

Recursivity and Focus in the Prosody of Xitsonga DPs

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Abstract: This paper explores the prosodic patterns of complex DP structures in Xitsonga by looking at penultimate lengthening in DPs with marked and unmarked word orders of different types. We discuss the underlying syntactic structures and prosodic realizations of Xitsonga DPs. We are particularly interested in the way in which recursion applies in the Xitsonga DP, where it surfaces in DPs with multiple modifiers of the same or different categories that appear in fronted (i.e., pre-nominal) positions. We propose that in Xitsonga nominal constituents move to a left-periphery-like position within the DP domain and that this position matches to a focus-marked phonological phrase. This type of phonological phrase is forced to remain in the phonology even if the one-word phrase violates the BINARITY constraint. We argue that the penultimate lengthening effects found in Xitsonga with the reordering of DP internal elements are best analyzed as showing sensitivity to this focus-marked phonological phrase.

Keywords: penultimate lengthening; recursion; Tsonga; Southern Bantu; DP; faithfulness to focus-marked phonological phrase



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1. Introduction

Adjectives are among the syntactic categories that can recur multiple times in a single noun phrase (DP), limited mostly by semantic constraints on meaningful interpretations. In this paper, we show that in the Bantu language Xitsonga, adjectives and other types of nominal modifiers can not only be merged recursively, but that movement can take place multiple times, resulting in completely free word order in the Xitsonga DP. However, closer examination reveals that while the word order is free in Xitsonga DPs, the processes creating these orders are constrained. We argue that only one element can move to a focus position immediately above DP, which we call Focus Phrase (FocP), even while multiple DP modifiers can appear before the noun in this Bantu language. Prosodically, this means that recursive phonological phrases are created in complex DPs.

Xitsonga (Guthrie code: S53)¹ is a Bantu language spoken by about 5.5 million first language speakers in South Africa, Mozambique and Zimbabwe. While there is no literature on the syntax of the DP in Xitsonga, Xitsonga grammar and syntax have been described in [Baumbach \(1987\)](#); [du Plessis et al. \(1995\)](#). The general tonology and prosody of Xitsonga have been described in [Kisseberth \(1994\)](#); [Lee and Selkirk \(2022\)](#); [Selkirk \(2011\)](#); [Zerbian \(2007\)](#). A study of penultimate lengthening patterns with single modifier DPs with focus movement in Xitsonga is [Lee and Riedel \(2021\)](#). There are several varieties of Xitsonga, spoken in different regions. Xitsonga is part of the Southern Bantu languages group (Zone S), where the different varieties form a subgroup of their own.

There is evidence that Southern Bantu DPs in general, not only Xitsonga DPs, differ significantly in their ordering restrictions from the types of ordering restrictions shown by

other Bantu languages. For most of Southern Bantu, literature such as [du Plessis and Visser \(1992\)](#) on isiXhosa, [Sabelo \(1990\)](#) on isiZulu, [Mokoaleli et al. \(2021\)](#) on Sesotho (as well as our own data on Sesotho) and [Creissels \(2014\)](#) for Tswana, show that many or even any nominal modifier, including relatives ([du Plessis and Visser 1992](#), p. 389), possessives and associative phrases, can appear before the noun. This means that, like Xitsonga, most if not all Southern Bantu languages allow a wide range of nominal modifiers to appear before the noun.

The paper is structured as follows: We first present a brief background on Bantu DPs before introducing Xitsonga DPs. Section 2 gives an overview of prosodic phrasing in Xitsonga. Section 3 discusses the DP in Xitsonga and the prosodic reflexes of word order variation. Section 4 offers our analysis of these patterns and Section 5 offers our conclusions.

1.1. Background: Bantu DP Structure

Xitsonga's tolerance of free word order in the DP is unusual in Bantu, where flexibility in the post-nominal position has been frequently noted ([Rugemalira 2007](#)) but normally only demonstratives can also appear in pre-nominal position. Here we provide a brief overview of relevant word order patterns applying to Bantu DPs.

Bantu DPs are typically noun-initial. Bantu languages have a number of different types of nominal modifiers including demonstratives, possessives, associatives (genitives), adjectives, numerals, quantifiers and arguably also question words such as 'which' (see [Katamba 2003](#) for a general overview of Bantu nominal morphology, [van de Velde 2019](#) for an overview of nominal syntax and [Bearth 2003](#) for general syntactic properties). Demonstratives may appear before or immediately after the noun or in final position of a DP in unmarked order, which differs depending on the language (cf. [van de Velde 2019](#)). [Van de Velde \(2019, p. 261\)](#) gives a number of examples of possible noun phrase word orders in Bantu languages which mostly vary in terms of the unmarked position of the demonstrative which can be before the noun (as in Digo), in final position, as in Nande and Orungu, or close to the noun but after the possessive (Nkore-Kiga), as shown in (1).²

- (1) a. Digo (E73): Dem N Poss Num Adj
 b. Nande (JD42): N Poss Num Adj Dem
 c. Nkore-Kiga (JE13/14): N Poss Dem Adj Num
 d. Orungu (B11b): N Poss Adj Num Dem

Bantu languages typically have very small adjective inventories and for some Bantu languages it has been argued that apparent adjectives are relative clauses. Across Bantu, numerals tend to behave categorically like adjectives and also agree with their head noun. Generally only some numerals agree in Bantu languages. These tend to be based on stems inherited from Proto-Bantu and typically represent the numbers lower than 6 or 10, while higher numbers are expressed by phrases and are often based on nouns rather than adjectives. In Southern Bantu languages, speakers typically use numbers borrowed from English in certain contexts (such as when referring to dates, time or phone numbers), but for small numbers the non-borrowed agreeing forms (see 7 below) remain the dominant pattern. As (1a,b) in contrast to (1c,d) show, there may be different unmarked orders for numerals and adjectives in different Bantu languages.

[Rugemalira \(2007\)](#) shows that in the post-nominal position different orders of adjectives (a category which for him includes agreeing quantifiers such as 'many'), numerals, ordinals, other quantifiers, associative phrases and relatives are possible in a number of Tanzanian Bantu languages, with only demonstratives, possessives and interrogatives that modify noun phrases having fairly fixed positions.

In Bantu languages, quantifiers may agree or not agree with the head noun, depending on the quantifier type and language (for a general overview of quantifiers in Bantu cf. [Zerbian and Krifka 2008](#)). Typically quantifiers are not flexible with respect to their position before or after the noun. For example, in many Bantu languages certain quantifiers must be pre-nominal and unlike other modifiers, these quantifiers do not agree with the number

or gender of the noun (2). However, in some Bantu languages quantifiers that normally appear after the noun can also appear prenominally (cf. Rutooro, [Clemens and Bickmore 2021](#) and Ha, [Harjula 2004](#)).

(2) Examples from ([Rugemalira 2007](#), p. 138):

- a. wó nndu vs. bhandu bhasha
 each 1person vs. 2people 2good
 ‘each person’ vs. ‘good people’ [Mashami, E621b]
- b. kila mtu vs. watu wazuri
 each 1person vs. 2people 2good
 ‘each person’ vs. ‘good people’ [Swahili, G42]

There is very limited available data on pre-nominal modifiers other than demonstratives and quantifiers beyond Southern Bantu but possessives have been reported to be allowable in pre-nominal positions in some Bantu languages that are not part of the Southern Bantu group. [Van de Velde \(2019, p. 260\)](#) notes optional pre-nominal possessives in Makaa (A83) which receive a focus reading, similar to the structures discussed here.

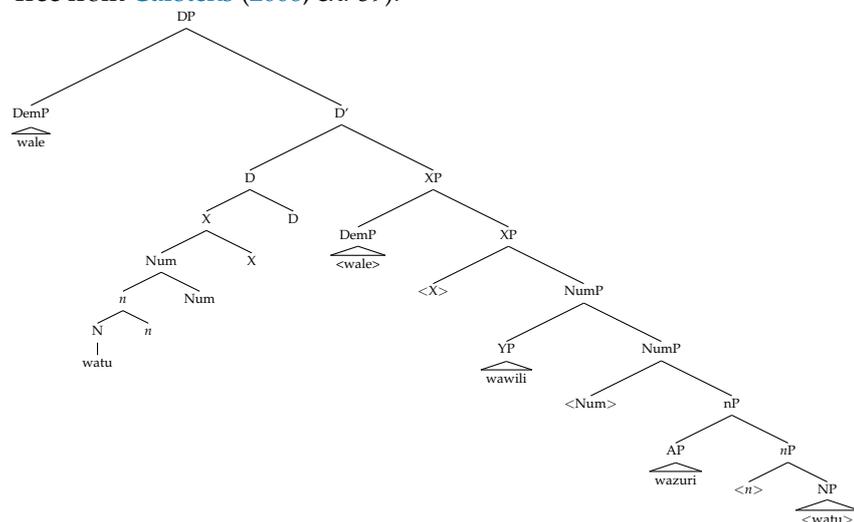
Having established that word order freedom in DP generally does not apply to the pre-nominal domain in Bantu languages, we show below that in Xitsonga any nominal modifiers are allowed to appear in pre-nominal position (see Section 3).

[Carstens \(2008\)](#) proposes the structure in (4) for the DP in Swahili, representing the noun phrase in (3) where the noun raises to D while the demonstrative is generated in a high position in the specifier of an XP immediately below DP. Swahili only allows demonstratives and the quantifier *kila* ‘each, every’ (2b) to appear before the noun. [Carstens \(2008, p. 155\)](#) discusses movements deriving variable post-nominal orders in the Swahili DP. She argues that the merge order is Dem-Num-Adj-N (which is not an allowable surface order in Swahili) but that Dem-N-Adj-Num, N-Dem-Adj-Num, N-Dem-Num-Adj and Dem-N-Num-Adj are all permissible for a noun phrase such as (3), meaning that the demonstrative can appear before or after the noun and the adjective and numeral can appear in either order.

- (3) Wa-tu wa-le wa-wili wa-zuri
 2-person 2-DEM 2-two 2-good
 ‘those two good people’ [Swahili, G42, [Carstens 2008](#), p. 155]

In Carsten’s model, illustrated in (4), the order Dem-N is derived by the DemP moving from SpecXP to SpecDP, with N-Dem not involving this movement, while the noun always raises to D. The order Adj-Num is derived by allowing left and right adjunction of specifiers in the various functional projections of the DP. Carsten rejects accounts which allow for the N to raise to an intermediate position.

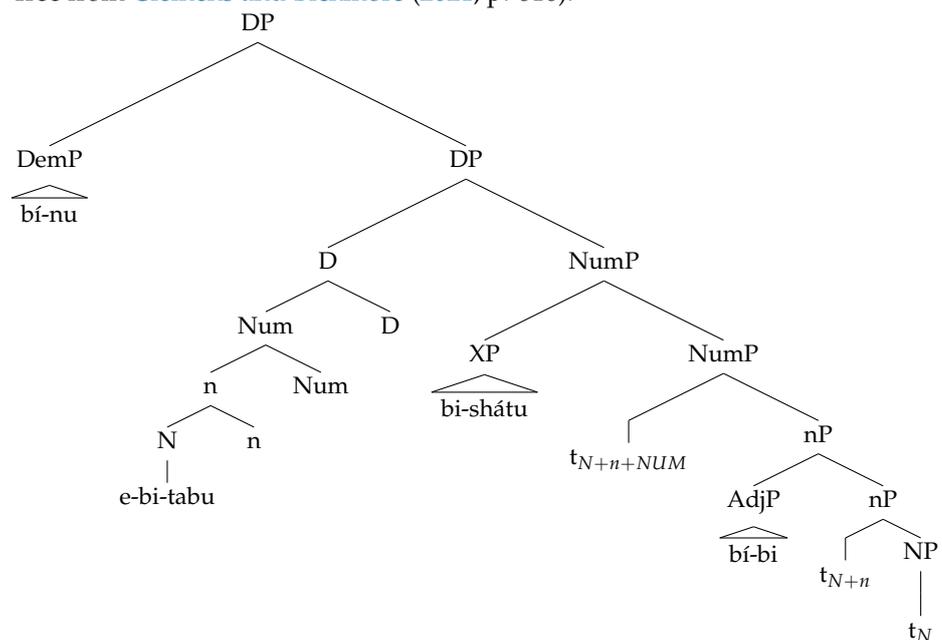
(4) Tree from [Carstens \(2008, ex. 59\)](#):



Clemens and Bickmore (2021) discuss DPs in Rutooro (JE12), where normally nominal modifiers are post-nominal and flexible in their relative orders, except for possessives which must immediately follow the noun. However, one class of nominal modifiers can appear pre-nominally in Rutooro. This class includes the quantifier ‘all’ and demonstratives (Clemens and Bickmore 2021). As shown in (5), modifiers of this kind are freely ordered with respect to the noun, as in the Southern Bantu data we discuss here.³ Clemens and Bickmore (2021, p. 815) generally, the structure from Carstens (2008) illustrated in (4), and derive demonstratives and type 2 modifiers via left adjunction to DP (for modifiers in pre-nominal position), as shown in (6) for a pre-nominal demonstrative (representing the noun phrase in (5c)). Nominal modifiers in DP-final position are right-adjoined to DP.

- (5) a. E-bi-bíra by-óóna
 AUG-8-forest 8-all
 ‘all forests’ [Rutooro, Clemens and Bickmore 2021, p. 813]
- b. By-óón ee-bi-bíra
 8-all AUG-8-forest
 ‘all forests’ [Rutooro, Clemens and Bickmore 2021, p. 813]
- c. Bí-nu e-bi-tabu bi-sátu bí-bi
 8-DEM AUG-8-book 8-three 8-bad
 ‘these three bad books’ [Rutooro, Clemens and Bickmore 2021, p. 816]

(6) Tree from Clemens and Bickmore (2021, p. 816):



Our proposed structure for Xitsonga and other Southern Bantu languages will build on (6) but introduce some additional movement to account for the variation observed.

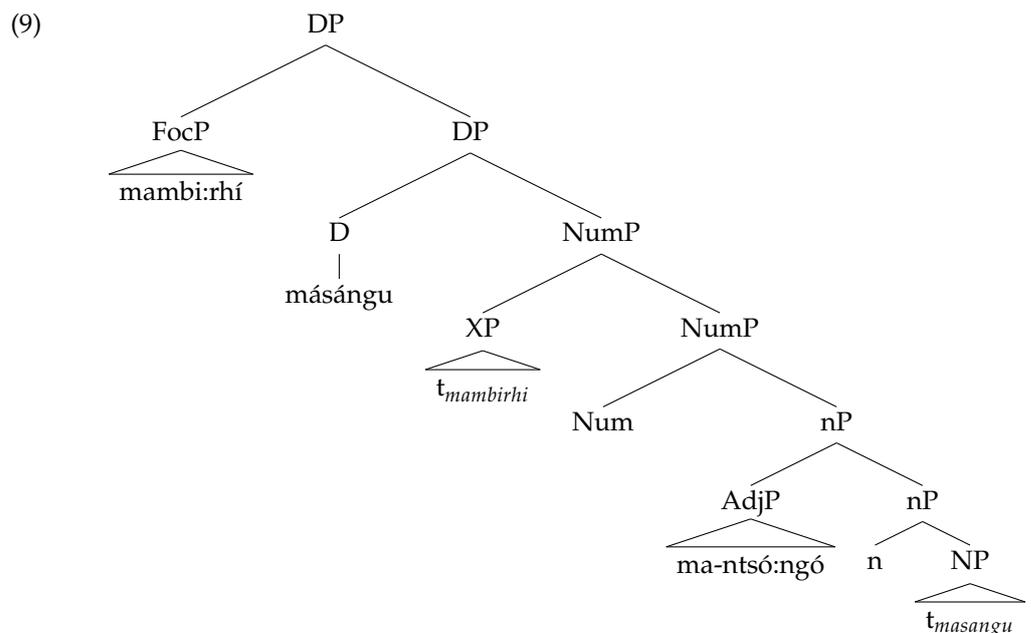
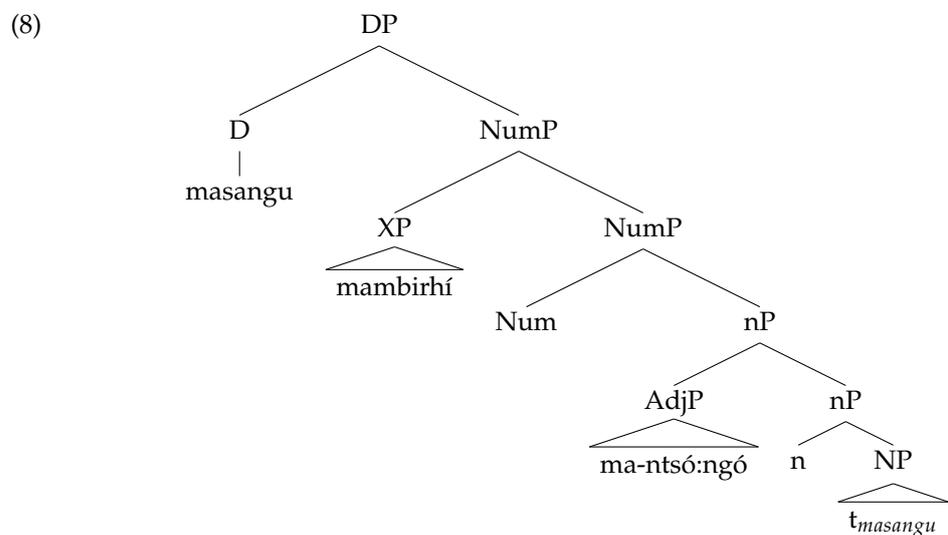
1.2. Xitsonga DPs

Xitsonga shows typical nominal morphosyntax for a Bantu language. There are 14 noun classes and the different types of modifiers such as demonstratives, adjectives, numerals and other quantifiers show agreement with the head noun. Xitsonga DPs are head-initial, all classes of nominal modifiers follow the head noun in unmarked word order, as in (7a). All elements in the DP show flexible word order, even allowing fronting to pre-nominal position, where a fronted element is interpreted as marked for focus. Phonetically, the fronted modifier *mambirhi* ‘two’ in (7b) has a longer penultimate syllable, whereas the head noun *ma-sangu* ‘6-sleeping mat’ in (7a) in the same position does not display such

lengthening when it appears in non-final position. In the examples below, H tone is marked with an acute accent and vowels that sponsor an H tone are underlined.

- (7) a. Ma-sangu ma-mbirhí ma-ntsó:ngó
 6-sleeping.mat 6-two 6-small
 ‘two small sleeping mats’ (unmarked word order: N Num Adj)
- b. Ma-mbi:rhí má-sángu ma-ntsó:ngó
 6-two 6-sleeping.mat 6-small
 ‘TWO small sleeping mats (neither 1 nor 3)’ (marked word order: Num N Adj)

The structures representing (7a,b) are shown in (8) and (9). These structures essentially follow Clemens and Bickmore (2021) but use a general focus phrase (FocP) in place of DemP that different types of nominal modifiers can move to (9). The unmarked word order with the noun in DP-initial position (7a) is represented in (8) and the marked order with the focused numeral (7b) in (9).



The unmarked DP structure in (7a) features penultimate lengthening in the final prosodic word. When one of the modifiers is fronted as in (7b), the fronted modifier also displays penultimate lengthening. The penultimate lengthening of the final prosodic word in both examples is due to a higher prosodic phrase boundary (see Selkirk 2019; Kisseberth

1994). The penultimate lengthening in the fronted modifier is puzzling. Xitsonga shows penultimate lengthening before an intonation phrase, but a single prosodic word is not an intonational phrase. As such, the modifier with the penultimate lengthening must have a different source (cf. Kanerva 1990). Xitsonga could be a language that uses phrase-based cues for focus marking (cf. Kügler and Calhoun 2020).

Before proposing a possible solution to this puzzle, we discuss our basic assumptions on the indirect relationship between syntactic constituents and prosodic structures. This paper uses the Match Theory proposed in Lee and Selkirk (2022), which assumes that Match is a spell-out constraint between the morphosyntactic output (MSO) and the phonological input (PI). This spell-out constraint allows recursive prosodic categories as part of the representation, departing from theories of prosodic structure that assume the Strict Layer Hypothesis (Elfner 2018; Selkirk 1986). The prosodic structures in the phonological output (PO) are formed following language-specific ranking of prosodic constraints, unrelated to MSO. Based on these assumptions, we understand the prosodic structures of the sentences in (7) to be as schematized in (10) with recursive phonological phrases in the PI. The phonological phrases in PO in (10) follow the prosodic well-formedness constraints in (12) that are discussed in Section 2. The *x* in (10b) stands for a prosodic category that needs to be determined and which corresponds to the FocP in the morphosyntax.

(10) a. Unmarked order

MSO: $IP[VP[verb\ DP[NP[noun]\ NumP[num]_{NumP}\ AP[adj]_{AP}DP]VP]IP$
 PI: ${}_i(\phi_4(verb\ \phi_1(noun)\phi_1\ \phi_2(num)\phi_2\ \phi_3(adj)\phi_3)\phi_4)_i$
 PO: ${}_i(\phi_4(\phi_5(verb\ noun)\phi_5\ \phi_6(num\ adj)\phi_6)\phi_4)_i$

b. Fronted modifier

MSO: $IP[VP[verb\ DP[FocP[adj]_{FocP}\ NP[noun]_{NP}\ NumP[num]_{NumP}]DP]VP]IP$
 PI: ${}_i(\phi_9(verb\ x(adj)_x\ \phi_7(noun)\phi_7\ \phi_8(num)\phi_8)\phi_9)_i$
 PO: ${}_i(\phi_9(\phi_{10}(verb\ x(adj)_x)\phi_{10}\ \phi_{11}(noun\ num)\phi_{11})\phi_9)_i$

In example (a) of (10), there is a mismatch between the morphosyntactic output and the prosodic structure in the phonological output. In the morphosyntactic output, the noun and its modifiers form single-word phonological phrases, which are grouped with the verb into a phonological phrase, whereas the noun is grouped with the preceding verb in the prosodic structure. The phonological input shows a matching prosodic structure.⁴ The phonological output of the unmarked DP structure corresponding to (7a) has a recursive phonological phrase ϕ ; the head noun and the verb form ϕ_5 and the first modifier forms ϕ_6 with the second modifier. The verb phrase itself also forms a phonological phrase ϕ_4 . In such a prosodic structure (10a) only the final prosodic word (i.e., Adj) shows penultimate lengthening. The prosodic structure in the phonological output in example (10b) also shows a mismatch with the morphosyntactic output. In the prosodic structure, the fronted Adj forms ϕ_{10} with the preceding verb. The recursive prosodic structure of (10b) differs from (10a) in that the fronted Adj forms its own phonological phrase and the noun and the Num form another phonological phrase ϕ_{11} . The verb and the fronted Adj correspond to ϕ_{10} and the verb phrase is ϕ_9 . Penultimate lengthening is observed in the fronted Adj and the sentence-final Num.

We propose that a fronted element is a focus-marked phonological phrase, which corresponds to the FocP phrase in the syntax. The element *x* in the prosodic representation in example (10b) is the prosodic realization of a focus phrase. This ϕ will be indicated as ϕ -FOC in the rest of the paper. The idea that prosodic structure reflects an inherent syntactic-semantic feature is adopted from Kratzer and Selkirk (2020), who show and argue that in Standard American English and British English a given-marked constituent is not mapped to a phonological phrase in the phonological input. For Xitsonga, we assume that the fronted modifier in Xitsonga is placed in the FocP and the contrastive nature of focus results in a realization of ϕ -FOC with penultimate lengthening. In Kratzer and Selkirk (2020)

and Lee and Selkirk (2022), it is proposed that the phonological input (PI) includes prosodic structure that matches or does not match the morphosyntactic output. The restructuring of prosodic structure is due to constraint interactions between PI and the phonological output PO. In Section 2, the architecture of this theory will be introduced in detail.

Mirroring syntactic structures, prosodic structures are argued to be recursive in Bennett (2018); Ito and Mester (2009, 2012); Kubozono (1989); Ladd (1986); Selkirk (2011); Selkirk and Lee (2015); Wagner (2005). For prosodic recursion, see Elfner (2012, 2015); Ito and Mester (2013); Myrberg (2013) and the works cited there. Even so, the flexible nature of the word order in Xitsonga DPs is puzzling because our native speaker consultant judges all permutations of a DP to be grammatical (see Section 3). DPs with three modifiers (24 types) or four modifiers (120 types) allow much more flexibility than has been reported for most other Bantu languages. We suggest that the flexible word order is driven by prosodic requirements: (a) a focused element appears in FocP, which then maps into a prosodic phrase ϕ -FOC, and by (b) other scrambling movement happens in the phonology only. As we show in Section 3, words that undergo scrambling movement do not show penultimate lengthening, nor are they interpreted as being in focus. While we demonstrate that scrambling movement is possible in Xitsonga, the exact nature of this type of movement in Xitsonga is yet to be uncovered; a future study focusing on mapping between the FocP in the morphosyntactic output and ϕ -FOC in the phonological input will shed more light on this.

2. Prosodic Phrasing in Xitsonga

Xitsonga, like the vast majority of Bantu languages, is a tone language that also makes extensive use of penultimate lengthening to mark phrase boundaries (Kisseberth 1994). High (H) tone spreading and lengthening of penultimate vowels are important markers of phonological phrase boundaries. In Xitsonga, H tone spreading is unbounded and this pattern is forced by the markedness constraint on H tone spreading shown in (12a). In (11a), a H tone originates from the subject prefix *vá-* and spreads to the penultimate syllable of the object. The examples in this section show that penultimate lengthening is an indicator of a higher phrase boundary. H tones do not spread onto the final syllable of a constituent (which may be a phrase at a relevant boundary or the entire sentence) due to the NON-FINALITY constraint (12b). In example (11b) with all toneless words, no H tone appears in the surface representation. Following Lee and Selkirk (2022), we assume the phonological input (PI) has prosodic structures that mirror the morphosyntactic output. In Xitsonga, a phonological phrase is required to have two prosodic words; a phonological phrase with a single prosodic word undergoes deletion of the phonological phrase (see PO of 11a). The deletion of ϕ (12d) of non-binary ϕ 's is forced by the markedness constraint that requires two prosodic constituents within a ϕ as in (12c). To make it easier to read the data, we have indicated prosodic boundaries with round brackets in a separate line below the gloss. In subsequent examples, prosodic word (ω) boundaries are omitted.

- (11) a. *Vá-xává nyá:ma*
SM2-buy 9.meat
PI: $i(\phi(\omega(v\acute{a}-x\acute{a}v\acute{a})\omega)\phi)\phi(\omega(ny\acute{a}:ma)\omega)\phi)_i$
PO: $i(\phi(\omega(v\acute{a}-x\acute{a}v\acute{a})\omega)\omega(ny\acute{a}:ma)\omega)\phi)_i$
'They buy meat' (originally from Kisseberth 1994, p. 142)
- b. *Ni-xava nya:ma*
SM1S-buy 9.meat
PI: $i(\phi(\omega(ni-xava)\omega)\phi)\phi(\omega(nya:ma)\omega)\phi)_i$
PO: $i(\phi(\omega(ni-xava)\omega)\omega(nya:ma)\omega)\phi)_i$
'I buy meat' (originally from Kisseberth 1994, p. 142)
- (12) a. HIGHTONESPREADING-RIGHT (HTS-RT)
Assign a violation mark to any toneless tone-bearing unit that is preceded by the right edge of a H-tone span (Lee and Selkirk 2022, p. 350)

- b. NON-FINALITY(ϕ, H)
The right edge of a H tone span may not coincide with the final syllable of a phonological phrase (ϕ) (Lee and Selkirk 2022, p. 351; Kisseberth 1994; Selkirk 2011)
- c. BINARITY(ϕ)
Assign a violation mark when a phonological phrase (ϕ) does not immediately dominate exactly two prosodic constituents. (A phonological phrase (ϕ) must be binary) (Lee and Selkirk 2022, p. 346; Kisseberth 1994; Selkirk 2011)
- d. MAX(ϕ)
Assign a violation mark when a constituent ϕ of phonological input (PI) is not present in the phonological output (PO). (No deletion of ϕ) (Lee and Selkirk 2022, p. 347; Kisseberth 1994; Selkirk 2011)

The target for penultimate lengthening (PL) and H tone spreading is identical in (11a), but this is not always the case in Xitsonga. One such mismatch between PL and HTS is found in (13), where the H tone spreads from the subject prefix (13a) or the verb (13b) to the noun class prefix of the object but not beyond when the noun has a toneless syllable followed by a H-toned syllable. The penultimate syllable is lengthened but remains toneless. The blocking of H tone spreading onto the toneless penultimate syllable is due to the Obligatory Contour Principle (14) (cf. Goldsmith 1976; Leben 1973; Lee 2009).

- (13) a. Vá-xává má-ta:ndzá
SM2-buy 6-egg
PO: ${}_i(\phi(vá-xává\ má-ta:\downarrow ndzá)_\phi)_i$
'They buy eggs' (originally from Kisseberth 1994, p. 144)
- b. Ni-vóná vá-la:lá
SM1S-see 2.enemy
PO: ${}_i(\phi(ni-vóná\ vá-la:\downarrow lá)_\phi)_i$
'I see enemies' (originally from Kisseberth 1994, p. 144)

- (14) OCP(ω, H)
Assign a violation mark to two H tone spans that are syllable-wise adjacent within a prosodic word ω (Lee and Selkirk 2022, p. 353)

Another example of the mismatch between the landing site of H tone spreading and penultimate lengthening is found in ditransitive constructions, as shown in (15), where the H tone spreads to the penultimate syllable of the first object, but not beyond. In (15), penultimate lengthening does not appear on the first object but only on the second object. In PI, each XP (corresponding to the two object NPs and the VP) is a phonological phrase. The deletion of phonological phrases encompassing the first and the second objects, which match the morphosyntactic output and the insertion of a phonological phrase including the verb and the first object, which violates DEP(ϕ, H) in (16b), are enforced by the BINARITY constraint which requires a phonological phrase and by the STRONGSTART constraint defined in (16a).

Example (15) shows that the domain for H tone spreading is the phonological phrase which groups the verb and the first object to the exclusion of the second object (Lee and Selkirk 2022), but the domain of penultimate lengthening is different. If the domain of the penultimate lengthening were any phonological phrase, we would expect to observe penultimate lengthening in the first object as well as in the second object. What we propose in Section 4.1 is that the penultimate lengthening of the second object *fo:le* is because it targets the ϕ -max. This mismatch further suggests that the penultimate lengthening we observe in the pre-nominal adjective *ma-ntsó:ngó* 'small' in (7b) could be due to a ϕ -max boundary that matches the FocP in the syntax.

- (15) a. Vá-xávéla xí-phúkúphúku fo:le
SM2-buy.for 7-fool 5.tobacco

PI: ${}_i(\phi(\underline{v\acute{a}}\text{-xavela } \phi(\text{xi-phukuphuku})_{\phi} \phi(\text{fole})_{\phi})_{\phi})_i$
 PO: ${}_i(\phi(\phi(\underline{v\acute{a}}\text{-x\acute{a}v\acute{e}l\acute{a}} \text{ x\acute{i}}\text{-ph\acute{u}k\acute{u}ph\acute{u}k\acute{u}})_{\phi} \text{ fo:le})_{\phi})_i$

‘They buy tobacco for a fool’ (originally from [Kisseberth 1994](#), p. 148)

- b. Ni-nyíká mú-nhu nya:ma
 SM1SG-give 1-person 9.meat

PI: ${}_i(\phi(\text{ni-ny\acute{i}ka } \phi(\text{mu-nhu})_{\phi} \phi(\text{nyama})_{\phi})_{\phi})_i$
 PO: ${}_i(\phi(\phi(\text{ni-ny\acute{i}k\acute{a}} \text{ m\acute{u}}\text{-nhu})_{\phi} \text{ nya:ma})_{\phi})_i$

‘I give someone meat’ (originally from [Kisseberth 1994](#), p. 148)

- (16) a. STRONGSTART(ϕ)

Assign a violation mark when a prosodic constituent ϕ begins with a leftmost daughter constituent π_n which is lower in the prosodic hierarchy than the constituent π_{n+1} that immediately follows. ([Lee and Selkirk 2022](#), p. 361)

- b. DEP(ϕ, H)

Assign a violation mark when a constituent ϕ of phonological output (PO) is not present in the phonological input (PI). No insertion of ϕ ([Lee and Selkirk 2022](#), p. 361)

H tone spreading patterns show dialectal differences as well. In Mozambican Xitsonga ([Kisseberth 1994](#), p. 148), a H tone spreads to the penultimate syllable of the first object, but not beyond, as shown in (17b), which shows that NON-FINALITY is at work at the phonological phrase level. In a dialect from Mhinga area, however, H tone may spread until the final syllable of a phonological phrase (17a). Although the application of NON-FINALITY at different levels displays different H tone spreading patterns, the penultimate lengthening pattern holds in both dialects. Only the penultimate syllable before a higher prosodic phrase boundary is lengthened.

- (17) a. $\underline{V\acute{a}}\text{-x\acute{a}v\acute{e}l\acute{a}} \text{ x\acute{i}}\text{-ph\acute{u}k\acute{u}ph\acute{u}k\acute{u}} \text{ fo:le}$
 SM2-buy.for 7-fool 5.tobacco
 PO: ${}_i(\phi(\phi(\underline{v\acute{a}}\text{-x\acute{a}v\acute{e}l\acute{a}} \text{ x\acute{i}}\text{-ph\acute{u}k\acute{u}ph\acute{u}k\acute{u}})_{\phi} \text{ fo:le})_{\phi})_i$

‘They buy tobacco for a fool’ (speech of a speaker from Mhinga, Limpopo)

- b. $\underline{V\acute{a}}\text{-x\acute{a}v\acute{e}l\acute{a}} \text{ x\acute{i}}\text{-ph\acute{u}k\acute{u}ph\acute{u}k\acute{u}} \text{ fo:le}$
 SM2-buy.for 7-fool 5.tobacco
 PO: ${}_i(\phi(\phi(\underline{v\acute{a}}\text{-x\acute{a}v\acute{e}l\acute{a}} \text{ x\acute{i}}\text{-ph\acute{u}k\acute{u}ph\acute{u}k\acute{u}})_{\phi} \text{ fo:le})_{\phi})_i$

‘They buy tobacco for a fool’ (originally from [Kisseberth 1994](#), p. 148)

In [Lee and Riedel \(2021\)](#), quantitative data of penultimate lengthening in DPs with a single modifier is examined. A focused element preceding the head noun in a DP displays penultimate lengthening, while the head noun in an unmarked order (Noun-modifier) does not have a lengthened penultimate syllable, suggesting that penultimate lengthening serves as a diagnostic tool for focused elements in Xitsonga. As suggested by the prosodic phrasing in (10), the Foc-marked phonological phrase that matches with a FocP in the syntax shows penultimate lengthening.

3. Recursion and Flexible Word Order in Xitsonga

The data we present in this section come from a Xitsonga-speaking trained linguist in his late 40s from Giyani (Limpopo, South Africa). DPs with two modifiers in unmarked order (nominals followed by modifiers) were created by him. The order of the modifiers was then varied by the first author to create a scrambled order of DP-internal elements. The speaker judged that the word order of all the sentences was acceptable, with remarks that marked word order displays focus effects on modifiers in the non-canonical position(s). In complex DPs, with a quantifier and an adjective in (18) and a numeral and an adjective in (21) modifying the noun (which here appears as the object), the Xitsonga consultant allowed all possible orders of modifiers, including for all of the nominal modifiers to appear

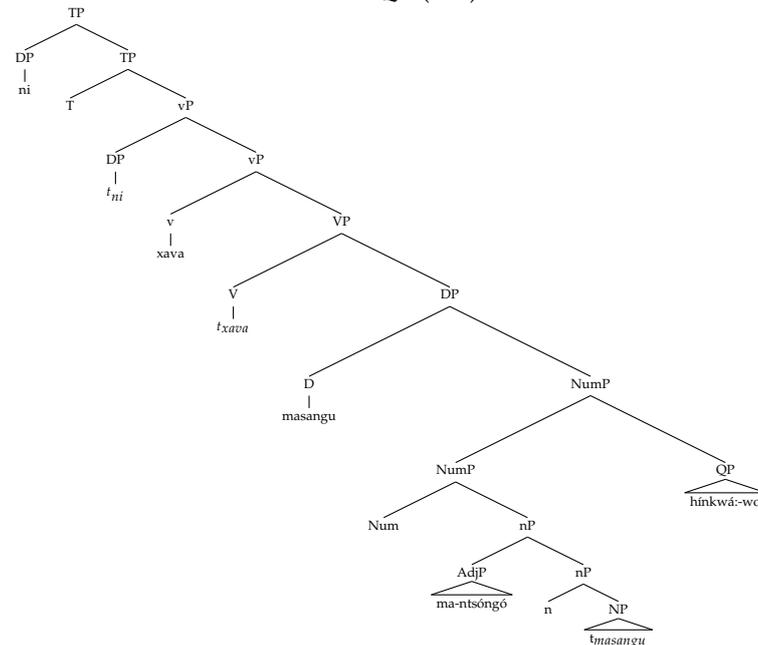
in pre-nominal position (18e,f). The data in the rest of the paper are based on the recording of the list by the consultant.

In (18), the complex DP has a head noun followed by an adjective (a lexical word) and a quantifier (a functional word). The final prosodic word in each example shows penultimate lengthening as it appears before a higher prosodic phrase boundary. In the unmarked order in a complex DP, as shown in (18a), the last prosodic word *hínkwá-wo* (the quantifier) occurs with penultimate lengthening. When the quantifier (18b) precedes the adjective in the post-nominal position, both the quantifier and the adjective display penultimate lengthening. When the adjective precedes the head noun and the quantifier as in (18c,d), the adjective is focused, displaying penultimate lengthening. Although not being part of the penultimate lengthening domain, the element immediately following the focus phrase is also focused according to our consultant. In (18c), both the adjective and the head noun are focused, while the adjective and the quantifier are focused in (18d). In (18e) and (18f), the quantifier that appears in the DP-initial position shows penultimate lengthening. Item (18e) has focus interpretation on the quantifier and the head noun, whereas all DP elements are focused when the DP-internal elements appear in a reverse order from the unmarked order as in (18f).

- (18) a. Ni-xava ma-sangu ma-ntsóngó ⁺hínkwá:-wo
 SM1S-buy 6-sleeping.mat 6-small all-6
 PO: ${}_i(\phi(\phi(\text{ni-xava ma-sangu})_\phi \phi(\text{ma-ntsóngó } ^+\text{hínkwá:-wo})_\phi)_\phi)_i$
 ‘I buy all small sleeping mats’ (unmarked word order: N-Adj-Q)
- b. Ni-xava ma-sangu hínkwá:-wo ma-⁺ntsóngó
 SM1S-buy 6-sleeping.mat all-6 6-small
 PO: ${}_i(\phi(\phi(\text{ni-xava ma-sangu})_\phi \phi(\phi(\text{hínkwá:-wo})_{\text{-FocP}} \text{ma-}^+\text{ntsóngó})_\phi)_\phi)_i$
 ‘I buy ALL small sleeping mats’ (marked word order: N-Q-Adj)
- c. Ni-xava ma-ntsóngó má-sangu ⁺hínkwá:-wo
 SM1S-buy 6-small 6-sleeping.mat all-6
 PO: ${}_i(\phi(\phi(\text{ni-xava } \phi(\text{ma-ntsóngó})_{\text{-FocP}})_\phi \phi(\text{má-sangu } ^+\text{hínkwá:-wo})_\phi)_\phi)_i$
 ‘I buy all SMALL SLEEPING MATS’ (marked word order: Adj-N-Q)
- d. Ni-xava ma-ntsóngó ⁺hínkwá-wo ma-sa:ngu
 SM1S-buy 6-small all-6 6-sleeping.mat
 PO: ${}_i(\phi(\phi(\text{ni-xava } \phi(\text{ma-ntsóngó})_{\text{-FocP}})_\phi \phi(^+\text{hínkwá-wo ma-sa:ngu})_\phi)_\phi)_i$
 ‘I buy ALL SMALL sleeping mats’ (marked word order: Adj-Q-N)
- e. Ni-xava hínkwá:-wo ma-sangu ma-⁺ntsóngó
 SM1S-buy all-6 6-sleeping.mat 6-small
 PO: ${}_i(\phi(\phi(\text{ni-xava } \phi(\text{hínkwá:-wo})_{\text{-FocP}})_\phi \phi(\text{ma-sangu ma-}^+\text{ntsóngó})_\phi)_\phi)_i$
 ‘I buy ALL small SLEEPING MATS’ (marked word order: Q-N-Adj)
- f. Ni-xava hínkwá:-wo ma-⁺ntsóngó má-sá:ngu
 SM1S-buy all-6 6-small 6-sleeping.mat
 PO: ${}_i(\phi(\phi(\text{ni-xava } \phi(\text{hínkwá:-wo})_{\text{-FocP}})_\phi \phi(\text{ma-}^+\text{ntsóngó má-sá:ngu})_\phi)_\phi)_i$
 ‘I buy ALL SMALL SLEEPING MATS’ (marked word order: Q-Adj-N)

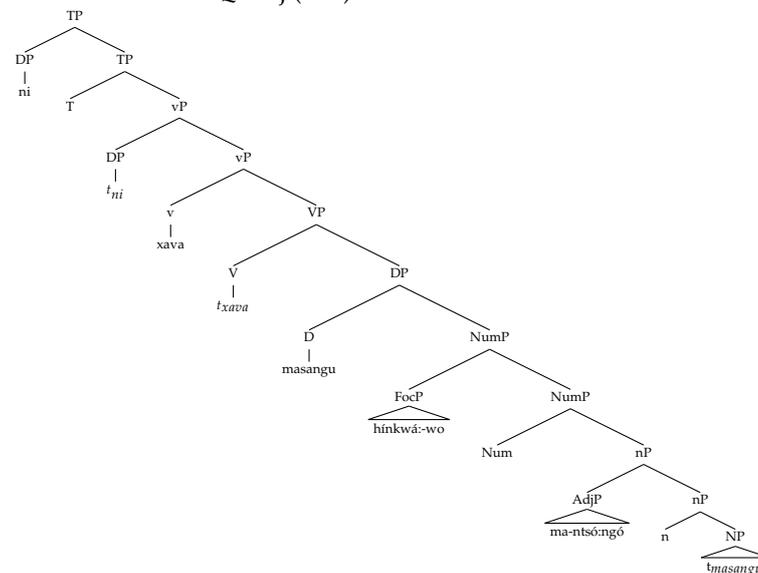
Following Carstens (2008) and Clemens and Bickmore (2021), we assume that DP modifiers such as adjectives, numerals and demonstratives can adjoin to the left or right and we extend this to quantifiers such as *hínkwá-wo* ‘all (-NC6)’. In the case of quantifiers, the unmarked position, as shown in (18a), is for the quantifier (QP) to be right-adjoined, as shown in (19).

(19) Unmarked attachment site for QP (18a)



The marked position of the quantifier is derived by left-adjunction to NumP which we assume like DP has a FocP, as shown in (20). Any single DP modifier that moves and is merged in this position is prosodically marked with PL.

(20) Marked order N Q Adj (18b):



The data in (21) and (22) show Xitsonga DPs with two lexical modifiers. This pattern is more complex when details of the word order of the DP with two adjective-like modifiers (an adjective and an adjective-like numeral), as in (21), are considered. In all examples in (21) and (22), the final prosodic word shows penultimate lengthening and is followed by a prosodic boundary. In (21a), penultimate lengthening occurs on the phrase-final prosodic word in the unmarked order. In (21b), after the head noun, the adjective precedes the numeral; the adjective is focused and shows penultimate lengthening. The free ordering of the elements in Xitsonga DPs creates additional possible orders. In (21c), the initial prosodic word is the adjective *mantsóngó* ‘small’ and in (21d), the initial prosodic word is the numeral *mambirhí* ‘two’. In these examples, the fronted prosodic word is in a focused position in the syntax and the prosody inherits the focus marking. The fronted element is focus-marked and it is realized with the penultimate lengthening pattern.

- (21) a. Ni-xava ma-sangu ma-mbirhí ma-¹ntsó:ngó
 SM1S-buy 6-sleeping.mat 6-two 6-small
 PO: ${}_i(\phi(\phi(\text{ni-xava ma-sangu})_\phi)_\phi)_i(\text{ma-mbirhí ma-}^1\text{ntsó:ngó})_\phi)_i$
 ‘I buy two small sleeping mats’ (unmarked word order: N-Num- Adj)
- b. Ni-xava ma-sangu ma-ntsó:ngó má-mbi:¹rhí
 SM1S-buy 6-sleeping.mat 6-small 6-two
 PO: ${}_i(\phi(\phi(\text{ni-xava ma-sangu})_\phi)_\phi(\phi(\text{ma-ntsó:ngó})_{\phi-\text{FocP}} \text{ má-mbi:}^1\text{rhí})_\phi)_i$
 ‘I buy two SMALL sleeping mats’ (marked word order: N-Adj-Num)
- c. Ni-xava ma-ntsó:ngó má-sangu ma-mbi:¹rhí
 SM1S-buy 6-small 6-sleeping.mat 6-two
 PO: ${}_i(\phi(\phi(\text{ni-xava } \phi(\text{ma-ntsó:ngó})_{\phi-\text{FocP}})_\phi)_\phi(\text{má-sangu ma-mbi:}^1\text{rhí})_\phi)_i$
 ‘I buy two SMALL SLEEPING MATS’ (marked word order: Adj-N-Num)
- d. Ni-xava ma-mbi:rhí ma-¹ntsó:ngó ma-sa:ngu
 SM1S-buy 6-two 6-small 6-sleeping.mat
 PO: ${}_i(\phi(\phi(\text{ni-xava } \phi(\text{ma-mbi:rhí})_{\phi-\text{FocP}})_\phi)_\phi(\text{ma-}^1\text{ntsó:ngó ma-sa:ngu})_\phi)_i$
 ‘I buy TWO SMALL SLEEPING MATS’ (marked word order: Num-Adj-N)

The last two examples in (22) are puzzling because no penultimate lengthening is observed on the fronted prosodic words, different from the exceptionless examples in (18), in which one of the modifiers is a quantifier. The absence of penultimate lengthening in the surface pattern suggests that these two orders do not involve a focus phrase. The difference in these two examples compared to the ones in (21) lies in the position of the adjective in relation to the numeral-noun grouping. We speculate that Xitsonga has a preference for prosodically phrasing the numeral and the noun together when they appear in that order. We postulate that Xitsonga may permit scrambling that generates the marked word orders in (22), which is less constrained by the syntax. Movement to FocP triggers penultimate lengthening, but scrambling movement does not.

- (22) a. Ni-xava ma-ntsó:ngó má-mbi:¹rhí má-sá:ngu
 SM1S-buy 6-small 6-two 6-sleeping.mat
 PO: ${}_i(\phi(\phi(\text{ni-xava ma-ntsó:ngó})_\phi)_\phi(\text{má-mbi:}^1\text{rhí má-sá:ngu})_\phi)_i$
 ‘I buy TWO SMALL sleeping mats’ (marked word order: Adj-Num-N)
- b. Ni-xava ma-mbirhí má-sá:ngu ma-¹ntsó:ngó
 SM1S-buy 6-two 6-sleeping.mat 6-small
 PO: ${}_i(\phi(\phi(\text{ni-xava } \phi(\phi(\text{ma-mbirhí má-sá:ngu})_\phi)_\phi)_\phi)_i(\text{ma-}^1\text{ntsó:ngó})_\phi)_i$
 ‘I buy TWO small SLEEPING MATS’ (marked word order: Num-N-Adj)

The same level of word order freedom as for DP objects is observed with DPs in subject position, as shown in (23a) with unmarked order and in (23b) with the marked order. When a complex DP appears in the preverbal position, the final prosodic word (in these examples, the verb) shows penultimate lengthening. The fronted modifier in (23b) shows penultimate lengthening because it is a ϕ -max that corresponds to a ϕ -FocP in PI, which matches FocP in the syntax. The fronted modifier *hínkwá-wo* ‘all-6’ is not realized with penultimate lengthening, showing that not all fronted modifiers automatically undergo penultimate lengthening. Instead, *hínkwá-wo* and the noun form a phonological phrase. The final word in the subject is realized with penultimate lengthening when the complex DP is in the unmarked word order (23a), whereas this penultimate lengthening is not observed when a complex DP shows marked word order (23b). We assume the subject DP is generated in Spec vP and moves to Spec TP (or an equivalent projection) for agreement. Unlike the object DP, the subject projects its own ϕ in the unmarked case (23a). However, when the subject DP includes a focused element which projects its own ϕ -FocP the rest of the subject DP is phrased with the verb rather than in its own ϕ -max (23b). The unmarked phrasing of the subject DP and the realization of different sizes of prosodic phrases for different types of lexical categories are somewhat reminiscent of what Rolle and Hyman (2018) discuss of

the Bantu language Makonde (P23) as ‘prosodic smothering’. However, in Xitsonga, the linear order of elements plays a role in this also.

- (23) a. Ma-sangu ma-ntsóngó hínkwá:-wo ⁺má-tá-dú:rhá
 6-sleeping.mat 6-small all-6 SM6-FUT-be.expensive
 PO: $:(\phi(\phi(\text{ma-sangu ma-ntsóngó})_{\phi} \text{hínkwá:-wo})_{\phi} \phi(\text{⁺má-tá-dú:rhá})_{\phi})_i$
 ‘All small sleeping mats will be expensive’ (((N Adj) Q) V)
- b. Ma-ntsó:ngó hínkwá:-wo ma-sangu ⁺má-tá-dú:rhá
 6-small all-6 6-sleeping.mat SM6-FUT-be.expensive
 PO: $:(\phi(\text{ma-ntsó:ngó})_{\phi-\text{FocP}} \phi((\phi(\text{hínkwá:-wo ma-sangu})_{\phi} \text{⁺má-tá-dú:rhá})_{\phi}))_i$
 ‘All SMALL sleeping mats will be expensive’ (((Adj) (Q N) V))

In sum, this section has shown that the variable order of DP-internal elements gives rise to varying prosodic realizations. In DPs with two modifiers, an initial head noun forms a phonological phrase with a preceding verb while the following modifiers form their own phonological phrases; penultimate lengthening is absent in the head noun. When one of the modifiers appears in the DP-initial position, that modifier, if focused, is realized with penultimate lengthening, which we propose as being a focus-marked ϕ in PI that matches with a focus phrase (FocP) in the morphosyntax. The unexpected pattern in (22b) without penultimate lengthening needs further investigation, but we assume that the numeral-noun order is preferred as one prosodic phrase. We now turn to analyzing and discussing the relevant structures in more detail.

4. Discussion

4.1. Penultimate Lengthening in Focused Elements of a Complex DP

In Section 3, we showed that Xitsonga displays penultimate lengthening in elements in a DP that are focused in non-final positions. In the final position of the intonation phrase, penultimate lengthening is obligatory due to a higher prosodic phrase boundary, a pattern that is well documented for Bantu languages, including Xitsonga (Kisseberth 1994). This study offers a window into the part of Xitsonga grammar that involves penultimate lengthening in these non-final positions: our proposal is that within a complex DP, penultimate lengthening marks focused elements when FocP is matched to a focused-marked phonological phrase, which is argued to take the status of a ϕ -FOC. The obligatory penultimate lengthening in the sentence-final position is argued to be due to the presence of ϕ -MAX (a ϕ that is not dominated by another ϕ , cf. Ito and Mester 2009)⁵, rather than an intonational boundary. If the source of penultimate lengthening is a specified ϕ (either ϕ -FOC or ϕ -MAX), then the distribution of penultimate lengthening in Xitsonga may have a unified source.

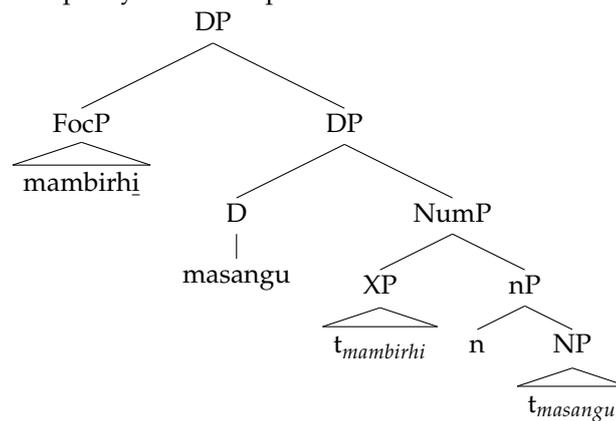
Let us illustrate our analysis with the examples in (24) which feature a complex DP with two modifiers. The unmarked order of the post-verbal complex DP is noun-numeral-adjective. In (24a), the verb and the head noun of the complex DP form a phonological phrase and so do the two modifiers. The prosodic grouping is enforced by the BINARITY constraint in (12c). The two ϕ s form a phonological phrase which is dominated by another ϕ phrase (a ϕ -MAX). Penultimate lengthening occurs in the final word of the ϕ -MAX. When the modifier is moved to FocP in the syntax and the fronted element is a focus-marked ϕ as in (24b), penultimate lengthening is expected. This phrasing violates (STRONGSTART) (cf. 16a), but the violation is forced by a higher-ranked constraint that bans deletion of a focus-marked ϕ .

- (24) a. Ni-xava ma-sangu ma-nhárhu ma-⁺ntsó:ngó
 SM1S-buy 6-sleeping.mat 6-three 6-small
 PO: $:(\phi(\phi(\text{ni-xava ma-sangu})_{\phi} \phi(\text{ma-nhárhú ma-⁺ntsó:ngó})_{\phi})_{\text{MAX-}\phi})_i$
 ‘I buy three small sleeping mats’ ((V N) (Num Adj))
- b. Ni-xava ma-ntsó:ngó ma-sangu ma-⁺nhá:rhu
 SM1S-buy 6-small 6-sleeping.mat 6-three
 PO: $:(\phi(\phi(\text{ni-xava } \phi(\text{ma-ntsó:ngó})_{\phi-\text{FocP}})_{\phi} \phi(\text{ma-sangu ma-⁺nhá:rhu})_{\phi})_{\text{MAX-}\phi})_i$

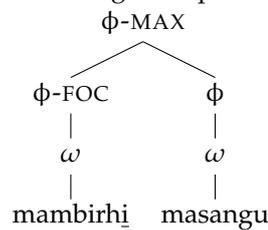
'I buy three SMALL sleeping mats' ((V (Adj)) (N Num))

In the version of the Match Theory in Lee and Selkirk (2022), the phonological input contains prosodic structures matching the morphosyntactic output. For this part, a DP with a single modifier is considered, which is represented in (25) (repeated from (9)). The phonological input of this morphosyntactic output is (26), in which the NumP with phonological null elements is not mapped to any prosodic structures. The D head is a prosodic word ω and the DP is a ϕ and the FocP is also a ϕ , which is marked as ϕ -FOC to distinguish them from other ϕ s. The DP matches with a ϕ -MAX as it is not dominated by another ϕ .

(25) Morphosyntactic Output



(26) Phonological Input from (25)

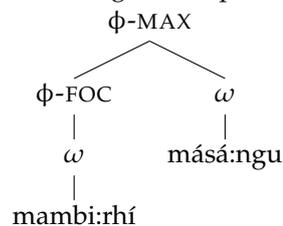


The constraint in (27) prohibits the deletion of a focus-marked phonological phrase, which is enforced by violations of the BINARITY constraint. The phonological output in (28) has the ϕ -FOC, which shows penultimate lengthening.

(27) MAX- ϕ -FOC

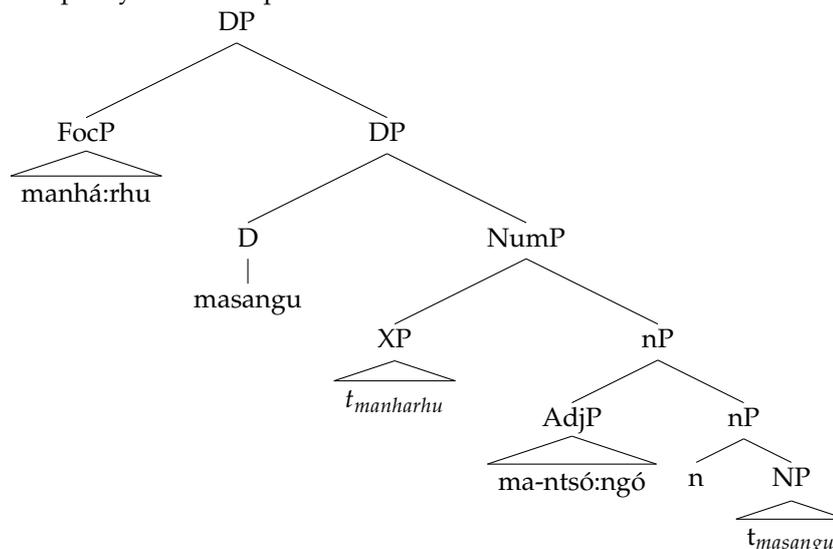
Assign a violation mark when a ϕ -FOC of PI is not present in PO (cf. a specific version of MAX- ϕ in Lee and Selkirk (2022, p. 347))

(28) Phonological Output



The tree in (29) represents the structure of the object DP in (24b).

(29) Morphosyntactic Output



When a complex DP has multiple modifiers, the penultimate lengthening of a fronted modifier such as *ma-ntsó:ngó* ‘small’ in (24b) is due to the pressure to avoid deletion of a Focus-marked ϕ in the input. In the syntax, the fronted modifier is in FocP (see 9) and that information is inherited in a prosodic constituent in the phonological input by focus marking fronted elements with FOC. This proposal is restrictive and only modifiers fronted to the FocP will show penultimate lengthening.

An alternative analysis is that focus-marked phrases show penultimate lengthening due to prosodic promotion (Ishihara 2019) of prosodic words either to an intonational phrase or a ϕ -MAX phrase. This analysis assumes that prosodic words will be promoted to a higher level, but with penultimate lengthening patterns it is not immediately clear which prosodic domain a focus-marked prosodic word would be promoted to or what restricts the promotion of prosodic levels.

4.2. Does Prosody Directly Refer to Syntax?

Whether the prosodic component in the grammar can directly refer to the syntactic output or not has been a subject of debate in the literature about the prosody–syntax interface. We maintain that the prosody only makes indirect reference to the syntax (following Selkirk 2019), but further assume that phonological input includes prosodic structures that mirror morphosyntactic output (following Lee and Selkirk 2022). The penultimate lengthening in the non-final position of Xitsonga complex DPs suggests that this pattern is possible. Penultimate lengthening in the non-final position refers to a syntactic position (i.e., the specifier position of the FOC_{DP} phrase) that is mirrored in the phonological input as a focus-marked ϕ . H tone spreading also shows indirect reference to the syntactic structure; thus, both penultimate lengthening and H tone spreading are only sensitive to prosodic structures that are in the phonological output. If our analysis is on the right track, what we observe in Xitsonga may support the following observation: “prosodic marking of focus in Bantu languages involves the establishment of focus-related phrasal domains that are only indirectly conditioned by focus” (see Downing and Hyman 2016, section 41.3.3).

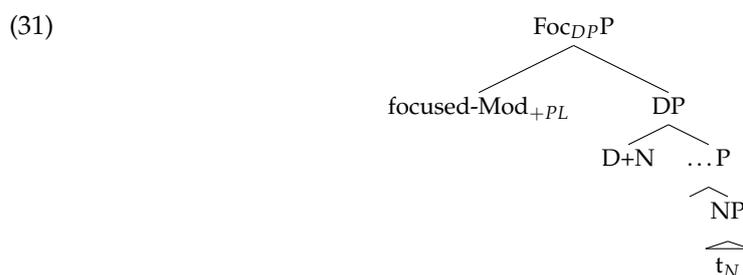
4.3. Implications for Bantu DP Structure

While the left and right adjunction accounts introduced in Section 1.1 can account for some of the flexible word orders in the Bantu DP, they cannot account for more complex DPs in variable orders (e.g., with several adjectives and/or multiple types of quantifiers). Allowing more flexibility requires either a number of FOC and TOP projections (cf. Aboh 2004) or arguing for another type of movement such as scrambling or prosodic movement that applies to ϕ -phrases (as argued for Japanese in Agbayani et al. 2015). We will argue based on phonological data that two of these processes happen in the Xitsonga DP.

Aboh (2004) argues for an extended DP for Gungbe, as in (30), which has focus and topic projections in its left periphery based on the discourse nature of DP distinctions such as definiteness and specificity.

$$(30) \quad [DP[D[TopP[Top[FocP[Foc[NumP[Num[FP...N...]]]]]]]]]]]$$

To account for our data and the rest of Southern Bantu, we proposed a different structure, where $Foc_{DP}P$ is just above D and where partial raising allows for the noun to appear in intermediate positions (which we do not all spell out here). Adjectives, numerals and quantifiers are all phrasal categories and any of these phrases can move to $SpecFoc_{DP}P$ if they are in focus. This kind of structure (shown in 31) can account for the one-to-one match of penultimate lengthening for one modifier in the pre-nominal position. We propose that these “reorderings” which do not affect meaning are caused by scrambling (cf. Hiraiwa 2010).



We have seen that seemingly two types of movement can take place in the Xitsonga DP: movement to single focused-position above D which is available to any DP modifier in Southern Bantu, and another type of movement to lower positions which give rise to the complete flexibility in DP word orders observed in Xitsonga. The second type of movement is not associated with meaning changes, nor with extra penultimate lengthening; therefore, we argue that this is scrambling. One might think that alternative accounts could explain this kind of freedom but, for example, a treatment of most modifiers as relative clauses cannot explain their movement to the pre-nominal position since there is no evidence that Bantu languages allow relative clauses with non-initial heads and an account where these clauses would be headless relatives would not work when an overt noun is present (for overviews of Bantu relative clause syntax, see Henderson 2006; Ngonyani 2001; Zeller 2004).

5. Conclusions

In this paper we presented syntactic evidence from Xitsonga which shows that pre-nominal modifiers have flexible word order in a pattern that appears to be widespread in Southern Bantu languages, refuting the frequent claim that only a single modifier of certain categories may appear pre-nominally in Bantu DPs or that Bantu DPs are always noun or demonstrative/quantifier-initial for this subgroup of Bantu languages. Our Xitsonga data show that in Southern Bantu there are two types of processes causing this: syntactic movement moving a single phrase to $SpecFoc_{DP}P$ and scrambling-type movement creating free order in the post-nominal and pre-nominal domains of the Xitsonga DP. Our prosodic data show that syntactic movement to $SpecFoc_{DP}P$ is mirrored in the phonological input as a focus-marked phonological phrase, which is marked by penultimate lengthening in the output. This focus-marked phrase is linked to focus readings but no other semantic or morphosyntactic effects. We propose that this is due to Xitsonga grammar requiring focus-marked phonological phrases to be overt and therefore they need to avoid deletion due to grammatical pressures such as STRONGSTART and BINARITY. Further research will be needed to see if the focus-marked prosodic phrasing pattern is as consistent across Southern Bantu as the syntactic pattern.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

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Abbreviations

The following abbreviations are used in this manuscript:

4W	fourth word from the end
APW	antepenultimate word
AUG	augment
ASS	associative
CJ	conjoint
DEM	demonstrative
DJ	disjoint
H	high tone
HTS	high tone spread
FUT	future
FV	final vowel
LNK	linker
NEG	negation
OM	object marker (numbers refer to noun class number)
PASS	passive
PERF	perfective
PI	phonological input
PO	phonological output
POSS	possessive
PRES	present tense
PROG	progressive
PST	past
PW	penultimate word
REL	relative marker
SG	(person) singular
SM	subject marker (numbers refer to noun class number)
STAT	stative
UW	ultimate word

Notes

- ¹ As is customary in much of the literature on Bantu languages, we use the so-called Guthrie code to unambiguously identify each Bantu language we refer to in parentheses where we first mention it in the text. We follow the codes as given in (Maho 2009). The data in this paper was created by a native Xitsonga speaker consultant from South Africa. The data is described in more detail in Section 3.
- ² Refer to the appendix sections for the abbreviations used in glosses.
- ³ In fact, Clemens and Bickmore (2021) note that several modifiers can appear prenominal in Rutooro, again as in Southern Bantu. Unfortunately, Clemens and Bickmore include no examples or discussion of these kinds of structures in Rutooro.
- ⁴ The DP in the MSO in (10a) is not matched to a phonological phrase in the PI. In Xitsonga, only lexical phrases in the MSO match to a phonological phrase in the PI. Details of the reasoning can be found in Lee and Selkirk (2022).
- ⁵ We thank an anonymous reviewer for suggesting ϕ -MAX as a possible source for sentence-final penultimate lengthening, alternative to the intonational phrase boundary.

References

- Aboh, Enoch O. 2004. Topic and Focus Within D. *Linguistics in the Netherlands* 21: 1–12. [CrossRef]
- Agbayani, Brian, Chris Golston, and Toru Ishii. 2015. Syntactic and prosodic scrambling in Japanese. *Natural Language & Linguistic Theory* 33: 47–77. [CrossRef]
- Baumbach, E. J. M. 1987. *Analytical Tsonga Grammar*. Pretoria: University of South Africa.
- Bearth, Thomas. 2003. Syntax. In *The Bantu Languages*. Edited by Derek Nurse and Gérard Philippson. London: Routledge, pp. 127–42.
- Bennett, Ryan. 2018. Recursive prosodic words in Kaqchikel (Mayan). *Glossa: A Journal of General Linguistics* 3: 1–33. [CrossRef]
- Carstens, Vicki M. 2008. DP in Bantu and Romance. In *The Bantu-Romance Connection: A Comparative Investigation of Verbal Agreement, DPs and Information Structure*. Edited by Cécile De Cat and Katherine Demuth. Amsterdam: Benjamins, pp. 131–65.
- Clemens, Lauren, and Lee Bickmore. 2021. Attachment height and prosodic phrasing in Rutooro. *Natural Language & Linguistic Theory* 39: 803–42. [CrossRef]
- Creissels, Denis. 2014. The ‘new adjectives’ of Tswana. In *Word Classes: Nature, Typology and Representations*. Edited by Raffaele Simone and Francesca Masini. Amsterdam: John Benjamins.
- Downing, Laura J., and Larry M. Hyman. 2016. Information structure in Bantu. In *The Oxford Handbook of Information Structure*. Edited by Caroline Féry and Shinichiro Ishihara. Oxford: Oxford University Press.
- du Plessis, Jacobus A., and Marianna Visser. 1992. *Xhosa Syntax*. Pretoria: VIA Africa.
- du Plessis, Jacobus A., N. E. Nxumalo, and Marianna Visser. 1995. *Tsonga Syntax*. Number 2 in Stellenbosch Communications in African Languages. Stellenbosch: Stellenbosch University.
- Elfner, Emily. 2012. Syntax-Prosody Interactions in Irish. Ph.D. thesis, University of Massachusetts Amherst, Amherst, MA, USA.
- Elfner, Emily. 2015. Recursion in prosodic phrasing: Evidence from Connemara Irish. *Natural Language and Linguistic Theory* 33: 1169–208. [CrossRef]
- Elfner, Emily. 2018. The syntax-prosody interface: Current theoretical approaches and outstanding questions. *Linguistics Vanguard* 4: 1–14. [CrossRef]
- Goldsmith, John. 1976. Autosegmental Phonology. Ph.D. thesis, MIT, Cambridge, MA, USA.
- Harjula, Lotta. 2004. *The Ha Language of Tanzania*. Cologne: Rüdiger Köppe.
- Henderson, Brent. 2006. The Syntax and Typology of Bantu Relative Clauses. Ph.D. thesis, University of Illinois at Urbana-Champaign, Champaign, IL, USA.
- Hiraiwa, Ken. 2010. Scrambling to the Edge. *Syntax* 13: 133–64. [CrossRef]
- Ishihara, Shinichiro. 2019. Match, layeredness and prosodic monsters. In *Tweets ‘n Grets for Caroline Féry on the Occasion of Her Farewell from Goethe-University Frankfurt*. Edited by Gerrit Kentner, Frank Kügler, Beata Moskal and Stavros Skopeteas. Frankfurt am Main: Institut für Linguistik Goethe-University Frankfurt, pp. 57–61.
- Ito, Junko, and Armin Mester. 2009. The extended prosodic word. In *Phonological Domains: Universals and Derivations*. Edited by Baris Kabak and Janet Grijzenhout. Berlin: Mouton de Gruyter, pp. 135–94.
- Ito, Junko, and Armin Mester. 2012. Recursive prosodic phrasing in Japanese. In *Prosody Matters: Essays in Honor of Elisabeth Selkirk*. Edited by Toni Borowsky, Shigeto Kawahara, Mariko Sugahara and Takahito Shinya. London: Equinox, pp. 280–303.
- Ito, Junko, and Armin Mester. 2013. Prosodic subcategories in Japanese. *Lingua* 124: 20–40. [CrossRef]
- Kanerva, Joni. 1990. *Focus and Phrasing in Chichewa Phonology*. New York: Garland Press.
- Katamba, Francis. 2003. Bantu Nominal Morphology. In *The Bantu Languages*. Edited by Derek Nurse and Gérard Philippson. London: Routledge, pp. 103–20.
- Kisseberth, Charles W. 1994. On Domains. In *Perspectives in Phonology*. Edited by Jennifer S. Cole and Charles W. Kisseberth. Stanford: CSLI, pp. 133–66.
- Kratzer, Angelika, and Elisabeth Selkirk. 2020. Deconstructing information structure. *Glossa: A Journal of General Linguistics* 5: 13. [CrossRef]
- Kubozono, Haruo. 1989. Syntactic and rhythmic effects on downstep in Japanese. *Phonology* 6: 39–67. [CrossRef]

- Kügler, Frank, and Sasha Calhoun. 2020. Prosodic Encoding of Information Structure: A typological perspective. In *The Oxford Handbook of Language Prosody*. Oxford: Oxford University Press. [CrossRef]
- Ladd, D. Robert. 1986. Intonational phrasing: The case for recursive prosodic structure. *Phonology* 3: 311–40. [CrossRef]
- Leben, William. 1973. Suprasegmental Phonology. Ph.D. thesis, MIT, Cambridge, MA, USA.
- Lee, Seunghun J. 2009. H tone, depressors and downstep in Tsonga. In *Selected Proceedings of the 38th Annual Conference on African Linguistics: Linguistic Theory and African Language Documentation*. Edited by Masangu Matondo, Fiona Mc Laughlin and Eric Potsdam. Somerville: Cascadilla Proceedings Project, pp. 26–37.
- Lee, Seunghun J., and Elisabeth Selkirk. 2022. Xitsonga tone: The syntax-phonology interface. In *Prosody and Prosodic Interfaces*. Edited by Haruo Kubozono, Junko Ito and Armin Mester. Oxford: Oxford University Press, pp. 337–73.
- Lee, Seunghun J., and Kristina Riedel. 2021. Pre-nominal DP modifiers and penultimate lengthening in Xitsonga. *Stellenbosch Papers in Linguistics Plus* 62: 107–34. [CrossRef]
- Maho, Jouni. 2009. The New Updated Guthrie List (NUGL): The Web Version. Electronic Document. Available online: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjMgavI_7L_AhX0sIYBHTIEBfsQFnoECAkQAQ&url=https%3A%2F%2Fbrill.com%2Ffileasset%2Fdownloads_products%2F35125_Bantu-New-updated-Guthrie-List.pdf&usg=AOvVaw3QklASjgZxPML6XzX1cSjr (accessed on 13 April 2021).
- Mokoaleli, 'Maseanakoena, Kristina Riedel, and Makoto Furumoto. 2021. Sesotho (S33). In *Descriptive Materials of Morphosyntactic Microvariation in Bantu Vol. 2: A Microparametric Survey of Morphosyntactic Microvariation in Southern Bantu Languages*. Edited by Seunghun Lee, Yuko Abe and Daisuke Shinagawa. Tokyo: Institute for the Study of Languages and Cultures of Asia and Africa (ILCAA).
- Myrberg, Sara. 2013. Sisterhood in prosodic branching. *Phonology* 30: 73–124. [CrossRef]
- Ngonyani, Deogratias S. 2001. Evidence for head raising in Kiswahili relative clauses. *Studies in African Linguistics* 30: 59–74. [CrossRef]
- Rolle, Nicholas, and Larry M. Hyman. 2018. Phrase-level Prosodic Smothering in Makonde. Paper presented at the Annual Meeting on Phonology (AMP), San Diego, CA, USA, 5–7 October.
- Rugemalira, Josephat M. 2007. The Structure of the Bantu Noun Phrase. *SOAS Working Papers in Linguistics* 15: 135–48.
- Sabelo, Nonhlanhla O. 1990. The possessive in Zulu. Master's thesis, University of Zululand, Richards Bay, South Africa.
- Selkirk, Elisabeth. 1986. On derived domains in sentence phonology. *Phonology Yearbook* 3: 371–405. [CrossRef]
- Selkirk, Elisabeth. 2011. The syntax-phonology interface. In *The Handbook of Phonological Theory*, 2nd ed. Edited by John Goldsmith, Jason Riggle and Alan C. L. Yu. Oxford: Wiley-Blackwell, pp. 435–83.
- Selkirk, Elisabeth. 2019. Constituent Matches from Spellout, Mismatches from Phonology. ICPP Handout. Available online: https://www2.ninjal.ac.jp/past-projects/crosslinguistic-studies/prosody/wp-content/uploads/sites/9/2019/10/ICPP2019_Selkirk_abstract.pdf (accessed on 13 April 2021)
- Selkirk, Elisabeth, and Seunghun J. Lee. 2015. Constituency in sentence phonology: An introduction. *Phonology* 32: 1–18. [CrossRef]
- van de Velde, Mark. 2019. Nominal morphology and syntax. In *The Bantu Languages*, 2nd ed. Edited by Mark Van de Velde, Koen Bostoen, Derek Nurse and Gérard Philippson. New York: Routledge.
- Wagner, Michael. 2005. Prosody and Recursion. Ph.D. thesis, MIT, Cambridge, MA, USA.
- Zeller, Jochen. 2004. Relative clause formation in the Bantu languages of South Africa. *Southern African Linguistics and Applied Language Studies* 22: 75–93. [CrossRef]
- Zerbian, Sabine. 2007. A First Approach to Information Structuring in Xitsonga/Xichangana. *SOAS Working Papers in Linguistics* 15: 65–78.
- Zerbian, Sabine, and Manfred Krifka. 2008. Quantification across Bantu language. In *Cross-Linguistic Perspectives on the Semantics of Quantification*. Edited by Lisa Matthewson. Bingley: Emerald, pp. 383–414.

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