

Obligatory CP nominalization in Ndebele

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Abstract. This article argues for the existence of obligatory clausal DP shells: a structure in which an embedded CP is directly dominated by a projection of D. While this structure has been proposed in previous literature, it poses a theoretical problem, since according to one theory of well-formed extended projections, a D head can only occur in the extended projection of a noun (Grimshaw 1991, 2000). A careful investigation of embedded clauses in Ndebele—verb-complement, noun-complement, and relative clauses—points to the conclusion that the grammar must allow base generation of direct clausal DP shells.

Keywords CP nominalization, DP shell, relative CPs, syntax, morphophonology, Bantu, Ndebele.

1 Introduction

This article argues for the existence of obligatory clausal DP shells: a structure in which an embedded CP is directly dominated by a projection of D:

(1) [DP D [CP C ...]]

Proposals according to which CPs are dominated by a nominal layer have appeared in the literature on clausal complementation and nominalization (Rosenbaum 1967; Lees 1965; Davies & Dubinsky 1999, 2001; Aygen 2002; Takahashi 2010; Hartman 2012; Kastner 2015, among others), though they differ in the details of the nominalization structure. Here, I focus on the question of whether the CP and its DP shell are merged directly, as in (1), or whether the structure additionally contains a nominal head such as N or n.

While both types of nominalization structure have been proposed, only the latter is compatible with the theory of extended projections in which the category D is defined as an extended projection of a noun. This characterization of DPs is explicitly stated in Grimshaw 1991, 2000, building on insights about functional categories since Abney 1987. According to this theory, the category D can only be projected from a nominal head, that is, a head introducing the nominal category feature, thus defining the extended projection as nominal. The structure in (1), in which a DP immediately dominates a CP, is then theoretically incoherent, and it is listed in Grimshaw 2000 as an impossible structure. I refer to this structure as a *direct DP shell* throughout this article. Elsewhere in the literature, structures of this type are often referred to as *mixed extended projections* (Borsley & Kornfilt 2000).

Proposals of various types of mixed extended projections are found in the well-known analysis of English poss-*ing* gerunds by Abney (1987) and much later literature on nominalizations (Bresnan 1997; Borsley & Kornfilt 2000; Malouf 2000; Baker 2011; Kornfilt & Whitman 2011; Hankamer & Mikkelsen 2012; Toosarvandani 2014; Kastner 2015, among many others). Nonetheless, explicit arguments that these extended projections are truly mixed (instead of involving covert structure, for instance) are scarce (see, e.g., Borsley & Kornfilt 2000). This article contributes exactly such evidence. On the basis of data from Northern Ndebele, a Bantu language of Zimbabwe

(S44 in the Guthrie classification), I argue that direct DP shells must be allowed by the grammar. A range of facts point to the conclusion that embedded clauses in Ndebele are obligatorily contained in a DP shell without a mediating nominal head.

The argument for the existence of direct DP shells is based on refuting two possible reanalyses of (1). One is the structure in (2), in which a null N intervenes between C and D.

- (2) [DP D [NP N_∅ [CP C . . .]]

This analysis, proposed for instance in Lees 1965, Aygen 2002, and Hartman 2012, does not violate the well-formedness of extended projections, as D is projected from a nominal category. N, being a lexical category, is not subject to the constraints that rule out (1)—it simply c-selects for a CP.

A different treatment of clausal DP shells has been suggested in Hartman 2012, who proposes that clausal arguments are base generated as bare CPs and a DP layer is inserted only in those structural contexts that require a DP (as a last-resort satisfaction of that requirement). This is observed most prominently with sentential subjects, which show nominal properties (unlike complement clauses, in many languages) and have been analyzed as CPs with a nominal layer (Lees 1965; Rosenbaum 1967; Davies & Dubinsky 1999, 2001; Han 2005, among others). Hartman proposes that the DP layer in sentential subjects is the result of last-resort insertion:

- (3) Last-resort insertion of clausal DP shell (Hartman 2012)
A DP shell may be inserted to allow a clausal argument to raise to Spec,TP.

If clausal DP shells are universally the result of such insertion, it becomes dubious whether their existence poses any problem for extended projections. Indeed, the very fact that they cannot be freely base generated can be interpreted as supporting Grimshaw's theory. I show, however, that DP shells in Ndebele do not have a last-resort distribution. Rather, they appear obligatorily in all contexts, suggesting that they are base generated, not inserted as a last resort.

This article consists of two parts. The first part argues for the existence of direct DP shells by refuting the two reanalyses discussed above. Section 2 focuses on verb-complement clauses and argues that a DP layer is present in these contexts and that its distribution does not show the last-resort profile observed in other languages. I conclude that, in the absence of a last-resort distribution, the insertion view of clausal DP shells is untenable for Ndebele. The other reanalysis of the direct-DP-shell structure, in which the CP is a complement to a null noun, is argued against in section 3. The argument is empirical and rather simple: CP complements to nouns are otherwise absent in the language. In other words, constructions in which the null N in (2) has an overt counterpart are not attested, rendering the null-N reanalysis empirically unfounded. Moreover, I argue that the direct-DP-shell hypothesis not only helps us understand the absence of clausal complements to nouns in Ndebele but also helps explain the constructions that we can descriptively call noun-complement clauses in this language: In a nutshell, complement clauses, being externally DPs, cannot directly attach to a projection of a noun—an independent fact of the language. Instead, they are introduced by a functional head, a *linker*. In this respect, noun-complement clauses in Ndebele resemble possessor DPs—both are adnominal phrases of category D and require the linker in order to appear inside a noun phrase.

The robustness of obligatory DP shells in Ndebele embedded CPs is corroborated by the syntax and morphophonology of relative clauses. The second part of the article is a detailed investigation of these constructions, showing that their behavior too is characteristic of DPs. I de-

velop an analysis of relative clauses in Ndebele in which relative CPs are dominated by a DP shell, and I discuss the advantages of this analysis: the structural parallelism of relative CPs with noun-complement clauses and possessor DPs (section 4) and correct predictions about the morphophonology of relative-agreement prefixes (section 5). Regarding the first point, relative clauses, like noun-complement clauses and possessors, are adnominal DPs, and all three are introduced by the same functional head, the linker. As to the second point, the proposed DP-shell hypothesis provides a straightforward derivation of relative-agreement prefixes: with the new assumption that relative clauses contain an overt D head, the otherwise irregular paradigm of agreement prefixes follows from regular phonological rules. The derivation is demonstrated in section 5, where I also discuss its advantages over an existing alternative analysis (Khumalo 1992).

2 Obligatory DP Shells in Ndebele: Against Last-Resort Insertion

This section presents evidence that the external syntax of verb-complement clauses in Ndebele is nominal, and it argues that the nominal shell is base generated rather than inserted as a last resort. The sentence in (4) is an illustration of a clausal DP shell in Ndebele. The D head is realized overtly as the so-called *augment*, a prefix that appears on all nominal elements in the language. The augment *u-* is prefixed on the complementizer *kuthi*.¹

- (4) Ngicabanga [DP u- [CP kuthi usukile]].
 1SG.thought AUG COMP 1.left
 ‘I thought that (s)he left.’

A similar structure has been proposed for sentential subjects, which, in some languages, differ from sentential objects in showing nominal properties (Lees 1965; Rosenbaum 1967; Davies & Dubinsky 1999, 2001; Han 2005, among others). In some languages, this contrast is reflected morphologically. In Polish, for instance, sentential subjects must be introduced by a demonstrative, as in (5-a), while clausal complements are impossible with a demonstrative, as shown by (5-b).

- (5) a. *(To) że Marek wyjechał zostało powiedziane jasno. Polish
 DEM that Marek left was said clearly
 ‘That Marek left was said clearly.’
- b. Powiedziałam (*to) że Marek wyjechał.
 said.1SG DEM that Marek left.
 ‘I said that Marek left.’
- c. Powiedziałam to.
 said.1SG DEM
 ‘I said this.’

¹ Unless otherwise noted, all Ndebele data come from the author’s fieldwork.

This article follows the Leipzig glossing rules. Other abbreviations used: 1 (etc.) = class 1 nominal prefix, 1.AUG (etc.) = class 1 augment, 1.SBJ (etc.) = class 1 subject-agreement prefix, 1SG.SBJ (etc.) = first-person singular subject-agreement prefix, 1.OBJ (etc.) = class 1 object-agreement prefix, 1SG.OBJ (etc.) = first-person singular object-agreement prefix, 1.REL (etc.) = class 1 relative-agreement prefix, DSJ = disjoint, LNK = linker, SP = subject (-agreement) prefix, TAM = tense/aspect/mood.

Taking the overt demonstrative as an indication of a nominal shell, we observe that the clausal subject requires a DP shell, while the complement clause in (5-b) disallows it—it must be a bare CP. The latter fact is of importance here: as we see in (5-c), the matrix verb ‘say’ *can* take DP objects, suggesting that the impossibility of a DP shell in (5-b) is not due to selectional properties of the matrix verb. Assuming that clausal arguments can be base generated with a DP shell, it is unclear what precludes the clausal DP shell in the object position.

Hartman (2012) presents paradigms like (5) as a key argument for a last-resort-insertion view of clausal DP shells; see (3) above. In this view, a clausal argument is base generated as a bare CP. A DP layer is inserted if and only if it secures convergent derivation; for instance, when a clause moves to a subject position, a DP layer is inserted to satisfy the requirement that Spec,TP be filled by a DP. Hartman suggests that another context for such last-resort insertion is oblique positions; for example, in Russian or Greek, clausal objects of prepositions (and clauses appearing in other oblique case positions) require a DP layer (which in those languages is morphologically overt). In sum, the last-resort-insertion view accounts for the fact that clausal DP shells are often in complementary distribution with bare CPs and that they are not freely generated, even in contexts that otherwise allow DPs (cf. (5-b) and (5-c)).

Ndebele embedded clauses show a range of nominal properties, listed in (6), but none of them can be characterized as having a last-resort distribution. I discuss each property in turn, with an emphasis on the obligatory nature of the nominal layer.

- (6) Nominal properties of verb-complement clauses in Ndebele
1. Clausal complements control object agreement on the matrix verb.
 2. The complementizer consists of the complementizer root and a determiner.
 3. Clausal complements can bear oblique case morphology.
 4. Coordination of clausal complements requires a nominal-conjunction marker.
 5. Clauses can be objects of prepositions.
 6. Clausal subjects are allowed and have the same form as clausal objects.

2.1 Clausal Complements Control Object Agreement on the Matrix Verb

Complement clauses behave like nominal objects in that they control object agreement. Consider the parallel between the nominal object in (7-a), class 15 *ukudla* ‘food’, and the clausal complement in (7-b). Both trigger the appearance of a class 15 object marker *ku-*.

- (7) a. Ngi-*(ya)-**ku**-funa ukudla.
1SG.SBJ-DSJ-15.OBJ-want 15.food
‘I want food.’
- b. Ngi-*(ya)-**ku**-funa ukuthi uZodwa a-pheke.
1SG.SBJ-DSJ-15.OBJ-want 15.COMP 1.Zodwa 1.SBJ-cook
‘I want Zodwa to cook.’

Object marking in Ndebele requires dislocation of the object—a common correlation in Bantu languages (Baker 2003a; Carstens 2005). Dislocation of the object in (7-a) is marked by the prefix *ya-* on the matrix verb (the so-called *disjoint form*). As shown in (7-b), object marking of a clausal complement requires the disjoint form as well. Thus, object marking of clausal complements obeys

the same dislocation requirement observed with nominal objects.²

2.2 The Complementizer Consists of the Complementizer Root and a Determiner

Etymologically, the complementizer *ukuthi*, as shown in (8), is a nominalization of the verb ‘say’: it consists of the verb stem *thi*, a class prefix *ku-*, and the augment *u-*.³ The class prefix and an agreeing augment are typical nominal morphology in Bantu languages (Katamba 2003).

- (8) u- ku- thi
 15.AUG- 15- say
 ‘saying/to say’

The view that the augment is a property of the nominal category is uncontroversial. It is evident not only from its distribution but also from semantics: the presence of an augment typically co-occurs with definiteness, referentiality, and specificity. The lack of an augment, on the other hand, corresponds to the interpretation of narrow-scope indefinites (Progovac 1993; Carstens & Mletshe 2015). For this reason, the augment in Bantu has been treated as a type of determiner (Ziervogel 1967; von Staden 1973; Giusti 1997; de Dreu 2008; Visser 2008; Taraldsen 2010; Buell & de Dreu 2013). I will follow this standard treatment and assume that the augment is an exponent of D that covaries with the noun class of the nominal root.⁴ ϕ -features on D are valued by agreement with the noun. The D head is then spelled out as the augment of the relevant class, for example *i-* for class 9:

- (9) i-nja ‘the dog’: [DP D $_{\phi:9}$ [NP N $_{\phi:9}$]]
 i- nja

The nominal etymology of the complementizer *ukuthi* certainly does not entail nominal syntax of embedded clauses in present-day Ndebele. It is possible—likely, in fact—that the nominalization of ‘say’ has been grammaticalized as a syntactic primitive of category C. There is, nevertheless, syntactic evidence that the complementizer *ukuthi* is not monomorphemic. I argue that it should be decomposed into the augment *u-* and the complementizer root *kuthi*:

- (10) [DP D $_{\phi:15}$ [CP C $_{\phi:15}$. . .]]
 u- kuthi

As with nominal objects, the augment is an exponent of D, which agrees with the class of its complement. In the case of nominal objects, the class features are inherent in the NP complement

² For a similar correlation between object marking and dislocation in Zulu, see for example Adams 2010; Buell 2005; Cheng & Downing 2009; Halpert 2012; Halpert & Zeller 2015; Van der Spuy 1993; Zeller 2012.

³ This complementizer is by far the most common; it introduces both indicative and subjunctive clauses. Other types of complementizers exist (e.g., *ukuze*, *sengathi*), though they are lexically selected by certain embedding predicates and occur only with the subjunctive mood. Indicative clauses only allow *ukuthi*. It remains to be seen if the nominal properties we observe with *ukuthi* clauses are found with the other complementizers.

⁴ Halpert (2012) proposes that the augment in Zulu is a realization of K, rather than D, and there is convincing evidence that the presence of the augment correlates with structural-case licensing. The discussion to follow is entirely independent of this choice. What matters is that the augment realizes some head in the nominal extended projection, be it K or D. For clearer exposition, I will therefore assume that the augment is an exponent of D.

of D. When the complement of D is a CP, as in (10), the augment agrees with the features of the complementizer root *kuthi*, namely class 15. I discuss evidence for the structure in (10) below.

The augment on Ndebele nouns can sometimes be omitted. The distribution of such augmentless nominals is determined by syntactic and semantic factors. Augmentless nouns must occur in the scope of negation and be in a postverbal in situ position,⁵ as illustrated in (11). The augment can be dropped in a negative sentence (11-a), but not in an affirmative one (11-b). Additionally, the object must be in situ rather than dislocated. Dislocation of an object is detected by the presence of an object marker. As we see in (11-c), a dislocated object cannot be augmentless, even in a negative sentence (cf. its nondislocated counterpart in (11-a)).

- (11) a. A-*ngi-funi* [DP (i)-*sinkwa*]. Negation + in situ object
 NEG-1SG.SBJ-want 7.AUG-7.bread
 ‘I don’t want (any) bread.’
- b. *Ngi-funa* [DP *(i)-*sinkwa*]. No negation
 1SG.SBJ-want 7.AUG-7.bread
 ‘I want bread.’
- c. A-*ngi-si-funi* [DP *(i)-*sinkwa*] Negation + dislocated object
 NEG-1SG.SBJ-7.OBJ-want 7.AUG-7.bread
 ‘I don’t want the bread.’

The augment in negative sentences like (11-a) is optional, and its presence or absence corresponds with a semantic difference. A DP with an augment is interpreted with wide scope with respect to negation (i.e., as a definite or a specific indefinite). An augmentless DP must be interpreted as a narrow-scope indefinite (11-a). This semantic contrast is compatible with the hypothesis that the augment is a type of determiner. A possible implementation of augment drop is a postulation of two types of D in Ndebele: the augment and a null morpheme. Their distribution roughly corresponds to what we expect from the definite–indefinite dichotomy.

The initial vowel of the complementizer *ukuthi* can be dropped as well. More importantly, an augmentless complementizer appears exactly in the configurations that license augmentless nominals. If the matrix verb is negated, the complementizer can be augmentless, as in (12-a). When the matrix clause is affirmative, however, the complementizer must have an augment, as shown in (12-b), just like any other object (cf. (11-b)). Finally, the augment cannot be dropped if the clausal complement is dislocated, even if the matrix verb is negated, as in (12-c).

- (12) a. A-*ngi-cabangi* [DP (u)-*kuthi* uSipho u-*za-pheka*].
 NEG-1SG.SBJ-think AUG-15.COMP 1.Sipho 1.SBJ-FUT-cook
 ‘I don’t think Sipho will cook. (I don’t think so at all.)’
- b. *Ngi-cabanga* [DP *(u)-*kuthi* uSipho u-*za-pheka*].
 1SG.SBJ-think AUG-15.COMP 1.Sipho 1.SBJ-FUT-cook
 ‘I think Sipho will cook.’
- c. A-*ngi-ku-cabangi* [DP *(u)-*kuthi* uSipho u-*za-pheka*].
 NEG-1SG.SBJ-15.OBJ-think AUG-15.COMP 1.Sipho 1.SBJ-FUT-cook
 ‘I don’t think Sipho will cook.’

⁵ This characterization is somewhat simplified. For details about licensing augmentless nominals in Zulu, a language with almost identical distribution of the augment, see for example Halpert 2012, 2015.

2.4 Coordination of Clausal Complements Requires a Nominal-Conjunction Marker

Another parallel between clausal arguments and DPs is in the use of conjunction markers. There are two clear cases of coordination in Ndebele: TP coordination, which uses a null conjunction marker, as shown in (15-a), and DP coordination, which requires the conjunction *la* (also functioning as a comitative marker), as in (15-b). The status of VP/vP coordination is unclear since, in most cases, it is difficult to tease apart from TP coordination. Example (15-c) shows that, if VP coordination exists, it uses the null conjunction, like TP coordination. The important generalization in (15) is that DP coordination requires the conjunction *la*, while other types of coordination prohibit it.

- (15) a. [Wena u-dlile] \emptyset /**la* [mina ngi-nathile]. TP coordination
 2SG.PRON 2SG.SBJ-ate & 1SG.PRON 1SG.SBJ-drank
 ‘You ate and I drank.’
- b. UJohn u-dle [_{DP} isuphu] *(**la**) [_{DP} isinkwa]. (> **lesinkwa**) DP coordination
 1.John 1.SBJ-ate 9.soup &- 9.bread
 ‘John ate soup and bread.’
- c. UJohn [_{VP} u-dlile] \emptyset /**la* [_{VP} u-nathile]. VP coordination
 1.John 1.SBJ-ate & 1.SBJ-drank
 ‘John ate and drank.’

The nominal conjunction *la* attaches to the second conjunct DP, creating a vowel hiatus between the conjunction and the augment of the following DP. The morphophonological alternation we observe here is an instance of regular hiatus resolution in the language. The rules for this, also known as vowel-coalescence rules, are listed in (16) and are exemplified in (17) with coordination of different classes of DPs. Vowel coalescence will be relevant again in sections 4 and 5.

(16) Regular hiatus-resolution rules in Ndebele (from Sibanda 2004):

- (i) $a + u \rightarrow o$ (ii) $a + i \rightarrow e$ (iii) $V_\alpha + V_\alpha \rightarrow V_\alpha$

- (17) a. i-nja **la** u-mangoye >inja **lomangoye** $a + u \rightarrow o$
 9.AUG-9.dog & 1.AUG-1.cat
 ‘a dog and a cat’
- b. u-mangoye **la** i-nja >umangoye **lenja** $a + i \rightarrow e$
 1.AUG-1.cat & 9.AUG-9.dog
 ‘a cat and a dog’
- c. a-bafana **la** a-mankazana > abafana **lamankazana** $a + a \rightarrow a$
 2.AUG-2.boy & 6.AUG-6.girl
 ‘boys and girls’

Going back to coordination patterns, embedded clauses behave differently than matrix clauses (and than VPs) in that they do not allow the null conjunction. Instead, they require the marker *la*, as shown in (18), like DPs. The marker *la* and the complementizer *ukuthi* in the second conjunct undergo coalescence, giving rise to the expected surface form *lokuthi*.

- (18) Ngizwe ukuthi uMary uyahlabela **lo**kuthi uJohn udlala ibhola.
 Ngizwe [DP ukuthi uMary uyahlabela] ***(la)** [DP ukuthi uJohn udlala ibhola].
 heard.1SG COMP Mary sings & COMP John plays soccer
 ‘I heard that Mary sings and that John plays soccer.’

The presence of the nominal conjunction *la* in (18) strongly suggests that the conjuncts are DPs. The only other possible analysis of (18) is that the conjuncts are CPs and that CP coordination uses *la*, like DP coordination. This is untenable, however, given that matrix-clause coordination, as in (15-a), only allows the null conjunction. Note that (15-a) is potentially ambiguous: the conjuncts could be either TPs or CPs. What this example shows is that, if CP coordination exists in Ndebele, it does not use the conjunction *la*. Thus, the obligatoriness of *la* in embedded-clause coordination provides evidence that the conjuncts are indeed DPs:

- (19) [VP V [&P [DP u- [CP kuthi . . .]] [&' la [DP u- [CP kuthi . . .]]]]]

2.5 Clauses Can Be Objects of Prepositions

Under the hypothesis that clauses in Ndebele are externally DPs, we expect them to be well-formed objects of prepositions—crucially, without any extra nominal structure. Indeed, clauses headed by *ukuthi* can be objects of prepositions. This is illustrated in (20), with the preposition *nga* ‘about’ attaching directly to the following object and coalescing with its augment. The translations remind us that English clauses contrast with DPs in this respect.

- (20) Clauses as objects of prepositions
- a. Si-khuluma **nga** [DP **u**-muntu omdala]. (> **ngo**-muntu)
 1PL.SBJ-talk about- AUG-1.person old
 ‘We are talking about an old person.’
- b. Si-khuluma **nga** [DP **u**-kuthi abantu babambane]. (> **ngo**-kuthi)
 1PL.SBJ-talk about- AUG-15.COMP people be.united
 ‘We are talking about *(the fact) that people are united.’

2.6 Clausal Subjects Are Allowed and Have the Same Form as Clausal Objects

Recall the contrast in (5) between clausal subjects and objects in Polish, repeated here. A morphologically overt DP layer is seen on clauses in subject positions but not in object positions.

- (21) a. ***(To)** że Marek wyjechał zostało powiedziane jasno. Polish
 DEM that Marek left was said clearly
 ‘That Marek left was said clearly.’
- b. Powiedziałam **(*to)** że Marek wyjechał.
 said.1SG DEM that Marek left.
 ‘I said that Marek left.’

The obligatoriness of a demonstrative in (21-a) is in line with the view of sentential subjects as CPs with a nominal layer (Rosenbaum 1967; Davies & Dubinsky 1999, 2001; Hartman 2012, among others): the nominal shell is necessary here because Spec,TP is a DP position. This restriction

does not hold for complement positions, in which bare CPs may appear. In the current proposal, the augment on the Ndebele complementizer is an exponent of D and is analogous to the Polish demonstrative. This correctly predicts that Ndebele clauses can appear in Spec,TP and that such sentential subjects have the same form as sentential objects (i.e., without any extra nominal morphology), as shown in (22). Note that clausal subjects control class 15 subject agreement.

- (22) **Ukuthi** izitha zi-za-buya **ku**-bal-iw-e e-roof-ini.
 15.COMP 10.enemies 10.SBJ-FUT-come 15.SBJ-write-PASS-PST LOC-roof-LOC
 ‘That enemies were coming was written on the roof.’

2.7 Discussion

Some of the nominal properties of clausal complements discussed above have been observed in other Bantu languages, among them Zulu, a close relative of Ndebele. Halpert (2012) notes that CPs in Zulu behave like nominal arguments in that they control object agreement and can be objects of prepositions.⁶ These facts, however, do not lead Halpert to analyze Zulu embedded clauses as DPs, unlike the proposal made here for Ndebele. An argument for retaining a category difference between clausal and nominal arguments (CP vs. DP) in Zulu is that clauses in this language cannot surface as preverbal subjects, as shown in (23). In Halpert’s analysis, this is a consequence of the inability of CPs to satisfy the EPP feature on T, a problem that does not arise for DP arguments.

- (23) ***Ukuthi** w-a-thatha umhlala phansi **kw**-a-ngi-mangaza. Zulu
 17.COMP 1.SBJ-PST-take 1.sit down 17.SBJ-PST-1SG.OBJ-surprise
 ‘That he retired surprised me.’ (Halpert 2016)

Interestingly, this asymmetry between Zulu and Ndebele clauses correlates with another contrast: unlike in Ndebele, complementizers in Zulu cannot appear without the augment (Claire Halpert, personal communication). The possibility of augment drop in Ndebele clauses is an important argument for the DP-shell analysis: it shows that the clausal periphery contains a true augment, that is, an exponent of D, whose distribution is governed by the general principles regulating the distribution of DPs beyond clausal arguments. Thus, Zulu clauses lack two important DP properties: an active augment and the ability to satisfy the EPP. A possible source of this variation is grammaticalization of the complementizer, augment and all, as C in Zulu. In Ndebele, on the other hand, the augment on *ukuthi* appears to have been analyzed as the head of a DP shell. It remains to be seen what other properties of clauses in the two languages correlate with the asymmetries observed here. I leave this question for future investigation, though I will briefly discuss another plausible correlation in section 3.

A crucial contrast between Polish and Ndebele clausal arguments has to do with the possibility of clausal DP shells in complement positions. The impossibility of a demonstrative in Polish clausal complements exemplifies the generalization made in previous literature that, in some languages, clausal subjects show nominal properties but clausal objects do not (Bresnan 2001; Roberts & Roussou 2003; Hartman 2012). This fact gives rise to patterns of structural complementarity between bare CPs and clauses with a DP shell, such as the pattern in (21), and it underlies the

⁶ See also Bresnan 1995 for a comparison of English and Chichewa clausal arguments. Bresnan concludes that clauses in Chichewa, but not in English, behave like nominals with respect to a number of diagnostics, including the possibility of taking oblique morphology, functioning as true sentential subjects or objects of prepositions.

idea that a clausal DP layer is inserted as a last resort. We have seen, however, that the DP layer in Ndebele clauses does not have a last-resort distribution: it appears in subject and object positions alike, and like other DPs, it is selected by prepositions and replaced by oblique markers. The contexts in which an augment can be dropped are the same for clausal and nominal arguments. For instance, there are no structural positions that allow augmented nominals but require augmentless complementizers (by analogy to the ban on demonstratives on Polish object CPs). I conclude then that clausal DP shells in Ndebele are generated obligatorily—they are not the result of last-resort insertion.

It should be noted that such systematic nominal properties of clauses are found in other languages as well (they are common, e.g., in Altaic languages). The question of why only some languages show last-resort clause nominalization, while others have it systematically, is not the main concern here.⁷ The importance of the present conclusion about Ndebele is that it eliminates one possible reanalysis of a direct DP shell in this language: the last-resort-insertion view in (24-a).

- (24) Two reanalyses of (apparent) direct DP shell [DP D [CP]]
- a. Base generation of CP + last-resort insertion of DP
 - b. [DP D [NP N_∅ [CP C]]]

The question that still remains is whether the base-generated DP shell is indeed *direct* or whether the nominal layer contains a null noun, as in (24-b). This second interpretation of clausal DP shells in Ndebele is refuted in the next section, where I show that the language does not allow CP complementation to nouns in general.

3 Noun-Complement Clauses: An Argument against Null-N Complementation

So far, we have seen morphosyntactic evidence that the initial vowel of the complementizer *u-kuthi* is an active augment and that embedded clauses are dominated by an obligatory DP layer, whose appearance is uniform across different contexts, showing no traces of a last-resort phenomenon. In this section, I consider another alternative to the direct-DP-shell analysis in (25-a), one in which the nominal shell is not a bare DP layer but rather a full nominal projection, containing both an N and a D head, as in (25-b). Under this alternative, the noun has zero pronunciation, but its structural presence ensures well-formedness for the nominal extended projection, which requires the functional head D to be a projection of the category N.

- (25) u-kuthi (15.AUG-15.COMP)
- a. Present proposal: [DP D u- [CP C kuthi]]
 - b. An alternative: [DP D u- [NP N_∅ [CP C kuthi]]]

I show that the null-N alternative receives no support from Ndebele data, as CP complements to nouns are generally unattested in the language. What is more, we will see that the direct-DP-

⁷ A reviewer asks precisely about this typological issue. It is entirely possible that the point of variation is very simple: in some languages clauses are obligatorily nominalized (base generated with a DP layer) while in others they are always base generated as CPs. DP-specific contexts will then require last-resort insertion of a DP shell in the latter language type, but in the former, clauses will readily fit in any distribution frame for a DP, rendering last-resort insertion inapplicable. It remains to be seen what phenomena would correlate with the hypothesized CP/DP-clause parameter. I must leave this interesting question for future work.

shell hypothesis *predicts* the impossibility of true clausal complements to nouns and that it offers a straightforward account of the constructions that we can descriptively call noun-complement clauses in Ndebele.

The main empirical point to be considered here is an asymmetry between verbs and nouns in the ability to take clausal complements: as illustrated by (26), verbs can take clausal complements but nouns cannot.

- (26) a. Ngi-zwe u-kuthi u-ya-m-thanda.
 1SG.SBJ-hear.PST 15.AUG-15.COMP 1.SBJ-TAM-1.OBJ-like
 ‘I heard that she likes him.’
- b. *Ngi-zwe indaba (u)-kuthi u-ya-m-thanda
 1SG.SBJ-hear.PST 9.news 15.AUG-15.COMP 1.SBJ-TAM-1.OBJ-like
 (Intended: ‘I heard the news that she likes him.’)

While the grammaticality of (26-a) is compatible with both the direct-DP-shell view (25-a) and the null-N analysis (25-b), the ungrammaticality of (26-b) is unexpected under the null-N analysis. The latter view involves CP complementation to a noun. The constructed example in (26-b) is what we expect a CP complement of a noun to look like. Assuming the present proposal, in which the augment on the complementizer is an exponent of the D layer, we expect to find the augmentless version of the complementizer in this context. The optional augment is included in (26-b) to show that the impossibility of CP complements to nouns does not depend on section 2’s proposed analysis of the complementizer as bimorphemic. Even if we ignored the evidence given in section 2 and assumed that the augment is part of the complementizer root, the conclusion would still hold: nouns do not take clausal complements the way verbs do.

It is worth noting that our interpretation of the facts in (26) would not change if a different analysis of noun-complement clauses was assumed—in particular, one in which the CP is not a true complement but instead is adjoined to the NP (Moulton 2009):

- (27) [DP D [NP [NP N] [CP C]]]

The difference between the adjunction view (27) and the true-complementation view (25-b) would be string vacuous: in both, we would expect some version of (26-b) to be well formed. Thus, the null-N reanalysis of clausal DP shells in Ndebele makes incorrect predictions.

The argument I presented here against the null-noun analysis is based on the absence of an overt counterpart of such a noun. A potential objection to such an argument is that the absence of an overt counterpart does not logically rule out the possibility of a null-noun structure. While true, this fact brings out a weakness of the theory: given the availability of both null heads and lexical idiosyncrasy, postulation of null categories is never fully falsifiable. Thus, it could be proposed that the ability to take CP complements is an idiosyncratic property of some null noun in Ndebele and that no overt noun has this selectional property. However, an analysis based on idiosyncratic properties of null lexical items is inherently unexplanatory and I discard it on these grounds.

Another potential objection concerns the assumptions I make about DP structure, consisting of only D and N. If we assumed a more articulated structure, we might perhaps identify a more fine-grained distinction between overt nouns and null-noun structures. In (28), I present two alternative implementations of the null-noun analysis that do not seem to pose a problem with respect to the well-formedness of extended projections.

- (28) Alternative implementations of the null-noun analysis [DP D [NP N_∅ [CP C]]
- a. Overt-noun DP: [DP D [NP n [√P √]]
 Clausal DP shell: [DP D [NP n [CP C]]
 - b. Overt-noun DP: [DP D [NP n [NP N]]
 Clausal DP shell: [DP D [NP n [CP C]]

The first possibility is that what I have been notating as N is in fact two projections: an acategorial root and the functional head n, which categorizes the root as nominal. Since n is the first element with a specified category feature, it is the element that starts out the extended projection and defines it as nominal. Suppose that the difference between overt nouns and clausal DP shells is that only the former contain a lexical root. Crucially, they both include n and thus constitute well-formed extended projections with D. The inability of overt nouns to take CP complements could then be modeled as a ban on CP selection by roots, but not by n.⁸ The problem with this account is that it bans both noun-complement and verb-complement clauses. If selection of a CP is done by the root, verb-complement clauses should be impossible, contrary to fact. The asymmetry between nouns and verbs in their ability to take clausal complements is truly about category, and therefore selection must take place at a structural level where category features are available.

The second alternative (28-b) does not run into this problem. Here, the structure contains a lexical nominal head N in place of an acategorial root, so the selectional contrast between nouns and verbs can be determined at this lower level, as a difference between N and V. However, since the category feature is determined lower in (28-b) than in (28-a), n is not the first, and thus defining, element of the extended projection. Rather, it is a functional head in the projection of N, much like D. Thus, the clausal-DP-shell structure offered in (28-b) is problematic for the theory of extended projections in the same way as the simple direct DP shell is. The problem for extended projection I consider here is not tied to a particular category, functional or lexical. It can be formulated more abstractly: it occurs when a nominal shell in a nominalization lacks the head that otherwise starts out and defines a nominal extended projection, whatever that head might be. In what follows, I continue to use the label N for that head in Ndebele, keeping this discussion in mind.

We concluded that CP complementation to null nouns should be impossible given the impossibility of CP complements to overt nouns. On the other hand, a *direct*-DP-shell structure does not make the incorrect prediction that noun-complement clauses should exist in Ndebele. In fact, we will see shortly that the direct-DP-shell hypothesis helps us understand the contrast between nouns and verbs in taking CP complements.

Ndebele exhibits a general ban on adnominals of category D; in other words, DPs cannot attach directly to a projection of a noun. This can be seen, for instance, in possessive constructions, where a bare possessor DP is ungrammatical, no matter what its position is, as shown in (29). Instead, adnominal DPs are introduced by a functional element: the linker *a-*. As we see in (30), the linker covaries with the class of the possessed NP and attaches to the possessor DP, undergoing regular vowel coalescence with its augment.

⁸ A reviewer suggests a further advantage of including n in the structure: in languages with grammatical gender, such as Ndebele, gender features are located on n (Kramer 2015); relatedly, Van der Wal & Fuchs (2018) propose that class prefixes in Bantu languages are exponents of n.

- (29) *{u-mfana} i-mota {u-mfana}
 1-boy 9-car 1-boy
 (Intended: ‘the boy’s car’)
- (30) i-mota y-a-u-mfana (> yomfana)
 9-car 9-LNK-1-boy
 ‘the boy’s car’

The linker *a-* in Ndebele, along with its cognates in Zulu and other related languages, is often referred to as the *associative marker*.⁹ In addition to possessive constructions, it appears in complex NPs with nominal modifiers (e.g., ‘a house of stone’) (Sabelo 1990). Interestingly, noun-complement clauses are possible if they are introduced by a linker:

- (31) a. indaba i- a- [DP u-kuthi u-ya-m-thanda] (> indaba yokuthi . . .)
 9.news 9- LNK- 15.AUG-15.COMP 1.SBJ-TAM-1.OBJ-like
 ‘the news that she likes him’
- b. isizatho s- a- [DP u-kuthi u-sukile] (> isizatho sokuthi . . .)
 11.reason 11- LNK- 15.AUG-15.COMP 1.SBJ-left
 ‘the reason why she left’

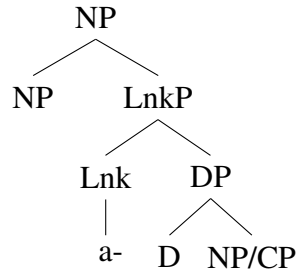
Note that, like with possessives, the linker in (31) agrees with the head noun and coalesces with the augment of the complementizer in the predicted way (the mechanics of linker agreement are discussed at the end of this section). Thus, what we can descriptively call noun-complement clauses in Ndebele are in fact more complex structures in which an adnominal DP is introduced by a functional head, the linker. I propose that the linking structure is the general structure of NP modification by a DP in this language.¹⁰

⁹ It is worth noting here that the term *linker* is not used in a consistent way in the literature. The kinds of functional elements that have been previously referred to as linkers in different languages and constructions include elements inside a vP associating two arguments (a phenomenon found in other Bantu languages, for instance in Kinande: Baker & Collins 2006; Schneider-Zioga 2015a, b), constructions involving predicate inversion (den Dikken 2006), and adnominal phrases broadly (den Dikken & Singhapreecha 2004). Whether all these instances of “linkers” can receive a uniform treatment is far from obvious and I do not commit to a stand on this issue.

¹⁰ As pointed out by a reviewer, this analysis of possessive constructions treats the possessor DP as an adjunct. To be precise, the possessor DP is introduced by an adjunct phrase, the LnkP. Evidence that Lnk-introduced possessors are indeed adjoined to the NP comes from the fact that they can be freely reordered with other adnominals, such as numerals and adjectives:

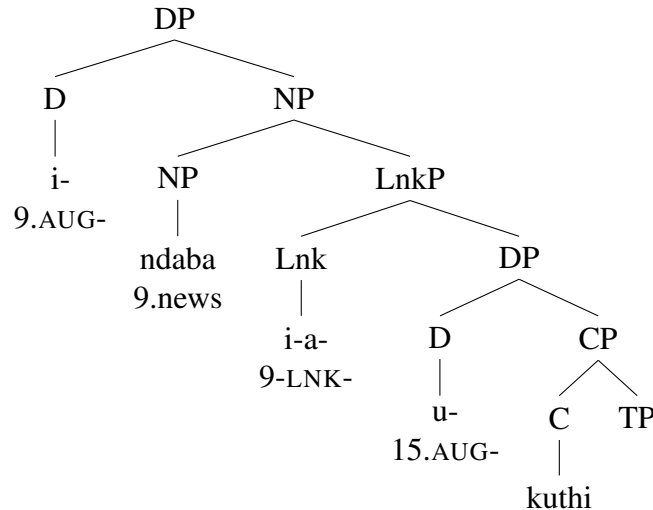
- (32) ‘the boy’s two big dogs’
- a. izinja ezinkulu ezimbili z-a-umfana
 10.dog 10.big 10.two 10-LNK-1.boy
- b. izinja z-a-umfana ezimbili ezinkulu
 10.dog 10-LNK-1.boy 10.two 10.big
- c. izinja ezimbili z-a-umfana ezinkulu
 10.dog 10.two 10-LNK-1.boy 10.big

(33) The syntax of the nominal linker in Ndebele



The obligatoriness of the linker in Ndebele noun-complement clauses strongly supports the view that clauses in this language are obligatorily DPs. The DP complement of the linker may have an NP complement (e.g., when it introduces possessors) or a CP complement (giving rise to a noun-complement clause). Crucially, the external syntax of the linker’s complement is always the same: it is a DP. The full structure of the noun-complement clause in (31-a) is as follows.

(34) The syntax of noun-complement clauses (structure for (31-a))



This analysis of noun-complement clauses is further supported by coordination facts. In particular, possessors and noun-complement clauses are coordinated in the same way: by means of the nominal conjunction *la*. Consider coordination of possessor DPs first:

(35) imoto yomama lobaba Possessor-DP coordination
 i-moto [LnkP **i-a-** [DP **umama**] ***(la)** [DP **ubaba**]]
 9-car 9-LNK- 1.mother & 1.father
 ‘mother and father’s car’

In this case, both conjuncts are clearly DPs and, as expected, the nominal conjunction *la* is required. Additionally, the coordination site is necessarily below the linker.¹¹ In (36), the agreeing

¹¹I propose in section 4.4 that the linker always undergoes lowering onto D. This means that, in coordinated structures, the lowering of the linker takes place into a coordinate structure but does not obey the Coordinate-Structure Constraint (it only attaches to the first conjunct). As the CSC is a syntactic constraint, postsyntactic movement is not expected to induce CSC violations. Even though across-the-board-type lowering has been observed in various

linker is contained in both conjuncts, which results in ungrammaticality, irrespective of whether the conjunction marker is *la* or the null morpheme.

(36) *imoto **yomama (la)yobaba**

*i-moto [L_{lnkP} **i-a-umama**] (**la**) [L_{lnkP} **i-a-ubaba**]
 9-car 9-LNK-1.mother & 9-LNK-1.father
 ('mother and father's car')

Coordination of noun-complement clauses shows exactly the same pattern: the nominal conjunction *la* must be used, and the coordination site is below the linker, that is, at the DP level:

(37) a. indaba **yokuthi** uMary uyahlabela **lokuthi** uJohn udlala ibhola

indaba **i-a-** [DP **ukuthi** uMary uyahlabela] *(**la**) [DP **ukuthi** uJohn udlala ibhola]
 9.news 9-LNK- COMP Mary sings & COMP John plays soccer
 'the news that Mary sings and that John plays soccer'

b. *indaba **yokuthi** uMary uyahlabela (**la**)**yokuthi** uJohn udlala ibhola

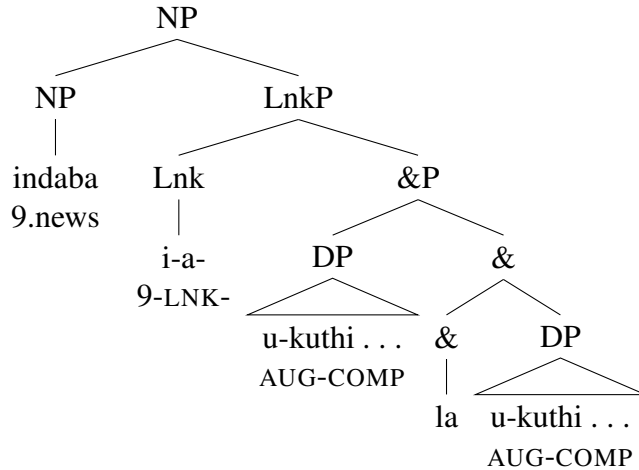
*indaba [L_{lnkP} **i-a-ukuthi** uMary uyahlabela] (**la**) [L_{lnkP} **i-a-ukuthi**
 9.news 9-LNK-AUG-COMP Mary sings & 9-LNK-AUG-COMP
 uJohn udlala ibhola]
 John plays soccer
 (Intended: 'the news that Mary sings and that John plays soccer')

Notice that the complementizers introducing each conjunct in (37-a) have different surface forms. The first instance of *ukuthi* is preceded by the inflected linker; they coalesce into *yokuthi*). The complementizer in the second conjunct is not preceded by *ya*; rather, it only coalesces with the preceding conjunction *la* to form *lokuthi*.

The linker analysis correctly derives only one instance of agreement in both possessives and noun-complement clauses. The agreement prefix is on the linker, which attaches to the leftmost conjunct but syntactically is not included in the coordination:

languages and constructions, there is evidence that syntactic and postsyntactic movement behave differently with respect to the CSC (Adger 1997; Wojdak 2008; Robinson 2008). In the present discussion of Ndebele, lowering of the linker is necessary given the impoverishment analysis of linker agreement: ϕ -features on Lnk are deleted after lowering to T. While more evidence is needed to determine how lowering works in coordinate structures in Ndebele, the lowering analysis is compatible with all my data involving coordination. A similar question arises for the conjunction *la*; again, more data is needed to see if it indeed lowers onto the second conjunct.

(38) N-complement-clause coordination



A consequence of this analysis of noun-complement clauses is that the surface shape of the complementizer in these constructions (e.g., *yokuthi* instead of *ukuthi*) is derived by regular vowel-hiatus-resolution rules. The agreeing linker coalesces with the DP-shell augment:

(39) $[[_{\text{Lnk}} \text{ i-a-}] [[_{\text{D}} \text{ u-}] [_{\text{C}} \text{ kuthi}]]] \rightarrow \text{yokuthi}$

The fact that the complementizer, in its surface form, covaries with the noun class of the head noun is not analyzed as syntactic complementizer agreement. The locus of syntactic agreement is on the linker, which attaches to C,¹² creating what looks like an agreeing complementizer.

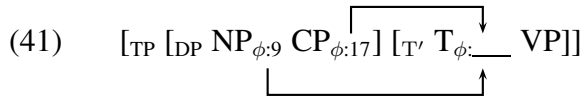
While that appears to be the correct analysis for Ndebele, Zulu seems to have developed a true agreeing complementizer in this context: the complementizer in Zulu noun-complement clauses looks the same as in Ndebele (it covaries with the head noun), but the presence of a DP shell and of a linking structure is doubtful. Recall the discussion of Zulu and Ndebele verb-complement clauses in section 2, where we observed two asymmetries between those languages that likely correlate with the presence or absence of a DP shell: the possibility of sentential subjects in Ndebele but not in Zulu and the possibility of augment drop on the complementizer in Ndebele but not in Zulu. If Zulu embedded clauses indeed lack a DP shell, as those facts suggest, and they are instead bare CPs, perhaps the linking syntax is not necessary in noun-complement clauses. If, in turn, there is no linker, the agreeing category must be C.

There is some evidence that noun-complement clauses in these two languages do have different syntax. Halpert (2012, 2015) proposes an analysis of Zulu noun-complement clauses as NP-adjoined CPs. The adjunction relation between the NP and its “complement” CP is argued to be responsible for a type of agreement optionality: when the complex NP is in a subject position, both the NP and the CP can control subject agreement, as illustrated in (40). In Halpert’s analysis, the adjunction relation renders the NP (class 9) and the CP (class 17) equidistant from T, resulting in optionality of agreement controller, shown in (41).¹³

¹²In section 4.2, I provide a more formal implementation of this concatenation. We will see evidence from relative clauses that the linker and the clausal augment undergo morphological lowering onto C.

¹³In more recent work, ? (to appear) proposes a different solution to the agreement optionality in Zulu noun-complement clauses. She assumes that the head noun in such constructions is inserted as a last resort, as in Hartman 2012, which allows the clause to appear in Spec,TP. T can agree with the clause before such insertion, giving rise to

- (40) a. [**Indaba** y-okuthi w-a-thatha umhlala phansi] y-a-ngi-mangaza.
 9.news 9-17.COMP 1.SBJ-PST-take 1.sit down 9.SBJ-PST-1SG.OBJ-surprise
 ‘The news that he retired surprised me.’
- b. [**Indaba y-okuthi** w-a-thatha umhlala phansi] **kw**-a-ngi-mangaza.
 9.news 9-17.COMP 1.SBJ-PST-take 1.sit down 17.SBJ-PST-1SG.OBJ-surprise
 ‘The news that he retired surprised me.’ (Zulu, Halpert 2012:264)



The DP-shell analysis of Ndebele clauses predicts a different agreement pattern. The CP in Ndebele noun-complement clauses is more deeply embedded than the CP in (41): it is introduced by a linker. Since the category adjoined to the head NP is not CP but LnkP, the complementizer and the head noun are not equidistant from T and no optionality is expected. Indeed, agreement with complex NPs in Ndebele is always controlled by the head NP and never by the complement clause:

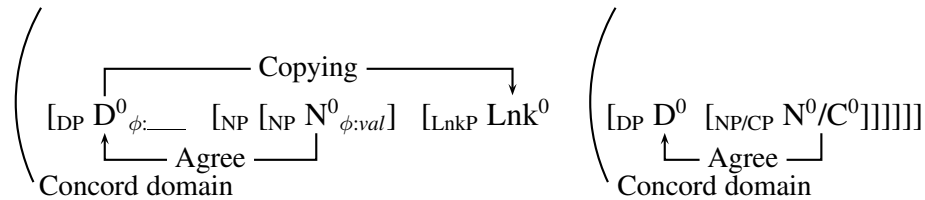
- (42) a. [**Indaba** i-a-ukuthi u-sukile] i-a-ngi-mangalisa. Ndebele
 9.news 9-LNK-15.COMP 1.SBJ-left 9.SBJ-PST-1SG.OBJ-surprise
 ‘The news that she left surprised me.’
- b. *[**Indaba** i-a-**ukuthi** u-sukile] **ku**-a-ngi-mangalisa.
 9.news 9-LNK-15.COMP 1.SBJ-left 15.SBJ-PST-1SG.OBJ-surprise
 ‘The news that she left surprised me.’

Finally, I treat the ϕ -feature covariation between the linker and the NP it adjoins to as an instance of *DP-internal concord*, whereby modifiers and other adnominal elements express the ϕ -features of the nominal head within the same nominal projection. I assume, following Norris 2014, that the highest head in the nominal projection, D,¹⁴ probes its c-command domain for valued number and gender (= class) features. Simplifying, we can say that this Agree operation results in N controlling class agreement on D, as shown in (43). This Agree relation is, according to Norris, the first, syntactic step towards the output of concord. The features collected in D are postsyntactically copied onto lower heads, resulting in the expression of nominal features on adnominal elements, such as numerals, demonstratives, and modifiers. Importantly, feature copying is restricted to a DP domain: features can be transmitted down within a single DP but never past a DP boundary. Linker agreement in Ndebele behaves as predicted by the analysis of Lnk as the head of a modifier: it covaries with the noun it modifies, as in (43), not with the DP it selects.

class 17 agreement, or after insertion of the nominal layer, resulting in agreement with the head noun.

¹⁴To be precise, Norris (2014) takes the domain of nominal concord to be a KP, not a DP, assuming that the highest head in the nominal extended projection is K, not D. Since nothing in my analysis hinges on the K-or-D choice, I will continue to assume D as the highest nominal projection.

(43) DP-internal concord in Ndebele modification structures



The uniformity of possessive constructions and noun-complement clauses proposed here is reflected in identical patterns of linker agreement. The linker covaries with the modified NP in both cases, since it is located in the higher concord domain. This results in linker agreement with the head noun of the complement clause and with the possessed NP. In neither construction is the linker predicted to agree with a controller in its c-command domain (the possessor N or the complementizer), since in both cases the lower controller is inside a different DP and thus in a different concord domain.

In sum, I have argued that the null-noun analysis of clausal DP shells in Ndebele is empirically unfounded, as it incorrectly predicts that CP complements to overt nouns should be attested in this language. The proposal advocated here, that clausal DP shells in this language are obligatory and direct, not only avoids this incorrect prediction but also offers a straightforward explanation of the syntax of Ndebele’s version of noun-complement clauses. Given their DP status and the general impossibility of adnominals of category D, complement clauses to nouns are introduced by the linker, a functional head that also introduces possessor DPs. The uniform treatment of embedded clauses as DPs is key to understanding the parallel between possessive constructions and noun-complement clauses and the asymmetry between verb- and noun-complement clauses. While verbs may directly merge with a DP, nouns require a linking structure to do so. Noun-complement clauses provide an additional argument against the view that the presence of a clausal DP shell is the outcome of a last-resort insertion process that secures a convergent derivation. The insertion of a DP layer in Ndebele noun-complement clauses would not serve such a repair function. While bare CPs are disallowed in adnominal positions, so are DPs. In order to appear as adnominals, they must be introduced by a linker. Thus, clause nominalization in Ndebele is neither a last-resort phenomenon nor a repair mechanism.

This conclusion contributes to the pool of arguments that direct DP shells, or mixed extended projections in general, must be allowed by the grammar. Even though the literature on nominalization abounds with proposals in which a verbal projection is dominated by a nominal functional head, they typically lack a discussion of such structures in the context of extended projections, and consequently the pool of explicit arguments for mixed projections is rather small. Borsley & Kornfilt (2000) present one such argument: they argue that English poss-*ing* gerunds must involve a direct DP shell, without a null noun, since their modifiers are adverbial, while a null noun should trigger an adjectival modifier (*John’s (*repeated) criticizing the book* (‘repeatedly’), 104). This argument is of the same kind as the one presented here: it compares the properties of overt nouns with the properties of the hypothesized null noun. In both English poss-*ing* gerunds and Ndebele complement clauses the conclusion is the same: the absence of overlapping properties argues against the postulation of a null noun.

In the next section, I extend the DP-shell hypothesis to relative clauses and argue that, upon close inspection, they provide further support for the hypothesized obligatoriness of clausal DP shells in Ndebele.

4 DP Shells in Relative Clauses

We concluded in the previous section that bare CPs cannot directly attach to a projection of a noun, either as complements or as adjuncts. Instead, noun-complement clauses, being obligatorily contained in a DP shell, require a linking structure. An immediate question arises as to whether CP adjunction to NP is possible in relative constructions. In this section, I provide a detailed analysis of relative clauses in Ndebele and argue that they do not counter the conclusions we have reached. In particular, I argue that their basic syntax is similar to that of noun-complement clauses and possessive constructions: they are externally DPs and thus require a linker to combine with an NP.¹⁵ Though the nominal status of relative clauses is not immediately transparent from their morphology, we find the crucial characteristics: the presence of a linker and the use of the nominal conjunction in coordination.

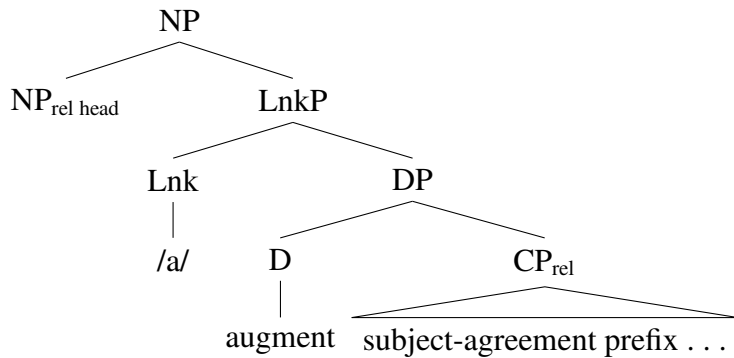
Relative clauses in Ndebele differ from other types of embedded clauses in a number of ways. There are two differences that are immediately relevant here. First, nominal properties of complement clauses can be detected by the morphology of the complementizer (an augment, ϕ -features); relative clauses, on the other hand, lack left-peripheral markers such as a complementizer or relative pronouns, thus lacking a transparent manifestation of a nominal shell. The second difference concerns the morphology of subject-agreement prefixes. Verbs in relative clauses are marked with a special form of subject-agreement prefix, which is called the *relative agreement* or *relative concord* (Doke 1954) in the Bantu literature (Meeussen 1971; Nsuka Nkutsi 1982; Khumalo 1992; Demuth & Harford 1999; Zeller 2004, 2006; Cheng 2006; Henderson 2006, 2007; Van der Wal 2010, among others). Although the two agreement paradigms show some morphological similarity, neither paradigm appears transparently derived from the other, as we see by comparing, for example, the class 7 prefixes in (44-a) and (45-a) with the class 1 prefixes in (44-b) and (45-b).

- (44) Subject agreement
- a. I-si-lwane **si**-yagijima.
7.AUG-7-lion 7.SBJ-run
'The lion is running.'
 - b. U-m-fana **u**-yagijima.
1.AUG-1-boy 1.SBJ-run
'The boy is running.'
- (45) Relative agreement
- a. i-si-lwane **esi**-gijimayo
7.AUG-7-lion 7.REL-run
'the lion that is running'
 - b. u-m-fana **o**-gijimayo
1.AUG-1-boy 1.REL-run
'the boy who is running'

The apparent idiosyncrasy of relative-agreement prefixes is, I argue, a consequence of the present proposal that embedded clauses, including relative clauses, project a DP shell:

¹⁵ Korsah (2017) similarly observes that in Kwa languages, a DP shell is found uniformly in a variety of embedded clauses.

(46) The syntax of relativization in Ndebele



I propose that the morphological composition of the relative-agreement prefix follows from the structure in (46). On this proposal, the relative-agreement prefix is trimorphemic, as shown in (47): it consists of a regular subject prefix and two preceding elements, an exponent of D (the augment) and the linker *a-*. The surface form of relative-agreement prefixes is determined by regular rules of vowel hiatus resolution.

(47) Relative-agreement prefix: the linker *a-* + D (augment) + T (subject agreement)

The subsection to follow develops an analysis of relative clauses, arguing that, like complement clauses, relative clauses are nominalized and involve a linking structure, similar to that found in possessives and noun-complement clauses. In subsection 4.2, I present evidence from coordination supporting this view. Subsection 4.4 focuses on the morphology of relative prefixes and their derivation from the proposed linking structure.

The analysis of relative prefixes proposed in this section gains further support from phonology. The phonological evidence will be discussed in section 5, where I demonstrate that the full paradigm of relative prefixes is derived from the linking structure and regular vowel-coalescence rules. I also consider the advantages of this analysis over an existing alternative (Khumalo 1992).

4.1 The Linking Structure of Relative Clauses

Under the standard analysis, the relative-agreement prefix is bimorphemic, not trimorphemic: it is the result of coalescence of the relative marker *a-* and the agreement prefix on the verb (Khumalo 1992; Demuth & Harford 1999; Zeller 2004, 2006; Cheng 2006; Henderson 2006, 2007, among others):

(48) umfana **o-** gijimayo (< **a-** **u-** gijimayo)
 1.boy 1.REL- run REL- 1.SBJ- run
 ‘the boy who is running’

The decomposition in (48) reveals a syntactic parallel between relative clauses (49-a), possessor DPs (49-b), and noun-complement clauses (49-c):¹⁶ they are all adnominal phrases introduced by the marker *a-*, here analyzed as an adnominal linker. (Note that there is one difference between relative clauses on the one hand and possessives and noun-complement clauses on the other: in

¹⁶Existent accounts of the Zulu marker *a-* in relative clauses treat it as a different morpheme than the marker *a-* in complex NPs, though their unification is suggested in Taraldsen 2010. A unified analysis is also advocated here.

relative clauses there is no agreement prefix on the linker. I return to this asymmetry in subsection 4.4, where I treat the lack of agreement as the result of impoverishment.)

- (49) a. umfana **a-** **u-** gijimayo (> **o-**gijimayo)
 1.boy LNK- 1.SBJ- run
 ‘the boy who is running’
- b. i-mota i- **a-** **u-** mfana (> **yo-**mfana)
 9-car 9- LNK- 1.AUG- boy
 ‘the boy’s car’
- c. i-ndaba i- **a-** **u-** kuthi . . . (> **yo-**kuthi)
 9-news 9- LNK- 15.AUG- 15.COMP
 ‘the news that . . .’

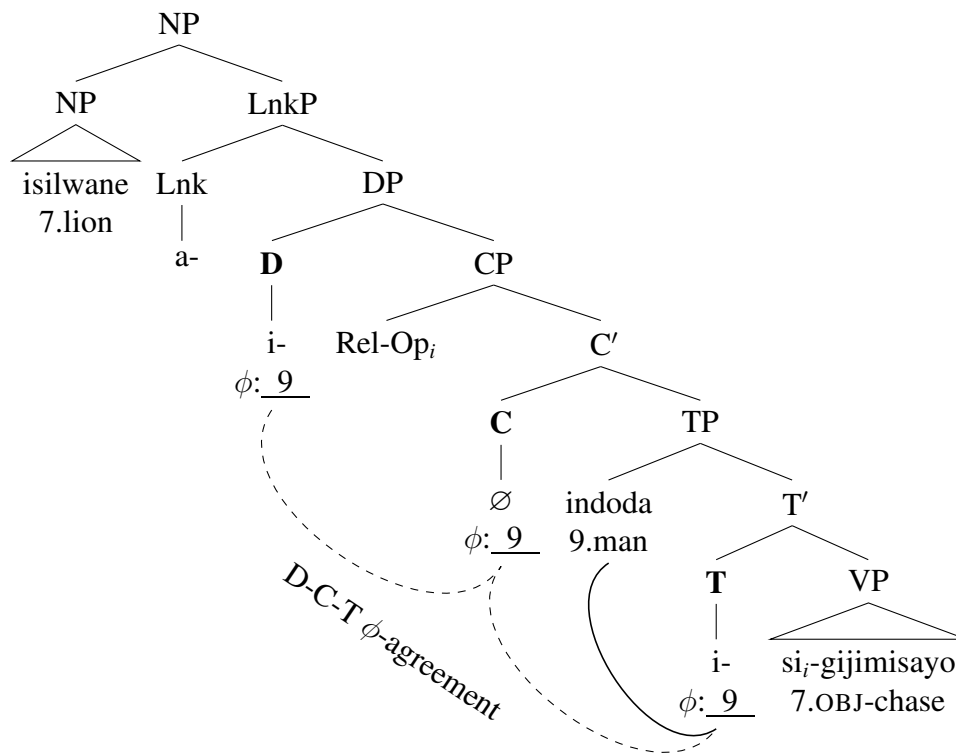
Thus, relative clauses do show at least one property of DPs: they are introduced by the same marker that introduces possessor DPs and noun-complement clauses (which, we have established, are also DPs). The analysis developed in this section builds on this parallel, proposing that all three constructions in (49) involve the general linking structure proposed above.

To see the details of relative-clause derivation, consider the object relatives in (50). As proposed above, a relative-agreement prefix is composed of three morphemes: the linker, an augment (exponent of the D head of the DP shell), and a regular subject-agreement prefix. Morphophonological evidence for this decomposition will be presented in section 5.

- (50) a. i-si-lwane i-n-doda a- **i-** **i-** si-gijimisayo (> **e-**sigijimsayo)
 7.AUG-7-lion 9.AUG-9-man LNK- 9.AUG- 9.SBJ- 7.OBJ-chase.REL
 ‘the lion that the man is chasing’
- b. i-si-lwane a-ma-doda a- **a-** **ma-**
 7.AUG-7-lion 6.AUG-6-man LNK- 6.AUG- 6.SBJ-
 si-gijimisayo (> **ama-**sigijimsayo)
 7.OBJ-chase.REL
 ‘the lion that the men are chasing’

Note that none of the morphemes that make up the complex relative-agreement prefix (*e-* in (50-a) and *ama-* in (50-b)) covary with the relative head, which is of class 7 in both examples. Lack of agreement with the relative head is a familiar property of relative clauses in Ndebele and other Nguni languages (including Zulu, Xhosa, and Swati); the prefix only reflects the features of the relative-clause-internal subject (Zeller 2004; Henderson 2006, 2007). I propose that this covariation with the relative-clause-internal subject is a consequence of the DP-shell augment agreeing with the relative-clause-internal T. This is demonstrated in (51) for the sentence in (50-a). The relative-clause-internal subject controls ϕ -agreement on T. Subsequently, the relative C is merged and projects a DP shell.

(51) Syntax of relativization (the structure of (50-a))



The D head that selects a relative clause behaves the same way as the D that selects an NP or a nonrelative CP. That is, it has a ϕ -probe that agrees with the head of its complement. The relative C is null, and its ϕ -features are determined by T, with which C agrees.¹⁷ Recall from section 2 that, in complement clauses, D agrees with an overt C, which has ϕ -features (class 15). The difference between relative clauses and complement clauses is that the former do not have an overt complementizer that could control features on the higher D. As a result, D obtains the class features of the next head down, namely T, and consequently always covaries with the relative-clause-internal subject.¹⁸ Since the augment is an integral part of the relative-agreement prefix, its phonology contributes to deriving the surface forms of relative prefixes. We will see in the next section that this morphological decomposition allows a straightforward derivation of the relative prefix paradigm.

Following Zeller 2004, I assume that relative clauses in Nguni languages, including Ndebele, are formed with an empty operator. In the object relative clause in (50-a), the operator binds a variable inside the relative clause resumed by an object marker. This assumption is, however, not crucial to the present discussion and, as far as I can see, other analyses of relative-clause syntax, such as raising or matching and deletion, are in principle compatible with the claims made here.

¹⁷ See Henderson 2013 for an analysis of relative clauses in related Bantu languages; in Henderson’s analysis, anti-agreement effects are derived by T-C agreement in these constructions.

¹⁸ A reviewer points out the possibility that relative clauses in Ndebele simply do not have a CP layer and are instead reduced relative clauses. While I cannot definitively reject this possibility, I find no convincing evidence that Ndebele relative clauses are in any way more reduced than subjunctive clauses, for instance, which have an overt complementizer. In the absence of such evidence, I maintain the CP analysis here.

Finally, note that although the linker and the augment spell out heads c-commanding the subject of the relative clause, they end up prefixed on the verb, following the subject. In the next subsection I propose that this is a result of postsyntactic lowering of these heads to T.

The connection between possessive and relative marking has been previously observed in other languages. A well-known example is Chinese, where the linker *de* is used both to introduce possessors and as a relative marker.

- (52) a. Hufei de shu Chinese
 Hufei LNK book
 ‘Hufei’s book’
- b. Hufei mai de shu
 Hufei buy LNK book
 ‘the book that Hufei bought’ (Cheng 2006)

Cheng (2006) observes that many Bantu languages employ possessive morphology in the formation of relative clauses—what Cheng calls the *Possessive Strategy of Relativization*. In this respect, Cheng makes an explicit connection between Chinese and Shona: both languages use the same marker to introduce possessors and relative clauses. Like in Ndebele, the relative/possessive marker in Shona is *a-*, as illustrated in (53) and (54). (Unlike in Ndebele, the linker in Shona relative clauses is preceded by an agreement prefix. I return to this asymmetry in subsection 4.4.)

- (53) varwi v-a-mambo Shona
 2.warrior 2-LNK-king
 ‘the warriors of the king’
- (54) ndimi dz-a-va-no-taura
 10.language 10-LNK-2.SBJ-TAM-speak
 ‘the languages that they speak’ (Cheng 2006)

Given this striking parallel, Cheng proposes that possessives and relatives have a similar structure in Shona and Chinese: they involve a linker selecting either a CP or a DP complement. Selection of a clause gives rise to relativization. If the linker selects a DP, the result is a possessive construction.

The analysis developed here builds on this connection, but proposes a more uniform syntax for the linker. There is no optionality in the category it selects: its complement is always a DP. The difference between relatives and possessives boils down to the internal structure of the linker’s DP complement. In the case of possessives, D selects for a noun phrase expressing the possessor. In a relative construction, the DP is the nominal shell of a relative CP. Note that this analysis of Ndebele relative clauses derives the so-called Possessive Strategy of Relativization: possessive marking is found in Ndebele relative clauses because they are externally DPs.

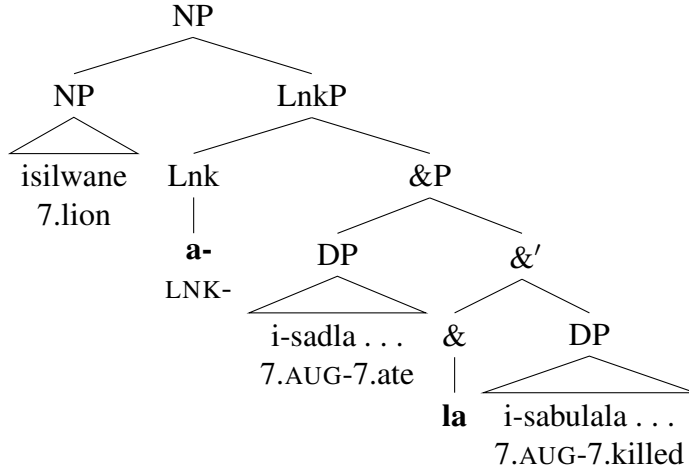
4.2 DP Shells in Relative Clauses: Evidence from Coordination

Recall that coordination of DPs, including possessors and DP-contained complement clauses, requires the nominal conjunction *la*. Relative clauses behave the same way: the second conjunct is necessarily introduced by the conjunction, as shown in *la* (55). The structure of relative-clause coordination as DP coordination is given in (56).

(55) Ngidinga isilwane esadla inkomo lesabulala inja.

Ngidinga isilwane a- [DP i- sadla inkomo] *(la) [DP i- sabulala inja].
 look-for.1SG 7.lion LNK- 7.AUG- 7.ate 9.cow &- 7.AUG- 7.killed 9.dog
 ‘I’m looking for the lion that ate the cow and killed the dog.’

(56) Relative-clause coordination



As usual, *la* coalesces with the augment of the second conjunct DP. Recall that in relative clauses, the DP-shell augment covaries with the relative-clause-internal subject. In (55), the relative-clause-internal subject is of class 7, for which the augment is *i-*. Thus, *la* in (55) surfaces as *le* after coalescence with the augment *i*.¹⁹

4.3 Interim Summary

In sum, we have seen that, even though the DP shell in relative clauses is not transparent morphologically, relative constructions do show DP properties: (i) they are introduced by a linker, which is required with adnominal DPs, and (ii) they employ the nominal conjunction marker in coordination. The conjunction marker additionally reveals an augment in relatives, as its surface form is derived by coalescence with the augment.²⁰ In section 5, we will see further evidence from the

¹⁹ A reviewer asks about coordination of nonobject relatives, pointing out that their structure could reveal the augment of the second conjunct relative clause: in the absence of a linker in the second conjunct, we would perhaps expect the subject-agreement prefix to be preceded by a bare augment. Unfortunately, more fieldwork is needed to verify this and so I must leave this question for future research.

²⁰ Another interesting test for the DP layer in relative clauses, suggested by a reviewer, is the possibility of augment drop. While we don’t observe the typical augment drop as on nominals or complement clauses, it turns out relative clauses can appear without *both* the linker and the augment. This phenomenon reminds us of augment drop, as it is restricted to cases in which the modified noun is itself augmentless. This is shown by the following contrast.

(57) Angiboni i-zinja *(a-i)-zi-gijimayo. (>*(e)zigijimisayo)
 1SG.see.NEG 10.AUG-10.dog (LNK-10.AUG)-10.SBJ-run
 ‘I don’t see the dogs that are running.’

(58) Angiboni zinja (a-i)-zi-gijimayo. (>(e)zigijimisayo)
 1SG.see.NEG 10.dog (LNK-10.AUG)-10.SBJ-run
 ‘I don’t see dogs that are running.’

phonology of relative-agreement prefixes for the DP-shell analysis of relative clauses. Before that, let me return to a couple of morphological puzzles related to the formation of relative-agreement prefixes.

4.4 The Morphology of Relative-Agreement Prefixes

The analysis proposed above leaves us with two morphosyntactic puzzles. The first puzzle concerns the unexpected surface position of the relative-clause-internal subject: it precedes the linker. And second, we observed an asymmetry between possessives and noun-complement clauses on the one hand and relative clauses on the other: unlike the first two, relative clauses show no linker agreement. In this subsection, I discuss these two questions in turn.

Given the linking structure of relative clauses, we predict relative-clause-internal subjects to be linearized to the right of the linker and the D head of its complement (that is, the augment), as in (59) (subjects will be marked by italics throughout the following discussion). We have seen, however, that this is not the case: both the linker and the augment are prefixed to the verb, and thus they follow the subject; this is illustrated by (60), repeated from (50-a).²¹

(59) [NP [NP relative head] [L_{nkP} **linker** [DP **augment** [CP ∅ [TP *subject* [T . . .]]]]]]

(60) i-si-lwane *i-ndoda* **a-** **i-** i- si- gijimisayo
 7.AUG-7-lion 9.AUG-9.man LNK- 9.AUG- 9.SBJ- 7.OBJ- chase.REL
 ‘the lion that the man is chasing’

I propose that the apparent high position of relative-clause-internal subjects is the result of affix lowering (Embick & Noyer 2001): the augment and the linker postsyntactically lower to T. I assume that lowering proceeds cyclically, in a bottom-up fashion, and targets all heads between T and Lnk. Lowering displaces a head onto the next head down. The first instance of lowering, C-to-T lowering, results in a complex C-T head in T and renders T the closest head to D. Thus, subsequent lowering operations are D-to-T and Lnk-to-T. This derivation, shown in (61), is responsible for creating a complex prefix on the verb—the relative-agreement prefix—comprising exponents of four heads (Lnk, D, C, and T). The phonological rules deriving the surface forms of relative prefixes are discussed in detail in the next section.

(61) Derivation of relative prefixes by postsyntactic lowering

$$\begin{aligned} & [_{NP} NP [_{LnkP} \mathbf{Lnk} [_{DP} \mathbf{D} [_{CP} \mathbf{C} [_{TP} \mathbf{subject} \mathbf{T} [_{VP} \dots]]]]]] \rightarrow \\ & [_{NP} NP [_{LnkP} \mathbf{Lnk-D-C-T} [_{DP} \mathbf{D} [_{CP} \mathbf{C} [_{TP} \mathbf{subject} \mathbf{Lnk-D-C-T} [_{VP} \dots]]]]]] \end{aligned}$$

It is worth noting that the apparent high position of subjects in Ndebele relative clauses is not a problem particular to the proposed analysis of relative clauses as involving a linking structure. It is a puzzle for any analysis in which the relative prefix contains left-peripheral morphology. Under the standard analysis of relative clauses in Zulu and other closely related languages, the relative marker *a-* is a complementizer. Assuming that subjects are in Spec,TP, they are equally unexpected

It remains a puzzle why augment drop on relative clauses necessarily deletes the linker with which the augment coalesces, but the possibility of dropping it at all points to the conclusion that the augment is present in the structure.

²¹Ndebele is not one of the Bantu languages that exhibit T-to-C movement in relative clauses (Demuth & Harford 1999). In those languages, relative clauses have VSO order. Ndebele relative clauses are always SVO, like matrix clauses.

to precede the relative marker on the standard analysis as they are in the present account.

Henderson (2007) offers an analysis of similar facts in Zulu relative clauses, arguing that the puzzling word order is due to a high, dislocated position for the relative-clause-internal subject. Building on previous observations that preverbal subjects in Bantu have properties of topics (Letsholo 2002), Henderson assumes that agreeing subjects are in Spec,TopP rather than Spec,TP, as shown in (62). The relative complementizer follows the subject because it is an exponent of Fin, a head below Top (following Rizzi 1997).

(62) [ForceP relative NP [TopP *subject* [FinP COMP_{rel} (**a-**) [TP . . .]]]]

The proposal in (62) solves the word-order puzzle by locating the relative-clause-internal subject high in the periphery, rather than by lowering the marker *a-* across a nondislocated subject.

There is evidence that the dislocation analysis is untenable for Ndebele. While preverbal subjects in root clauses do behave like topics, relative-clause-internal subjects do not. First, left-peripheral topics are generally disallowed in Ndebele relative clauses. And second, unlike matrix subjects, relative-clause-internal subjects can be in narrow focus.²² This asymmetry between root clauses and relative clauses can be exemplified with the distribution of interrogative pronouns, which, by assumption, are incompatible with a topic position. In matrix clauses, *wh*-subjects are not allowed preverbally, as shown by (63-a); this restriction supports the hypothesis that a preverbal subject in a main clause must be a topic. In relative clauses, however, preverbal *wh*-subjects are allowed, as in (63-b), indicating that the subject is not dislocated. Crucially, the *wh*-subject still precedes the linker *a-*.

- (63) a. **Ubani* u- pheke inyama?
 1.who 1.SBJ- cook.PST 9.meat
 (Intended: ‘Who cooked the meat?’)
- b. *Udle* inyama *ubani* ayiphekilego?
 U- dle inyama [RC *ubani* a- a- yi- phekileyo?]
 2SG.SBJ- eat.PST 9.meat 1.who LNK- 1.SBJ- 9.OBJ- cook.PST.REL
 ‘Who is such that you ate the meat that they cooked?’

The nontopicality of relative-clause-internal subjects is further evidenced by the distribution of subjects associated with the focus particle *kuphela* ‘only’. Matrix subjects cannot appear with the focus particle, while relative-clause-internal subjects can:

- (64) a. **Umama kuphela* u- pheke inyama.
 1.mother only 1.SBJ- cook.PST 9.meat
 (Intended: ‘Only mom cooks meat.’)
- b. *Leyo y-inyama* [RC *umama kuphela* a- a- yi- phekileyo].
 9.DEM COP-9.meat 1.mother only LNK- 1.SBJ- 9.OBJ- cook.PST.REL
 ‘This is the meat that only mom cooks.’

Thus, relative-clause-internal subjects in Ndebele are not dislocated. The facts are accounted for instead by the lowering analysis, according to which linearization of the subject to the left of the

²² A similar asymmetry between main and embedded clauses can be found in Kinande (Schneider-Zioga 2000, 2007).

relative marker is due to lowering of left-peripheral morphology onto the verb, not subject dislocation.

The second morphological puzzle is the absence of linker agreement in relative clauses. In this respect, relatives contrast with possessives and noun-complement clauses:

- (65) a. inja (*i-) a- u- u- gijimayo (> o-gijimayo; *yo-gijimayo)
 9.dog 9- LNK- 1.AUG- 1.SBJ- run
 ‘the dog that is running’
- b. i-mota i- a- u- mfana (> yo-mfana)
 9-car 9- LNK- 1.AUG- boy
 ‘the boy’s car’
- c. i-ndaba i- a- u- kuthi . . . (> yo-kuthi)
 9-news 9- LNK- 15.AUG- 15.COMP
 ‘the news that . . .’

Recall from subsection 4.1 that this asymmetry is not found in Shona, where the linker agrees with the preceding NP in both possessives (53) and relative clauses (54). Thus, although both Shona and Ndebele employ the same morphological marking for possessives and relatives, the parallelism is not perfect due to the lack of linker agreement in Ndebele relatives:

(66) Linker-agreement variation

	Ndebele	Shona
Possessives	Lnk agreement	Lnk agreement
Relative clauses	No Lnk agreement	Lnk agreement

To the best of my knowledge, this agreement asymmetry between Shona and Ndebele does not correlate with any syntactic asymmetry: both languages uniformly employ the associative marker/linker to introduce possessors and relative clauses. It is therefore plausible that the lack of linker agreement in (65-a) is not a syntactic fact but a morphological one, an instance of *impoverishment* (Bonet 1991; Noyer 1992; Halle & Marantz 1999; Halle 1997; Harley & Noyer 1999; Arregi & Nevins 2012). I suggest that the linker always agrees with the head noun, be it a possessum NP, the head of a noun-complement clause, or a relative head, but that ϕ -features on the linker are deleted in Ndebele relative clauses. More specifically, I propose that in Ndebele, but not in Shona, the nominal features copied on the linker are removed by an impoverishment rule in the context of T (i.e., in the same complex head as T):

- (67) Ndebele ϕ -impoverishment on Lnk
- a. Structural description: $[[\phi \text{ Lnk}] \text{ T}]_{\text{complex head}}$
- b. Structural change: $[\phi \text{ Lnk}] \rightarrow [\text{Lnk}]$

ϕ -impoverishment does not apply in possessives and noun-complement clauses, as neither of those constructions involves lowering of the linker onto T. When the linker introduces a possessor, there is no T inside of its complement DP. In noun-complement clauses, we’ve seen that the linker attaches to the complementizer *ukuthi* and precedes the subject. Thus, only relative clauses involve lowering all the way to T, while in noun-complement clauses, the linker and the augment lower to C:

- (68) a. Relative clauses (lowering to T): $[_T \phi\text{-Lnk-D-C-T}] \rightarrow [_T \text{Lnk-D-C-T}]$
 b. N-complement clauses (lowering to C): $[_C \phi\text{-Lnk-D-C}]$

Lowering of the linker and the augment in relative clauses creates a complex head in T that, as I argue, constitutes the relative-agreement prefix. We will see in the next section that assuming the presence of an augment in this complex makes the form of the relative-agreement prefix entirely predictable from regular phonological rules, further supporting the DP-shell hypothesis for relative clauses.²³

5 Evidence from Phonology: Deriving Relative Agreements

In this section, I present converging morphophonological evidence for a DP shell in Ndebele relative clauses. In particular, I will show that postulating an augment (D) as part of the relative-agreement prefix derives the surface forms of that prefix from regular phonological rules. In subsection 5.1, I present the details of the vowel coalescence that gives rise to the morphologically complex relative-agreement prefixes. In subsection 5.2, I discuss the advantages of my analysis over an existing alternative.

5.1 Trimorphemic Structure and Hiatus Resolution

The term *relative agreement* or *relative concord* was used in Doke 1954 to refer to subject-agreement prefixes in Zulu that appear in relative clauses. This terminology reflects the fact that relative agreements in Zulu (and related languages, including Ndebele) were initially treated as monomorphemic, replacing subject prefixes in relative clauses (Doke 1954; Mischke 1998; Poulos 1999; Mawadza 2009; Poulos & Msimang 1998). Indeed, they appear in the same position as subject-agreement prefixes: they attach to the left of a tense marker and, together with the verb, follow a preverbal subject (which is, by assumption, located in Spec,TP).

The relative and nonrelative paradigms of subject-agreement prefixes are given in (69). As we can see, there is no straightforward morphological relationship between the two paradigms. In some classes, the relative subject prefix consists of the regular subject prefix preceded by an additional mid vowel (e.g., classes 7 and 15). In other classes, there is no extra segmental material in the relative prefix; rather, the relative prefix either remains the same (class 6) or changes to a mid vowel (e.g., classes 1 and 9).

- (69) Two paradigms of subject-agreement prefixes (partial paradigm)

Noun class	1	2	3	4	5	6	7	8	9	10	11	14	15
Regular prefix	u-	ba-	u-	i-	li-	a-	si-	zi-	i-	zi-	lu	bu	ku-
Relative prefix	o-	aba-	o-	e-	eli-	a-	esi-	ezi-	e-	ezi	olu	obu	oku-

Nonetheless, relative prefixes do not seem entirely idiosyncratic: some of their properties are clearly related to the properties of regular subject-agreement prefixes. For instance, all classes that add an extra vowel to form a relative prefix are those whose regular form is CV (e.g., classes

²³ As suggested by a reviewer, an interesting question for future research would be to test the DP-shell hypothesis for other types of clausal adjuncts, in particular participial NP/VP modifiers. If these can be shown to be reduced clauses and to lack a CP layer, it could be tested whether clausal DP shells in Ndebele are a property of full clauses only—something inherently related to C—or a broader phenomenon.

2, 5, 7, 8, and 15 in (69)). Onsetless subject prefixes remain onsetless in the relative paradigm (e.g., classes 1, 6, and 9). Moreover, the mid vowels found in relative prefixes share their backness feature with the vowel of the regular prefix. Treating the two paradigms as two sets of monomorphemic prefixes renders these generalizations accidental. Below, I argue that there are no accidental similarities between the two paradigms.

According to the syntactic analysis of relative clauses developed in section 4, a relative-agreement prefix is not monomorphemic. Rather, it is composed of three overt morphemes within a single complex head: the linker *a-*, an augment, and a subject-agreement prefix.

- (70) [T Lnk [T D [T C T]]]
 Linker Augment ∅ Subject agreement

This trimorphemic decomposition allows for a straightforward derivation of relative prefixes by applying regular phonological rules of hiatus resolution, called vowel-coalescence rules:

- (71) Regular hiatus-resolution rules in Ndebele (from Sibanda 2004)
 (i) a + u → o
 (ii) a + i → e
 (iii) V_α + V_α → V_α

Given the DP-shell proposal for relative clauses in Ndebele, the linker *a-* is always in hiatus: as seen in (72), it is immediately followed by an augment, which is always a vowel. By the rules in (71), unless that vowel is identical to the linker (i.e., /a/), the linker and the augment coalesce into a mid vowel.

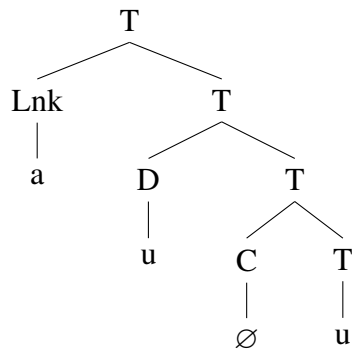
- (72) Vowel-coalescence derivation of relative-agreement prefixes from a trimorphemic structure

Noun class	Linker	+	augment	+	subject prefix	⇒	relative prefix
Class 1	a-		u-		u-		o-
Class 2	a-		a-		ba-		aba-
Class 5	a-		i-		li-		eli-
Class 6	a-		a-		a-		a-
Class 7	a-		i-		si-		esi-
Class 8	a-		i-		zi-		ezi-
Class 9	a-		i-		i-		e-
Class 15	a-		u-		ku-		oku-

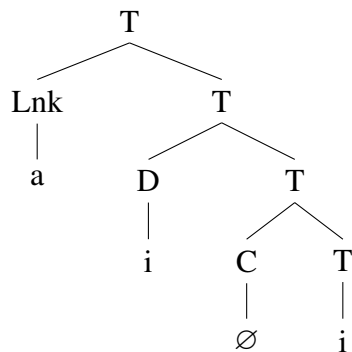
For classes whose subject prefix is CV, relative prefixes follow straightforwardly: the subject prefix is preceded by two vowels in hiatus, and the hiatus is resolved by the regular coalescence rules in (71). With onsetless subject prefixes, there are two instances of vowel hiatus, as all three components of the relative-agreement prefix are vowels. I assume that the order of application of hiatus-resolution rules is determined by the hierarchical position of the relevant morpheme within the complex head. Assuming cyclic spellout (in a bottom-up fashion), the first hiatus to be resolved is the lower one, between the subject-agreement prefix and the augment. Since these two morphemes are identical in all relevant noun classes (see (72)), they simply coalesce into a singleton vowel of the same quality. This is shown for class 1 in (73) and for class 9 in (74). The next step, also shown

in (73) and (74), is coalescence with the linker *a-*, where the familiar height neutralization applies.

- (73) Class 1 relative prefix:
 $a + (u + u) \rightarrow a + u \rightarrow o$



- (74) Class 9 relative prefix:
 $a + (i + i) \rightarrow a + i \rightarrow e$



Now, while full DPs have an augment reflecting their class, first- and second-person pronouns do not:

- (75) a. mina ‘1SG.PRON’
 b. wena ‘2SG.PRON’
 c. thina ‘1PL.PRON’
 d. lina ‘2PL.PRON’

This raises the question of how to determine the shape of the augment in relative clauses when the relative-clause-internal subject is a first- or second-person pronoun. One possibility is that the augment is of the human class: class 1 (*u-*) for singular pronouns, class 2 (*a-*) for plural pronouns.²⁴ This is not what we find. Instead, the form of the augment is a copy of the vowel found on the regular-agreement prefix.

- (76) a. umfana a- i- ngi- m-bonayo (> engimbonayo)
 1.boy LNK AUG- 1SG.SBJ 1.OBJ-saw
 ‘the boy that I saw’

²⁴I thank an anonymous reviewer for suggesting this possibility.

- b. umfana a- **u-** **u-** m-bonayo (> ombonayo)
 1.boy LNK AUG- 2SG.SBJ 1.OBJ-saw
 ‘the boy that you saw’
- c. umfana a- **i-** **si-** m-bonayo (> esimbonayo)
 1.boy LNK AUG- 1PL.SBJ 1.OBJ-saw
 ‘the boy that we saw’
- d. umfana a- **i-** **li-** m-bonayo (> elimbonayo)
 1.boy LNK AUG- 2PL.SBJ 1.OBJ-saw
 ‘the boy that you (pl) saw’

Given these facts, I tentatively treat the form of the augment with first- and second-person pronouns as the result of partial reduplication, rather than as class agreement.

In the next subsection, I consider an alternative derivation of relative prefixes—one that assumes a bimorphemic structure. I show that the bimorphemic analysis requires stipulations about phonological rules involved and makes incorrect predictions.

5.2 A Bimorphemic Account of Relative Prefixes: The Vowel Raising Analysis (Khumalo 1992)

A monomorphemic analysis of relative prefixes is nowadays widely rejected. Instead, it is typically assumed that they conflate two morphemes, the relative complementizer *a-* and the regular subject-agreement prefix (Khumalo 1992; Demuth & Harford 1999; Zeller 2004, 2006; Henderson 2007, among others):

(77) Relative-agreement prefix = relative COMP (*a-*) + subject-agreement prefix

Under this view, the subject-agreement prefix in relative clauses has the same form as in nonrelative clauses. The reason its surface form is altered is that the complementizer *a-* attaches to its left and undergoes a phonological alternation. The alternation is, however, somewhat peculiar. It resembles the vowel-coalescence rules discussed above, but it has other properties as well. Combining the bimorphemic analysis in (77) with the regular coalescence rules does not yield the complete relative paradigm. As shown in (78), the only prefixes that can be derived are those whose subject prefix is a vowel (classes 1, 6, and 9) and, by chance, the class 2 prefix. The coalescence rules cannot reliably derive the relative prefix for noun classes whose subject prefix has an onset (compare classes 5, 7, 8, and 15 to class 2).

(78) Vowel-coalescence derivation of relative-agreement prefixes from a bimorphemic structure

Noun class	Relative COMP	+	Subject prefix	⇒	Relative prefix
Class 1	a-		u-		o-
Class 2	a-		ba-		aba-
Class 5	a-		li-		*ali- (Correct: eli-)
Class 6	a-		a-		a-
Class 7	a-		si-		*asi- (Correct: esi-)
Class 8	a-		zi-		*azi- (Correct: ezi-)
Class 9	a-		i-		e-
Class 15	a-		ku-		*aku- (Correct: oku-)

The predicted forms for CV classes do not involve height neutralization because there is no hiatus between the complementizer and the subject prefix. Given no hiatus, the complementizer is expected to retain its original form, namely /a/, with any CV subject prefix, contrary to fact.

The analysis proposed in the previous section avoids that problem by revising the underlying morphological composition of the relative prefixes: they are trimorphemic, not bimorphemic. The widely adopted view is, however, that the bimorphemic structure is correct and that the inadequacy is related to the phonological rules that determine the surface form of relative prefixes. This is the so-called Vowel Raising analysis proposed by Khumalo (1992) for Zulu (whose relative-agreement paradigm is identical to the one found in Ndebele). According to this analysis, the relative marker *a-* undergoes raising to a mid vowel when the following subject-agreement prefix *contains* a high vowel (no hiatus required). Consider, for instance, the class 7 prefix in (78); there, the relative marker *a-* undergoes raising to *e-* because the following subject prefix *si-* contains a high vowel.

The Vowel Raising analysis, as shown in (79), has three components: a bimorphemic structure for relative-agreement prefixes, a rule that alters the relative marker *a-*, and a rule that deletes the subject-agreement prefix if it is a vowel and is preceded by the relative marker.

- (79) The Vowel Raising analysis of the relative prefix (Khumalo 1992)
- a. Bimorphemic structure: $a_{\text{REL-}} + \text{subject prefix (SP)}$
 - b. Vowel Raising: $a_{\text{REL}} \rightarrow V_{[\text{mid}, \alpha\text{back}]} / \text{--- (C)V}_{[\text{high}, \alpha\text{back}]}$
 - c. V-Subject-Prefix Deletion: $V_{\text{SP}} \rightarrow \emptyset / \text{REL ---}$

In addition to raising, the marker *a-* assimilates in backness and roundness: it is raised to a round back mid vowel (/o/) or an unrounded front mid vowel (/e/), depending on the conditioning environment. Since Vowel Raising applies to the relative markers attached to both V and CV subject-agreement prefixes, the rule must encode an optional C in the conditioning environment (79-b). This first rule is enough to derive the relative agreements of the CV classes, as shown in (80) for classes 2, 5, and 15.

- (80) Vowel Raising derivation of relative prefixes

Class	Input (REL-SP)	Vowel Raising	V-Subject-Prefix Deletion	Surface form
2	a-ba-	N/A	N/A	aba-
5	a-li-	e-li-	N/A	eli-
15	a-ku-	o-ku-	N/A	oku-
6	a-a-	N/A	a-	a-
9	a-i-	e-i-	e-	e-
1	a-u-	o-u-	o-	o-

For classes whose regular-agreement prefix is a vowel, the application of Vowel Raising is not enough, since it gives rise to two vowels in hiatus. Khumalo (1992) proposes that the second vowel, that is, the subject-agreement prefix, is deleted in this morphophonological context. The deletion rule (79-c) applies to classes 6, 9, and 1 in (80). Note that the two rules apply in a counterbleeding order: subject-prefix deletion must apply after Vowel Raising, otherwise it would bleed it.

It is worth noting that Khumalo's analysis can handle relative prefixes for first- and second-person subjects, discussed in the previous subsection as an instance of partial reduplication. Nonetheless, the approach advocated in this article has a number of advantages over Khumalo's Vowel Raising account, both theoretical and empirical. I discuss three of them below.

First, vowel raising and backness assimilation are not found across intervening consonants in other morphosyntactic contexts in Ndebele.²⁵ This can be seen, for instance, in negative forms. The negative prefix *a-* is attached to the left of an inflected verb, just like the relative marker. As we see in (83), the negative prefix does not undergo raising (or backness assimilation).

- (83) No vowel raising in the negative prefix *a-*:
- a. *a- li- pheki* > *alipheki* (**elipheki*) (cf. class 5 in (80))
 NEG- 2PL.SBJ- cook
 ‘You are not cooking’
 - b. *a- ku- la-manzi* > *akulamanzi* (**okulamanzi*) (cf. class 15 in (80))
 NEG- 17.SBJ- COP-water
 ‘There is no water’

The negation marker is in the same morphophonological context as the relative marker in (80): it has the same form and it is immediately followed by a subject-agreement prefix containing a high vowel. Nonetheless, it does not undergo any alternation. Thus, Vowel Raising must be a construction-specific rule.

Second, a vowel-raising rule is not sufficient. As discussed above, deletion of the subject prefix must apply whenever the prefix has no onset (classes 6, 9, and 1 in (80)). Just like Vowel Raising, the deletion rule (79-c) is specific to relative-agreement prefixes. In other contexts, the same phonological environment does not trigger deletion of the subject prefix. Consider the proposed derivation of a class 9 relative prefix, where the hiatus of *e-i-* is resolved by deleting the second vowel. The regular resolution of such a hiatus is deletion of the *first* vowel. In fact, /*e*/ is always deleted when followed by another vowel; this rule is stated in (84-a). The rule of /*e*/ deletion, like the coalescence rules, is a regular rule of hiatus resolution. As an example, consider the aspectual marker *se-* ‘now’, which combines with an inflected verb, as in (84-b). Here *se-* is concatenated with a verb whose first segment is an onsetless subject prefix, *i-*. As we see, the general /*e*/-deletion rule applies, retaining the second vowel, /*i*/, in the surface form.

- (84) a. Regular rule of /*e*/ deletion (Sibanda 2004): $e \rightarrow \emptyset / _ V$
 b. *i- se- i- pheka* > *isipheka* (**isepheka*) (Cf. class 9 in (80))
 9.SBJ- SE- 9.SBJ- cook

²⁵ A reviewer brings up a potential counterexample. Demonstratives in Ndebele consist of the demonstrative root *la* and a noun-class prefix. Interestingly, the vowel of the demonstrative raises to a mid vowel and assimilates in backness to the vowel in the class prefix:

(81) *la + li-* → *leli-*

(82) *la + khu-* → *lokhu-*

Note, however, that Khumalo’s Vowel Raising analysis of relative clauses does not immediately account for these facts, as it is restricted to apply to the relative marker *a-*. Such a restriction is necessary because Vowel Raising does not apply across the board. Thus, the Vowel Raising approach would simply need to add another stipulation to the set of contexts in which such raising can apply. The alternative is to view the alternation in demonstratives as revealing an augment in the underlying form of demonstratives, preceding the class marker. I do not venture a further analysis of demonstratives here, but it should be pointed out that it is not particularly surprising that demonstratives can cooccur with determiners, especially in languages, like Ndebele, in which demonstratives behave like adjuncts.

‘she is now cooking’

Since the derivation of the class 9 relative prefix involves deletion of the second, not the first, vowel, the rule in (79-c) remains a stipulation about relative prefixes. In the trimorphemic account proposed in this article, no deletion rule is necessary. Assuming cyclic application of phonological rules, the three vowels undergo the predicted coalescence:

(85) Derivation of class 9 relative prefix: the trimorphemic account

$$\begin{array}{c} [a \quad [i \quad [i]]] \rightarrow [a \quad [i]] \rightarrow e \\ \text{LNK \quad AUG \quad SP} \end{array}$$

Thus, the trimorphemic analysis proposed here has a theoretical advantage over the Vowel Raising analysis: it does not rely on context-specific rules to derive the relative-agreement paradigm. Rather, the correct forms follow from regular rules of vowel-hiatus resolution.

The third argument against the Vowel Raising analysis is empirical. In addition to coalescence rules and /e/ deletion, there is a third strategy of hiatus resolution in Ndebele: gliding (Sibanda 2004). Gliding applies to high vowels followed by nonhigh vowels:

(86) Gliding

- (i) $u \rightarrow w / \text{ ___ } V_{[-\text{high}]}$
- (ii) $i \rightarrow j / \text{ ___ } V_{[-\text{high}]}$

The instance of gliding relevant here is in nonrelative forms: between a subject prefix and the past-tense prefix *a-*. If the subject prefix is a high vowel, it becomes a glide:

- (87) a. Umfana **u-** **a-** bala. (> **wabala**)
 1.boy 1.SBJ- PST- read
 ‘The boy read.’
- b. Inkazana **i-** **a-** bala. (> **yabala**)
 9.girl 9.SBJ- PST- read
 ‘The girl read.’

Importantly, gliding turns two adjacent vowels into one C-initial syllable (here, /wa/ and /ya/). This result is crucial in making predictions about relative forms of the past tense. When the forms in (87) appear in a relative clause, they are preceded by the relative marker:

(88) Relative forms of (87):

- a. umfana **a-** **wa-** bala (> **owabala**; *awabala)
 1.boy REL- 1.SBJ.PST- read
 ‘the boy who read’
- b. inkazana **a-** **ya-** bala (> **eyabala**; *ayabala)
 9.girl REL- 9.SBJ.PST- read
 ‘the girl who read’

According to the Vowel Raising analysis, the relative marker in (88) is not expected to undergo raising because the triggering environment is absent: there is no high vowel in the following syllable. Therefore, the predicted forms are *awabala* and *ayabala*, respectively. As we see in (88), this

is a wrong prediction of the Vowel Raising analysis. The relative marker does undergo raising.

Admittedly, this argument against the Vowel Raising analysis is based on the assumption that gliding in (88) applies first, that is, before the rules forming relative prefixes. This order of application follows from the assumption I make in this article, namely that phonological rules apply cyclically in a bottom-up fashion. One could argue that the order of rule application is different. Note that gliding is a regular phonological rule, while the two rules proposed by Khumalo (1992) are very specific, as discussed above. In the framework of Distributed Morphology (adopted here, though not by Khumalo), phonological rules that make reference to specific morphosyntactic features apply before regular phonological rules and are called *readjustment rules*. If we treat Vowel Raising and V-Subject-Prefix Deletion as readjustment rules, the formation of the relative prefix would take place before gliding. In (89) I attempt a derivation of the forms in (88) with this rule ordering, that is, where gliding is suspended until after the application of Vowel Raising and V-Subject-Prefix Deletion.

(89) Relative-prefix derivation in the past tense: gliding applies at the end

	Input (C _{Rel} -SP-T)	Readjustment rules		Regular phonological rules (gliding)
		Vowel Raising	V _{SP} Deletion	
Class 1	a-u-a	o-u-a	o-a	N/A (not an environment for gliding)
Class 9	a-i-a	e-i-a	e-a	N/A (not an environment for gliding)

This rule ordering does not yield the attested forms. This is due to the role that the subject-agreement prefixes (*u-* and *i-*) play in the derivation. On the one hand, they are necessary to trigger Vowel Raising, and suspending gliding of those prefixes (into /w/ and /j/) allows the desired application of Vowel Raising. On the other hand, Vowel Raising is immediately followed by deletion of those subject prefixes. The deletion rule, as a context-specific rule, must apply before gliding—but that means the environment for gliding is deleted: there are no high vowels in the output of the readjustment rules.

In other words, cyclic application of the rules in question removes the environment for Vowel Raising, while the order of application in (89) removes the environment for gliding. Thus, neither order can derive the fact that both gliding and raising take place in these forms.²⁶

The past-tense relative forms follow from the analysis proposed in this article with no further amendments. Derivations for the classes 1 and 9 forms are given in (90). Since the underlying structure of the relative prefix is trimorphemic, in the past tense we have a sequence of four vowels: in addition to the usual three morphemes (the linker, augment, and subject prefix), there is a past-tense prefix *a-*. Like in other forms, the derivation involves cyclic application of regular hiatus-resolution rules: here, gliding and vowel coalescence.

(90) Relative prefix in the past tense: the trimorphemic account

- a. Class 1: [a [u [u [a]]]] → [a [u [wa]]] → [a [uwa]] → owa
LNK AUG SP T
- b. Class 9: [a [i [i [a]]]] → [a [i [ya]]] → [a [iya]] → eya
LNK AUG SP T

²⁶There is one more logically possible order of application: Vowel Raising > gliding > V_{SP} Deletion. While it would derive the correct forms, this order is entirely unprincipled: it obeys neither cyclicity (it ignores hierarchical structure) nor modularity (it interleaves readjustment rules with regular phonology).

The Vowel Raising analysis of relative prefixes was meant to account for height alternation of the relative marker *a-* in contexts where regular hiatus-resolution rules do not apply, that is, when the marker is followed by a C-initial subject marker. I argued in this section that this analysis is both unexplanatory and empirically inadequate. I argued that the problem with CV classes is not a phonological one. Rather, the problem stems from the assumption that the relative prefix is bimorphemic. I rejected that assumption and proposed that the relative prefix contains an augment (D) immediately following the relative marker *a-*, analyzed here as a linker taking a DP complement. This single morphological change eschews both the theoretical and empirical problems of the Vowel Raising analysis. Thus, the morphophonology of relative-agreement prefixes strongly supports the syntactic analysis of relative clauses as projecting a DP shell, a property they share with both verb-complement clauses (section 2) and noun-complement clauses (section 3).

6 Conclusion

I argued in this article that Ndebele embedded clauses are obligatorily contained in a direct DP shell, a structure in which a CP is immediately dominated by a DP layer. The direct-DP-shell structure, though problematic for the theory of extended projections (Grimshaw 1991), was supported by a wide range of empirical arguments. First, I argued that the DP layer in complement clauses, evidenced by both morphological and syntactic phenomena, does not have a last-resort distribution, rendering the last-resort-insertion view untenable. The claim I put forth was that clausal DP shells in Ndebele are base generated and obligatory. Further, we saw that the null-N hypothesis, according to which the clausal DP shell contains a null noun, is empirically unfounded. It predicts the existence of noun-complement clauses of the type found in English and other Indo-European languages, contrary to fact. The view advocated here, namely that clausal DP shells are direct and obligatory, predicts the impossibility of English-type noun-complement clauses. Since the complement clause is externally a DP, its direct attachment to a projection of a noun is ruled out by independent properties of the language, namely the requirement that adnominals of category D be introduced in a linking structure. Thus, the DP-shell view additionally predicts the well-formedness of constructions that can be descriptively referred to as noun-complement clauses but in which the complement clause is introduced by the nominal linker, patterning with possessor DPs in this respect.

The second part of the article dealt with a different type of noun-attached clause, namely relative clauses, and argued that they too project a DP shell. Though less transparent morphologically, the DP shell in relative clauses explains a number of their peculiarities. First, relative clauses are introduced by the same linker as possessors and noun-complement clauses—a situation expected if they are externally DPs. Second, coordination of relative clauses requires the nominal conjunction marker. And third, upon closer inspection, the DP-shell analysis of relative clauses predicts the forms of the relative-agreement prefix from the regular phonology of Ndebele.

An outstanding question is the specific consequences of these findings for the theory of extended projections. What is the minimal revision that would capture direct DP shells (and other true mixed projections) without losing the predictive power of the theory with regard to possible functional sequences? A possible path to follow would be to attribute the possibility of base-generated direct DP shells to morphosyntactic properties of complementizers. It is well known that complementizers in many Bantu languages show nominal properties (e.g., in controlling ϕ -agreement). Perhaps what it takes to head a nominal extended projection is not strictly speaking having a category feature,

such as +N (for proposals in this vein see, e.g., Baker 2003b; Vinokurova 2005; Reuland 2011), but some other feature, one that may be associated with other categories in some languages. I leave this question for future research.

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