

Auxiliary vs INFL in Bantu

The syntactic and phonological complexity of Ndebele verbs

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Abstract

A distinctive property of Bantu verbs is the division into two domains: a cluster of inflectional prefixes (INFL) and a lexical verb stem. This claim has been supported by a range of multidomain effects which single out INFL as an independent constituent. Such effects led to the hypothesis that INFL in Bantu is of the same category as auxiliary verbs found in auxiliary–participle constructions. This paper investigates syntactic, morphological and phonological complexity effects in Northern Ndebele verbs and concludes that INFL in this language cannot be treated as a type of auxiliary. This conclusion is reached through a detailed comparison of INFL and verbal auxiliaries, revealing striking asymmetries, syntactic and phonological, between the two. The autonomy of INFL is argued to be a reflex of how verbal morphology is organized into complex heads in Bantu languages.

Keywords. Bantu, syntax, morphology, phonology, compound tenses, Ndebele

1 Introduction

The distinction between simple and compound tenses, extensively studied in Indo-European languages, is typically defined by the number of verbal elements: simple tenses are mono-verbal expressions, while compound tenses are multi-verbal – they contain the lexical verb and at least one auxiliary verb. Verb-count is, however, not the only measure of complexity in verbal expressions. It is a widely accepted claim that verbs in Bantu languages can be complex even in the absence of an auxiliary verb. This is due the hypothesized independence of inflectional prefixes, which have been analyzed as a separate constituent, akin to an auxiliary verb. This claim, represented in (1), was first proposed by Barrett-Keach (1986) for Swahili and by Myers (1987) for Shona, and it is known as *the Inflectional Stem Hypothesis*. As an illustration, consider the three Bantu languages in (2).¹

- (1) [_{INFL/AUX} **Inflectional prefixes**] [_{VP} *lexical V-Stem*]
- (2) a. **Nd- a- ká- vérenga** *Shona* (Myers, 1987:41)
1sg- PST- REM- read
'I read (yesterday or before)'
- b. **Ni- na- ku- phenda** *Swahili* (Barrett-Keach, 1986:562)
1sg- PRES- OM- love
'I love you'
- c. **N- ká- láá- boomba** *Chibemba* (Julien, 2002:192)
1sg- FUT- PROG- work
'I will be working'

The idea that the inflectional prefix cluster in Bantu is an auxiliary-like element was supported and adopted in much later work in Bantu verbal morpho-syntax and phonology (Myers, 1998, 1992; Barrett-Keach, 1986;

¹ Abbreviations: 1 = class 1 (etc.), 1PRON = class 1 pronoun, 1sg = 1st person singular (etc.), APPL = applicative, AUX = auxiliary verb, COMP = complementizer, D-PST = distant past, FS = final suffix, FUT = future tense, INF = infinitive, NEG = negation, OM = object marker, PST = past tense, PRES = present tense, REM = remote, REL = relative marker, R-PST = recent past, & = conjunction.

Hyman, 1993; Hyman & Mtenje, 1999; Mutaka, 1994; Buell, 2005, among others). Evidence for the claim in (1) comes from both morphosyntactic and phonological phenomena found in a range of Bantu languages. Generally speaking, the inflectional prefix cluster exhibits some independence from the V-Stem. It has been argued to be a morpho-syntactic unit, called Infl or Aux, to the exclusion of the lexical part of the verb, and to constitute a separate domain for phonological rules. As such, it resembles verbal auxiliaries, familiar from IE compound tenses. This parallel underlies the categorization of INFL as Aux – the category of both auxiliary verbs and the Bantu INFL cluster.

An important consequence of this approach to INFL in Bantu is that all verbs with inflectional prefixes are complex, in a similar way compound tenses are. This idea is additionally corroborated by the fact that many tense prefixes in Bantu are etymologically verbs. In Ndebele – the language analyzed in detail in this paper – the future tense prefix is cognate with the verb *uku-za* ‘INF-come’ (3a). However, we do find in Bantu languages compound tenses that involve verbal auxiliaries. An example is the Ndebele Future Progressive, illustrated in (3b).

- (3) a. U- za- bala. *Simple Future*
 2sg- FUT- read
 ‘You will read’.
- b. U- za- be u- bala. (> uzabubala) *Future Progressive*
 2sg- FUT- AUX 2sg- read
 ‘You will be reading’.

In (3b), the auxiliary verb *be* ‘be’ and the lexical verb are independently inflected for subject agreement – a fact strongly suggesting that (3b) is a multiverbal expression.

Given the existence of compound tenses of the familiar type, i.e. with a verbal auxiliary, a question arises about the nature of INFL and the hypothesis that it is an auxiliary itself. If both INFL and the verbal auxiliary are of the same category, as it is often assumed, we expect to see complexity effects characteristic of Aux–Verb compounds in both (3a) and (3b). The first goal of this paper is to demonstrate that INFL and verbal auxiliaries in Ndebele are significantly different. In particular, I show that *compound tenses* (i.e. constructions with verbal auxiliaries) exhibit syntactic and morphophonological complexity absent in forms with INFL but without verbal auxiliaries, such as (3a) (I refer to the latter type as a *simple tense*). One of such complexity effects is the availability of a coordination site within the verbal expression. As shown below, coordination is allowed below a verbal auxiliary (4a), but not below INFL (here: Agr+T) (4b).

- (4) a. Wena u- za- be- u-hamba njalo u-gitshima. ✓ V_{Aux} [V & V]
 You 2sg- FUT- AUX- 2sg-walk and 2sg-run
 ‘You will be walking and running.’
- b. Wena u- za- hamba njalo *(u- za-) gitshima. *INFL [V & V]
 We 2sg- FUT- walk and 2sg- FUT- run
 ‘You will walk and run.’

On the basis of contrasts like (4), I argue that tense markers in Ndebele, whatever their etymology, cannot be analyzed as a type of auxiliary.

The second goal of the paper is to return to some most convincing arguments for the auxiliary status of INFL in Bantu and attempt to reconcile them with the contradictory conclusion from Ndebele. Acknowledging the existence of various complexity effects on the INFL–V-stem boundary, I argue that these effects are not indicative of a compound-tense syntax. Rather, they are a (typically phonological) reflex of how Bantu languages group verbal morphology into complex syntactic heads. I formulate typological predictions about

the distribution of such effects in Bantu languages, and provide evidence from Ndebele and Swahili.

I start in with background information about verbal morphology in Ndebele and lay out the theoretical assumptions (section 2). Section 3 presents the main issue of the paper in more detail and reviews some representative arguments for the INFL-VStem hypothesis found the Bantu literature. In section 4, I develop an analysis of simple and compound tenses in Ndebele, arguing that an expression of a simple tense is morphosyntactically one unit (one complex head), while compound tenses consist of two such units. The proposed analysis is further supported by a number of morphological and syntactic asymmetries between simple and compound forms. Section 5 provides converging evidence from phonology. Tone patterns and prosodic minimality effects reveal a phonological boundary in expressions with verbal auxiliaries but not in ones with just INFL. Finally, section 6 considers broader implications of the Ndebele facts for the Inflectional Stem Hypothesis and word formation in Bantu in general. I argue that a particular syntax-phonology mismatch in Ndebele compound tenses is incompatible with the claim that INFL is a type of auxiliary. Instead, I argue that the independence of INFL indicates that it forms a separate complex head. Section 7 concludes the paper.

2 Background

Northern Ndebele (IsiNdebele, S44) is spoken primarily in a western Zimbabwe region of Metabeleland by descendants of rebelling Zulus who left South Africa during the Mfecane exodus some 200 years ago. As such, Northern Ndebele still bears striking resemblance to Zulu and is often considered a dialect of it.

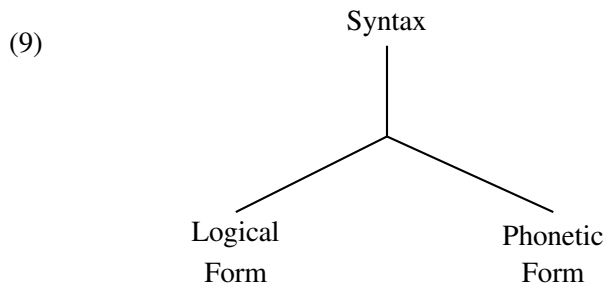
Various aspects of Ndebele morphology have been described and analyzed in works such as Pelling (1966), Rycroft (1983), Rycroft (1980), Downing (1990), Hyman et al. (1999), Sibanda (2004), Khumalo (2007), Cook (2013). Ndebele verbs show a strong agglutinative character: they encode temporal and aspectual information, host subject agreement, object marking, and a range of derivational morphology. The basic morphological template of a verb in Ndebele can be described as in (5).

- (5) VERB-MORPHOLOGY TEMPLATE :
AgrS–Tense–(AgrO)–Root–(Derivation)–FV

Ndebele avoids vowel sequences. There are three main hiatus resolution strategies in Ndebele: i) vowel deletion, ii) gliding, and iii) vowel coalescence (6)-(8) (from Sibanda 2004:122).

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| <p>(6) Coalescence rules:</p> <p>a. $a + a \rightarrow a$</p> <p>b. $a + i \rightarrow e$</p> <p>c. $a + u \rightarrow o$</p> | <p>(7) Gliding:</p> <p>a. $u \rightarrow w / __ a$</p> <p>b. $u \rightarrow w / __ e$</p> |
| | <p>(8) Vowel deletion: $e \rightarrow \emptyset / __ V$</p> |

The analysis developed in this paper is framed in the general minimalist theory of syntax (Chomsky, 1995), and it assumes the model of grammar in (9); syntactic structures are built in the narrow syntax component by a binary combinatorial operation (*Merge*) and the output of syntactic computation is the input to semantic interpretation (Logical Form) and to phonological interpretation (Phonetic Form). Phonetic Form (PF) is the component of grammar where functional and lexical information is paired with phonological representations.



The theory of spell-out adopted here is the realizational framework of Distributed Morphology (developed by Halle & Marantz (1993), Halle (1997), Embick & Noyer (2001), Embick (2010), among others). Terminal nodes of the input structure, called *morphemes*, are bundles of lexical or functional features. At the PF component (often referred to as "Morphology") morphemes are interpreted phonologically in the process of Vocabulary Insertion assigning phonological form (an *exponent*) to morphemes. Allomorphy is modeled as competition between vocabulary insertion rules (called *Vocabulary Items*),² and regulated by the Subset Principle (Halle, 1997), whereby more specific rules win over more general rules.

While this paper is not meant to be a contemplation of the concept of word, some definitions are in order.³ I will follow the standard definition of *morphological word* adopted in Distributed Morphology and presented in (10) (from Embick (2010)).

- (10) *M-Word*: (Potentially complex) head not dominated by another head projection

Another working definition will be the *phonological word* which I will use with reference to a prosodic unit that constitutes a domain of tone displacement rules. I assume that a PWord is subject to disyllabic minimality, as follows from the following Prosodic Hierarchy (McCarthy & Prince (1986, 1993b), Nespor & Vogel (1986), Selkirk (1986)) and the Strict Layer Hypothesis (12). Finally, I assume MWord-to-PWord mapping, which will become relevant in section 5.

- (11) The Prosodic Hierarchy: Utterance > Intonational Phrase > PWord > Foot > Syllable

- (12) Strict Layer Hypothesis (Nespor & Vogel (1986))

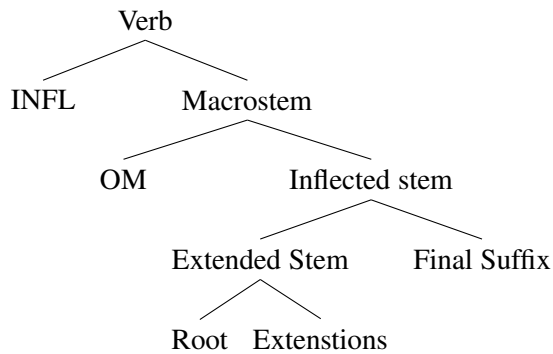
- a. A given nonterminal unit in the prosodic hierarchy. X^P , is composed of one or more units of the immediately lower category, X^{P-1} .
- b. A unit of a given level of the hierarchy is exhaustively contained in the superordinate units of which it is a part.

I will use some of the traditional terminology for verbal morphemes in Bantu. The node labels in (13) will be used descriptively to refer to subparts of the verb. Since object markers are largely irrelevant in the present discussion, I will typically collapse Macrostem and Inflected Stem, calling them both Verb Stem (V-Stem). Similarly, extensions (derivational suffixes) will not be at issue, and so the V-Stem in most examples consists of the root and the Final Suffix.

² The type competition between phonological representations employed in Distributed Morphology (Embick & Marantz, 2008) is crucially among Vocabulary Items, i.e. between realization rules for single morphemes. This is different from the competition between output candidates in globalist frameworks such as Optimality Theory (Prince & Smolensky, 1993; McCarthy & Prince, 1993a), where the competitors are alternative outputs of possibly complex forms, such as entire words.

³ Various treatments and definitions of the concept of word are more broadly discussed in Julien (2002) and the references cited there.

(13) Morphological structure of Bantu verbs (Downing (1999))



As the structure in (13) assumes the contested Inflectional Stem Hypothesis (the two major constituents of a verb word are INFL and a verb stem (or Macrostem)), (13) is not a theoretical assumption.

I follow Sibanda (2004) and Downing (1990) in viewing the tonal opposition in Ndebele as high versus toneless (TL). Phonologically toneless syllables surface as low. In the examples throughout the paper, syllables which surface with a high tone are marked with an acute accent (´), while low-toned syllables are unmarked. Some tonal units are analyzed as being underlyingly associated with a segmental morpheme. For example, Object Markers, as well as some Subject Markers and some roots in Ndebele are said to be "underlyingly high". In the theory of spellout adopted here, we will say that an underlyingly high morpheme is a Vocabulary Item that has a binary exponent: segmental and tonal. For example, the lexical entry for the high-toned root $\sqrt{\text{choke}}$ is in (14a) and for the low-toned root $\sqrt{\text{cook}}$ as in (14b).

- (14) a. $\sqrt{\text{choke}} \leftrightarrow \left[\begin{array}{c} /kham/ \\ H \end{array} \right]$
 b. $\sqrt{\text{cook}} \leftrightarrow /phek/$

A realization rule like (14a) only tells us that the word built on this root has a high tone as part of its phonological input. Since application of subsequent phonological rules might change its final phonetic form, the Vocabulary Item in (14a) does not determine the position in which the tonal exponent will ultimately surface. As some morphemes may have only segmental exponent (e.g. $\sqrt{\text{cook}}$), others may have only tonal exponent (a floating tone).

Finally, I assume that tone displacement in Ndebele is metrically conditioned (Goldsmith (1984), Goldsmith et al. (1989), Goldsmith (1987), Peterson (1985), Sietsema 1989). This is to say, phonological rules which shift a tonal unit interact with metrical structure by making reference to accentual properties of syllables.

3 Types of verbal complexity in Bantu

The complexity of a verbal expression is here understood as a multi domain effect – a situation in which the verbal predicate consists of two (or more) units that show some level of independence. One rather transparent case are compound tenses in analytic languages, such as English, where certain inflectional contexts require two verb words, rather than one. For instance, the expression of Present Perfect in English clearly shows a split into two morphological units: the auxiliary *has* and the main verb *left*. Most notably, the two can be split by intervening material, showing a considerable level of syntactic independence.

- (15) She has (already) left. *Present Perfect*

Similar patterns are found in other inflectional contexts, involving different auxiliaries and modal verbs. All these cases share one crucial property: the complexity of such verbal expressions is *defined* by the

presence of an auxiliary/light verb. I will refer to this type of multi-domain effect as AUXILIARY SPLIT – a phenomenon where lexical and functional meanings of a verbal predicate are distributed between two morphological words, both of the verbal category.

Although AUXILIARY SPLIT is very common crosslinguistically, other structural divisions within verbal expressions have been proposed. Bantu verbs, the focus of this paper, have been analyzed as consisting of two domains which are not defined by the presence of an auxiliary verb, but where the split is along a different dimension: between inflectional versus lexical material. This split was originally proposed by Myers (1987) for Shona and Barrett-Keach (1980, 1986) for Swahili, and is known as the *Inflectional Stem Hypothesis*. According to this theory of verb structure, all inflectional markers, which are preverbal in Bantu,⁴ form a syntactic constituent, called INFL (or Aux), while the lexical root with any suffixal morphology form a separate constituent – the Verb Stem. As an example, consider the Shona verb in (16), where INFL consists of the subject marker **ndi-** and the future tense marker **chá-**, while the V-stem contains the root *dzok* and the Final Suffix *-a*.

- (16) [INFL **Ndi- chá-**] [V-stem *dzok-a*] mangwáná zvekáre. *Shona*
 1sg- FUT- return-FS tomorrow again
 ‘I will come back again tomorrow’

Thus, (15) and (16) are instances of two different types of verbal complexity (17):

- (17) Verbal complexity types
 a. AUXILIARY SPLIT: structural autonomy of an auxiliary verb and a lexical verb
 b. INFL SPLIT: structural autonomy of inflectional and lexical material

What distinguishes the auxiliary verb *has* and the INFL constituent in (16) is the presence of a verbal root. Unlike the auxiliary verb, INFL does not contain a verbal root; rather, it is a cluster of inflectional affixes which form a constituent to the exclusion of the lexical verb stem. There is, however, a similarity between the two: both encode inflectional meaning such as tense and agreement. This parallel, as well as the structural autonomy of INFL observed in many Bantu languages, underlie the hypothesis in (18), according to which auxiliary verbs and the Bantu INFL are equivalent and are of the same category, namely Aux.

- (18) *Infl–Aux Equivalence Hypothesis*
 An inflectional-affix cluster in Bantu (INFL) is the same syntactic object as an auxiliary verb, namely Aux.

In this section, I discuss INFL SPLIT and AUXILIARY SPLIT in turn. In section 3.1, I present some representative arguments for INFL SPLIT in Bantu that have been proposed in previous literature, as well as its theoretical implementations. In section 3.2, I consider the nature of INFL SPLIT in relation to AUXILIARY SPLIT and present the first argument against the *Infl–Aux Equivalent Hypothesis*.

3.1 INFL SPLIT in Bantu

In his analysis of Shona verbs, Myers (1987) points out a systematic misalignment between an orthographic word and a phonological word on the one hand, and a syntactic word on the other. Although inflectional and lexical morphemes in (19) together form an orthographic word and a phonological word (19a), the preverbal

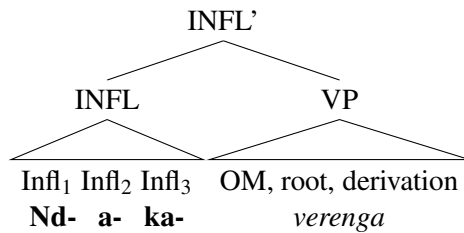
⁴ As mentioned in the previous section, the so-called Final Suffix is an inflectional morpheme, and it is the only inflectional morpheme that appears after the root, rather than before. Nonetheless, the Final Suffix belongs to the Verb Stem and not to the Inflectional Stem, according to the Inflectional Stem Hypothesis and its later adaptations. A widely accepted view is that the Final Suffix is an agreement morpheme that co-varies with preverbal inflectional markers, such as tense, aspect, mood and polarity.

inflectional morphemes form a separate syntactic head, called INFL, which takes a VP complement (the V-Stem) (19b).

- (19) a. (Ngakaverenga.)_ω Shona (Myers, 1987:41)
 b. [_{INFL} **Nd- a- ká-**] [_{V-Stem} *vérenga*]
 1sg- PST- REM- read
 ‘I read (yesterday or before)’

In the original analysis of INFL SPLIT, the inflectional markers form a constituent (Barrett-Keach, 1986; Myers, 1987) – the *Inflectional Stem* (20).

- (20) INFL-SPLIT syntax (Myers, 1987)



The theory of Bantu verb structure that singles out the V-Stem has been empirically and theoretically motivated. On the empirical side, the Verb Stem shows some level of syntactic and phonological independence that can be traced systematically across Bantu. Theoretical arguments concern affix ordering asymmetries in the lexical and the inflectional domain. In the rest of this subsection, I review some representative arguments for INFL SPLIT in Bantu.

The first argument for the INFL-SPLIT structure comes from high tone deletion in Shona. This particular type of deletion, known as the Meeussen’s Rule,⁵ is common in Bantu, and it deletes a high tone that is preceded by another high tone (21).

- (21) Meeussen’s Rule: H → ∅ / H ____

Myers shows that Meeussen’s Rule in Shona is sensitive to a verb structure that singles out V-Stem and INFL as constituents. Consider the verb *téngésá* ‘sell’. Its root is underlyingly associated with a High tone which surfaces on all syllables of the Verb Stem (22a). As shown in (22b), the High tone of the stem is deleted if the stem is preceded by a High tone, by Meeussen’s Rule. Note, however, that the object marker in (22c) does not trigger deletion of the following H, although it meets the surface criteria to do so: it is itself associated with a H tone and it immediately precedes the stem. The question is, then, why is Meeussen’s Rule triggered by the future tense prefix *chá-*, but not by the object marker *rí-*?

- (22) (Shona, Myers 1998: 240-241)

- a. **ku-** *téngésá*
 INF sell
 ‘to sell’
- b. **Ndi-** **chá-** *tengesa* *H on V-stem deleted*
 1sg- FUT- sell
 ‘I will sell’

⁵ The term *Meeussen’s Rule* was coined by Goldsmith (1984), acknowledging A.E. Meeussen’s discovery of the rule in Tonga (Meeussen, 1963).

- c. **ku-** rí *téngésá* *H on V-stem remains*
 INF- OM- sell
 ‘to sell it’

Myers argues that the asymmetry between (22b) and (22c) can be explained if we assume the Inflectional Stem Hypothesis. In his analysis, there is a structural boundary separating the Verb Stem (which includes the Object Marker) and the Inflectional Stem. Meeussen’s Rule in Shona verbs applies *across* that boundary only, i.e. between **cha-** and *tengesa* in (22b), but not between *ri-* and *tengesa* in (22c). As Myers points out, an analysis that does not recognize the INFL-SPLIT boundary would have to resort to more stipulative measures in order to capture the distribution of Meeussen’s Rule in Shona.

Another phonological argument for INFL SPLIT comes from stress assignment in Swahili verbs (Barrett-Keach, 1980, 1986; Henderson, 2003). As shown in (23), primary stress falls on the penultimate syllable of the phonological word (primary stress is marked with acute accent).

- (23) a. (Nì- na- ku- phénda)_ω (Swahili, Barrett-Keach 1986:562)
 1sg- PRES- OM- love
 ‘I love you’
- b. (Ha- wà- ta- sóma)_ω kitabu (Swahili, Henderson 2003:257)
 NEG- 3pl- FUT- read book
 ‘They will not read a book’

In addition to primary stress on the penultimate syllable, the verbs in (23) have secondary stress (marked with grave accent). Unlike primary stress, secondary stress shows some variability with respect to its position: it appears on the first syllable in (23a), but on the second syllable in (23b). Barrett-Keach argues that the distribution of secondary stress is entirely predictable if we assume the Inflectional Stem Hypothesis: secondary stress falls on the penultimate syllable of the INFL constituent.

- (24) Stress assignment in Swahili verbs: *A trochaic foot from right to left*
- a. [INFL ní-na] [V-Stem ku-phénda]
 b. [INFL ha-wá-ta] [V-Stem sóma]

Thus, stress in Swahili is assigned to the penultimate syllable in both INFL and the Verb Stem, providing evidence that they form two separate phonological domains.⁶

In addition to phonological arguments, INFL SPLIT has been evidenced by morpho-syntactic phenomena. One classic argument comes from Swahili relative clauses (Barrett-Keach, 1980, 1986; Ngonyani, 1999; Henderson, 2003). Swahili relative clauses may be formed with a relative complementizer *amba* (25a), or without it (25b). In either case, the relative clause must contain a resumptive pronoun. In (25), the resumptive pronoun *ye* is the subject of the relative clause.

- (25) (Swahili, Henderson (2013))
- a. Mchana amba-ye a-li-soma kitabu.
 1girl COMP-IPRON 3SG-PST-read 7book
 ‘the girl who read the book’

⁶ Primary stress is determined by the End Rule and falls on the head of the second trochee. The head of the first foot (in the Inflectional Stem) ends up bearing secondary stress.

- b. Mchana a-li-ye-soma kitabu.
 1girl 3SG-PST-1PRON-read 7book
 ‘the girl that read the book’

On the face of it, the resumptive pronoun *ye* can appear in two different positions, depending on the presence of the complementizer *amba*. If the complementizer is present, the resumptive pronoun attaches to its right, and it precedes the verb. In the absence of the complementizer, the pronoun appears *within* the relative-clause internal verb. Note that, being a subject pronoun, *ye* is expected to appear preverbally. Thus, (25b), not (25a), is the puzzling case. Interestingly, the pronoun in (25b) appears exactly between the inflectional and the lexical part of the verb, i.e. between INFL and the Verb Stem. The position of resumptive pronouns was, then, one of the main arguments for INFL SPLIT in Swahili and for its syntactic nature. In particular, it has been argued that inflectional prefixes form a separate syntactic head I^0/T^0 (Ngonyani, 1999; Henderson, 2003), while the lexical stem remains low, inside the VP, as shown in (26).

- (26) [TP [T **a-li** [VP *soma*]]] INFL SPLIT in Swahili
 3SG-PST read

This analysis of INFL SPLIT accounts for the contrast in (25): it arises due to T-C movement, which occurs only when the relative C^0 is null. Consider first a relative clause with an overt complementizer. Since the tense and agreement markers remain in T, the subject pronoun surfaces in a preverbal position, to the right of the complementizer *amba*, as shown in (27a). If *amba* is absent, however, T-C movement takes place, displacing the inflectional markers to the left of the subject pronoun, and stranding the Verb Stem low. As a result, the subject pronoun *ye* intervenes between the inflectional markers and the V-Stem (27b). Note that the agreement prefix on T undergoes head movement together with T. The T-to-C analysis of relative clauses in Swahili is thus based on the assumption that an agreement prefix is part of the T head (either as a realization of T’s φ -feature or as a separate agreement heads which lowers to T).

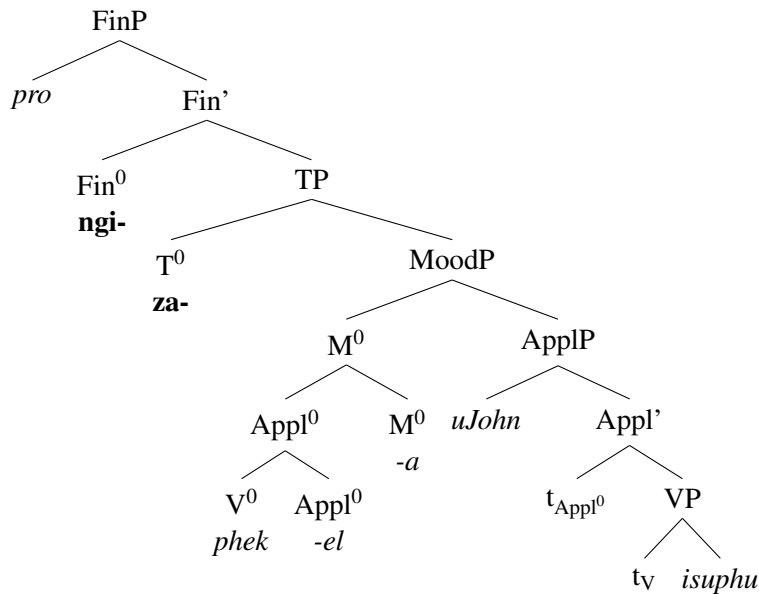
- (27) a. [C *amba* [TP *ye* [T **a-li** [VP *soma kitabu.*]]]]
 COMP 1PRON 3SG-PST read 7book
 b. [C **a-li** [TP *ye* [T <a-li> [VP *soma kitabu.*]]]]
 3SG-PST 1PRON read 7book

Thus, INFL SPLIT in Swahili is manifested quite transparently: the inflectional markers form a syntactic constituent to the exclusion of the Verb Stem, and are targeted by syntactic operations, such as movement, on their own. It is important to observe the parallel between INFL SPLIT and AUXILIARY SPLIT in this respect. Auxiliary verbs can undergo movement independently from the main verb, showing similar syntactic autonomy from the main verb as inflectional markers in Swahili. This parallel is discussed in more detail in the next subsection.

The three phenomena just discussed provide empirical evidence for INFL SPLIT in Bantu. The split has also been argued on theoretical grounds. The argument comes from affix order in a verb word: inflectional morphemes are *prefixes*, while the verb stem consists of a verb root and derivational *suffixes*. Adopting the theory of movement as left-adjunction only (Kayne, 1994), i.e. where movement can only result in suffixation, Julien (2002) argues that verbs in Shona (and similar Bantu languages) undergo partial head-movement: only as high as the projection hosting the Final Suffix (Mood⁰, for Julien). Tense, agreement and other prefixes, on the other hand, do not form a complex head with the V-Stem, or with one another. Julien’s proposal for the Bantu verb structure is shown in (29), illustrated with the Ndebele verb in (28).

- (28) **ngi- za- phék- el- a** uJohn isuphu. Ndebele
 1sg- FUT- cook- APPL- FS 1John 5soup
 ‘I will cook soup for John’

(29) The syntax of Bantu verbs (Julien, 2002)



In Julien's analysis, inflectional markers do not form a syntactic constituent, but rather, they are syntactically free morphemes, spelled out in their base positions. This analysis, referred to as the "clausal word" approach by Zeller (2013), bears some resemblance to the original account of INFL SPLIT. Despite the different treatment of the inflectional domain, the clausal-word approach does single out the Verb Stem as a syntactic head, allowing it some level of structural independence from higher inflectional markers.

3.2 INFL SPLIT versus AUXILIARY SPLIT

We saw in the previous subsection that inflectional-affix clusters in Bantu share some properties with auxiliary verbs, e.g. they undergo movement stranding the main verb. In that, INFL SPLIT resembles the familiar AUXILIARY SPLIT, found in IE languages. Consider, for instance, the comparison between T-C movement in Swahili and the English subject-aux inversion (30).

(30) The parallel between INFL SPLIT and AUXILIARY SPLIT:

a. [C_{rel} **a-li** [TP ye [T <a-li> [VP *soma*]]]] *Swahili*
 3SG-PST 1PRON read

b. [C_{+Q} **Has** [TP he [T <has> [VP *gone*]]]] *English*

Both in English and Swahili, part of the verbal expression undergoes movement to C. And in both cases, the moving part carries functional information, such as tense and agreement, but does not contain the lexical part of the predicate, which is stranded in a lower position. This empirical parallel between auxiliary verbs in IE languages and the inflectional-affix clusters (INFL) in Bantu underlies a series of proposals where the two are treated on a par. Building on his earlier work, Myers (1998) proposes that auxiliary verbs and INFL in Bantu are of the same syntactic category, namely Aux, following Chomsky's (1957) proposal that auxiliaries are not of the same category as lexical verbs. While the Aux hypothesis was originally proposed for auxiliary *verbs* in Chomsky (1957), it has later been argued that Aux need not contain a verbal root. Rather, Aux is defined as a syntactic constituent comprising inflectional meaning, such as tense, aspect, modality etc. (Steele et al., 1981). This characterization of Aux makes it irrelevant whether Aux contains a verbal root or not. Phenomena like INFL SPLIT in Bantu, where inflectional-affix clusters behave like

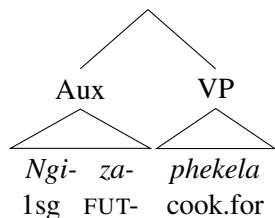
auxiliary verbs, were key arguments put forward by defenders of the Aux hypothesis (Akmajian & Wasow, 1975; Akmajian et al., 1979; Steele et al., 1981). While the treatment of auxiliary verbs in English and other Indo-European languages has evolved in various directions since Chomsky (1957), the Aux hypothesis prevailed in the Bantu literature. Various versions and adaptations of it can be found in the current work on both the syntax and phonology of Bantu verbs. For example, Buell (2005) proposes that every verbal expression in Zulu is, in fact, bi-clausal. Inflectional markers belong to a higher clause, while the verb stem with suffixes is located in a lower clause. Other similar proposals additionally provide a diachronic rationale for this view: a great portion of the so-called tense markers (tense prefixes) are derived from light/auxiliary verbs. For instance, the Zulu future tense prefix *zo-* is a form of the verb "come" (Doke, 1950). Based on this diachronic evidence, Khumalo (1981) analyzes all tense, aspect and negation prefixes in Zulu as "underlying deficient verbs" (1981:103). A similar treatment of tense affixes in Swahili is found in Henderson (2003), where tense prefixes show the behavior of auxiliary verbs: they can undergo T-C movement alone and check the [+V] feature on C. Thus, informed by striking parallels like (30), a great deal of work on Bantu verbs starts out with the hypothesis that the inflectional cluster in those languages is equivalent to Aux (31).

(31) *Infl–Aux Equivalence Hypothesis*

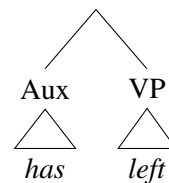
An inflectional-affix cluster in Bantu (INFL) is the same syntactic object as an auxiliary verb, namely Aux.

According to the *Infl–Aux Equivalence Hypothesis*, the external syntax of INFL SPLIT and AUXILIARY SPLIT is the same, as shown in (32). They are both verbal compounds in which inflectional morphemes dominating the verb stem form a syntactic constituent of the category Aux. The difference between them lies in the content of Aux: the presence versus absence of a verbal root.

(32) a. INFL-SPLIT syntax (for (28))
(= Aux without a verbal root)



b. AUXILIARY-SPLIT syntax
(= Aux with a verbal root)



A consequence of the Infl–Aux Equivalence Hypothesis is that every verb in Bantu is a compound, periphrastic expression – a consequence observed and defended in the Bantu literature. This view is, however, puzzling. It poses an immediate question about the structure of verbal expressions in Bantu that *do* involve an auxiliary with a verbal root. Existent accounts of word formation in Bantu do not investigate the simple-compound distinction in much detail, and it is still unclear how "verbless auxiliaries" differ from auxiliary verbs. Rather, they focus on deriving a version of the INFL-Stem Hypothesis, which unifies a verbless Aux (32a) and an Aux with a verbal root (32b) under the *Infl–Aux Equivalence Hypothesis*. If INFL SPLIT and AUXILIARY SPLIT have the same external syntax (Aux VP), we predict similar multi-domain effects to arise in both simple and compound tenses in Bantu. This is because, by (31), verbal complexity in Bantu is sensitive to the presence of the Aux category, and not to the presence of an auxiliary *verb*. The latter is, however, the core property distinguishing simple and compound tenses.

Contrary to that prediction, complexity distinctions in Ndebele verbs directly correlate with the presence versus absence of an auxiliary verb. Consider again the Future Progressive and Future Simple (non-progressive) forms in (33), repeated from (3). Like other compound tenses, Future Progressive allows coordination of its subconstituent – the main verb with the lower subject agreement prefix *u-*. As shown in (34a),

the coordination is dominated by an inflected auxiliary verb. Importantly, a cluster of inflectional markers alone does not behave like an auxiliary in this respect. In the absence of an actual auxiliary *verb*, the lexical verb may not be coordinated (34b).

- (33) a. U- za- bala. *Simple Future*
 2sg- FUT- read
 'You will read'.
- b. U- za- be u- bala. (> uzabubala) *Future Progressive*
 2sg- FUT- AUX 2sg- read
 'You were reading'.
- (34) AUXILIARY SPLIT in Ndebele: coordination
- a. Wena u- za- be- u-hamba njalo u-gitshima. $\checkmark V_{Aux} [V \ \& \ V]$
 You 2sg- FUT- V_{Aux} - 2sg-walk and 2sg-run
 'You will be walking and running.'
- b. Wena u- za- hamba njalo *(u- za-) gitshima. $*INFL [V \ \& \ V]$
 We 2sg- FUT- walk and 2sg- FUT- run
 'You will walk and run.'

The contrast in (34) is a true AUXILIARY-SPLIT phenomenon: coordination of the lexical verb is possible under a verbal auxiliary, but not under INFL. Again, the observed asymmetry between V_{Aux} and INFL is unexpected under the *Infl–Aux Equivalence Hypothesis*, where both the progressive (compound) and the non-progressive (simple) Future have the same Aux-VP syntax.

In the rest of this paper, I argue that the *Infl–Aux Equivalence Hypothesis* is empirically inadequate. In particular, I present evidence that Ndebele exhibits AUXILIARY SPLIT of the kind found in English and other IE languages, that is, where a range of multi-domain effects, both syntactic (section 4) and phonological (section 5), are triggered by the presence of an auxiliary *verb*, and are absent in forms without it. These facts point to the conclusion that INFL SPLIT is not simply a Bantu version of AUXILIARY SPLIT and that INFL, however we define it, should not be treated on a par with auxiliary verbs.

Establishing that verbal auxiliaries and INFL are distinct raises a further question: what is INFL SPLIT, then? Given the abundance of evidence that led to the *Infl–Aux Equivalence Hypothesis*, we must reconcile the unquestionable presence of AUXILIARY SPLIT in Bantu with the apparent auxiliary-like behavior of inflectional-prefix clusters. It is in principle possible that INFL is a different type of auxiliary than verbal auxiliaries, and that whatever the difference is, it is what underlies contrasts like the coordination facts in (34). In this particular case, one can imagine an account where a verbless Aux and a verbal Aux take different syntactic constituents as their complements and that only the complement of a verbal Aux may be coordinated. In section 6, I discuss why this view is untenable and suggest a different treatment of INFL SPLIT. I argue that, unlike compound tenses, INFL SPLIT in Bantu is not an instance of Aux–VP syntax, but it is a consequence of how Bantu languages group verbal morphemes into complex heads.

4 The simple–compound distinction in Ndebele: an analysis

Compound tenses in Bantu have been recognized and discussed in the syntactic literature, mostly in relation to case and agreement (Carstens, 2001, 2005; Henderson, 2006; Baker, 2008; Diercks, 2010, 2012, among others). However, due to the prevailing hypothesis of *Infl–Aux Equivalence*, the simple–compound distinction in Bantu remains a gray area, especially in the study of word formation. Asymmetries between INFL and verbal auxiliaries are, however, very transparent in Ndebele. As far as syntactic differences, only verbal

auxiliaries can dominate a coordination site, contain two agreement prefixes and use a low negation marker. In this section, I develop a syntactic analysis of simple and compound tenses in Ndebele which accounts for those syntactic asymmetries.

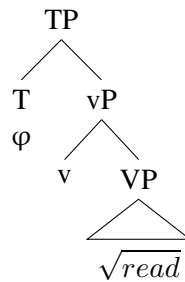
4.1 The syntax and word formation

Recall that the basic property differentiating simple and compound forms is that compound forms contain an auxiliary verb preceding the lexical verb stem, but simple forms do not (35).

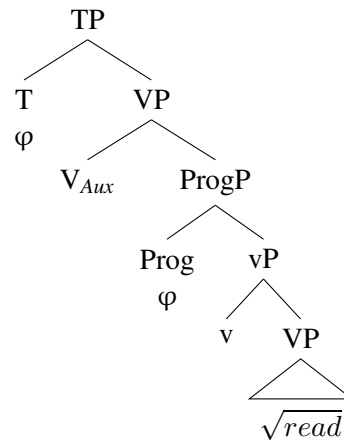
- (35) a. U- za- bala. *simple*
 2sg- FUT- read
 You will read.
- b. U- za- be u- bala. (>uzabubala) *compound*
 2sg- FUT- AUX 2sg- read
 'You will be reading.'

Note, however, that, in the surface form, the auxiliary *be* is concatenated on the main verb, just like inflectional markers, and it coalesces with the following vowel. In accordance with vowel hiatus resolution rules, the vowel /e/ of the auxiliary is deleted before /u/, giving rise to the surface form *uzabubala*. The tight phonological connection between auxiliaries and the main verb has been interpreted as evidence that *be* is, in fact, an inflectional prefix (Sibanda, 2004). Despite this apparent phonological integrity of a compound tense expression, I do not treat *be* in (35b) as a prefix. Rather, I propose that the Future Progressive has the familiar auxiliary-participle syntax. As shown in (36),⁷ a simple tense contains only one agreement probe – on T⁰. In compound tenses, on the other hand, an additional φ -probe is located on Prog⁰ – the aspectual head that encodes progressive aspect and heads the progressive participle.

- (36) a. Simple tense syntax



- b. Compound tense syntax



Ndebele has four simple tenses, listed in (37), and three progressive tenses (38). All of them are exemplified with the verb *bala* ‘read’ with 2nd person singular agreement.

⁷ The structures in (36) are somewhat simplified: derivational suffixes (applicative or causative) would correspond to the relevant projections (ApplP, CausP) in the V-Stem. Derivational morphology is not of primary concern here, and I will simply assume that the vP constituent comprises the root and all suffixes.

(37) Simple tenses (*read.2sg*):

Tense	AGR	TNS	Stem	Surface form	translation
Present	u	ya	bala	uyabala	<i>You read</i>
R(ecent) Past	u	∅	balile	ubalile	<i>You read (recently)</i>
D(istant) Past	u	a	bala	wabala	<i>You read (long time ago)</i>
Future	u	za	bala	uzabala	<i>You will read</i>

 (38) Compound tenses (*read.2sg*):

Tense	AGR ₁	TNS	AUX	AGR ₂	Stem	Surface form	translation
R-Past Prog	u	∅	be	u	bala	ububala	<i>You were reading (recently)</i>
D-Past Prog	u	a	ye	u	bala	wawubala	<i>You were reading (long time ago)</i>
Future Prog	u	za	be	u	bala	uzabubala	<i>You will be reading</i>
		<i>auxiliary</i>			<i>participle</i>		

The proposed analysis of word formation has three parts, summarized in (39). First, I assume that, in addition v^0 and C^0 , Prog^0 is a cyclic head in Ndebele, introducing a phase boundary (Alboiu & Avery, 2009).⁸ Second, the verb undergoes head movement to v^0 (through any intervening derivational heads). The resulting complex head in v^0 is the V-Stem. This part of the analysis is in line with other recent proposals that verb movement in Bantu proceeds only to a low head (low Mood⁰ in Julien (2002), Aux⁰ in Buell (2005)) – the head realized by the final suffix.⁹ In addition to head movement, terminal nodes may form complex heads by post-syntactic lowering. I propose that lowering in Ndebele is phase-bound. This means that for all heads which are subject to lowering, there is an additional restriction: they can only lower within a single phase and cannot cross a phasal boundary.

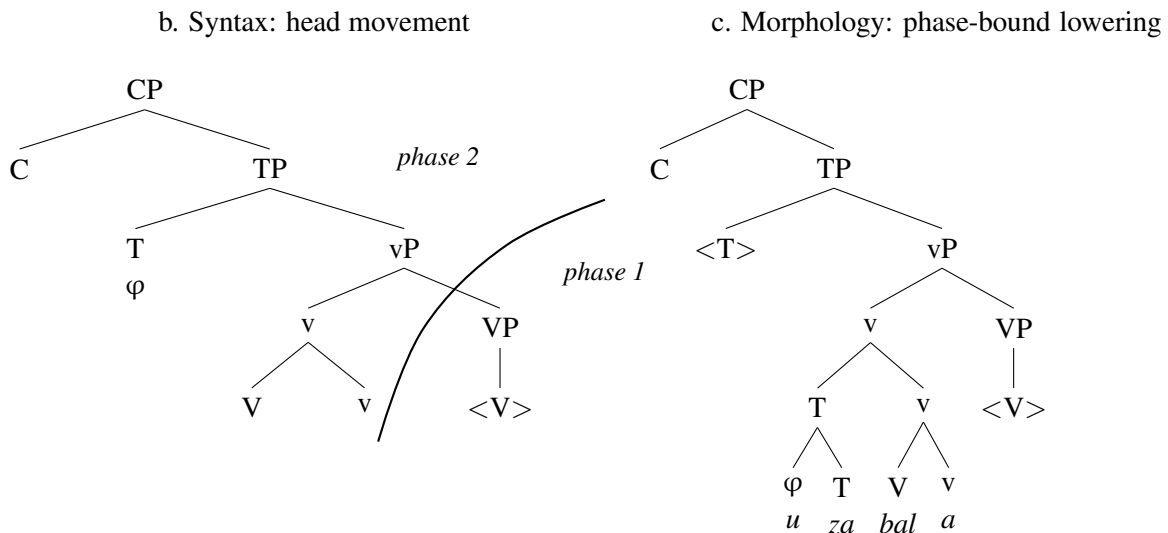
- (39) a. Phase heads: v^0 , Prog^0 , C^0
 b. Head movement: V^0 -to- v^0
 c. Post-syntactic lowering: phase-bound

As an illustration of word formation in a simple tense, consider the Simple Future (40a). The V-Stem complex head is created in the syntax, by head movement of V^0 to v^0 . In simple tenses, there are only two phase heads, v^0 and C^0 . When v^0 is merged, it triggers spell-out of its complement, the VP. Due to V-to- v movement, however, the verb vacates the VP and is not spelled out in the first cycle. Merge of the next cyclic head, C^0 , triggers spellout of *phase 2*. As shown in (40)-c, phase-bound lowering applies to T^0 and v^0 .

- (40) a. u- za- bal -a
 1- FUT- read -FS
 ‘He will read’

⁸ To be precise, Alboiu & Avery propose that Aspect⁰ is a phase in Ndebele. Assuming that Prog^0 is a type of aspectual head, their proposal for Asp⁰ naturally extends to Prog^0 .

⁹ A reviewer points out that v might not be the final landing site for verb movement. This is due to the fact that in-situ subjects follow the verb. Assuming that external arguments are generated as specifiers of vP , V-to- v movement does not derive the VS order. Instead, a common assumption about VS orders in Bantu is that the verb moves a bit further, to some low functional projection outside of vP . Incorporating the word order facts requires a minor change in the present analysis: the phasal head which hosts the final suffix is not v^0 , but a higher functional head (e.g. Voice). All other parts of the analysis would remain the same. The proposed V-to- v movement is a simplification made for the purposes of this paper – a simplification without any serious consequences for the analysis and the claims made here.



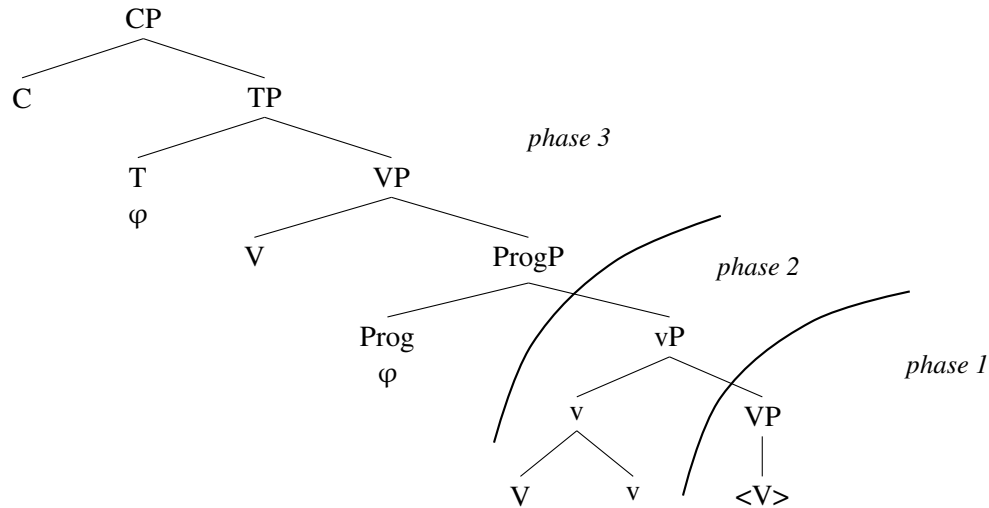
A simple tense expression is, then, a single complex head created by head-movement and lowering. Word formation proceeds the same way in all other simple tenses listed in (37). Note that the agreement prefix is not analyzed as a separate head (e.g. Agr^0), but rather it corresponds to the φ -feature on T. By assumption, any head H bearing φ in Ndebele is subject to a fission rule which splits-off the φ -node: $[\text{H}, \varphi] \rightarrow [[\varphi] [\text{H}]]$. Phi-agreement on T is then spelled out as an separate affix preceding the tense marker.

Turning now to compound tenses, recall that their syntax differs from that of simple tenses in the following way: compound tenses involve an auxiliary verb and an aspectual head, Prog^0 , which heads the progressive participle. The structure of a compound tense, such as the Future Progressive in (41), contains three cyclic heads: C^0 , Prog^0 and v^0 . As in simple tenses, the only instance of head-movement is the V-to- v movement creating the V-stem (41)-b. Unlike in simple tenses, no higher heads lower on v^0 since it is separated from higher inflections by a phase-boundary. Instead, phase-bound lowering targets all heads in *phase 3* and results in a complex head in Prog^0 , as shown in (41)-c.¹⁰

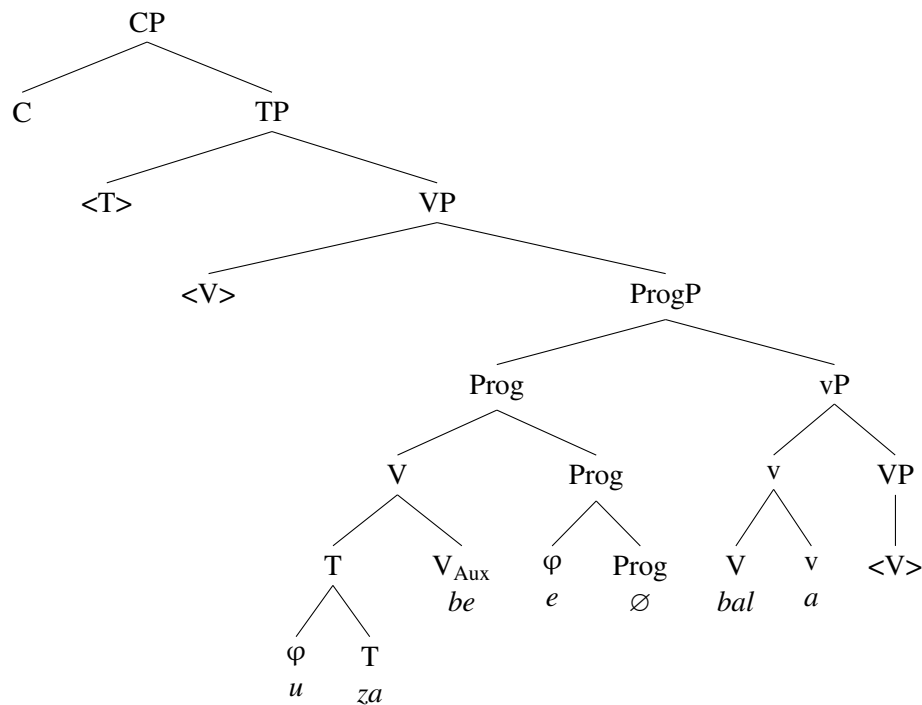
- (41) a. u- za- be e- bal -a
 1- FUT- AUX 1- read -FS
 ‘He will be reading’

¹⁰ Note that the auxiliary verb undergoes lowering together with inflectional affixes. In relation to that, a reviewer asks whether other auxiliaries (e.g. adverbial auxiliaries) are subject to lowering, as well. I do not claim that lowering applies across the board, i.e. to all heads within every phase. Whether or not a head undergoes lowering must be encoded as a property of a particular head. Phase-boundedness is an additional restriction on lowering in general. My analysis requires making the stipulation that the default auxiliary *be* in Ndebele is subject to lowering, but determining whether other auxiliaries or light verbs behave the same way requires further investigation of syntactic and morphophonological properties of construction involving such verbs. I must leave this interesting questions for future research.

b. Syntax: head movement



c. Morphology: phase-bound lowering



Note that the two complex heads in (41) resemble the division into INFL and V-Stem: the boundary between them separates the lexical stem with suffixes from higher inflectional material. This observation will be discussed in more detail in section 6.

This analysis of Future Simple and Future Progressive straightforwardly applies to all the other tenses, listed in (37) and (38). In (42) I provide the complete list of vocabulary entries employed in simple and compound tenses in Ndebele. For morphemes which have a tonal exponent, I use the superscript /^H on the segmental representation. Note that the Final Suffix is treated here as an exponent of v^0 .

- (42)
- | | | | |
|----|-----------------------------|--|-------------------------------------------|
| a. | /u/ ↔ φ:2sg | | |
| b. | /ya/ ↔ T:PRES | | g. /ye/ ↔ V _{Aux} / ___ T:D-PAST |
| c. | ∅ ↔ T:R-PAST | | h. /be/ ↔ V _{Aux} |
| d. | /a/ ^H ↔ T:D-PAST | | i. /ile/ ↔ v / ___ T:R-PAST |
| e. | /za/ ↔ T:FUT | | j. /a/ ↔ v |
| f. | ∅ ↔ Prog | | k. /bal/ ↔ $\sqrt{\text{read}}$ |

The proposed analysis treats verbal auxiliaries differently than INFL. Inflectional morphemes are simply affixes spelling out inflectional heads, while the verbal auxiliary is of the category V and co-occurs with a participle. In both cases, we observe phase-bound lowering, which does not discriminate between verbs and affixes – it equally applies to all heads in the clausal spine and is constrained by phase boundaries. The crucial difference between simple and compound tenses is that, due to different phase boundaries, simple tenses involve one complex head, while compound tenses consist of two.

4.2 Explaining syntactic asymmetries between simple and compound tenses

The proposed analysis accounts for three syntactic phenomena that distinguish simple and compound forms: the number and form of agreement prefixes, coordination and negation marking. In this section, I discuss these three asymmetries and demonstrate how they are derived by the proposed analysis. Finally, I show that the morphosyntactic properties diagnosing compound tenses are found in independent participles – ones that occur outside of compound tenses – providing further evidence that compound tenses in Ndebele should be treated as auxiliary-participle constructions.

A property typically associated with compound, but not simple, tenses is the presence of an additional subject agreement prefix within a verbal expression. In those Bantu languages where compound tenses have been recognized and discussed, the extra agreement probe is assumed to be associated with the participle, and therefore its presence has been taken as an indicator of an auxiliary-participle syntax. Moreover, the two agreement prefixes in a compound tense may differ in form. As shown in (43a), class 1 agreement prefix has the form *u-* when it appears on the auxiliary, and the form *e-* on the main verb. Similar variation is observed for class-2 prefixes (43b).

- (43)
- | | | | |
|----|-----------------------------------------------------------------------------------------|----|--------------------------------------------------------------|
| a. | U- za- be e- hlabela.
1- FUT- AUX 1- sing
'He will be singing'. | c. | U- za- hlabela.
1- FUT- sing
'He will sing'. |
| b. | Ba- za- be be- hlabela.
2- FUT- AUX 2- sing
'They will be singing'. | d. | Ba- za- hlabela.
2- FUT- sing
'They will sing'. |

The allomorphs *u-* and *ba-* are used in simple tenses (43c)-(43d), and on auxiliaries in compound tenses. In both cases, they appear on a finite verb (inflected for tense). The finite and participial agreement paradigms are presented in (44).¹¹ As we see, only class 1 and class 2 prefixes have different exponent in participles. They are both segmentally and tonally different.

¹¹ 3rd person is exemplified with class 1 (singular) and class 2 (plural). Other noun classes do not show this allomorphy.

(44) SUBJECT AGREEMENT PREFIXES

a. Finite paradigm:

1SG	ngi
2SG	u
3(cl.1)	ú
1PL	si
2PL	li
3(cl.2)	bá

b. Participial paradigm:

1SG	ngi
2SG	u
3(cl.1)	e
1PL	si
2PL	li
3(cl.2)	be

Under the present analysis, the number of agreement prefixes corresponds to the number of functional heads bearing φ -probes. In addition to T^0 , it is proposed that Prog^0 , the aspectual head introducing the progressive participle, also bears a φ -probe. Consequently simple tenses involve one agreement prefix, while compound tenses contain two. I treat the nonfinite allomorphs as conditioned by the context of Prog , while the finite forms are the elsewhere allomorphs:

(45) Subject agreement allomorphy:

- a. /e/ \leftrightarrow [φ : cl.1] / ___ Prog
- b. /u/^H \leftrightarrow [φ : cl.1]
- c. /be/ \leftrightarrow [φ : cl.2] / ___ Prog
- d. /ba/^H \leftrightarrow [φ : cl.2]

Another property that distinguishes simple and compound tenses is the position of negation marker. There is a tendency in Bantu languages to use a low negation affix in compound tenses, and a high negation affix in simple tenses. Ndebele is an example of this typological generalization. In simple tenses, the negation prefix has the form *a-* and it precedes the subject marker (46a). In compound tenses, negation is expressed by the prefix *nga-*, which follows the participial subject marker and immediately precedes the verb stem (46). Crucially, the negation marker *a-*, found in simple forms, cannot be used in compound tenses, either on the auxiliary or the participle.

(46) a. **A-** ba- bali.
 NEG- 2- read
 'They are not reading.'

b. Ba- za- be be- **nga-** bali.
 2- FUT- AUX 2- NEG- read
 'They will not be reading.'

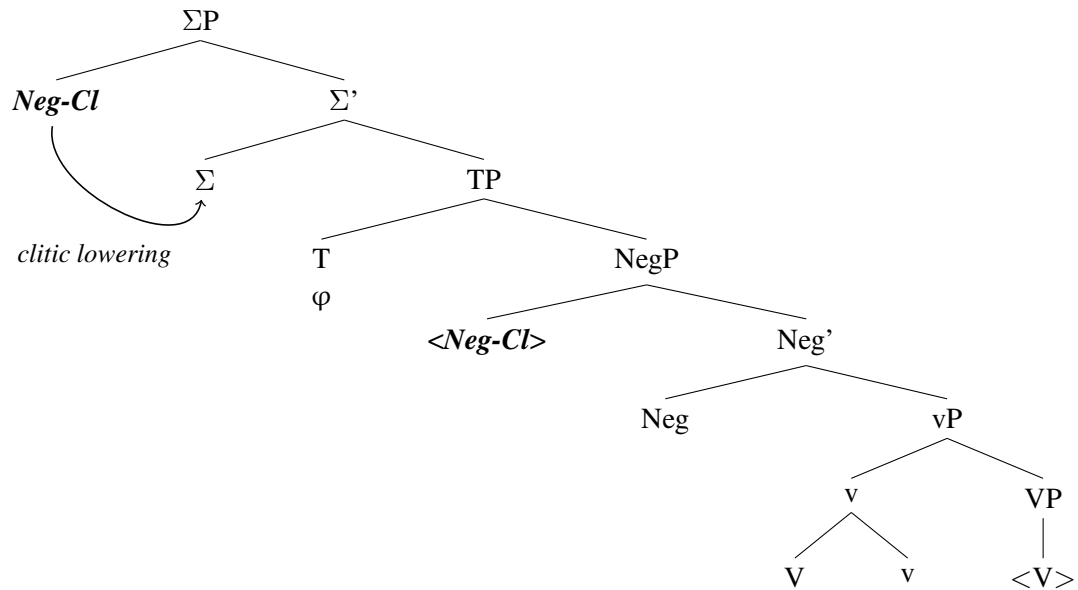
An analysis of similar facts in Zulu was proposed by Buell (2005). In his account, the asymmetry in negation marking arises due to two NegPs in the structure of Zulu: a high and a low NegP. In compound tenses, the high NegP is inactive and only the lower NegP is realized. The opposite is true in simple tenses. I propose that there is one NegP in the structure of the Ndebele clause. It is projected immediately above vP and it can host either negation marker. The position in which the negation marker surfaces is determined by the possibility of movement to a higher position. Its form is determined by the morphosyntactic context at spell-out.

I assume that the negation marker is a clitic, generated in the specifier of NegP and undergoing phrasal movement to a higher polarity head (ΣP), as shown in (47)-a.¹² After movement to $\text{Spec}, \Sigma P$, it cliticizes onto the closest head, i.e. on Σ^0 . Further word formation proceeds as proposed before: phase-bound lowering creates a complex head in v^0 , which comprises all verbal morphology in the clause ((47)-b).

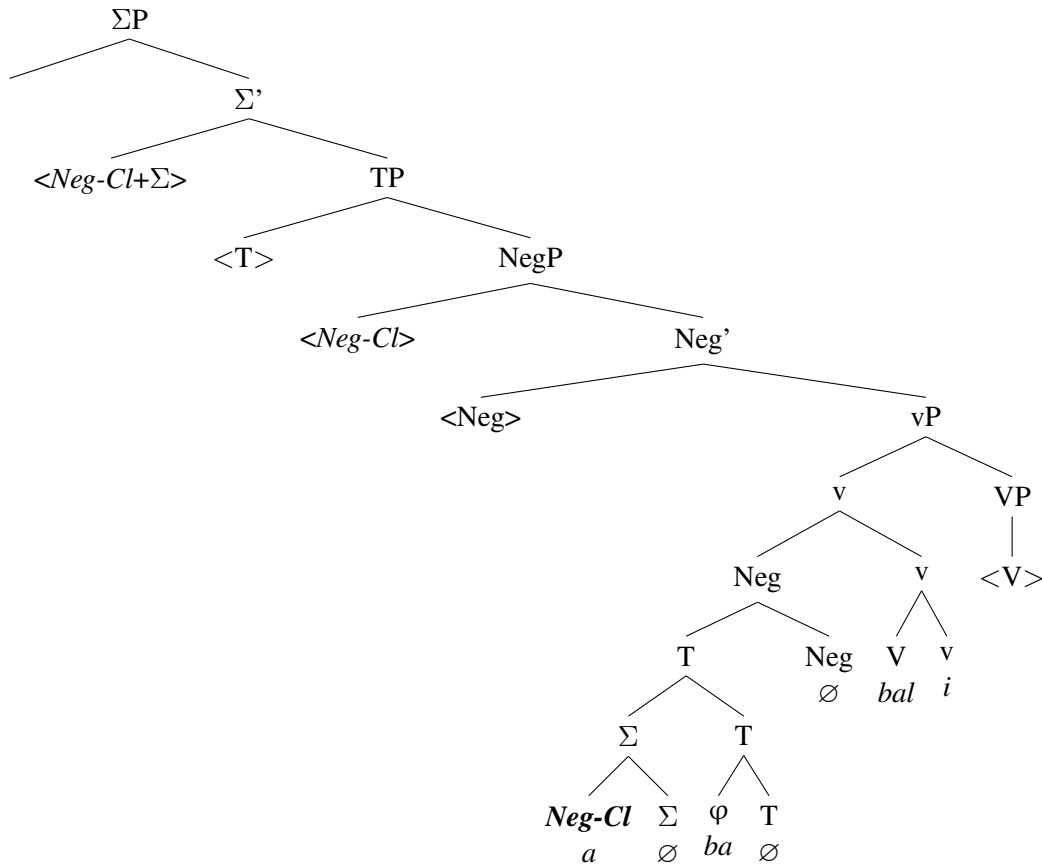
¹² A similar analysis of negation marking was proposed by Haddican (2004) for Basque. As Haddican argues, the initial position of negation in Basque is the result of phrasal movement of the negation marker from Spec, NegP to Spec, PolP .

(47) Negation in simple tenses

a. Syntax: Neg-Cl movement to ΣP



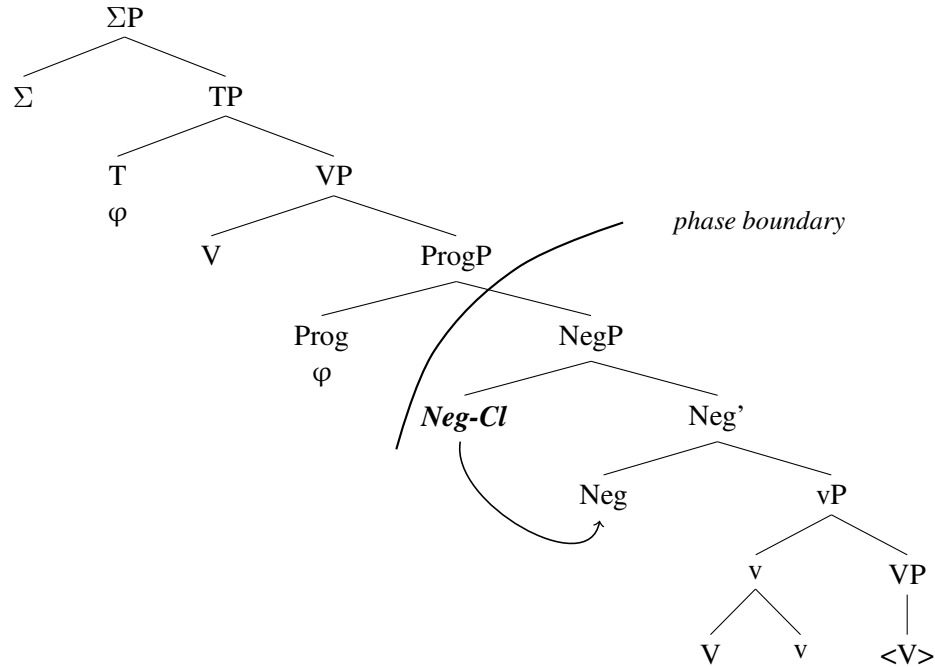
b. Morphology: phase-bound lowering



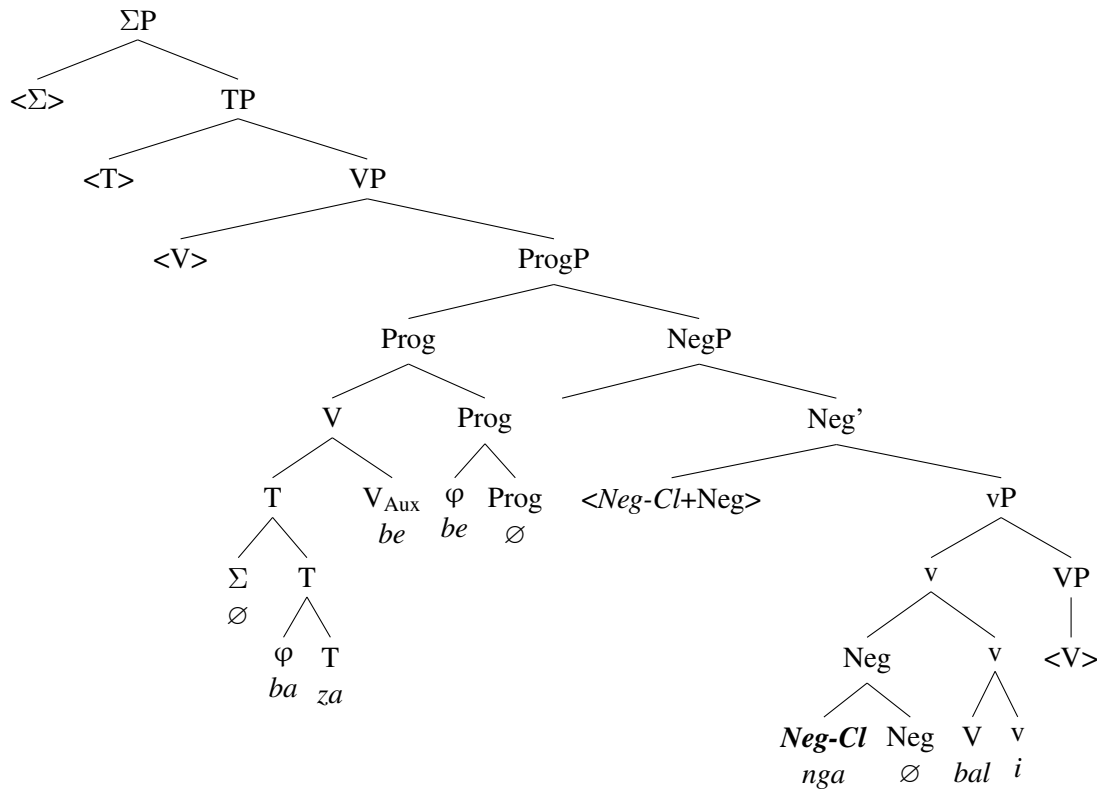
In compound tenses, NegP is dominated by a cyclic head – Prog⁰. The presence of a phase boundary blocks movement of the negation clitic to the specifier of ΣP. The negation clitic remains in its base-generation position and cliticizes onto Neg⁰ – the closest head, resulting in a low negation marker in compound tenses (48)-a. As in affirmative compound tenses, all higher inflectional heads lower to Prog⁰ – the lowest head in the phase, as shown in (48)-b. Neg⁰ and v belong to the lower phase and so, by phase-bound lowering, they form a separate complex head in v.

(48) Negation in compound tenses

a. Syntax: no movement of Neg-Cl to ΣP



b. Morphology: phase-bound lowering



The different phonological forms of the negation marker are an instance of contextual allomorphy. The vocabulary entries for Neg-Cl, as well as other newly introduced morphemes are given in (49). Note that the final suffix, the exponent of v , has a different allomorph than in corresponding affirmative forms.¹³

- (49)
- $/a/ \leftrightarrow \text{Neg-Cl} / \text{---} \Sigma$
 - $/nga/ \leftrightarrow \text{Neg-Cl}$
 - $/\emptyset/ \leftrightarrow \Sigma$
 - $/\emptyset/ \leftrightarrow \text{Neg}$
 - $/i/ \leftrightarrow v / \text{---} \text{Neg}$

The proposed analysis accounts for the asymmetry in negation marking in simple and compound tenses and derives the fact that in the latter construction negation must appear low, immediately preceding the verb stem. The additional phase boundary in compound tenses is responsible for the lack of movement to Spec, Σ P and the obligatory low position of negation in compound tenses. Since low negation is not in the environment of Σ , the a -allomorph is not triggered.¹⁴ Let me point out an advantage of this analysis of negation over

¹³ The analysis of the final suffix is simplified here. The final suffix co-varies not only with polarity but also with tense (and possibly other inflectional features). It is beyond the scope of this paper to determine whether this formal variation stems from contextual allomorphy, from syntactic agreement, or a combination of the two. This choice is largely orthogonal in the present discussion. For simplicity, I treat the final-suffix variability as allomorphy.

¹⁴ A reviewer points out a challenge for the allomorphy analysis of negation concerning a typological observation. In particular, if low and high negation markers are allomorphs, we would expect to find Bantu languages in which low and high negation markers are identical. It appears, however, that Bantu languages systematically utilize different negation morphology in these two positions. In terms of the analysis proposed here, this means that Bantu languages systematically exhibit positional allomorphy in negation. While this aspect of the analysis seems somewhat unsatisfying, it does not invalidate the movement analysis of negation, and therefore I leave this question for future research. It is worth noting that the common alternative view – that NegP can be projected in different positions (depending on clause type etc.) – offers no better answer to this puzzle. The different negation

the common alternative view that NegP can be base-generated in two different positions in different clause types or constructions. The base-generation view must stipulate which type of negation, high or low, will be generated in a simple tense, and which in a compound tense. In the movement analysis proposed here, low negation in compound tenses correlates with the number of complex heads and the number of agreement prefixes – all three properties are a consequence of a single theoretical assumption about compound tense syntax, namely the presence a phasal Prog head.

Finally, we have seen an asymmetry between simple and compound tenses with respect to coordination. While compound tenses allow coordination of a constituent containing the lexical verb below the inflectional markers (50a), such a split is impossible with simple tenses (50b).

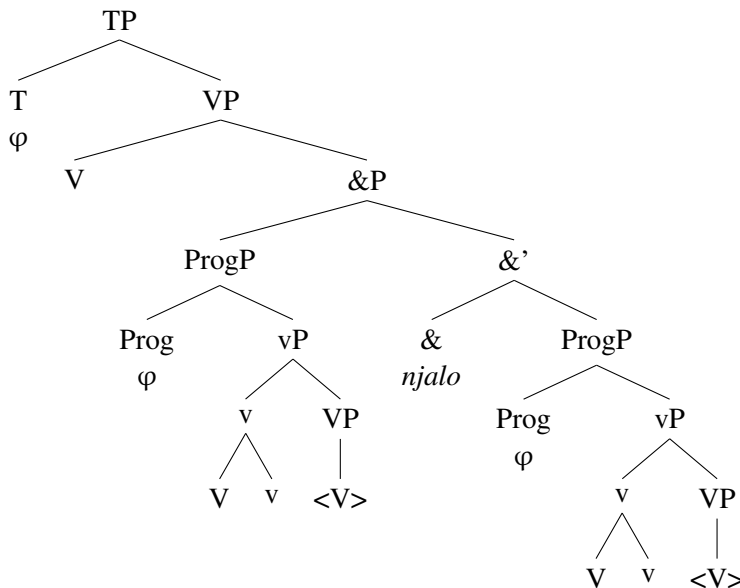
(50) AUXILIARY SPLIT in Ndebele: coordination

a. Yena u- za- be- e-hamba njalo e-gitshima. ✓ **Aux** [V & V]
 He 1- FUT- AUX- 1-walk and 1-run
 ‘He will be walking and running.’

b. Yena u- za- hamba njalo *(u- za-) gitshima. ***INFL** [V & V]
 He 1- FUT- walk and 1- FUT- run
 ‘He will walk and run.’

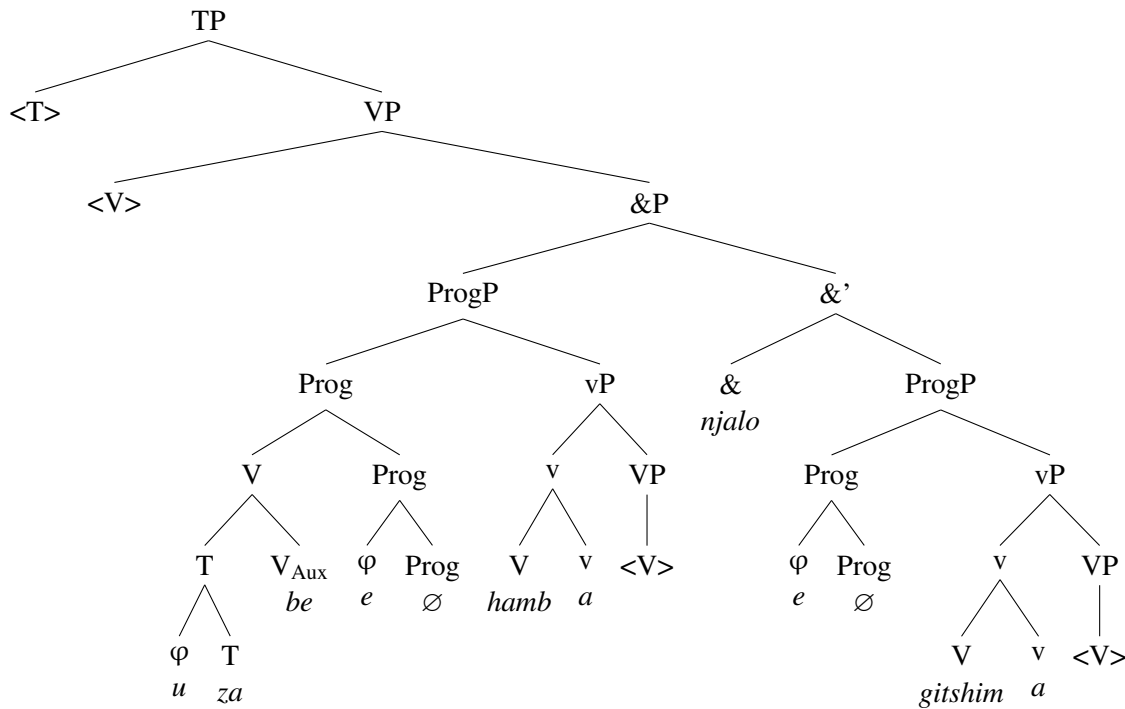
Since both conjuncts in the grammatical (50a) contain a subject agreement prefix, the minimal coordination site must be the projection bearing the participial agreement probe – the Prog head. Thus, the proposed structure of verb coordination in compound tenses is (51), where each conjunct is a ProgP – a progressive participle.

(51) a. Syntax



markers are, under this view, essentially positional allomorphs. The variable-base-generation view faces additional challenges, which the movement analysis I propose avoids. Most importantly, it cannot predict which type of negation will surface in a given structure. The movement analysis derives the distribution of high and low negation from independently motivated properties of Ndebele clausal syntax.

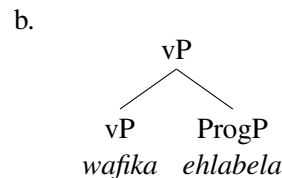
b. Morphology



As expected, both conjuncts bear a nonfinite agreement prefix – in both cases, the allomorph /e/ is triggered by the context of Prog⁰. Note also that postsyntactic lowering of T and V_{Aux} adjoins those heads to the leftmost Prog⁰ – the head of the first conjunct.¹⁵ As a result, in the post-syntactic structure, the first conjunct contains higher inflectional morphology, while the second conjunct does not. In neither conjunct, however, does Prog⁰ lower to v⁰. The asymmetry between simple and compound tenses with respect to coordination can be, then, captured by a basic syntactic difference between the two. The syntax of simple tenses lacks ProgP – the coordination site in compound tenses.

We have discussed three morphosyntactic properties of compound tenses, not found in simple tenses: nonfinite agreement, low negation and coordination. In the discussion of coordination, I referred to each conjunct (ProgP) as a *progressive participle* by analogy to similar facts in other languages where compound tenses are auxiliary-participle constructions and allow coordination of participles below the auxiliary. Additional motivation for identifying ProgP in Ndebele as a participle comes from its uses outside of compound tenses, as an independent participle. Ndebele independent participles (often referred to as verbs in participial mood) are distributed in a similar set of environments as English gerunds, e.g. as VP modifiers. As an illustration, consider (52a).

- (52) a. U- a- fika e- hlabela.
 1- D-PST- arrive 1- sing
 He arrived singing.



¹⁵ A reviewer notes that this lowering looks different than the type of lowering found, for instance, in English VP coordination, where T undergoes ATB lowering to both conjuncts. Indeed, post-syntactic lowering in Ndebele is not sensitive to the Coordinate Structure Constraint. Given that the CSC is a syntactic constraint, it is unclear whether post-syntactic displacement is expected to obey the CSC. While ATB lowering is attested (e.g. in English), CSC-insensitive lowering has also been shown to exist (Adger, 1997; Wojdak, 2007; Robinson, 2008). Interestingly, Ndebele has no clear instances ATB-lowering, but we do find CSC-insensitive lowering outside of compound tenses.

An independent participle lacks any inflectional projections higher than ProgP. It combines with a finite verb, as in (52a), by adjoining to some projection of the finite verb (52b). As such, an independent participle is similar to the second conjunct in ProgP coordination in compound tenses – there is no higher inflectional head, such as T, to lower on Prog⁰.

The morphosyntactic properties diagnosing compound tenses are found in independent uses of participles. First, we see in (52a) that the independent participle bears nonfinite agreement – just as in compound tenses, the allomorph *e* for class 1 is selected in the context of Prog⁰. And second, independent participles pattern with compound tenses with respect to negation marking. In both, negation is marked by the low prefix *nga*, appearing between the participial agreement and the verb stem (53).

- (53) a. Ba- za- be be- **nga**- hlabeli. *compound tense*
 2- FUT- AUX 2- NEG- sing
 'They won't be singing.'
- b. Ba- za- fika be- **nga**- hlabeli. *independent participle*
 2- FUT- arrive 2- NEG- sing
 They will arrive not singing.

Although the external syntax of the two participles in (53) is different, NegP is dominated by Prog⁰ in both. Assuming that the Prog⁰ phase blocks movement of the negation clitic, we predict low negation in any use of the progressive participle.

We have seen in this section that verbal auxiliaries in Ndebele behave differently than inflectional prefix clusters. The latter do not show the multidomain character of compound tenses evidenced by coordination, Neg-movement blocking and multiple agreement marking. It will be shown in the next section, that the simple-compound distinction is evidenced also by phonological phenomena: tone patterns and prosodic minimality effects.

5 Phonological evidence for the simple-compound distinction

In section 4.2 we have seen syntactic evidence for AUXILIARY SPLIT in Ndebele, where a set of syntactic phenomena diagnoses the distinction between simple and compound tenses. We concluded that Ndebele has compound tenses of the type found in Indo-European languages, i.e. auxiliary-participle constructions, and that these verbal forms are distinct from simple tenses. In this section, I provide converging evidence from phonology, showing that compound tenses are phonologically more complex than simple tenses and that they contain a participle. First, I discuss prosodic minimality effects. It will be shown that simple tenses involve one domain of prosodic minimality, while compound tenses contain two (section 5.1). The second phonological evidence comes from tone patterns. We will see that the tone pattern found in independent participles is also present in compound tenses and that the boundary between the phonological domains is marked with a downstep – an effect not observed in simple tenses (section 5.2).

5.1 Prosodic minimality

Ndebele verbs exhibit prosodic minimality effects. A well-formed prosodic word must be minimally disyllabic and if that requirement is not met, we typically observe epenthesis. This is especially common in imperative verb forms, which lack inflectional prefixes and so minimality must be satisfied by the verb stem alone. If the verb stem is disyllabic, as in (54a), the expression is well-formed. Monosyllabic stems, on the other hand, must be augmented by the epenthetic syllable *yi* (54b). In the examples below, the verb stem consists of the root and the final suffix *-a*.

- (54) a. Phek-a! (**Yi*-pheka!)
 cook-FS
 ‘Cook!’
- b. *Yi*- ph-a! (*Pha!)
yi- give-FS
 Give!

Since most verbal roots in Ndebele are CVC, like *phek* ‘cook’, and are always followed by at least the final suffix, minimality is typically satisfied by the verb stem alone. Minimality effects arise with subminimal (consonantal) roots, such as *ph* ‘give’ in (54b). In the discussion below we will use the subminimal root *ph* ‘give’ as an example.

As we see in (55), no epenthesis takes place when a monosyllabic verb stem is preceded by inflectional prefixes.

- (55) Simple tenses with a monosyllabic stem: no minimality effects
- a. u- ya- pha
 2sg- PRES- give
 ‘you give’
- b. u- a- pha (>wapha)
 2sg- D-PST- give
 ‘you gave’
- c. u- za- pha
 2sg- FUT- give
 ‘you will give’

The lack of minimality effects in (55) suggests that, in simple tenses, inflectional prefixes and the stem are part of the same prosodic domain. Following the standard assumption, I take the domain to be a PWord. According to the Prosodic Hierarchy (Nespor & Vogel, 1986; Selkirk, 1986), where a PWord dominates a Foot, and the Strict Layer Hypothesis, disyllabic minimality falls out as a well-formedness condition on PWords. While in simple tenses, inflectional prefixes are part of the same PWord as the verb stem, in compound tenses they are not. Rather, the verb stem must satisfy minimality by itself. When the stem is monosyllabic, we observe epenthesis (Downing, 1990; Sibanda, 2004). Consider the three progressive tenses with the subminimal root *ph* ‘give’ in (56) below, where the monosyllabic verb stem gives rise to a minimality effect – the epenthesis of the syllable *si*. For comparison, consider the same paradigm with a disyllabic root in (57), where no epenthesis takes place.

- (56) Compound tenses with a monosyllabic stem: a minimality effect
- a. *U- ∅- be u- pha. U-∅- be u- *si*- pha. ✓ (> ubusipha)
 2sg- R-PST AUX 2sg- give
 ‘You were giving (recently)’
- b. *U- a- ye u- pha. U-a-ye u- *si*- pha ✓ (> wawusipha)
 2sg- D-PST- AUX 2sg- give
 ‘You were giving (a long time ago)’

- c. *U- za- be u- pha. U- za- be u- *si*- pha ✓ (> uzabusipha)
 2sg- FUT- AUX 2sg- give
 ‘You will be giving’

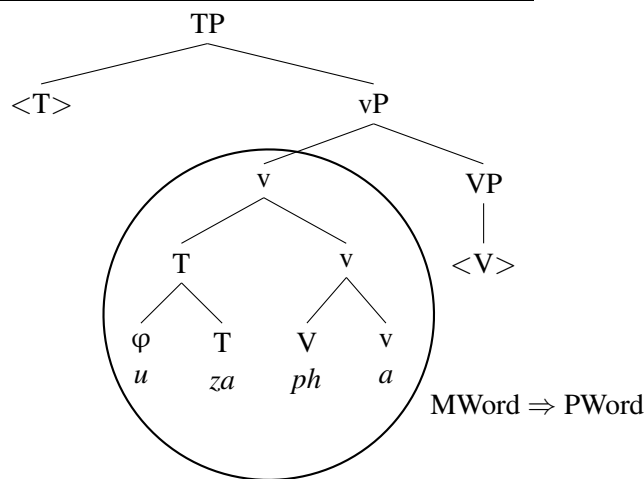
(57) Compound tenses with a disyllabic stem: no minimality effect

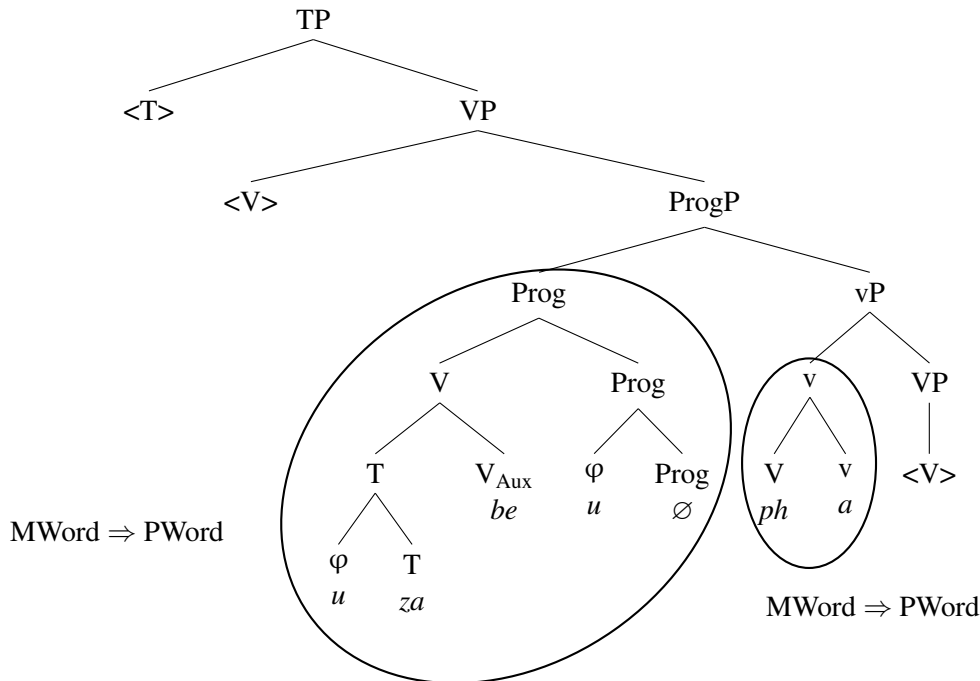
- a. U- ∅- be u- pheka. *U-∅- be u- *si*- pheka.
 2sg- R-PST AUX 2sg- cook
 ‘You were cooking (recently)’
- b. U- a- ye u- pheka. *U-a-ye u- *si*- pheka
 2sg- D-PST- AUX 2sg- cook
 ‘You were cooking (a long time ago)’
- c. U- za- be u- pheka. *U- za- be u- *si*- pheka
 2sg- FUT- AUX 2sg- cook
 ‘You will be cooking’

The fact that *si* is epenthized only with subminimal roots suggests that this phenomenon is prosodically conditioned. In contrast to simple tenses, the V-Stem in compound tenses forms its own prosodic domain – a separate PWord. The asymmetry in syntactic complexity between simple and compound tenses is, then, reflected in phonology: a simple tense expression constitutes one prosodic domain, while an expression of compound tense contains two. Note that this complexity asymmetry is an AUXILIARY SPLIT phenomenon: the number of prosodic domains is predicted by whether or not the expression contains an auxiliary with a verbal root. If it does, the verb stem is a prosodic domain on its own.

Prosodic complexity of compound tenses corresponds to their morphosyntactic complexity proposed in the previous section. Due to phase-bound lowering, a simple tense expression is one complex head (58a), while in a compound tense, the verb stem forms a complex head to the exclusion of inflectional morphology, which together forms a higher complex head (58b).

(58) a. Postsyntactic structure of simple tenses (55c):



b. Postsyntactic structure of compound tenses (56c):


I propose that the different prosodic behavior of the verb stem in simple and compound tenses results from a direct mapping from morphological word (MWord) to prosodic word (PWord.) This is to say, the distribution of prosodic domains mirrors the distribution of complex heads (MWords): each complex head maps to a prosodic word. Thus, the verb stem in (58b), being a separate complex head, is subject to PWord minimality by itself. In (58a), the inflectional prefixes are part of the same complex head as the verb stem, and they satisfy minimality together. This accounts for the fact that monosyllabic stems are possible in simple tenses (55), but in compound tenses epenthesis is required (56).

Note that, although compound tenses are prosodically more complex than simple forms, the division into MWords/PWords in (58b) does not match the syntactic boundary between auxiliary and participle observed in coordination. The mismatch (discussed in more detail in section 6) is due to the placement of the participial agreement prefix in the higher domain. Interestingly, this grouping of morphemes is an instance of INFL SPLIT: the V-stem (vP) forms one constituent and inflectional prefixes form another. However, the INFL-SPLIT grouping does not account for the distribution of *si*-epenthesis in Ndebele – it incorrectly predicts that *si* would be epenthesized in the V-Stem in both simple and compound tenses. Consider again the contrast between simple (59a) and compound (59b) forms.

- (59) a. (55c): [INFL uza] [V-stem pha] ✓
 b. (56a): [INFL ubu] [V-stem pha] *

The structural division into INFL and V-Stem does not correctly derive minimality effects in Ndebele tenses. The facts are, however, captured by the MWord-to-PWord mapping proposed above.

The proposal that complex heads map to PWords makes a set of predictions. The first prediction concerns the prosodic behavior of inflectional prefixes in compound tenses. In particular, if there are minimality effects in the inflectional domain, the relevant prosodic word contains the exponents of all heads in the Prog⁰ complex head, i.e. the auxiliary verb with prefixes, as well as the participial agreement prefix, as in (58b). Evidence that the Prog⁰ complex head maps to a prosodic constituent comes from subject prefix deletion in the Recent Past Progressive. As a compound tense, Recent Past Progressive consists of an inflected auxiliary verb and a participle. Each verbal element bears an agreement prefix (60a). The crucial contrast in (60) is

that, unlike the 2sg prefix in (60a), the 1sg prefix in (60b) is deleted before the auxiliary.

- (60) a. **u-** ∅- be **u-** phek -a (> ubupheka)
 2sg- R-PST AUX 2sg- cook -FS
 ‘you were cooking’
- b. (*/?**ngi-**) ∅- be **ngi-** phek -a (> bengipheka)
 1sg- R-PST AUX 1sg- cook -FS
 ‘I was cooking’

The generalization about subject prefix deletion is purely phonological. Irrespective of its class/number features, the initial agreement prefix is deleted if it has an onset, and it remains overt if it doesn’t. Interestingly, this somewhat unintuitive phonological generalization reduces to a disyllabic minimality requirement if we assume the syntax-prosody mapping in (58b). According to that morpho-prosodic structure, the prosodic grouping of morphemes in (60) is as in (61a)-(62a). Note that in each case, the inflectional PWord (corresponding to the complex head in Prog⁰) is disyllabic.

- (61) Onsetless agreement prefix: no deletion
- a. (u-b-u)_ω (phek-a)_ω
 b. *(b-u)_ω (phek-a)_ω
- (62) C-initial agreement prefix: deletion
- a. (be-ngi)_ω (phek-a)_ω
 b. */?(ngi-be-ngi)_ω (phek-a)_ω

Consider first the onsetless prefix in (61). Due to vowel hiatus, the auxiliary *be* coalesces with the following participial agreement prefix: *be + u → bu*. This coalescence also reduces the number of syllables in the inflectional PWord from the underlying three syllables (*u.be.u*) to the surface two (*u.bu*). The deletion of the initial subject marker in (61a) would result in a monosyllabic, i.e. prosodically ill-formed, PWord (61b). Thus, subject prefix deletion in Recent Past Progressive is blocked by prosodic well-formedness conditions. The reason deletion is not blocked with C-initial prefixes (62a) is that the participial subject prefix *ngi-* does not coalesce with the preceding auxiliary *be*. The lack of coalescence is, in turn, due to the fact that the subject prefix has an onset. Since the number of syllables in the inflectional PWord is not reduced by coalescence, the initial subject prefix may be deleted without violating disyllabic minimality. Thus, a generalization about agreement prefix deletion can be made if the relevant prosodic domain includes the participial agreement prefix – a correct prediction of the analysis in (58b). Finally, note that lack of deletion of the initial subject marker is not judged by speakers as strikingly ungrammatical (as indicated by the question mark in (62b)). Rather, the intuition is that (62a) is "short for" (62b), and that the longer form is never encountered, at least in speech. Such an intuition is compatible with diachronic facts. As reported by Doke (1950), both subject markers were present in earlier stages of equivalent forms in Zulu. Crucially, the marginal acceptability of (62b) clearly contrasts with the definite ungrammaticality of (61b).

The second prediction is that *si*-epenthesis does not take place in negative forms. As proposed in the previous section, movement of the negative marker is blocked by the Prog⁰ phase boundary, which is why the negation marker must surface low, immediately before the verb stem. Further, Neg⁰ becomes part of the v⁰-complex head – a consequence of phase-bound lowering (48)b. By MWord to PWord mapping, we predict that the negation prefix *nga* belongs to the same PWord as the verb stem, and that disyllabic minimality requirement is satisfied by the verb stem and the negation prefix together. This prediction is borne out. Compare the affirmative (63a), where a monosyllabic stem triggers *si*-epenthesis, with its negative counterpart, where *si*-epenthesis is impossible (63b).

- (63) a. U- za- be u- [_{v⁰} *si-* ph- a.]
 2sg- FUT- AUX 2sg- *si-* give- FS
 ‘You will be giving’
- b. U- za- be u- [_{v⁰} *nga-* ph- i.] *U- za- be u- {*si-*}- *nga-* {*si-*}- phi
 2sg- FUT- AUX 2sg- NEG- give- FS
 ‘You will not be giving’

The the lack of *si*-epenthesis (63b) is expected under the proposed analysis: the minimality effect is not triggered because the relevant PWord does not violate disyllabic minimality.

Finally, phase-bound lowering and MWord-to-PWord mapping make a prediction about minimality effects in independent participles and the second conjunct in participle coordination in compound tenses. Both constituents were analyzed in the previous section as ProgPs and were subject to the same phase-bound lowering as other verbal forms. Prog⁰, being a phase head, never lowers to v⁰, and thus the verb stem forms a separate complex head. As predicted, a monosyllabic stem must be augmented by the syllable *si* both in independent participles (64a) and in both conjuncts of participle coordination (64b).

- (64) a. [_{Prog⁰} e- [_{v⁰} *si-* pha]] (> ubusipha)
 1- *si-* give
 ‘as he is giving’
- b. u- be- [_{Prog⁰} e- [_{v⁰} *si-* lwa]] njalo [_{Prog⁰} e- [_{v⁰} *si-* pha]] (> ubesilwa njalo esipha)
 1- AUX- 1- *si-* fight & 1- *si-* give
 ‘He was fighting and giving’

Thus, evidence from prosody supports the analysis where compound tenses consist of two complex heads formed by phase-bound lowering. This multidomain effect is absent in forms without a verbal auxiliary.

5.2 Tone patterns

Participles and finite verbs exhibit different tonal patterns. The basic difference is that participles surface with an "extra" high tone, compared to tensed forms. Compare the finite form of the verb ‘cook’ in (65a) with its participial counterpart in (65b).

- (65) Toneless root: *phek* ‘cook’
- a. U- pheka inyama. *finite verb*
 2sg- cook meat
 ‘You cook meat’
- b. u- phéka inyama *progressive participle*
 2sg- cook meat
 ‘as you cook meat’

Importantly, the high tone in (65b) is contributed neither by the root nor by the subject prefix – both are toneless morphemes, as we see in the toneless finite form (65a). Rather, the high tone in (65b) is a systematic property of progressive participles. Given that neither the subject prefix nor the root in (65) are potential high-tone sponsors,¹⁶ I propose that the participial high is a marker of the progressive aspect: the realization

¹⁶ A different view can be found in Sibanda (2004), where the participial high tone is analyzed as originating with the participial subject prefix. In this view, the 2sg prefix *u-* is underlyingly low when it occurs in finite forms, and underlyingly high when it occurs in a participle. Thus, the low–high variation of subject prefixes is viewed as contextual allomorphy: a toneless prefix

of Prog⁰. The vocabulary item in (66a) is, then, a revision of the one proposed in section 4 – the exponent of Prog⁰ is suprasegmental, a floating high tone. Since Prog⁰ has no segmental exponent, the high tone is associated with the closest syllable to its right,¹⁷ as shown in (66c) for the morphological input in (66b).

- (66) a. $\emptyset^H \leftrightarrow \text{Prog}$
- b. u- \emptyset^H - phék - a
 φ Prog $\sqrt{\text{cook}}$ v
- c. 

The tonal contrast between a finite and a participial form in (65) is, then, accounted for by the presence of Prog in the progressive participle and its lack in the simple present.

The progressive high is also found in compound tenses, providing phonological evidence that compound tenses contain a participle. In (67a) below, none of the segmentally overt morphemes is a high tone sponsor. Nonetheless, the participle surfaces with a high tone on the verb stem, yielding a tone pattern identical to the one found in independent participles (cf. (65b)). As predicted by our analysis of coordination in compound tenses, the second conjunct, being a ProgP, also surfaces with the progressive high (67b).

- (67) a. U- za- be u- phéka .
 2sg- FUT- AUX 2sg- cook
 ‘You will be cooking’.
- b. U- za- be u- hlabéla njalo u- phéka.
 2sg- FUT- AUX 2sg- sing & 2sg- cook
 ‘You will be singing and cooking’.

Another tonal difference between simple and compound tenses is manifested by the presence of a downstep at the left edge of the V-Stem. The downstep is observed in compound tenses but not in simple tenses. Compare the Simple Present (68a) and Distant Past Progressive – a compound tense (68b), both containing the high-toned root *kham* ‘choke’. Morphemes which are high tone sponsors are marked with the superscript H in (68).

- (68) a. u^H- ya- kham^H -a > úyákháma *simple tense*
 1- PRS choke -FS
 ‘He is choking’
- b. u^H- a^H- ye e- kham^H -a > wáyé!kháma *compound tense*
 1- D-PST- AUX 1- choke -FS
 ‘He was choking’

In both tenses, the first three syllables surface as high, while the final syllable is low. In the compound tense, however, a downstep occurs at the left edge of V-Stem (here, of the root). In order to properly identify a downstep, the syllable to its left and the syllable to its right must bear a high tone, as in the surface forms of (68). Before discussing the downstep further, let me briefly review the tone displacement rules which apply in (68a) and (68b) to yield the surface sequence of three consecutive highs we observe in both forms. Following Sibanda (2004), I assume that highs originating with subject prefixes spread metrically, i.e. across

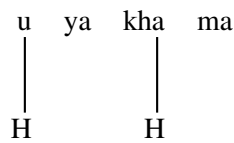
has a high-toned allomorph in participles. This tonal alternation is, however, not an idiosyncratic property of a particular prefix, e.g. the 2sg *u-* in (65). Rather, it is a systematic alternation between finite forms and progressive participles. This generalization is not captured by the allomorphy analysis, where the low–high alternation must be stated for every toneless agreement prefix separately.

¹⁷ In Ndebele we do not observe leftward-directed tone association phenomena. All tone displacement rules shift or spread a tone to the right (Sibanda, 2004).

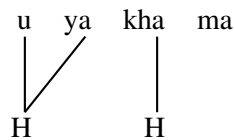
all toneless syllables up to the antepenultimate syllable¹⁸. Thus, in (68a), the high tone associated with the subject prefix *u-* spreads one syllable to the right. The root high does not undergo spreading since the final syllable is never targeted by tone displacement rules in Ndebele (Sibanda, 2004). Consequently, the first three syllables surface with a high tone in (68a). Turning now to the progressive tense in (68b), the subject prefix high does not spread because the following vowel, the tense prefix, is not toneless. The Distant Past high does not undergo metrical spread in Ndebele. Rather, it only spreads one syllable to the right. This rule of tone displacement is observed elsewhere in the language (e.g. with objects markers) and is known as Local Shift (Sibanda, 2004; Downing, 1990). As a result of local displacement, the Distant Past high spreads to the auxiliary verb *ye*. The derivation of surface tone patterns in the two tenses is presented below.

(69) a. Simple Present: (68a)

Initial association:

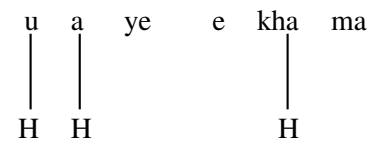


Metrical spread:

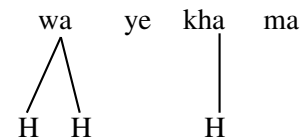


b. Dist. Past Prog: (68b)

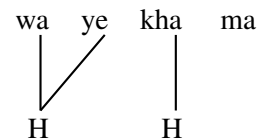
Initial association:



Hiatus resolution and tone fusion:



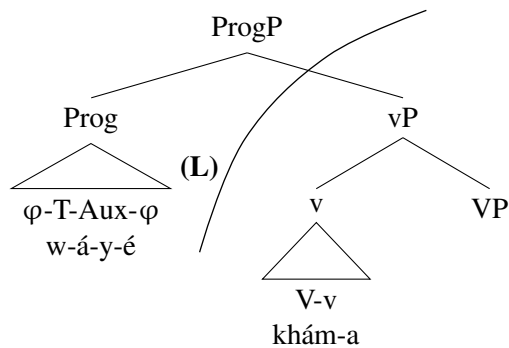
Local spread:



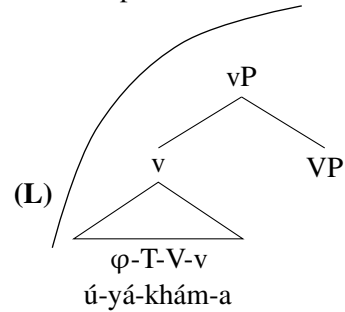
The derivation of surface tone in the simple tense involves only one tone displacement rule. In Distant Past Progressive, we additionally observe gliding and vowel coalescence. In effect, the surface distribution of high tones in both forms in (69) is the same: of the three consecutive highs, the first two fall on inflectional material, while the third high appears on the first syllable of the V-Stem. As we saw in (68b), however, the V-Stem high is preceded by a downstep in the progressive tense. Note that this tonal asymmetry between simple and compound tenses correlates with the prosodic difference between the two. As discussed in the previous subsection, the V-Stem forms a morphological and phonological word to the exclusion of all higher inflectional morphemes, which form another morpho-prosodic domain. The downstep, then, appears at the boundary between the two morpho-prosodic domains. Simple tenses, on the other hand, form one complex head, and so the relevant boundary is absent. I propose that the downstep, which I analyze as a reflex of a floating low tone, appears at left edge of *vP* in Ndebele. A V-Stem initial downstep is observed if the preceding prefix is spelled out outside of *vP* and surfaces with a high tone – the situation we find in Distant Past Progressive (70a). Since simple tenses form one complex head in *v⁰*, inflectional prefixes end up inside the *vP* (70b). The floating low ends up in the initial position and downstep cannot be observed.

¹⁸ The penultimate syllable may also be metrically strong and targeted by metrical tone spread, instead of the antepenult. The determination of which syllable is metrically strong depends on the so called conjoint/disjoint alternation, and it is immaterial to the present discussion. In disjoint forms, such as (68a), metrical spread always targets the antepenult.

(70) a. Distant Past Progressive



b. Simple Present



The proposed analysis of V-Stem initial downstep is further supported by infinitival forms. As in many other Bantu languages, infinitives in Ndebele show both verbal and nominal properties. Internally, they are verbal (e.g. they can host object markers). Externally, they behave like nominals (e.g. they control object agreement). This distribution of verbal and nominal properties is naturally captured by viewing infinitives as verb nominalizations, i.e. verb phrases with an outer nominal layer (Abney, 1987). The amount of verbal structure in the Ndebele nominalization is rather small: no temporal or aspectual morphology is present in infinitives, but we find the V-Stem with an optional object marker (a constituent called Macrostem in the Bantu literature). I will therefore assume that infinitives are vP nominalizations. As shown in the example below, infinitives are nominal expressions of class 15. The verb stem is preceded by the nominal prefix *uku*, which is associated with a high tone.¹⁹ Interestingly, the boundary between the class prefix and the V-Stem is marked with a downstep. According to Sibanda (2004), the downstep is caused by a floating low tone which appears at the left edge of the V-Stem in infinitives (71b).

(71) a. uku^H - [_{vP} $kham^H$ -a] > úkú!kháma
 cl.15- choke -FS
 'to choke'

b. $\begin{array}{ccc} uku & kha & ma \\ | & | & \\ H & (L) & H \end{array}$ (Sibanda, 2004:231)

Interestingly, the downstep observed between the nominal prefix and the verb stem in (71b) can be seen as an instance of the vP-edge floating low tone. Following Halpert (2012), I assume that the nominal prefix is bimorphemic, where the augment vowel *u* is an exponent of K^0 and the prefix *ku-* is an exponent of D^0 . Thus, the structure of vP nominalization is as in (72).

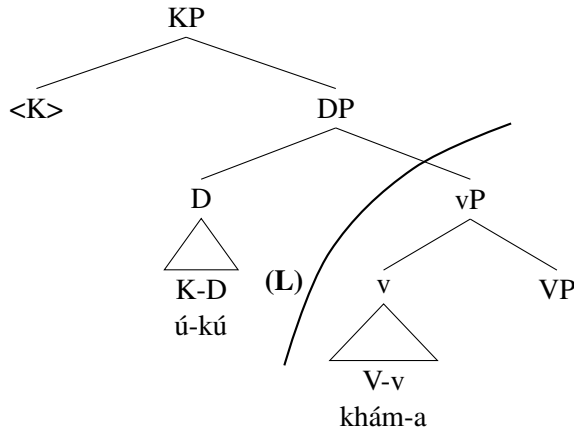
(72) [_{K⁰} u- [_{D⁰} ku- [_{vP} khama]]]

Assuming that *D* is a phase head, the phase-bound lowering analysis of word formation allows lowering of K^0 to D^0 , but not of D^0 to v^0 (the same way phasal $Prog^0$ cannot lower to v^0). Thus, after lowering,

¹⁹ To be precise, the high tone is a property of the initial vowel of the class prefix, known as the pre-prefix or the augment. The high tone spreads from the augment to the second syllable of the class marker.

the nominalization consists of two complex heads: one in D^0 and one in v^0 . We, then, correctly predict a downstep at the left edge of a high-toned V-Stem. As shown in (73), a floating low tone is inserted at the left edge of the vP, and intervenes between the Verb Stem and the higher inflectional material, the same way it does in Distant Past Progressive.

(73)



Thus, the distribution of downstep in different verbal forms correlates with the distribution of phase heads, in the present analysis. If vP is dominated by a cyclic head (Prog^0 or D^0), lowering to v^0 is blocked, resulting in two complex heads, between which a downstep may be observed.

To sum up, we have discussed two phonological complexity phenomena which occur in compound tenses, i.e. constructions with a verbal auxiliary, but not in simple tenses. Compound tenses involve two prosodic domains, while simple tenses constitute one. The domain boundary was evidenced by prosodic minimality effects and the presence of a downstep in compound tenses. We have additionally seen tonal evidence that compound tenses indeed contain a participle – an extra high tone observed also in independent participles, but not in simple finite forms. Combined with the syntactic evidence for the simple–compound distinction, we conclude that the Ndebele verbal system exhibits a true AUXILIARY SPLIT – both the syntactic and phonological diagnostics identify forms with an auxiliary *verb*, and do not collapse them with forms that contain only affixes in the inflectional domain.

Interestingly, the phonological boundary we find in compound tenses does not overlap with the syntactic division into an auxiliary and a participle, observed e.g. in coordination. Rather, it falls between the Verb Stem (vP) and all inflectional morphology preceding it. This division is the INFL-SPLIT division. Thus, although compound tenses show AUXILIARY-SPLIT syntactic complexity, their phonological complexity reveals a different domain division: that of INFL SPLIT. In the next section, I discuss the nature of this syntax-phonology mismatch and its implications for what INFL-SPLIT effects stem from.

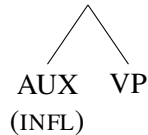
6 A syntax-phonology mismatch and the nature of INFL SPLIT

One of the main questions taken up in this paper concerns the nature of INFL SPLIT and how/whether it differs from AUXILIARY SPLIT. In relation to this question, we considered the Infl–Aux Equivalence Hypothesis, whereby the inflectional-prefix cluster in Bantu is akin to an auxiliary verb, and so every verb containing inflectional prefixes is, in a sense, a compound tense. The striking asymmetries between simple and compound tenses in Ndebele show that the Infl–Aux Equivalence Hypothesis has no empirical support: INFL and verbal auxiliaries in this language do not behave alike. INFL does not show syntactic or phonological independence and does not trigger multi-domain effects of the type found in compound tenses.

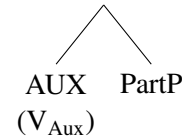
With this conclusion, we must return to the original arguments for INFL SPLIT in Bantu and ask why is

it, then, that inflectional-affix clusters have been treated as auxiliary-like elements across Bantu. Admittedly, the conclusion that INFL and verbal auxiliaries are not alike in Ndebele does not rule out the possibility that INFL is a *type* of auxiliary – one which shows a different behavior than verbal auxiliaries. All the asymmetries we have seen between simple and compound tenses could be attributed to that difference, whatever it may be. Let us consider this hypothesis a bit further. Suppose that both simple and compound tenses are complex verbal expressions, both consisting of two major domains: Aux and some form of the lexical verb. If the Aux is non-verbal, i.e. INFL, its complement is the bare verb stem (VP), as shown in (74a). If Aux is a verbal auxiliary, the main verb is of a different category, call it participle (PartP), as in (74b).

(74) a. INFL SPLIT



b. AUXILIARY SPLIT



INFL SPLIT and AUXILIARY SPLIT as different types of verbal compounds

Under this hypothesis, (74a) is the structure of a non-progressive tense in Ndebele, while (74b) is the structure of a progressive tense. This analysis could, in principle, explain the observed differences we found between those two types of tenses. For instance, coordination of PartP, but not of VP, would be allowed in the language. It could also capture the fact that the complement of verbal auxiliaries is inflected for subject agreement, but the complement of INFL is not. The latter is a bare V-Stem (VP) without an agreement probe. Finally, it could account for crosslinguistic variation in the manifestation of INFL SPLIT: some languages, for instance Swahili, exhibit multi-domains effect in verbal compounds of the type in (74a), but others do not. The latter situation would have to be the case in Ndebele, where the boundary between inflectional prefixes and the bare verb stem (VP) is not evident, syntactically or phonologically. Not in simple tenses anyway. And this is where the hypothesis in (74) proves empirically inadequate.

Recall our general conclusion that compound tenses in Ndebele consist of two, rather than one, syntactic and phonological domains. However, the domains do not overlap. Syntactically, the boundary falls between the auxiliary and the participle (as evidenced by coordination). Phonologically, we observe a split between the verb stem (vP) and all preceding inflectional morphology (prosodic minimality, downstep). The mismatch is schematized in (75) for Future Progressive.

(75) Syntax-phonology mismatch in compound tenses:

<i>auxiliary</i>	<i>participle</i>
(Ngi za be 1sg fut aux	ngi) _ω (pheka) _ω 1sg cook

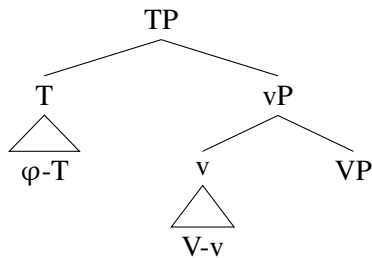
'I will be cooking'

Crucially, the morphophonological domain boundary in (75) is exactly the INFL-SPLIT boundary. The lower domain, containing the lexical root, meets all the criteria defining the Verb Stem: it consists of the lexical root, derivational suffixes, the final suffix and, optionally, an object marker. The higher domain, though it contains a verbal auxiliary, fits in the definition of INFL: it comprises preverbal inflectional morphology dominating the V-Stem. Crucially, the INFL-SPLIT division in Ndebele is found in AUXILIARY-SPLIT structures (and, in fact, only there). This fact cannot be reconciled with our hypothesis in (74) that INFL SPLIT

and AUXILIARY SPLIT correspond to different types of verbal compounds. Given the systematic presence of INFL-SPLIT phenomena in AUXILIARY-SPLIT structures, we must reject the hypothesis that INFL and verbal auxiliaries are two different types of "Aux-like" syntactic objects.

If INFL SPLIT is not a type of compound tense, what is it, then? The analysis developed here offers a simple answer. INFL SPLIT is a set of multi-domain effects, syntactic or phonological, where the two domains are defined as complex heads. This characterization does not relate INFL-SPLIT phenomena to any particular morphosyntactic context. That is, they may arise in simple tenses, in compound tenses or in both, depending on the availability of head movement and lowering in a particular language. It so happens that Ndebele progressive tenses contain two complex heads (one comprising inflectional prefixes and the auxiliary root, while the other – the verb stem), but simple tenses consist of one complex head due to lowering. But, in principle, the situation could be different, e.g. if a language lacks post-syntactic lowering. Likely, this is what we find in Swahili. Recall from section 3 that INFL SPLIT in this language is observed in simple tenses, and is manifested e.g. by two stress domains. If Swahili lacks T-to-v lowering, the analysis proposed here predicts that INFL-SPLIT effects should be observed in Swahili simple tenses. This is due to the fact that simple tenses in this language will always contain two complex heads: one in T and one in v (76)²⁰.

(76) Swahili verb structure: No lowering; two complex heads in a simple tense

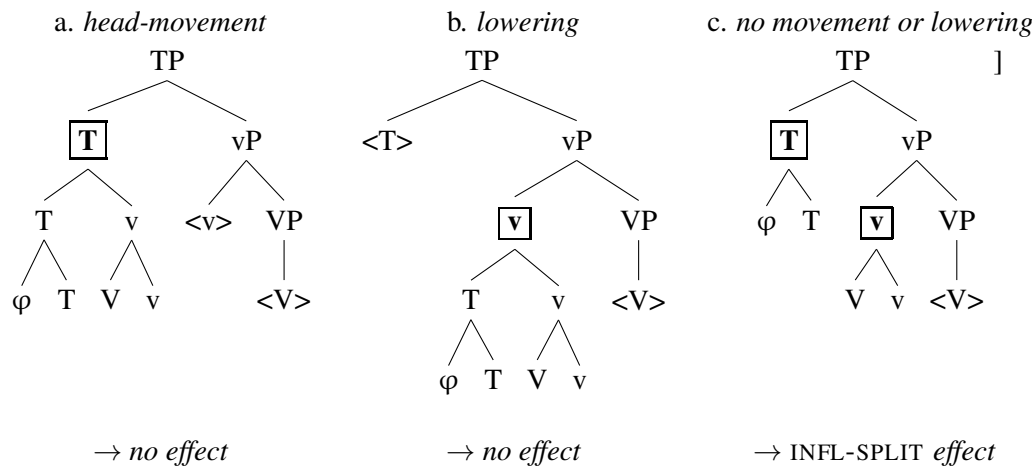


This analysis accounts for both the syntactic and the phonological facts that have been treated as arguments of the auxiliary-like nature of the inflectional cluster in Swahili. Syntactically, we saw that INFL undergoes movement to C, stranding the verb stem low. This fact itself does not require an analysis of INFL as an auxiliary. Rather, Swahili simply exhibits T-C movement in relative clauses. In the absence of v-to-T movement and T-to-v lowering, we predict that the inflectional prefixes in T will be fronted independently of the verb stem and surface to the left of the subject. The phonological evidence we discussed was the presence of secondary stress on the penultimate syllable of the INFL constituent. In the account proposed here, stress in Swahili is assigned within each complex head. If a simple tense consists of two MWords, we predict two domains of stress assignment. Thus, stress assignment in Swahili is accounted for by the same MWord-to-PWord mapping proposed to derive prosodic minimality domains in Ndebele.

The view of INFL SPLIT as boundary marking between complex heads predicts a general correlation between INFL-SPLIT effects and the availability of mechanisms of complex head formation, such as head-movement and post-syntactic lowering. If, for example, v and T are combined by either operation and form one complex head, no INFL-SPLIT effects are expected (77)-a,b. The effects may only surface in languages (or constructions) where v and T are not combined into a single head by either operation (77)-c.

²⁰ The facts in Swahili are more complicated if we consider different simple tenses. For instance, present tense verbs or verbs in the subjunctive mood do not show INFL-SPLIT effects in stress patterns. It is beyond the scope of this paper to account for this variation in Swahili. The crucial fact is, however, that Swahili does show multidomain effects in some simple tenses, and it is those facts that require attention in the present discussion.

(77) The predicted correlation between INFL-SPLIT effects and complex-head formation



Although verifying this typological prediction requires further investigation of INFL-SPLIT effects across Bantu, we can, given the present discussion, classify Ndebele as the lowering type language in (77)b, where the lack of INFL-SPLIT effects in simple tenses is due to T-to-v lowering. Swahili past tense, on the other hand, was suggested to be of type (77)c: T and v form two separate complex heads, giving rise to various multidomain effects. The third predicted correlation is between INFL-SPLIT effects and head movement ((77)a). In this scenario, it is head-movement, rather than lowering, that eliminates INFL-SPLIT effects. Below I briefly discuss evidence for this correlation from Swahili v-to-C movement.

In his analysis of stress assignment in Swahili relative clauses, [Henderson \(2003\)](#) points out a correlation between head-movement and secondary stress: secondary stress is present in the C complex head if the verb does not move to C (78a). In the case of v-C movement, secondary stress is absent (78b).

(78) Swahili ([Henderson, 2003](#))

- a. kitabu [_{C⁰} u- lí- cho] [_{v⁰} sóma] (> ulichosóma)
 book 2sg- PST- REL read
 ‘the book that you read’
- b. kitabu [_{C⁰} u- somá- cho] [_{v⁰} <soma>] (> usomácho)
 book 2sg- read- REL
 ‘the book that you (always) read’

The availability of v-C movement in Swahili relative clauses depends on a particular tense. For instance, the verb moves to C in the present, but not in the past tense. To account for the contrast in stress patterns in (78), [Henderson](#) proposes that stress in Swahili is assigned within a phase (assuming that C and v are phase heads). In (78a), the verb and the inflectional prefixes form two different complex heads (v^0 and C^0) belonging to different phases, and so each constituent receives its own penultimate stress. In the surface form, the stress assigned in the C^0 complex heads becomes secondary stress. In the case of verb movement to C, as in the present tense (78b), the verb ends up in the same phase as inflectional prefixes. Since all verbal morphology belongs to one phase, only one stress is assigned, deriving no secondary stress in (78b). Note, however, that the phase-based generalization about stress domains can be captured by the number of complex heads. Thus, [Henderson](#)’s analysis can be straightforwardly translated into the present account, where a complex head maps to a prosodic domain in a verbal expression. Secondary stress in Swahili is, then, predicted in the same configuration in which we find a downstep in Ndebele: when the verbal expression VP consists of two complex heads. The contrast in (78) is the consequence of head movement, which reduces the number of complex

heads, and effectively eliminates the otherwise observed INFL-SPLIT effect. Thus, the correlation between head-movement and INFL-SPLIT effects presented in (77) is supported by Swahili *v*-to-*C* raising.

In sum, INFL SPLIT does not define a particular syntactic structure, such as the auxiliary-participle structure. Rather, it is a set of multidomain phenomena marking the boundary between complex heads. Therefore, nothing prevents INFL-SPLIT effects from occurring in constructions involving verbal auxiliaries – a situation found in Ndebele and one which rules out the analysis of INFL as a different type of auxiliary.

Finally, I'd like to offer a speculation on why INFL-SPLIT phenomena are so common in Bantu. What is the reason why the INFL–*V*-Stem division has been treated as a fundamental property of the Bantu verb structure? It appears that it is a combination of two, somewhat related, factors: a grammatical one and a historical one.

The first grammatical factor is the lack of verb movement to higher inflectional heads. It is typically assumed that the verb in Bantu languages does not move all the way to *T*, but that it stops in a lower position – the head hosting the final suffix (Julien, 2002; Buell, 2005; Harford, 2008; Cheng & Downing, 2012).²¹ Additionally, higher inflectional heads often have overt realizations (e.g. tense markers). Morpho-phonological boundary effects between *v* and *T* are, then, expected to be common – in the absence of head movement, they can only be avoided if the language employs post-syntactic lowering. And even when lowering is available, the structural conditions for its application may be disrupted by earlier syntactic operations.

The other reason why inflectional prefixes have been treated as an independent constituent and called *Aux* is historical. A large portion of the so called tense markers originated from verbs such as *go* or *come*, and were grammaticalized as affixes. That is, what we synchronically characterize as a simple (synthetic) tense in Bantu likely originated from a compound tense. As mentioned above, the future tense in Ndebele is an example: the future tense prefix *za-* is historically an auxiliary verb selecting an infinitival form of the lexical verb. The previous sections have, however, demonstrated, on the basis of syntactic and phonological facts, that the tense prefix *za-* does not behave like an auxiliary verb anymore and that the non-progressive future is a synthetic tense which contrasts sharply with the progressive future – a compound tense. It seems likely that INFL-SPLIT phenomena emerged alongside the grammaticalization process of auxiliaries into tense affixes. A synchronic consequence of the recent verbal history of tense affixes could be, for instance, the notorious lack of *v*-*T* movement in Bantu and the prefixal nature of inflectional morphology – two properties of Bantu verbs that constitute the environment for INFL-SPLIT effects.

7 Conclusion

I argued that INFL and verbal auxiliaries in Ndebele cannot be treated on a par. The language exhibits true AUXILIARY SPLIT (compound tenses with verbal auxiliaries), and verb forms containing just INFL show none of the complexity effects found in compound tenses. More importantly, INFL-SPLIT effects in Ndebele are found only in constructions with verbal auxiliaries – a fact which invalidates the hypothesis that INFL and auxiliary verbs form different types of verbal compounds. The proposed approach to INFL SPLIT, as marking a boundary between complex heads, can capture both the puzzling Ndebele data and the complexity effects that lay ground for the Inflectional Stem Hypothesis.

As a final note, let me observe that a vast majority of arguments given in support of the INFL-SPLIT hypothesis are phonological phenomena. This fact is rather striking under the view of INFL SPLIT as an *Aux*–*Verb* construction, like compound tenses. It is surprising that we would find almost exclusively phonological evidence for their compound nature. Under the present approach to INFL SPLIT, however, this overwhelming majority of phonological evidence is natural. INFL SPLIT is a reflection of morpheme organization. Such an

²¹ According to Harford (2008), *v*-to-*T* movement occurs when tense is marked by a suffix (*-ile* in Ndebele and Zulu), rather than a prefix. This view assumes that the suffix is, in those cases, an exponent of *T*. In my view, the final suffix is always the same lower head (*v*⁰, in this analysis), which covaries with tense. As we saw in table (37), this is the case in Ndebele Recent Past: the final suffix is *-ile* in Recent Past, while *T* has a null exponent.

organization is a question of morphology and therefore we expect to see its reflexes post-syntactically, that is in morphology and phonology.

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