo*(***U***), ?∃x.*Fo*(x))
go (⟨↑$_0$⟩⟨↑$_1$*⟩ ?*Ty*(*t*))
ELSE Abort
ELSE Abort

(343) Parsing *kè á bá sè*



With the pointer at the root node pragmatic inference is invoked. The class 7 OM has encoded the substitution restriction that the metavariable be replaced by a lexical NP of class 7, contextual relevance typically implies that the inanimate object will fulfil the patient semantic role and the patient is typically the direct object in a multiple object construction by a hypothesised anticipation. This is confirmed by the previous parse of the class 2 OM that has already been updated into the tree and the one place predicate node (type $e \rightarrow t$) to which the direct object node is the argument daughter has already been generated in the previous stage of pragmatic inference in order to enrich the class 2 OM into the indirect object position in the tree:

(344) Fixing *sè*



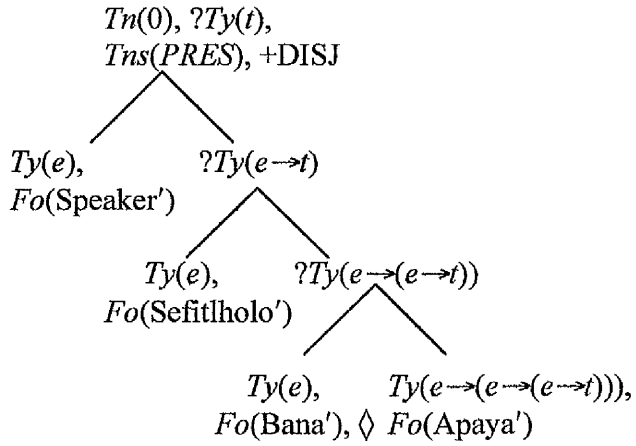
With the pointer at the root node the parse can continue on to the verb which, minus the final vowel which is parsed separately, has the following lexical entry:

(345) *àpéél-*

IF $?Ty(t)$
THEN IF $\langle\downarrow_0\rangle Ty(e)$
THEN make ($\langle\downarrow_1\rangle$); go ($\langle\downarrow_1\rangle$); put ($?Ty(e\rightarrow t)$);
make ($\langle\downarrow_0\rangle$); go ($\langle\downarrow_0\rangle$); put ($?Ty(e)$); go ($\langle\uparrow_0\rangle$ $?Ty(e\rightarrow t)$);
make ($\langle\downarrow_1\rangle$); go ($\langle\downarrow_1\rangle$); put ($?Ty(e\rightarrow(e\rightarrow t))$);
make ($\langle\downarrow_1\rangle$); go ($\langle\downarrow_1\rangle$);
put ($Ty(e\rightarrow(e\rightarrow(e\rightarrow t)))$, Fo(Apaya′));
go ($\langle\uparrow_1\rangle$ $?Ty(e\rightarrow(e\rightarrow t))$); make ($\langle\downarrow_0\rangle$); go ($\langle\downarrow_0\rangle$);
put ($?Ty(e)$)
ELSE Abort
ELSE Abort

The actions in the lexical entry give instructions to build the full propositional tree structure. That the majority of the structure has already been generated through pragmatic inference is not problematic since the structure projected by the verb harmlessly collapses with any structure already built. As specified in the lexical entry, the pointer finished at the indirect object node in the tree:

(346) Parsing *kè á bá sè àpéél-*



With the full propositional structure now built and all the nodes decorated, only the parse of the final vowel remains and acts in conjunction with the disjunctive marker to signal the end of the parse and compile up the tree. Just as in example (331) above, the lexical entry for the final vowel is as below:

(347) *-à*

IF $?Ty(e)$
THEN IF $\langle\uparrow^*\rangle$ $Tn(0)$, $?Ty(e) \wedge$ +DISJ
THEN Abort
ELSE Abort

As already discussed above (under example (331)) the lexical entry for the final vowel takes a $?Ty(e)$ node as its trigger and checks for a +DISJ feature on the root node, if there are both (a type *e* requirement and a +DISJ feature) the parse fails and aborts since

the final vowel of the verb form when the verb is disjunctive should be the last thing parsed, and if there is an outstanding requirement for a formula of type *e* then the verb is not clause final and so not disjunctive.

During the parsing process, DS takes both syntax and semantics into account, while also allowing pragmatic information to be available throughout the parse and, furthermore, pragmatic contextual information interacts closely and immediately with the process of tree construction. Local *Adjunction enables pragmatic inference to occur during the online parsing process because it allows the locally unfixed node generated by its application to be enriched into a fixed argument relation local to the type *t* requiring node and in any order, meaning that the indirect object can be enriched into the tree before the direct object has been parsed. Local *Adjunction operates freely under the remit that the predicate node is not already decorated and there is not already a locally unfixed node in the tree. For the examples used in this chapter, this ensures that one OM is fixed into the tree and updated with a full formula value before the next OM is parsed and that the verb is parsed last since the predicate node is only decorated by the verb and no locally unfixed nodes can be built after the predicate is decorated. Anything parsed after the verb will not be part of the same clause and so not part of the same DS tree.

6.3 Summary and Conclusion

The purpose of this chapter was, primarily, to introduce an analysis for multiple OMs in Setswana. The notion of pragmatics introduced in chapter 1 was revisited at the outset of this chapter, initially establishing the semantic roles of arguments, objects in particular, and then moving on to the interpretation of pronouns in a given context with the flexible ordering of Setswana object markers. Where case marking is used in scrambling languages to fix locally unfixed nodes decorated by agreement markers, the lack of case in Setswana and the fact that tense marking can occur at the end of the verb form motivates an alternative method for fixing locally unfixed nodes. This alternative method is the enrichment of locally underspecified relations to that of the appropriate argument relation in the DS tree based on a combination of the lexical specification of OMs and the semantic roles of the same.

The analysis presented in section (6.2) began with the parse of a single object construction in Kiswahili, in which locally unfixed nodes were built and one decorated by the subject marker, which was then fixed by the tense marker that followed, while the second was decorated by the object marker which was updated into the tree after the parse of the verb had constructed the full propositional structure. The same analysis was applied to a single object construction in Setswana to demonstrate how the same tools can be used across languages to the same effect. Multiple object constructions are not analysed in the same way, and this was explored following the single object constructions. Certain parts of the single object construction analysis were carried across (Local *Adjunction) but the process of building tree structure was shown to be quite different.

Local *Adjunction introduces unfixed nodes that are relative to a local domain and so have to be updated within that domain before the parse can continue. This means that there cannot be more than one locally unfixed node at a time, the underspecified relation of the locally unfixed node must be updated into a fixed position in the DS tree before another locally unfixed node can be created. While Cann *et al.* (2005) use case information carried by NPs in languages such as Latin or Japanese to account for the fixing into the tree structure of locally unfixed nodes, this cannot work for Setswana since there is no case information carried on the noun. Thus, I suggest that pragmatic inference enriches locally underspecified relations into the contextually relevant and appropriate argument relation in the tree. The use of locally underspecified relations, enriched into a fixed position in the DS tree can account for the flexibility in the multiple object markers that occur on the verb form in Setswana. Part of the pragmatic substitution of (pronominal) formula values is to do with the inherent semantics of the noun class system and agreement. I believe that the pragmatic process of structural enrichment is the same and refers to the noun classes and agreement markers and so syntax and pragmatics are not isolated modules but should be considered together as a means of analysis. As a matter for further research, it would be interesting to see how this analysis transfers over to languages that do not have noun classes.

Though it is the analysis of multiple object constructions that was the primary goal, other interesting features arose during the course of this chapter. Firstly, the disjunctive marker and its role in the DS parse. Recall that the segmental disjunctive marker fulfils a similar function to the tense marker, however it is not a tense marker, rather it gives the instruction to compile up the tree once the verb has been parsed because the verb always occurs last in the clause when it is disjunctive. It does this by

working in conjunction with the final vowel, that is triggered by a ?*Ty*(*e*), searches for a ?*Ty*(*t*) *and* the +DISJ feature at the root node and aborts the parse if it finds such. Thus ensuring that there are no outstanding type *e* requirements when the verb has been parsed which in turn ensures that the verb is the last element to be parsed in the clause. This is fairly straightforward, however the disjunctive is only marked segmentally (with the disjunctive marker *a*) in the present positive tense. In all other tenses that show a conjunctive/disjunctive distinction (see section (3.2.2)), this is shown through prosodic tone marking on the verb form. The effect of disjunctive marking on the verb form is the same, it indicates that the verb is last in the clause and gives the instruction to compile up the tree when the verb has been parsed. However, unlike with the segmental disjunctive marker the instructions are not lexically encoded – there is no lexical entry for prosodic tone marking. Without providing an analysis for prosodic tone marking (which is a matter for further research), conjunctive tone marking on the verb form sends a clue to the hearer that following the parse of the verb (or perhaps more specifically, following the parse of the final vowel) there will be something more following, disjunctive tone marking on the verb form sends a clue to the hearer that there will be nothing following the verb (or final vowel) and so to be prepared to compile up the tree. Just as DS does not treat syntax and pragmatics as isolated modules but rather employs an interaction of the two during the parse, neither are syntax and phonology isolated modules but rather work together with the phonology giving the hearer parsing clues as to the building of tree structure (see Kula & Marten, fcmg).

The second interesting feature raised during this chapter, is that of how this analysis can account for 'basic' order of constituents. When the clause to be parsed contains lexical NPs, rather than pronominal forms, Setswana is an SVO language with lexical object NPs occurring post-verbally:

(348) *kè* *tlhátswà* *dìápárò*
SM1sg wash 11.clothes
'I wash clothes'/'I am washing clothes'

According to the analysis proposed in this chapter, the verb projects full propositional structure with fixed object argument nodes with ?*Ty*(*e*). As previously mentioned, lexical NPs cannot project onto fixed nodes (only LINKed or unfixed nodes) and so this poses a problem of how the object position is decorated and the type requirement satisfied. Two possible explanations are that (1) Setswana is object drop, meaning that even in cases with a lexical object NP the object node is decorated with a metavariable and the full formula value is retrievable from the context or (which I believe to be more

likely) in introduced through an application of Late *Adjunction (see section (5.5.1.4)) where the lexical object NP is projected onto the unfixed node introduced by Late *Adjunction and then updated into the tree. Once again, this is a matter for further research.

7 Conclusion

The purpose of this thesis was to propose an analysis for multiple object markers in Bantu languages, with Setswana as the language of example, using the tools as provided by Dynamic Syntax. The intended audience for this work falls into two categories, those interested in the multiple object marking phenomenon from a Bantu perspective and those interested from a syntax perspective. Thus before embarking upon the task of fulfilling the main purpose it was necessary to introduce certain other areas to provide important background information and matters of interest so that readers coming from the two perspectives can have the full picture.

Each chapter of this thesis covers a different topic contributing to the whole. The chapters are written so as to be independent of each other, to a certain extent, to allow readers coming from different perspectives or with different interests and questions to read that which is most applicable or interesting to them without necessarily having to read about the topics of which they are familiar, however certain chapters (and certain sections of those chapters) interact with each other both in the analysis and from a wider perspective looking at the implications and limitations of the analysis.

For those coming from a syntax perspective the chapters on Bantu languages and Setswana in particular give background and language information about the language family and the particular language from which primary examples in chapter 6 are taken. For those coming from a Bantu perspective the chapter on agreement markers introduces the syntactic concept of agreement and how the noun class markers in Bantu languages fulfil this function. The chapter on Dynamic Syntax introduces the syntactic theory within which the analysis in this thesis is undertaken which will be of use to those who have no or limited knowledge of the theory, whether from a Bantu or a syntax perspective.

7.1 Summary of Findings

The analysis of multiple object marker constructions proposed in this thesis uses pragmatic enrichment of tree structure along with locally unfixed nodes to account for having two OMs on the verb form, both preceding the verb, which are flexible in their linear order while at the same time yielding the same semantic interpretation.

The notion of pragmatics introduced in chapter 1 is revisited in the analysis chapter where, having introduced the agreement markers in the preceding chapter, it

was possible to discuss the notion of pragmatics as it is specific to this thesis. It was in this discussion that the semantic roles of the arguments in an utterance were introduced and how these roles can be used to resolve cases of syntactic ambiguity relating roles the arguments play in the phrase structure (direct or indirect object, for example) was established.

Local *Adjunction allows for the introduction of unfixed nodes which must be resolved within a domain local to a $Ty(t)$ requiring node, and this resolution has to occur before a second locally unfixed node can be introduced into the tree structure. The node introduced by Local *Adjunction has to be an argument node and the operator utilised by Local Adjunction $\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle X$ allows for the definition of a construction step which introduces a node with the identifier $\langle\uparrow_0\rangle\langle\uparrow_1{}^*\rangle Tn(a)$ which defines the dominance relation between $Tn(a)$ and the node it dominates as being along one argument relation and an unspecified number of functor relations. This construction step allows each noun phrase in a sequence of locally scrambled noun phrases to decorate an unfixed node as long as each unfixed node is fixed before a further application of Local *Adjunction and the predicate node has not yet been decorated.

In Bantu languages, lexical NPs cannot decorate locally unfixed nodes, only LINKed or fixed nodes. This ensures that no lexical NP comes between the subject and the verb:

(349) *kè* *tlhátswà* *dìápárò*
SM1sg wash 11.clothes
'I wash clothes'/'I am washing clothes'

(350) **ke* *diaparo* *tlhatswa*
SM1sg 11.clothes wash
Intd: 'I wash clothes'/'I am washing clothes'

This preserves the basic constituent structure (SVO) while allowing for multiple OMs to occur on the verb form, as long as one is fixed into the structure before the second is parsed. Unfixed nodes can be fixed by case markers, which determines whether an object is a direct or indirect object, but Setswana does not have case markers and so there must be some other strategy for fixing an unfixed node. I propose that locally underspecified relations are enriched to the contextually relevant position in the DS tree through online pragmatic enrichment. This process presupposes that pragmatic enrichment is freely available to the hearer during the parsing process, and therefore it does not matter which OM is parsed first since a pragmatic inference enriches the underspecified relation to the appropriate relation for the current OM.

That lexical NPs cannot occur between the subject and the verb is part of the justification used by B&M and D&J in section (4.3) for their analysis of the OM as an incorporated pronoun. Essentially, when a verb form is object marked, the lexical object NP is optional, and if it does occur it is considered to be a postclausal topic that is anaphorically linked with the OM on the verb. Though the discussion of this in section (4.3) is, in fact, only a part of the wider discussion on the status of agreement markers in Bantu (with both B&M and D&J agreeing on the status of the OM as an incorporated pronoun but disagreeing on the status of the SM, which D&J assert is also an incorporated pronoun like the OM, while B&M assert that it is ambiguous between being an incorporated pronoun and a grammatical agreement marker), it is of particular relevance in this thesis.

Among other factors, B&M also posit phrase final tonal effects as evidence that the OM is an incorporated pronoun. A postverbal constituent occurring inside the verb phrase will prevent this tonal retraction, but a postverbal constituent outside of the verb phrase will not, so a verb that has is followed by an NP that is in agreement with and OM in the verb form will show H tone retraction. Thus it is the interaction between word order and agreement morphology on the verb, along with interaction between tone and phrase structure that show the OM to be an incorporated pronoun anaphorically linked to a floating topic NP, rather than an agreement marker. The tone on the verb discussed in section (3.2.1) is akin to the conjunctive/disjunctive tone marking on the verb form found in Setswana and explored in section (3.2.2).

The use of the conjunctive form suggests that the verb is not in the clause final position and that anything that follows the verb is 'new' information, while the use of the disjunctive form suggests that the verb *is* in clause final position and anything that may follow the verb is a 'postclausal topic', this is exactly what was demonstrated in section (4.3). In the present positive tense this distinction can be seen through the use of a disjunctive marker *a* (the tone of the disjunctive marker comes under the tonal effects discussed earlier in the chapter). In the other tenses discussed by Creissels (1996) (present negative, future positive, perfect positive) the conjunctive/disjunctive distinction can be seen only through the tonal differences on the verb, furthermore the distinguishing tonal melodies are different for each tense.

The notion of 'given' and 'new' information as indicated by the conjunctive/disjunctive distinction in Setswana is akin to the topic and focus functions discussed by B&M and D&J. These notions to do not translate into the DS parsing process which operated linearly, building tree structure as constituents are parsed. While the

conjunctive/disjunctive distinction is, on one level, opaque due to the tone system of Setswana being particularly complex and there not being a DS account of the phonology-syntax interface (though see Kula & Marten, fcmg), the function of the conjunctive/disjunctive distinction is simple. The conjunctive indicates that the verb is not clause final and so the parse should wait for something more to follow the verb before initiating the instruction to compile up the tree, while the disjunctive indicates that the verb is clause final and once the verb is parsed the only instruction left is to compile up the tree.

To sum up, from the perspective of Bantu languages, the analysis shows that OMs can be analysed as pronominal elements, even in languages that allow multiple OMs on the verb form. If OMs are pronominal elements this implies that Bantu languages are optionally verb final when the verb form includes OMs and the phrase is without the full object nouns. Add to this the findings that in Setswana multiple OMs are flexible in their ordering on the verb form and it is possible to see an interesting parallel between Setswana (and possibly by extension Bantu languages) and verb-final scrambling languages such as Japanese and Korean. In verb-final scrambling languages resolution is typically found through the use of morphological case on the nouns. In Setswana, however, there is no morphological case marking, and so I propose that resolution is found through the syntax-pragmatics interface. Syntax and pragmatics are not encapsulated modules that operate independently of each other, but rather pragmatic process are important for the enrichment of structural relations as well for the structural enrichment of content, which is the accepted standard function of pragmatic processes.

7.1.1 From Here

The above raises certain implications of wider scope than this thesis. As my analyses show, flexible ordering of multiple OMs on the verb form in Setswana can be accounted for through the syntax-pragmatics interface. Since flexible ordering can be accounted for, the question arises as to why there are ordering restrictions on the OMs in other Bantu languages that allow multiple OMs on the verb form. In light of this, there is the question of how my analysis would extend to languages that do not have noun class markers providing inherent semantic information that can interact with the context and so provide pragmatic information relating to the markers contribution to the interpretation of the phrase.

Leading on from the above, verb forms in Bantu languages are largely taken to be morphologically constructed, however scrambling is not a morphological matter. Since the OMs in a multiple object construction can be scrambled, this would imply that the OMs are not morphemes but are syntactic elements instead, or that there is a level of syntax-morphology interface that needs to be explored.

DS uses case as the resolution for scrambling, but as I have shown it is possible to have scrambling without case, so the question comes of whether the notion of pragmatic inference that I propose for OMs be extended to case marking and would this still use some form of *Adjunction in the construction of the DS tree?

These questions are all out of the scope of this thesis, but would make interesting areas for future research.

7.1.2 Limitations

This thesis and the data included in it suffers from some limitations. Due to the nature of this being a PhD thesis time was a limiting factor and as such I undertook only one period of fieldwork (of 6 months between February and September 2005) during which all of my data was gathered. Had there been additional trips, gaps found in the data during the analysis period could have been found and filled.

The number of informants that I worked with is small, 6 in total, though I worked with them for extensive periods of time. All 6 of my informants are women, which I do not see as a limitation, though it could be argued that my data may be slightly skewed having worked with only one gender. Further, all of my informants are university educated with a knowledge of linguistics, I found this to be useful due to my unfamiliarity with Setswana and occasional need to ask for an explanation for utterances if I did not understand the construction or how it worked. I accept that this is a limitation, however, because one of the main languages of instruction in further education in Botswana is English and this could have an effect on the naturalness of the informants responses.

In terms of data, during elicitation sessions my primary concern was with the verb form and its structure. However, for my analysis data from discourse and texts, that is with more context, would be crucial evidence and so is a clear topic for future research.

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