The layered structure of concord: A Nanosyntactic approach

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1 Introduction

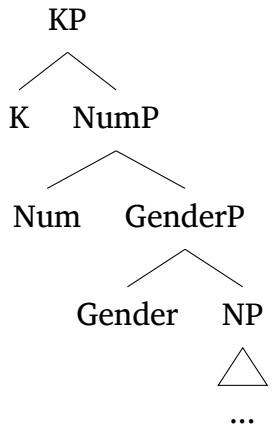
This chapter investigates the morphological marking of concord in Dime (Omotic), Finnish (Finno-Ugric), Georgian (Kartvelian), Khwarshi (Caucasian), and Zulu (Bantu). The main idea is that concord morphology in these languages gives us reasons to think that concord features do not form a bundle in the tree (occupying a single terminal), but exhibit rich internal structure. Specifically, the chapter proposes that each concord feature occupies a designated head in the morphosyntactic tree (Taraldsen 2010).

While the chapter provides evidence for the existence of a rich structure of concord features, it does not put forth a specific proposal as to how exactly these structures are generated. However, it seems that if each concord feature heads its own projection, it is most natural to merge each concord feature independently on top of the modifier, an approach adopted for verbal agreement in Blix (2021), Starke (2020), where ϕ features are introduced one by one in the projection line of the verb. Under this approach, feature matching between the modifier and the noun can be accounted for by semantic considerations. For instance, agreement features can be understood as introducing presuppositions on the modified noun, as in Sudo & Spathas (2020). The need to maximize such presuppositions within each of local domain (i.e., both in the projection line of the noun and the adjective) leads to the effect that the features added to the adjective are exactly the same as those added to the noun (Sudo & Spathas 2020:§5.2.1).

In developing this claim, I build on a strand of research, which has established that when a noun combines with features such as gender, number and case, these features are not present as an unstructured bundle, but form a hierarchy above the NP. This hierarchy is reflected in morpheme orders (Picallo 1991), suppletion (Moskal 2015), and other phenomena. In this paper, I will be working with a hierarchy where gender (or more broadly noun class) is the lowest functional head in the NP, number an intermediate one, and case the highest one. The hierarchy is depicted in (1).[1]

[1] See Picallo (1991), Kramer (2015) and Baggio (2022) for the proposal that gender is an independent head, different from the N node, and located below number. See Travis & Lamontagne (1992), Bittner & Hale (1996), Bayer et al. (2001), Norris (2012), Smith et al. (2019) for proposals to the effect that case is the highest projection of the extended NP. Even in approaches where case and/or gender are not recognized as independent projections, case features are assumed to be located higher than number, often a part of the D projection, and gender features lower than number, a part of the little *n* or an equivalent category.

(1)



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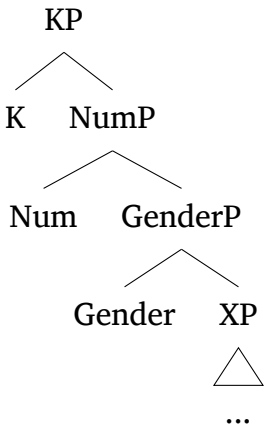


Against this background, the main claim of this paper is that the same hierarchy of projections is implicated by concord morphology, so that for any category that agrees in ϕ-features and case, the same hierarchy as in (1) should be placed on top of the agreeing category (demonstrative, adjective, numeral). The idea is depicted in (2), where XP stands for an agreeing modifier, such as the demonstrative, numeral or adjective.[2]

The chapter is organised as follows. Section 2 discusses languages where morphemes that realise concord on modifiers are identical to morphemes that realise ϕ and case on nouns. The reason for discussing such systems is the following: supposing that nominal affixes realise functional heads in the nominal spine, then, if the the same morphemes are found on the modifier, it seems that the same projections must also be found on top of the modifier.

Section 3 turns to a generalisation proposed by Bayırlı (2017), which concerns variation in the range of categories that are subject to concord. Bayırlı (2017) notes that variation in concord is restricted by the hierarchy in (2) in the sense that if a language shows concord for case (the topmost category in (2)), it also shows concord for all the other (lower) categories. Similarly, if a language shows concord in number, it also shows concord in gender. Thus, the hierarchy of features is reflected in the range of categories that are subject to concord. Clearly, a number of explanations for such a generalisation can be provided, including ones where the generalisation is explained by reference to the hierarchy in (2). In this approach, the generalisation amounts to the proposal that categories can be missing from the top of that hierarchy, but not, e.g., in the middle, which makes the absence of agreement similar to restructuring phenomena (Wurmbrand 2001).

The remaining sections discuss some potentially problematic examples of concord, which either violate the generalisation proposed by Bayırlı (2017), or represent systems where the marking of ϕ features on modifiers is different from the marking of ϕ features on nouns. The main point of this discussion is to show that once we take into consideration some independent proposals concerning the morphological realisation of syntactic categories, these facts do not undermine

[2]I assume that languages without agreement lack these projections on top of the modifier. As to why some languages must have these projections on top of their modifiers (languages with concord) while others not (languages without concord) is an important question, but it is one that I don't try to answer here.

the main idea of this paper.

To show this, Section 4 introduces some general assumptions about how morphological exponents relate to syntactic structure. Specifically, the section introduces the notion of phrasal spellout (Starke 2018) and root size (Caha et al. 2019). Once these independent proposals are taken into consideration, the apparently problematic cases become in fact expected instance of how the hierarchical structure on top of modifiers may be morphologically expressed.[3]

Sections 5-6 discusses concord on modifiers in Georgian, Khwarshi, Zulu and Dime, where the morphology of the modifier differs from the morphology of the noun in interesting (and non-trivial) ways. Sometimes, the modifier includes morphemes that are missing on the noun, other times the noun has extra morphemes compared to the modifier. The relevant sections argue that once we take the notion of root size introduced in Section 4 seriously, these examples are compatible with the idea of parallel feature hierarchies as per the proposal in (1) and (2).

Section 7 concludes the paper by providing some speculations as to how and why ϕ features are generated independently on the modifier and the noun.

2 Identical marking of modifiers and nouns

This section presents some evidence for proposing parallel ϕ hierarchies for modifiers and nouns, as in (1) and (2). The evidence is provided by the existence of languages where agreeing categories are marked the same as nouns. The logic, recall, is the following: if case and ϕ morphemes on nouns are the realisation of syntactic nodes, and if the same morphemes are found on the modifier, then the same syntactic nodes should also be found on the modifier. In many such cases, the ordering of agreement markers directly reflects the hierarchy of projections, thus revealing its presence.

As the first example, consider Finnish. Karlsson (2013:8) describes the facts as follows: "When adjectives occur as premodifiers of nouns, they agree in number and case with the headword, i.e. they take the same endings." The following set of examples illustrates the point for adjectives, with the relevant morphemes in bold.

(3) Finnish (Karlsson 2013:8)

a. iso auto
big car
'a/the big car'

b. iso-**ssa** auto-**ssa**
big-in car-in
'in a/the big car'

c. iso-**i-ssa** auto-**i-ssa**
big-PL-IN car-PL-IN
'in (the) big cars'

[3]The notions of 'phrasal spellout' and 'root size' have been developed within the Nanosyntax approach to spellout (Starke 2009 et seq.). However, other morphological frameworks include similar tools and concepts and the general approach explored in Section 4 can be easily translated into alternative frameworks.

The same observation carries over to demonstratives. The full paradigm of a Finnish distal demonstrative is provided in table (4). The demonstrative is placed side by side with a noun for comparison; however, the two words together also form a well-formed noun phrase 'that road.' Of particular interest are two facts: (i) that the demonstrative and the noun have the same suffixes (with differences due to vowel harmony), and (ii) the fact that from the genitive down, we clearly discern an agglutinative pattern of marking in the plural, with the plural *-i* closer to the base than case.

(4) Finnish Karlsson 2013:80, 281

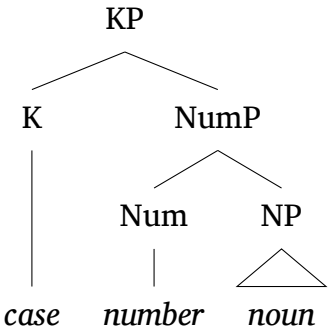
CASE	that	road	those	roads
NOMINATIVE	tuo	tie	nuo	tie-t
GENITIVE	tuo-**n**	tie-**n**	no-*i*-**den**	te-*i*-**den**
PARTITIVE	tuo-**ta**	tie-**tä**	no-*i*-**ta**	te-*i*-**tä**
INESSIVE	tuo-**ssa**	tie-**ssä**	no-*i*-**ssa**	te-*i*-**ssä**
ELATIVE	tuo-**sta**	tie-**stä**	no-*i*-**sta**	te-*i*-**stä**
ILLATIVE	tuo-**hän**	tie-**hin**	no-*i*-**hin**	te-*i*-**hin**
ADESSIVE	tuo-**lla**	tie-**llä**	no-*i*-**lla**	te-*i*-**llä**
ABLATIVE	tuo-**lta**	tie-**ltä**	no-*i*-**lta**	te-*i*-**ltä**
ALLATIVE	tuo-**lle**	tie-**lle**	no-*i*-**lle**	te-*i*-**lle**
TRANSLATIVE	tuo-**ksi**	tie-**ksi**	no-*i*-**ksi**	te-*i*-**ksi**

It has been observed by Greenberg (1966) that such an ordering of number and case is rather typical, a fact noted in his Universal 39.

(5) Greenberg's Universal 39 (Greenberg 1966:95)
Where morphemes of both number and case are present and both follow or both precede the noun base, the expression of number almost always comes between the noun base and the expression of case.

There is a consensus in the literature that such ordering restrictions are indicative of a syntactic hierarchy of projections, where number is closer to the noun than case (as already mentioned). The consensual hierarchical structure is in (6) and its mirror image in (7).[4]

(6)



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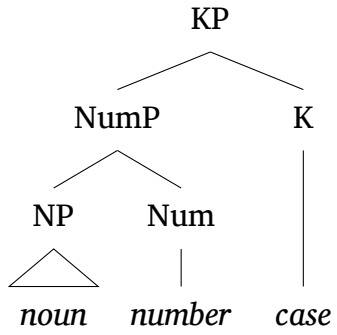


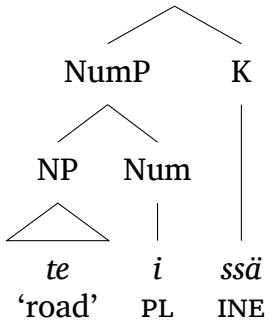
The trees show that no matter whether we order the terminals to the right or to

[4]See Cinque (2005), Abels & Neeleman (2012), Medeiros (2018) for various approaches to ordering based on the idea that restrictions on the attested orders are the consequence of a cross-linguistically fixed sequence of projections.

the left of the noun, number is closer to the noun than case.[5]

If our theory of morpheme orders is based on a hierarchy such as (6) or (7), the simplest move to explain the same ordering on the demonstrative in Finnish is to adopt the exact same theory for both the noun and the demonstrative. If we do so, the structure of the demonstrative will run in parallel to that of the noun, as we show in (8) and (9), only swapping DemP for NP:

(8)



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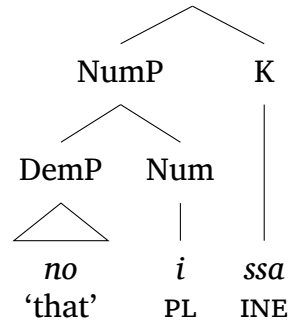


As another illustration of the same logic, consider Spanish. As Baker (2008) points out, the predicate adjective in Spanish agrees both in number and gender, see (10). The glosses make it clear that gender and number are marked by separate morphemes on the predicate adjective, with gender closer to the stem than number. This is the same order as found on Spanish nouns (Picallo 1991), and it is also the order that the hierarchies (1)/(2) would lead us to expect (because gender is lower than number).

(10) Spanish (Baker 2008:8)

a. Nosotros estamos list-**o-s**.
we.M.PL are.1pS ready-M-PL

b. Nosotras estamos list-**a-s**.
we.F.PL are.1pS ready-F-PL

As the final example, consider Amharic. In this language, functional morphemes stack on unmodified nouns as suffixes, see (11a). However, with modified nouns, the very same functional morphemes are realised on the modifiers, see (11b).

(11) Amharic (Workneh 2011:3,126)[6]

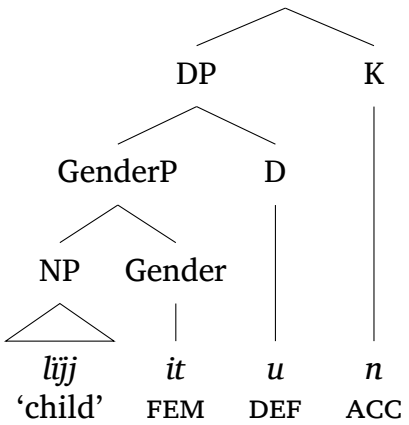
a. lïjj-**it-u-n**
child-FEM-DEF-ACC
'the girl' (accusative)

b. räjjïm-**it-u-n** gobäz-**it-u-n** lïjj
tall-FEM-DEF-ACC intelligent-FEM-DEF-ACC child
'the tall intelligent girl' (accusative)

[5]The only way we could disrupt this order would be by movement. Kloudová (2020) points out that there are languages where movement does indeed have the effect of producing mirror-violating sequences like NOUN-CASE-NUMBER. Such orders (with case closer to the root) are only found in postnominal position, an observation that falls in line with the general observation that mirror-violating orders are only attested in post-head positions (but not in pre-head positions). See Cinque (2005) and Abels & Neeleman (2012) for approaches that restrict movements in a way that unattested orders are not generated.

We can see that the ordering of the morphemes on the adjective in (11b) is exactly the same as on the noun in (11a). This can be explained if the same hierarchy of projections is found on top of each adjective in (11b) as on top of the noun in (11a), with case higher (and therefore further away from the root) than definiteness, which is in turn higher than gender (and therefore also further away from the root).[7]

(12)



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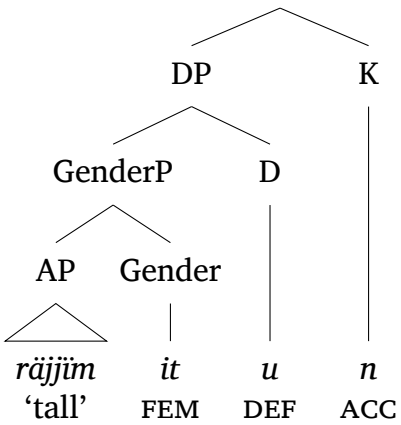


Amharic has also number markers, see (14a). Number is subject to concord, see (14b). It is once again the case that the same sequence of morphemes as found on the noun in (14a) is replicated on top of each adjective in (14b).

(14) Amharic (Workneh 2011:32,126)

a. lïjj-**očč-u-n**
child-PL-DEF-ACC
'children' (accusative)

b. räjjïm-**očč-u-n** gobäz-**očč-u-n** lïjj-očč
tall-PL-DEF-ACC intelligent-PL-DEF-ACC child-PL
'the tall intelligent children' (accusative)

Summarising, this section discussed languages where ϕ and case features on modifiers are expressed by the same affixes as on the modified nouns. This fact suggests that for the purpose of morphology at least, ϕ and case features should be represented in the same way on the modifier and on the noun. If affixes on nouns realise functional categories of gender, number and case, then the same functional categories should be placed on top of the modifier.

We also saw that when concord is expressed by multiple affixes, the affixes are ordered in the same way on the modifier as on the noun. Ideally, we should have a single theory that accounts for both orders, i.e., the ordering of morphemes on the noun should be explained in the same way as the order of morphemes on

[6] In the (b) example, Workneh's original gloss of *lïjj* has been changed from 'girl' to 'child.' I did this to make the glossing consistent across the two examples.

[7] Agreement on the second adjective is optional in Amharic. However, we agree with Workneh (2011) that the possibility of placing the functional morphemes on each modifier does indicate that this phenomenon falls under the definition of concord. We leave it unaddressed why the noun has no morphology just in case the adjectives do; what is crucial for us is the fact that the agreement morphemes may attach to each modifier and when they do, they exhibit an ordering that is straightforwardly explained by placing the relevant functional heads on top of the modifier.

the adjective. If the ordering in the nominal domain is an effect of a hierarchy of functional projections dominating the noun, where each affix realises a particular head, it is natural to conclude that the same hierarchy is replicated on top of the modifier (with each concord morpheme realising a dedicated head).

3 The range of categories targeted by agreement

Consider now the range of categories that are subject to concord across various languages. This aspect of concord has been recently studied in detail by Bayırlı (2017) and Norris (2019). As a starting point, consider the generalisation (15) observed by Bayırlı (2017).

(15) The Concord Hierarchy Generalization (Bayırlı 2017)
There is a hierarchy among gender, number and case features
(case ≫ number ≫ gender)
such that the presence of concord for some feature in a language L implies the presence of concord for every feature in L that is lower in the hierarchy

Leaving the empirical discussion aside for now, the generalisation allows the four language types given in the top part of Table (16), and disallows the language types in the lower part. Checkmarks indicate the presence of concord for a given category, dark shade indicates the absence of agreement for a given category.

(16) Concord systems allowed by the Concord Hierarchy generalisation (15)

		GENDER	NUMBER	CASE
1.	allowed			
2.	allowed	✓		
3.	allowed	✓	✓	
4.	allowed	✓	✓	✓
5.	not allowed	✓		✓
6.	not allowed		✓	✓
7.	not allowed		✓	
8.	not allowed			✓

Let me now briefly exemplify some of the allowed systems, drawing mainly on the typological study by Norris (2019), which investigates concord in a diverse sample of 174 languages.

Line 1 depicts languages without any concord. This is a frequent type. Out of the 174 languages in Norris' sample, only 103 show concord, which entails that 71 languages do not exhibit any concord.

Line 4 represents languages with 'full concord,' i.e., languages where all of gender, number and case are subject to concord. Such languages include Amharic discussed in (11), and many Slavic languages belong in this category as well. In the database Typology of Nominal Concord (Conctypo, Norris 2021), I found 24 languages where at least one modifier agrees in these three categories. 7 languages show this pattern on all modifiers, i.e., adjective, numeral and demon-

strative (Wambaya, Russian, Icelandic, Pashto, Greek, Latvian, Ukrainian).[8]

The generalisation (15) also allows the existence of languages where some, but not all nominal categories are targeted by concord. I will refer to such cases as partial concord. Partial-concord languages are not so rare. Specifically Norris (2019:4) notes that within the 103 languages with concord in his sample, only 30 have case concord. This means that out of the 103 languages with concord, at least 73 are partial-concord languages (showing no case concord).

Partial-concord languages allowed by (15) are shown on lines 2 and 3. Line 2 of the table represents languages that only have gender concord. Using the Conctypo database (Norris 2021), I found 20 languages with at least one modifier that agrees in gender only. (Norris 2019:9) reports that on a language-wide basis, there are seven languages that exhibit purely gender concord: Apurinã, Chinantec, Maybrat, Slave, Trumani, Wari and Yurok.

As the final allowed type, line 3 represents languages with agreement in gender and number but not in case. Such languages are relatively common too, and include, e.g., French (Norris 2019). Section 6 further discusses the Omotic language Dime, which also has only gender and number concord. I found 52 languages in the Typology of Concord database where at least one modifier has gender and number concord (Norris 2021). 10 languages show this pattern on all the modifiers (Babungo, Yagua, Arapesh, Chichewa, Ndonga, Archi, Kisi, Swahili, Nkore-Kiga, Tiwi).

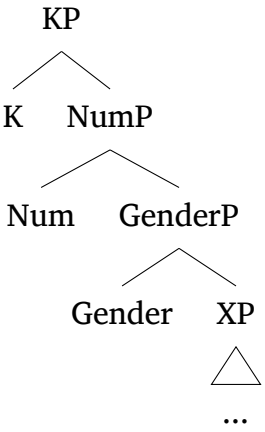
If Bayırlı's generalisation is correct, the remaining types are expected to be unattested. Potential instances of such systems are, nevertheless, found, and I turn to them shortly. Regardless of what we shall conclude about these additional cases, the point is that our theory of concord must in any case have a way to allow for at least the concord systems on lines 1-4 (leaving it aside whether and how additional types will have to be accommodated).

What is interesting about the language types discussed up to now is that they bear a clear relation to the hierarchy of functional projections in (2). Specifically, in these languages, it is the case that if concord targets a given projection in the hierarchy (2), it targets all lower projections. If we assume that agreement features are structured as in (2), we can capture the different types of concord as making use of different structures that are trimmed top down, as in (17)-(19). (Modifiers with no concord would then correspond to bare XP.)[9]

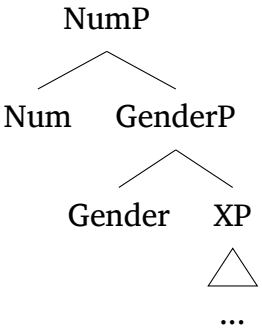
[8] I am grateful to Mark Norris for pointing me to the database and patiently answering my querries.

[9] This approach finds inspiration in Harley (1994), who also proposes that entailment relations in concord patterns can be captured by tree-like geometries. The variation is reminiscent of 'restructuring' types of configurations, with projections missing from the top (Wurmbrand 2001).

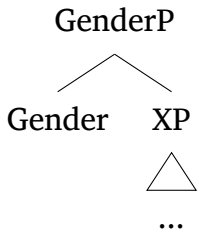
(17) Full concord



(18) Number & Gender



(19) Gender only



Due to the fact that the structures are trimmed top-down (which seems to be a general property of 'restructuring'), the presence of case presupposes the presence of number, and the presence of number presupposes the presence of gender. This way, Bayırlı's generalisation is derived from the idea that modifiers have the same hierarchical structure of ϕ and case features as nouns.

Let me now turn to some empirical challenges to Bayırlı's generalisation (15) noted in Norris (2019), as well as those emanating from the typological database of concord available as Norris (2021). The reason why I discuss the challenges is not to undermine the structural approach in (17)-(19), which does indeed capture a large part of the variation. The point is rather to show that to capture the complete range of facts, we will need additional mechanisms to deliver variation. After I introduce the challenges, I argue that the Nanosyntax theory of spellout is one such theory. (I leave it open whether alternative theories of morphological realisation are capable of achieving the same, though I suspect the answer to be positive.)

As a starting point, consider the fact that Norris (2019) offers a somewhat weaker statement relating case, number and gender concord, see (20).

(20) Norris (2019:8): If a language or lexical category within a language has case concord, it will likely have number concord (and if the language has gender, gender concord).

The generalisation (20) clearly states something similar to Bayırlı's generalisation (15), namely that concord in case, a high category in the hierarchy, generally implies agreement in the lower categories (if the language makes the relevant distinctions to begin with).

The two main differences between (20) and Bayırlı's generalisation (15) are the following. First, (20) is stated as a tendency rather than an absolute universal. This is because Norris' sample actually contains some of the languages predicted to be unattested by Bayırlı's generalisation (15). Second of all, (20) also remains intensionally vague concerning the direction of the implicational relation between number and gender concord. These differences are triggered by the fact that Norris did find some additional language types compared to Bayırlı's results.

Consider, for instance, line 6 of Table (16), representing languages with case

and number concord only. According to Bayırlı, such languages should not be attested. However, we have already seen that Finnish, as discussed in (4), is such a language. In Norris' (2021), I could find 18 languages where at least one modifier agrees in number and case only. Importantly, some of these languages also have gender (e.g., Ingush, Wardaman, Nez Perce). Four languages show number and case concord consistently on all modifiers (Yup'ik, Finnish, Itelmen, Greenlandic). If the morphology on such modifiers is to be accounted for, one needs to allow for variation along more parameters than just 'restructuring,' i.e., the approach I suggested above.

According to line 7 in Table (16), we should not find languages that only have concord in number. But again, the database Norris (2021) contains 50 languages where at least one modifier agrees in number only (e.g., English is one of these, because of *this/these*). One language (Kunama) shows number concord consistently on all modifiers. Admittedly, many of these languages may have a rather weak gender system (as English), and one may therefore wonder whether that is the relevant factor that actually defines the relevant set of languages. However, (Norris 2019:9) found that six of these languages have a gender system (Fur, Grebo, Lakhota, Maranungku, Mixtec (Chalcatongo), and Tagalog). And so we reach the same conclusion again: In order to capture such languages, something beyond restructuring needs to be assumed.

Similarly, line 8 of Table (16) represents languages with case agreement only, but no number/gender agreement. According to statement (15), such languages should be unattested. However, Norris (2021) contains 20 languages where at least one modifier agrees in case only. Three languages show this pattern on a language-wide basis (Georgian, Gumuz, Kayardilid). As the clearest example, Norris (2019) mentions Georgian (as discussed in Fuchs 2021).

Finally, according to line 5, there should be no languages with agreement in gender and case only. However, Norris' (2021) database contains four languages where this patterns is found with at least one modifier. In three of these, the pattern is found with numerals, which may be considered spurious, since number on numerals may be considered different than on other modifiers (consider the difference between *hundreds of* and *hundred of*). But even if we ignore the numerals, there remains one example where agreement in gender and case is found with demonstratives (Haram Oromo). However, this pattern seems to be the rarest of all, and no language shows this on language-wide basis.

In sum, the descriptive picture is somewhat more complicated than suggested by Bayırlı's generalisation, even if there is a tendency for languages to comply with it. The empirical discussion is summarise in Table (21). I list here the number of languages that contain a particular pattern for all modifiers, and in bracket, I indicate the number of languages which show the relevant concord pattern for at least one of the modifiers.

(21) Concord systems identified in Norris (2021)

		GENDER	NUMBER	CASE	Languages	
1.	allowed				attested	71
2.	allowed	✓			attested	10 (20)
3.	allowed	✓	✓		attested	7 (52)
4.	allowed	✓	✓	✓	attested	7 (24)
5.	not allowed	✓		✓	attested	0 (4)
6.	not allowed		✓	✓	attested	4 (18)
7.	not allowed		✓		attested	1 (50)
8.	not allowed			✓	attested	3 (20)

The table makes it clear that to capture the relatively less numerous, but attested patterns in the lower part of the table, we need something in addition to the restructuring type of variation. In the following sections, I argue that if we adopt the Nanosyntax model of spellout (Starke 2009 et seq.), we can derive the additional language types, keeping everything else constant.[10]

Before we explore this proposal, let me briefly summarise what we have seen up to now. I started by presenting the main idea of this paper, which is that ϕ features and case features on modifiers are structured in the same way as on nouns. I presented two types of evidence for this proposal. The first type of evidence is provided by languages where the marking of ϕ features and case features is the same on nouns as on the modifiers, including interesting restrictions on ordering. This is elegantly captured by assuming a parallel make up of the modifier and the noun.

The second reason for proposing parallel hierarchies is that with some exceptions, the range of possible concord systems generally tracks the hierarchy of functional projections. Specifically, various attested concord systems can be captured by reducing functional structure top-down, which is a known parameter of variation (Wurmbrand 2001). Because of these two empirical reasons, I consider the idea of replicating a nominal hierarchy on top of the modifier to be an approach worth pursuing.

The reminder paper is dedicated to languages where the morphology of agreeing categories does not align as neatly with the morphology of the noun as in the Finnish paradigm (4). I propose an account of such facts within the framework of Nanosyntax (Starke 2018). Specifically, the idea is that different roots may spell out a variable number of functional projections (Caha et al. 2019), and this is what leads to differences in morphological marking. Moreover, I argue that the very same approach can accommodate the counterexamples to Bayırlı's generalisation in (15).

[10] I do not discuss this in detail, but (I think that) the same results can be achieved in other realisational models of morphology, such as Distributed Morphology (Halle & Marantz 1993, Bobaljik 2017).

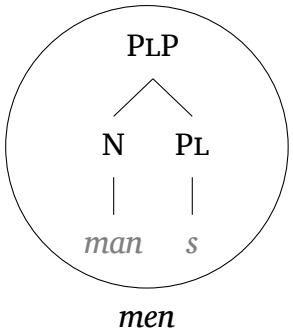
4 Introducing root size

This section introduces the idea of a 'root size,' explored in Caha et al. (2019). The goal is to show that differential root size interacts with the hierarchy of functional projections on top of the modifier in a way that gives us the extra generative power needed to describe concord systems that appear as exceptional at this point (i.e., those listed on lines 5-8 in Table (21)).

To illustrate how the idea works, this section discuses plural marking in English. To begin with, consider suppletive plurals such as *men*. Clearly, *men* is the plural of the noun *man*, and it conveys a meaning that would be expressed by *man*+*s* if *man* were a regular noun.

The tree in (22) depicts a particular implementation of this idea, using the idea of phrasal spellout. First of all, the structure assumes that the structure of the plural is exactly the same as in the regular cases, and it is composed minimally of an N node (hosting the lexical meaning) and the functional head PL. The circle around the tree depicts the idea that *men* is capable of the realisation of this complex structure due to phrasal spellout.

(22)



(23) *men* ⇔

(24) *man* ⇔ N

Phrasal spellout is allowed for the lexical item *men* because is stored in the lexicon as associated to the plural phrasal node, see (23). The singular *man* would then have the entry as in (24), assuming that the bare N corresponds to the meaning of the singular.[11]

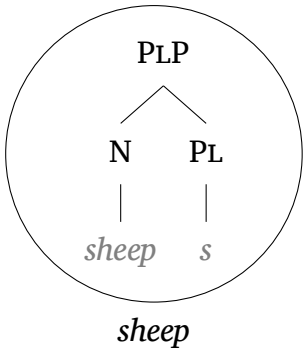
In Nanosyntax, matching between potentially phrasal lexical entries and syntactic nodes is governed by the so-called Superset Principle given in (25).

(25) *Superset Principle* (Starke 2009)
A lexically stored tree L matches a syntactic node S iff L contains the syntactic tree dominated by S as a subtree.

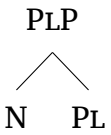
The Superset Principle (just like the Subset Principle of DM) allows for an elegant analysis of syncretism. Consider, for instance, the lexical item *sheep*. In some sense, *sheep* is like *men* in that it needs no plural *-s* to convey the plural meaning. It is therefore tempting to propose that it also spells out the PLP node, see (26). Its lexical entry is as in (27).

[11] I shall refine this later on in Section 6, and propose a dedicated SG head in between PL and N.

(26)



(27) *sheep* ⇔



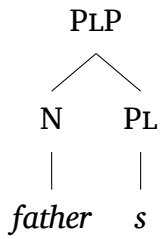
Interestingly, given the lexical item (27), the Superset Principle allows that a bare N (without the plural on top) can also be spelled out as *sheep*, since the N node is contained in the lexical entry (27). The result is that *sheep* is the realisation of both the plural structure (which includes N + PL) and the singular structure, which corresponds to N only.

In the case of the singular – plural pair *man* ∼ *men* discussed above, *men* can also spell out the singular structure (corresponding to just the bare N). However, unlike in the case of *sheep*, the lexical item *men* has a competitor, namely *man*, recall (24). Since the lexical item *man* is a perfect match for the singular structure, it wins in competition with *men* because of the commonly assumed Elsewhere Condition.

So far, we looked at two nouns (*man*, *sheep*) none of which have *-s* in the plural. Let us now turn to nouns that actually need *-s* to give rise to the plural interpretation. The idea is that plural *-s* is needed with roots whose lexical entry only includes N, and therefore, these roots fail to spell out both the N node and PL. For instance, the lexical item *father* is only specified as spelling out the N node (see (28a)), and requires therefore the plural *-s* (given in (28b)), so that they jointly spell out the plural, see (29). The lexical item *father* cannot realise the whole plural structure, because the structure is not contained in its lexical entry.

(28) a. *father* ⇔ N
b. *-s* ⇔ PL

(29)



In sum, we have seen that in English, some lexical items need plural *-s*, and some don't. I analyse the latter group as spelling out both the N node and the plural node. Due to lexicalising plural by themselves, these roots don't combine with the plural suffix. Some of these roots (e.g., *sheep*) function also as bare singulars, others don't (*men*). This depends on whether they have a competitor for the bare N node or not.

In what follows, I use the idea of differential root size to provide an account for languages that have different morphology on the modifier and the noun. The main idea is that the underlying structure of ϕ is the same for the noun and the modifier, but the roots of the modifiers are lexically specified for a different set

of projections than the roots of nouns. This leads to nouns and modifiers having different suffixes, just like in the case of *father-**s*** vs. *men*(-Ø). The same machinery also allows us to account for cases that counterexemplify Bayırlı's generalisation (15).

5 Modifiers bigger than nouns

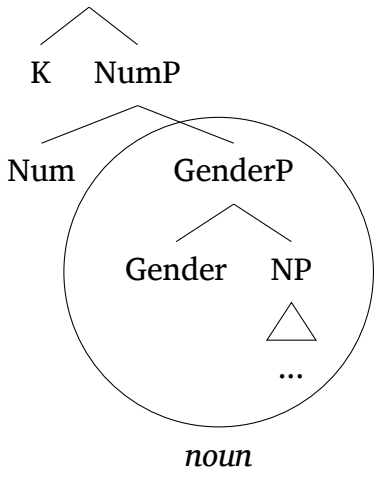
This section looks at languages that can be modelled by proposing that their modifiers have 'bigger' lexical entries than nouns. This means that the lexical entry of modifiers includes some functional projections that the noun lacks. This leads to the effect that the morphology on the modifier is impoverished compared to the noun. This 'impoverishment' affects morphemes from the root out, because that is the direction in which phrasal spellout operates – starting with the lexical head, lexical items realise multiple positions from the bottom up, targeting gender before number. This mechanism thus complements the structural impoverishment approach explored in Section 3, allowing for additional language types.

5.1 Georgian

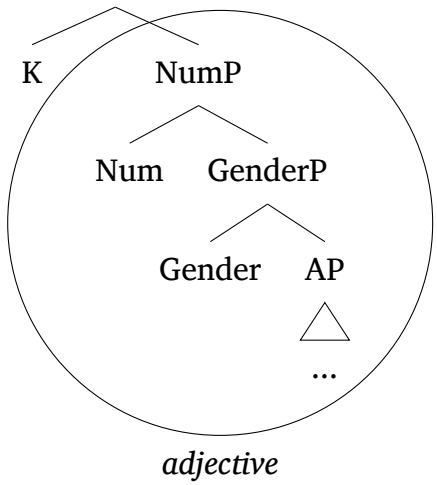
This section discusses concord on Georgian adjectives. I propose that Georgian adjectives have lexical entries like the English *sheep* (spelling out PL), while Georgian nouns are like the English noun *father*, not spelling out PL. I show that when a language has a lexicon like this, it is going to violate Bayırlı's generalisation (15) on the surface, even though the underlying structure respects the hierarchy of projections.

To see how this works, consider again the main idea, which is that both nouns and adjectives have the same structure of ϕ and case features on top of the lexical head (noun, adjective). Suppose further that nominal roots realise GenderP, as in (30). As a result, nouns will have no gender marker, but they will combine with affixes for number and case.

(30)



(31)



Suppose further that adjectival roots differ from nominal ones in that they are able to spell out the NumP projection, as in (31). (This is an entry analogous to

the English *sheep*.) As a consequence of spelling out Num, such adjectives won't combine with any number markers (just like *sheep* does not). The only morpheme that could be found on the modifier would be a case marker.

As a result, such language would be described as having case concord but no number concord. This would be a counterexample to Bayırlı's generalisation (15), despite the fact that the underlying structures are in conformity with the idea that the modifier has the exact same projections as the noun.

In sum, just by exploring the logical possibility that adjectives in some language may behave like the noun *sheep* in English, we allow for the existence of languages that, on the surface, violate Bayırlı's generalisation (15).

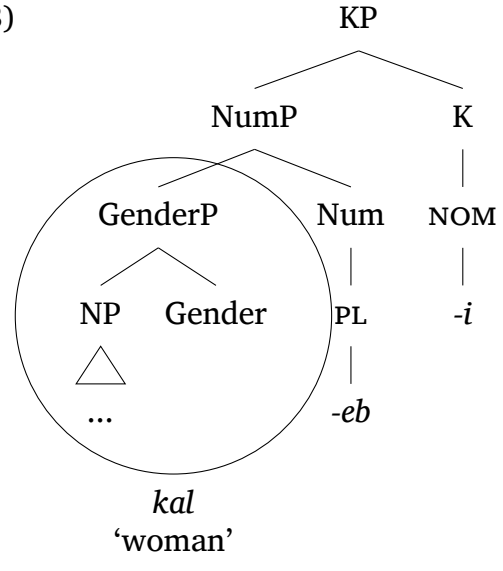
In Section 3, we noted that Georgian, as discussed in Norris (2019) and Fuchs (2021) is indeed such a language. A paradigm fragment is proivided in (32).

(32) Georgian paradigm fragment (Hewitt 1995:45)

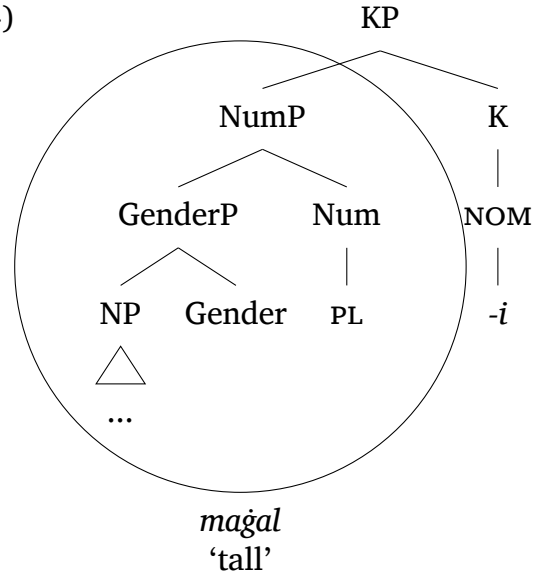
	SINGULAR		PLURAL	
	tall	woman	tall	woman
NOM	maġal-i	kal-i	maġal-i	kal-eb-i
VOC	maġal-o	kal-o	maġal-o	kal-eb-o
DAT	maġal	kal-s	maġal	kal-eb-s
ERG	maġal-ma	kal-ma	maġal-ma	kal-eb-ma

We see in (32) that nouns have a dedicated plural marker *-eb*, which comes in between the root and the case marker. However, the adjective *maġal-* 'tall' shows no number distinctions: it only combines with case markers. We can encode this by proposing that Georgian adjectives spell out the whole NumP, see (34).

(33)



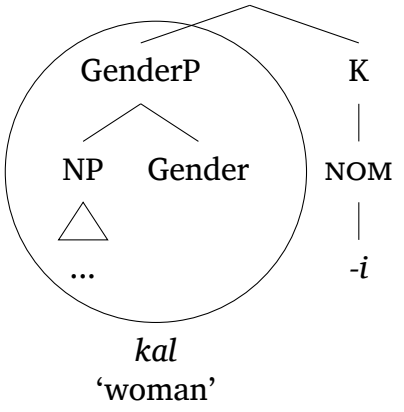
(34)



On the other hand, the noun only spells out GenderP. Therefore, Num is realised by the plural marker *-eb*, on analogy to nouns like *father*, see (33).

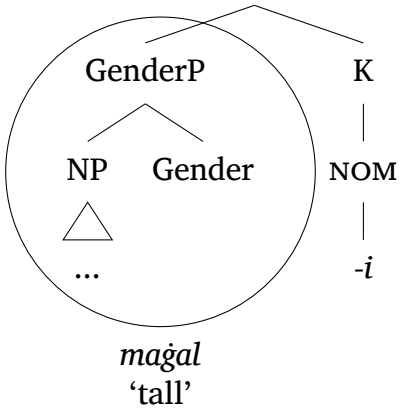
The spellout of the singular structures (characterised by the absence of the plural Num head) is shown in (35) (for nouns) and (36) for adjectives. The noun spells out exactly the same constituent as in (33). Due to the lack of the plural Num in (35), there is no need for the plural suffix.

(35)



kal
'woman'

(36)



maġal
'tall'

The adjective in (36) also spells out GenderP (like the noun). This is allowed by the Superset Principle (25), since GenderP is contained inside the lexical entry of the adjective. As a result, the singular adjective spells out the same constituent as the noun, and they thus both take the same case suffix.

In effect, according to this analysis, Georgian modifiers actually include the projection of number in the morphosyntactic structure. However, the adjective bases happen to be syncretic between the plural and the singular (just like the English *sheep*), and the morphosyntactic distinction between the singular and the plural is thus neutralised in the process of morphological realisation (due to syncretism).

Before we conclude this section, let me briefly return to Finnish. Recall from Table (4) that Finnish nouns show a system similar to Georgian nouns, with number and case following the noun in that order. This can also be seen in the example (37c).

(37) Finnish (Karlsson 2013:8)

a. iso auto
big car
'a/the big car'

b. iso-**ssa** auto-**ssa**
big-in car-in
'in a/the big car'

c. iso-**i-ssa** auto-**i-ssa**
big-PL-IN car-PL-IN
'in (the) big cars'

Differently from Georgian, Finnish modifiers (including adjectives) show number and case suffixes just like the corresponding nouns. This fact can be captured by proposing that Finnish adjectives spell out GenderP – just like the nouns they modify. As a result, they do combine with number and case suffixes (but show no gender marking).

The difference between Finnish and Georgian is thus not a difference in structure, but a difference in the morphological realisation of that structure, which can be ultimately linked to a lexical difference between Georgian and Finnish adjectives. I depict this on the first two lines of the lexicalisation table (38). The table

depicts the idea that due to spelling out the gender and number heads, Georgian adjectives only combine with a case marker. Finnish adjectives fail to spell out number, and combine with number and case suffixes as a consequence.

(38) The root-size parameter

	AP	Gender	Number	Case
Georgian	adjective			K
Finnish	adjective		PL	K
Expected	adjective	Gender	PL	K

These proposals further lead us to expect that there may be languages (as depicted on the last row) with adjectival roots that do not spell out Gender. Such languages would be predicted to show three suffixes after the root, namely gender, number and case. In Section 6.2, I analyse the Caucasian language Khwarshi along these lines, see (39) for an example.

(39) siħira-**l**-**ťa**-*lo* zor-za-*la*
sly-ANIM-PL-GEN2 fox-PL-GEN2
'sly foxes' (Khwarshi, Khalilova 2009:101)

The important general point is that the size of the root is a parameter of variation that is orthogonal to the 'restructuring' parameter. Specifically, since all the languages in Table (38) show case concord, I assume that they have the full structure on top of the modifiers, i.e., including Gender, Number and Case. The root-size parameter then yields three different surface systems of concord on the basis of the exact same underlying structure. The three different language types have concord systems that correspond to lines 4, 6 and 8 in Table (21).

Importantly, the latter two types correspond to languages that are not expected by Bayırlı's generalisation (15), but nevertheless attested. The introduction of the root-size parameter thus has the effect that the 'generative capacity' of the system increases in the right direction. Specifically, we are able to maintain the idea of a hierarchy of projections, which allows us to capture the ordering of gender, number and case on the modifier. At the same time, we are able to model systems of concord (like Georgian or Finnish) which seemed to challenge this approach.

5.2 Zulu

In this section, I discuss adjectival and demonstrative concord in Zulu, drawing on the data and analysis provided in Taraldsen (2010). Taraldsen's main point is that the morphology of concord in Zulu may be captured by assuming that concord marking always corresponds to a subset of the functional projections associated with nouns. Taraldsen notes that compared to nouns, modifiers may lack morphemes realising particular projections both at the bottom of the tree, or at the top of the tree. These observations directly correspond to the two parameters of variation in concord that are explored in this chapter: missing projections at the top are the effect of restructuring, while missing projections at the bottom arise when a particular modifier realises these projections due to phrasal spellout (or an equivalent mechanism in frameworks without phrasal spellout).

The idea that the two parameters of variation may combine within a single language further leads to an interesting consequence for the typology of concord systems. In particular, if a modifier can lack both the top-most projection (case) due to restructuring, as well as the bottom-most projection (due to phrasal spellout), the modifier will be left with number marking only. Such systems are (surface) problematic for Bayırlı's generalisation (15), but nevertheless attested, recall line 7 of Table (21). The fact that the current proposal can capture such systems (by adding variation in root size on top of structural variation) is therefore another welcome consequence.

Let us now consider the data, beginning with the morphology of nouns. The first thing we need to know is that nouns fall into a number of noun classes that are characterised by a particular prefix on the nominal root. These prefixes code the number and gender of the noun. For example, nouns with Class 1 prefixes are always animate (so the prefix codes animacy), and their plurals are generally formed by substituting the Class 1 prefix with a different prefix, called traditionally Class 2 (so the prefix also codes number). For instance, ***um****-ntwana* (Class 1 noun) means 'a child,' while ***aba****-ntwana* (Class 2 noun) means 'children.'

Consider now some additional examples. In Class 7 (prefix *isi-*) we find inanimates that generally form plurals by replacing the Class 7 prefix *isi-* by Class 8 prefix *izi-*, e.g. ***isi****-wa* 'precipice' has the plural ***izi****-wa*. Similarly, ***in****-ja* (Class 9) means 'a dog' while ***izin****-ja* (Class 10) means 'dogs.'

As the examples indicate, the even-numbered classes (2, 4, etc.) tend to be reserved for plurals of the odd-numbered classes (1, 3, etc.), even though there are exceptions to the pairing 1-2, 3-4, etc.

The list of prefixes for the classes 1 to 10 in Zulu is shown in Table (40). The pairs of singular/plural classes can be grouped into genders demarcated by the vertical lines (Carstens 1991), where each gender has an (odd) singular class and and (even) plural class. However, this proposal is not unproblematic, see Taraldsen et al. (2018) for a discussion.

(40)

1	2	3	4	5	6	7	8	9	10
u-m	a-ba	u-m	i-mi	i-li	a-ma	i-si	i-zi	i-N	i-zi-N

As indicated by the dashes in (40), the prefixes are is morphologically complex. They consist of the so-called initial vowel (IV, sometimes also called pre-prefix) and the inner prefix, usually of the shape CV. The morphemic nature of the initial vowel can be observed in cases where it disappears, and the noun appears without it, as under negation, see (41a). Note that the initial vowel appears again when the noun scopes higher than negation, see (41b).

(41) a. A-ndi-boni (*a)-ba-fundi
NEG-1SG-see IV-2-student
'I don't see any students.'

b. A-ndi-ba-boni *(a)-ba-fundi
NEG-1SG-2-see IV-2-student'
'I don't see the students.' / 'There are some students I don't see.'

It has been pointed out that the initial vowel thus behaves as a determiner of sorts, because it leads to a specific/definite interpretation of the object in (41b).

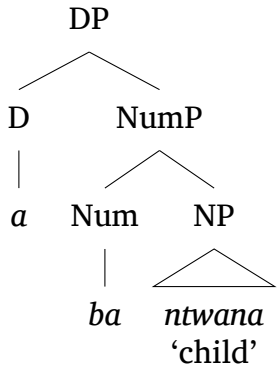
The initial vowel also disappears on predicative adjectives, see (42). This is also consistent with the idea that the initial vowel has, in some contexts, a function similar to the definite article.

(42) a-ba-ntwana ba-de
IV-2-child AC2-tall
'The children are tall.'

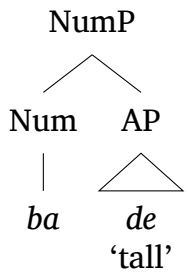
To recapitulate, the main points so far were that Bantu nouns have prefixes coding gender and number. These prefixes are morphologically complex, containing the initial vowel and the inner CV prefix. The initial vowel is missing on predicative adjectives, and on indefinite objects under negation.

Taraldsen (2010) interprets this in a way that noun-class prefixes realise at least two different morphosyntactic positions, which he calls A and B for the lack of a better term. I shall call them D and Num, since the initial vowel has some properties that link it to D, and the CV prefix definitely codes number as one of its properties. I show the simplified structure of the Class 2 *a-ba-ntwana* 'children' in (43). We shall make the structure more refined (by adding Gender) as the discussion unfolds.

(43) Class 2 noun



(44) Class 2 adjective



Since adjectives in all classes lack the initial vowel, recall (42), this straightforwardly leads to the idea that adjectives lack the topmost projection, see (44). This is consistent with the idea that modifiers replicate the same sequence as found on nouns, but may not replicate the sequence all the way to the top.[12]

Let me now turn to the demonstratives, which in Zulu also agree with the noun. The demonstratives are in the second column of Table (45) (labelled DEM).

[12]Case marking is prefixal in Zulu, and it is not subject to concord. This is expected if adjectives only project up to NumP.

(45) Based on Taraldsen (2010)

CLASS	PREFIX	DEM	√	DC	D	Num	Gender
1	u-m-	l-o	la-	u		u	m
2	a-ba-	l-a-ba	la-	a-ba	a-		ba
3	u-m-	l-o	la-	u		u	m
4	i-mi-	l-e	la-	i		i	mi
5	i-li-	l-e-li	la-	i-li	i-		li
6	a-ma-	l-a	la-	a-		a	ma
7	i-si-	l-e-si	la-	i-si	i-		si
8	i-zi-	l-e-zi	la-	i-zi	i-		zi
9	i-N-	l-e	la-	i		i	N
10	i-zi-N	l-e-zi	la-	i-zi	i-	zi	N

As we can see, the Zulu demonstrative always starts with an *l-*, which is followed by class specific morphology. Let me start the analysis of this class-specific morphology by focussing on the vowel which always follows the demonstrative root *l-*. This vowel changes depending on the class. The important observation is that its quality can be predicted from the quality of the initial vowel of the prefix. If the initial vowel is *a-* (as in Class 2 and 6), the demonstrative *l-* is also followed by *a*. If the initial vowel is *u-* (as in Classes 1 and 3), then the vowel after the demonstrative *l-* is *-o*. If the initial vowel is *i-* (as in the remaining classes), the demonstrative *l-* is followed by *-e*.

These facts can be explained (as pointed out by Taraldsen 2010) by assuming that the demonstrative root corresponds to an invariant *la-* (given in the column marked √), which is then always followed by the initial vowel of the relevant class. The initial vowel then coalesces with the final *a* of the demonstrative in a way such that:

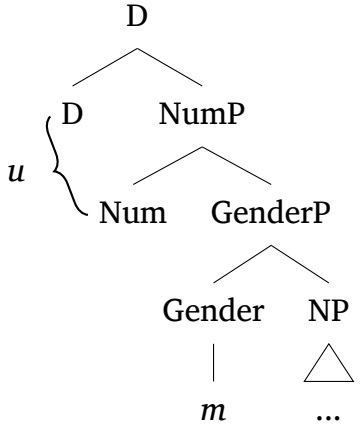
(46) a. $la + a = la$
b. $la + u = lo$
c. $la + i = le$

Such vowel coalescence is common in Bantu. If we assume its existence, the demonstrative concord (which follows the invariant *la-*) has the shape given in the column DC of Table (45).

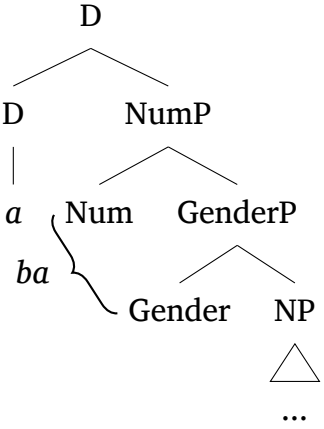
The interesting fact about DC is that in Classes 1, 3, 4, 6 and 9, it corresponds to the initial vowel alone. However, in the remaining classes, the demonstrative concord includes not only the initial vowel, but also the rest of the inner prefix. Thus, descriptively, in order to get the correct shape of the demonstrative concord, we must compose different number of ingredients for each class. How can we capture this behaviour?

The way Taraldsen (2010) explains this is shown in (47) and (48). The basic idea is that each noun contains not two, but at least three grammatical components, which Taraldsen calls the A-layer, the B-layer and the C-layer. We shall label these layers as D, Num and Gender; however, the reader should keep in mind that this is a simplification and that Taraldsen remains noncommittal about the precise label of these heads.

(47) Class 1



(48) Class 2



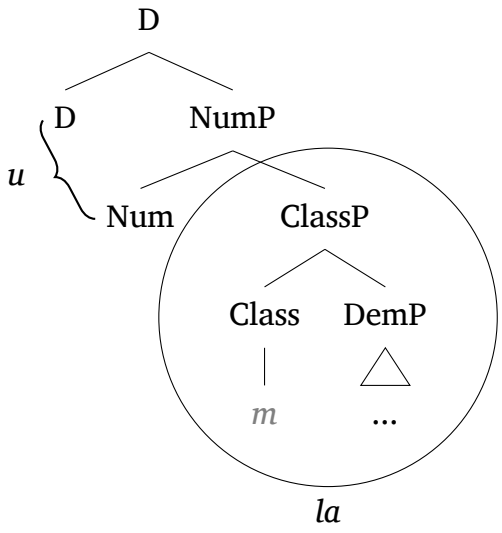
The basic idea in (47) and (48) is that since we have three projections and only two markers, one of the markers is going to be a portmanteau marker, expressing multiple positions. There are two logical options: either the initial vowel is the portmanteau, or the inner CV prefix is. Taraldsen proposes that both options are attested, depending on the class. In (47), I depict the proposal that the initial vowel of Class 1, namely *u-*, lexicalises two layers, and *m-* only spells out the lowest structural position labelled Class. The other lexicalisation pattern is depicted in (48), where the initial vowel of Class 2 only lexicalizes the topmost D layer, and the CV-prefix lexicalises the remaining two layers.

In Table (45), I indicate which lexicalisation pattern holds for which class by placing shading below the heads realised as a portmanteau.

It turns out that the bifurcation in the behaviour of the demonstrative concord in different classes can be explained as an effect of these two different types of lexicalisation. Specifically, once class markers are analysed as in (47) and (48), it becomes possible to derive demonstrative concord based on the idea that (i) the functional sequence above Dem is the same as the nominal sequence, and (ii) that the demonstrative root is lexically specified as the realisation of GenderP. The second statement means that the root of the demonstrative is lexically larger than the nominal roots, which do not spell out Gender. This is then the only factor that derives both the differences between nominal and demonstrative class marking as well as the bifurcation in the type of demonstrative concord.

Let me begin with Class1. First, recall that I assume that the modifier actually has the same projections as the noun. However, since the demonstrative spells out the whole GenderP, we need no exponent for the lowest Gender head in Class 1, only the D and the Num layers need to be lexicalised. As a result, in all classes where the initial vowel spells out these two layers, there is no need to include the inner prefix. Since in Class 1, the inner prefix *m* spells out just Gender (recall (47)), we get the demonstrative concord *u*, see (49).

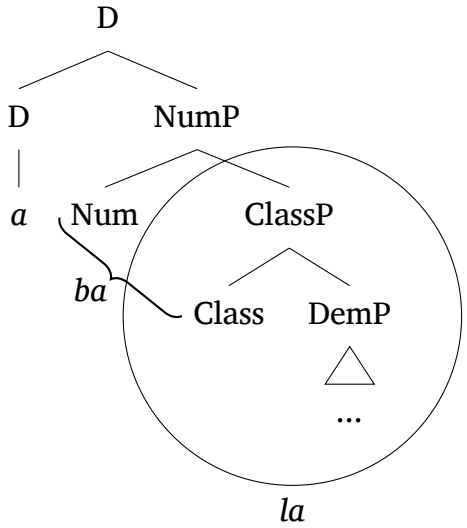
(49) Class 1 demonstrative



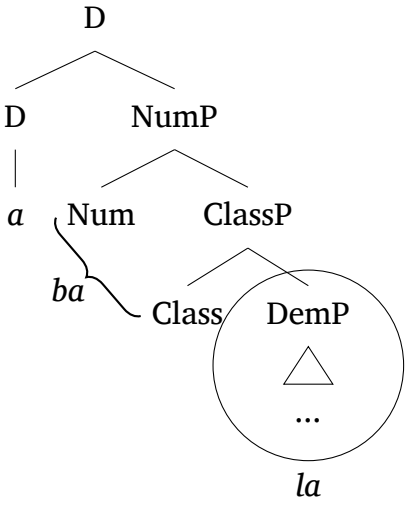
I further assume that the demonstrative root moves to the left, yielding the correct order *la-u*. After coalescence between the final *a* of the demonstrative and the initial vowel *u*, we get the correct form *l-o*, recall Table (45).

In Class 2, the situation is different. If we circle the GenderP constituent, as in (50), the initial vowel is incapable of spelling out all the residual projections: we still need the inner prefix *ba*, since *ba* is the only morpheme capable of spelling out Num in Class 2.

(50) Class 2 demonstrative



(51) Class 2 demonstrative



When we place all the three elements in the tree corresponding to Class 2, see (50), we realise that there are two candidates for spelling out Gender, since both DEM *la* and the inner prefix *ba* can spell out this node. In Nanosyntax, such scenarios are resolved by making the root (or in general the lower element) realise only a sub-part of its full lexicalisation potential, since this is allowed by the Superset Principle (see Starke 2018, De Clercq & Vanden Wyngaerd 2018, Vanden Wyngaerd et al. 2020 for a technical discussion). Therefore, the final outcome of lexicalisation is as given in (51), with *la* spelling out only DemP.[13]

In other words, an account of demonstrative concord in Zulu becomes possible

[13] As in Class 1, also in Class 2 the demonstrative moves to the left and we get *la-a-ba* = *laba*.

under the proposal that all functional heads are replicated on top of the modifier, but their spellout is different in some classes due to the fact that the demonstrative has a larger root than the noun.

Summarising the discussion so far, I proposed two things. The first thing is that adjectives have a syntactically impoverished structure, lacking all the projections realised by the initial vowel. In (44), I proposed that this can be captured by attributing to adjectives a structure of the size NumP (corresponding to the B-layer of Taraldsen 2010). In other words, I am using the restructuring-type of variation to account for adjectival concord.

The second proposal was that demonstratives have the same structure as nouns (i.e., including D), and they differ from nouns because their root is bigger. In abstract terms, I am using the root-size strategy to deal with demonstrative concord. Thus, it turns out that both strategies are operative in Zulu, albeit for different classes of modifiers.

Before we leave this section, I need to revisit and update my proposal concerning adjectival agreement in light of what has been proposed for demonstratives. To see why, consider first the following table listing the form of the adjectival concord for all the ten classes. We see that in all classes except 9, the adjectival concord simply loses the initial vowel.

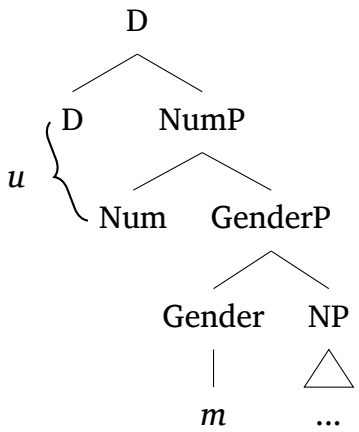
(52)

CLASS	1	2	3	4	5	6	7	8	9	10
NOUN	u-m	a-ba	u-m	i-mi	i-li	a-ma	i-si	i-zi	i-N	i-zi-N
ADJ	m	ba	m	mi	li	ma	si	zi	i-N	zi-N

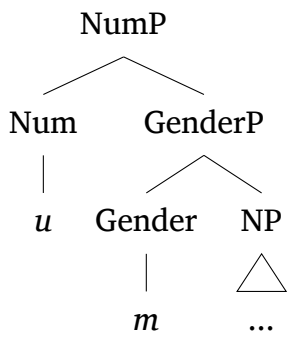
In (44), I proposed (following Taraldsen's ideas) that adjectival agreement lacks the top-most D projection, and corresponds to NumP. This nicely matched the observation that the adjective lacks the D-like initial vowel, but it agrees in number and gender with the noun.

However, some care needs to be taken here, since I have subsequently decomposed the structure of the nominal prefix even further, and introduced an additional layer below number. Most relevantly, in some classes (such as in Class 1), the initial vowel was then proposed to be the realisation of the two topmost projections, see (53).

(53) Class 1



(54) Class 1 Adj (wrong)



Given these updates, it seems that the idea that the adjectival concord corre-

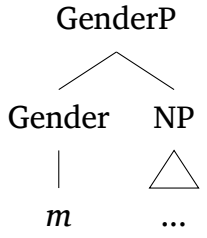
sponds to NumP can no longer be maintained. In (54), I show that if we simply trim the Class 1 structure to the size of NumP, we seem to predict that the adjectival concord for Class 1 is *u-m*. The idea in (54) is that since D is missing, *u-* realises just a sub-part of its lexical specification, which is allowed. However, this expectation is factually wrong, since the adjectival concord in Class 1 is just *m-*, see (55).

(55) u-m-ntwana m-de
1-child AC1-tall
'The child is tall.'

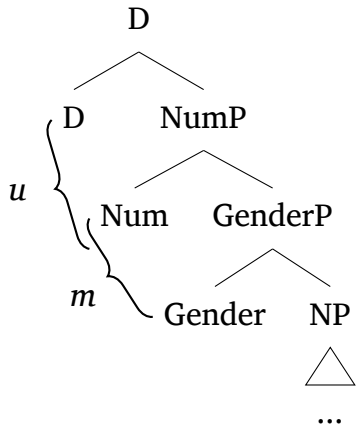
This shows that we need to update our proposal for adjectival concord in one way or another, particularly in those classes where the initial vowel spells out both Num and D.

It turns out that there are two ways to do that. What Taraldsen (2010) proposes is that adjectival concord corresponds to an even smaller structure, corresponding to our GenderP, as shown in (56). This straightforwardly accounts for the fact that the initial vowel disappears even in classes where it spells out Num, see (56).

(56) Class 1 Adj (Taraldsen 2010)



(57) Updating the inner prefix

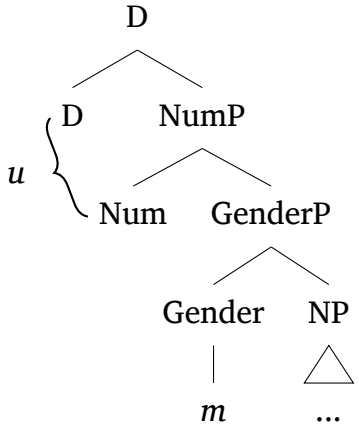


For Taraldsen, such update is unproblematic, because he does not label the relevant projections as D, Num, Gender; he simply calls them the A layer, the AC layer, etc. However, for my approach, such an update is problematic, because obviously, adjectives track not only the gender of the noun, but also its number. Therefore, I am going to pursue here an alternative approach.

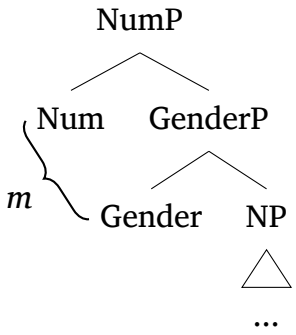
The alternative I suggest is shown in (57). It proposes that the inner prefix in Class 1 is lexically specified as capable of spelling out both Gender and Number: this is the only update I am proposing. From the lexical specification of the inner prefix, it follows that it cannot realise D. D can only be realised by the initial vowel, which is lexically specified for both Num and D. As a result, the two markers that jointly realise all the Class 1 functional heads overlap for Num. We have already encountered such a situation, and we noted that it is resolved by making the lower morpheme realise only the lower projection, while the higher morpheme uses its full specification. This follows from the nature of the spellout algorithm, as described in Starke (2018) (see also De Clercq & Vanden Wyngaerd 2018, Vanden Wyngaerd et al. 2020). Therefore, the functional heads for a Class

1 noun are realised as shown in (58) (with *m-* using only a subpart of its specification).

(58) Class 1



(59) Class 1 Adj (final)



Adjectives, by hypothesis, lack the highest projection, see (59). In this case, the inner prefix *m-* realises both Gender and Number. Since there is no D projection, there is no need to introduce *u-* (which would make *m-* 'shrink' to spell out only Gender). This way, we can capture the facts without the need to trim the adjectival structure all the way down to GenderP.

5.3 Summary

In this section, we discussed in detail two languages (Georgian and Zulu) where nouns have a smaller root than the modifier. In Georgian, the adjective could spell out the Number head (both singular and plural), which led to the effect that we could not see any number marking on the adjective, even though number marking is found on nouns.

In Zulu, the demonstrative root is also bigger than the noun, spelling out the GenderP immediately above NP. This leads to the effect that in classes where the initial vowel realises both Number and D, the inner prefix is missing; e.g., the demonstrative modifying a Class 1 noun has just *u-*, while the nominal Class 1 prefix is *u-m*. This approach is flexible enough to handle also cases where the full nominal prefix is found on the demonstrative, e.g., in Class 2, where both the noun and the demonstrative have the class marker *a-ba*. This is because in this class, the initial vowel only spells out D, and so *ba* is needed to realise Num.

The main observation is that both in Georgian and in Zulu, the marking on the modifier is reduced compared to the noun. However, the reduction does not eliminate high functional projections, but rather those that are adjacent to the root (number, the inner prefix). Most current morphological frameworks allow for modeling these kinds of cases in one way or another. The approach I adopt here (Nanosyntax) handles these examples by phrasal spellout: it attributes to the modifier a lexical entry of a particular size. When this size happens to be greater than that of the noun, the result is a reduction of functional morphology in positions adjacent to the root.

The goal of the following section is to investigate a complementary set of cases, namely those where the marking on modifiers has more morphemes than

the marking on nouns.

6 Nouns bigger than modifiers

The main claim of this section is that examples where modifiers have extra morphology compared to nouns can be explained by proposing that nominal modifiers in such languages have 'small' roots, i.e., smaller than nouns. This leads to the fact that the root of the modifier fails to realise some functional projections that the nominal root spells out, and this is why the 'additional' morphology emerges.

6.1 Dime

As the first example of a language where adjective roots are smaller than nominal roots, consider Dime (Omotic, Seyoum 2008). We shall illustrate the facts using the nouns for 'man' *goštú* and 'woman' *ʔámzi*, whose indefinite forms are illustrated in (60a,b) respectively.

(60) Dime (Seyoum 2008:76, 155)

a. **goštú** yerím nááʁe šin-i-n
man donkey-ACC yesterday sell-PF-3
'A man sold a donkey yesterday.'

b. čúú-ná sugur **ʔámzi** dán
down-3FS Bodi woman COP
'That down there is a Bodi woman.'

When such indefinite nouns are modified by an adjective, the adjective shows gender concord (masculine or feminine). We show this in (61).

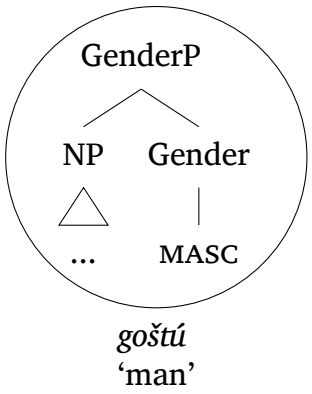
(61) Dime (Seyoum 2008:83-4)

a. gúdúm-**ub** goštú
tall-**MASC** man
'a tall man'

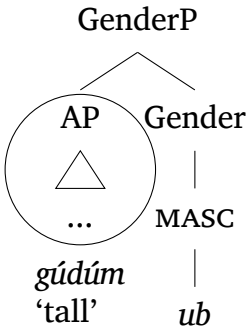
b. gúdúm-**ind** ʔámzi
tall-**FEM** woman
'a tall woman'

The contrast between nouns and adjectives regarding gender marking can be captured by the proposal that nouns realise a phrasal constituent containing gender, as in (62). In contrast, adjectives are not lexically specified for spelling out gender, yielding a structure such as (63).

(62)



(63)



Note that in order to distinguish the masculine from the feminine, I am placing the feature MASC under Gender. This is an abbreviation: I consider it likely that a decompositional approach to the masculine and feminine gender is more accurate, where the masculine has just a single gender head, with the feminine adding the FEM feature (Caha 2021, Baggio 2022).

Considering the difference between nouns and adjectives in (62) and (63), we see that it is possible to capture Dime morphology under the assumption that adjectives and nouns have the same functional heads dedicated to ϕ-features. What is new here is that the adjective has more overt morphemes compared to the noun, which is a predicted possibility allowed by Late Insertion theories in general and Nanosyntax in particular.

As the next interesting point, let us mention that Dime adjectives also agree in number, as illustrated in (64a). It will be relevant that also numerals may agree in number, see (64b).[14]

(64) Dime (Seyoum 2008:111)

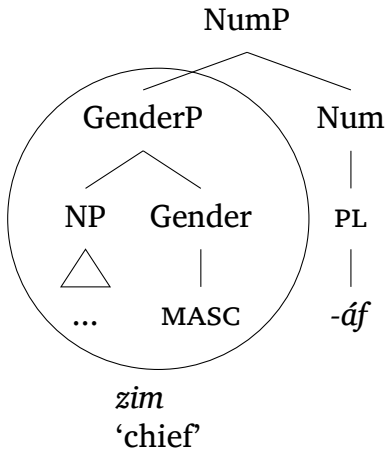
a. mə̀kkim gúdúm-**id** zim-**áf**
three tall-**PL** chief-**PL**
'three tall chiefs'

b. mə̀kkim-**id** ʔámz-**af**
three-**PL** woman-**PL**
'three women'

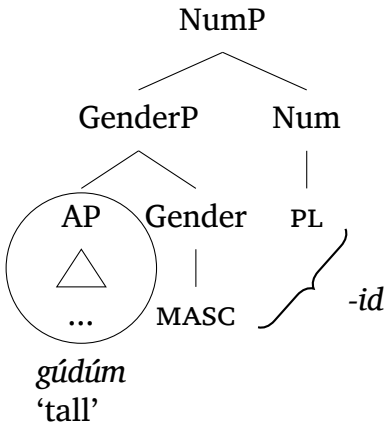
The interesting fact is that agreeing modifiers take different number marker than nouns: we have *-id* on modifiers, *-af* on nouns. This fact can be understood using the structures in (65) and (66). (65) shows the realisation of number with nouns. Since nouns spell out Gender, the nominal plural marker only spells out the Num head.

[14]Number agreement is optional both on numerals and adjectives.

(65)



(66)



However, adjectival roots cannot spell out gender, and so this projection must be realised by something outside of the root. A straightforward idea is that *-id* is a portmanteau for the two categories, as in (66). This is why *-id* differs from the nominal marker *-af* (the latter is not a portmanteau, while the former is).

This concludes the discussion of root size differences between nouns and adjectives in Dime. As a point that is relevant to the general issue of variation in concord, I shall also illustrate here the fact that adjectives in Dime do not contain the projection of definiteness or case, which I understand here as a 'restructuring'-type of reduction, trimming the structure top down.

To show that, let me now move on to the discussion of definiteness and case suffixes in Dime. We can see the definiteness marker *-is* in (67a,b). If we compare the roots with the indefinite forms *goštú* 'a man' and *ʔámzi* 'a woman' in (60), we may note that the final vowel of the root is lost when the definiteness marker attaches to the base. What this shows is that the definiteness suffix is tightly integrated with the stem like the plural, which also gives rise to such an effect, recall the plural form *ʔámz-af* 'woman-PL' in (64b).

(67) Dime (Seyoum 2008:36, 152)

a. gošt-ís
   man-DEF
   'the man'

b. ʔámz-is
   woman-DEF
   'the woman'

Despite its suffixal nature, the definiteness marker is not targeted by concord. In (68), I show two examples where definiteness is not found on the modifier, only the plural is.[15]

[15]The definiteness marker, even though it is suffixed to the last element of the phrase, thus appears to have a phrasal scope, which I depict by the bracketing.

(68) Dime (Seyoum 2008:110-1)

a. [s'án-**íd** wúdúr-**af**]-is
black-**PL** girl-**PL** -DEF
'the black girls'

b. [k'əstin-**id** wúdúr-**af**]-is
two-**PL** girl-**PL** DEF
'the two girls'

The same holds for case. Out of all the nominal suffixes in (69a), the agreeing numeral is only marked for plural. The same type of marking (number yes, case and definiteness no) is found on the quantifier in (69b).

(69) Dime (Seyoum 2008:91, 111)

a. [k'əstin-**id** zim-**áf**]-is-im
two-**PL** chief-**PL**- DEF-ACC
'the two chiefs' (accusative)

b. [s'us'-**id** ʔámz-**af**]-is-ko ʔakim-is
many-**PL** woman-**PL** -DEF-GEN calabash-DEF
'the calabash of all the women'

In sum, agreeing modifiers in Dime only agree in gender and number, but not in case or definiteness. I attribute this type of variation to the possibility that the projection of the modifier undergoes restructuring, trimming functional projections from the top down. In Dime and elsewhere, this type of variation coexists with differences between nouns and modifiers that affects morphemes adjacent to the root. In particular, Dime adjectives show a gender marker not found with nouns.

6.2 Khwarshi

As the final empirical case, let me discuss Khwarshi (Caucasian, Khalilova 2009). The point of the discussion is to show that adjectives in Khwarshi fall into two major classes depending on whether they do (or do not) agree in Gender. I show how this can be explained by assuming variation in root size, thereby maintaining a uniform structure for all adjectives. Ultimately, the variation is explained in terms of a simple difference between adjectival roots in the postsyntactic lexicon.

At the first look, the situation in Khwarshi is similar to Dime in that adjectives agree in gender, but nouns have no overt gender marking. As Khalilova (2009:41) puts it, "[t]he category of gender is a covert category, i.e. the gender is not shown on nouns."

This is illustrated in (70). With one group of adjectives, gender concord is marked by a prefix, see (70). In another class, it is marked by suffixes, see (71). The prefixes are ususally the same as the suffixes, but not always (as in Class I). Crucially, there is no corresponding gender marker on the noun.[16]

[16]The adjectives which show suffixal concord are all loans from Avar and they make up about 45% of adjectives in the language. The adjectives with prefixes are of Khwarshi origin and make up about 15% (Khalilova 2009:99). The remaining 40% corresponds to a third group, to be discussed shortly.

(70) Prefixal concord (Khalilova 2009:100)

a. **ø**-ogu obu
I-good father(I)

b. **y**-ogu kad
II-good girl(II)

c. **b**-ogu zihe
III-good cow(III)

d. **l**-ogu lože
IV-good word(IV)

(71) Suffixal concord (Khalilova 2009:110, 145, 283, 299)

a. bercina-**w**
beautiful-I

b. bercina-**y** kad
beautiful-II girl

c. bercina-**b** he^{n}še
beautiful-III book(III)

d. bercina-**l** tarpa
beautiful-IV bag(IV)

The interesting twist in Khwarshi is that there is an additional class of adjectives, which (are similar to nouns and) show no gender concord at all. In (72), we can compare the adjective 'beautiful' (which shows suffixal agreement) with the adjective 'red,' which shows no agreement.

(72) a. bercina-**b** he^{n}še
beautiful-III book(III)

b. ut'ana he^{n}še
red book(III)

(73) a. **b**-ogu zihe
III-good cow(III)

b. k^{ʔ}aba zihe
black cow(III)

In (73b), we can see that the adjective 'black' shows no agreement either. In sum, it should be remembered that Khwarshi has two major classes of adjectives, where one class shows no gender agreement, while the other class agrees in gender, marked either as a suffix or a prefix. In what follows, I focus on suffixal adjectives only, contrasting them with the other group of adjectives that show no gender agreement.

Moving on beyond gender, it should be noted that all Khwarshi adjectives show agreement in number and (to some degree) also in case. To see that, consider the full paradigm of the phrase 'black bird' in (74). The adjective 'black' belongs in the class that shows no concord in gender.

(74) Adjective with no gender concord (Khalilova 2009:101)

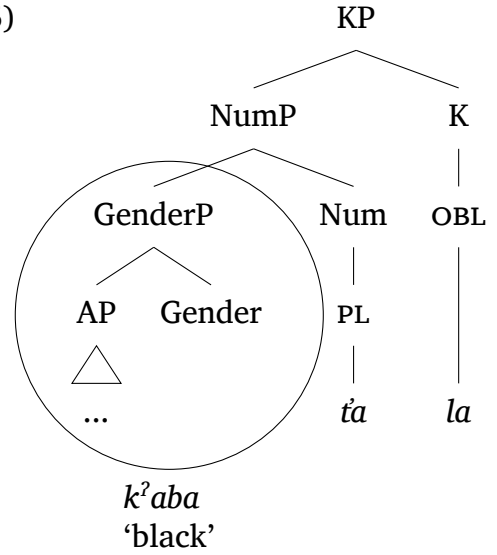
	SINGULAR		PLURAL	
	'black'	'bird'	'black'	'bird'
NOM	k^{ʔ}aba	ɣ^{w}ade	k^{ʔ}aba-**ťa**	ɣ^{w}ad-ba
ERG	k^{ʔ}aba-*la*	ɣ^{w}ad-*i*	k^{ʔ}aba-**ťa**-*la*	ɣ^{w}ad-za
GEN1	k^{ʔ}aba-*la*	ɣ^{w}ad-*is*	k^{ʔ}aba-**ťa**-*la*	ɣ^{w}ad-za-*s*
LAT	k^{ʔ}aba-*la*	ɣ^{w}ad-*il*	k^{ʔ}aba-**ťa**-*la*	ɣ^{w}ad-za-*l*
GEN2	k^{ʔ}aba-*la*	ɣ^{w}ad-*la*	k^{ʔ}aba-**ťa**-*la*	ɣ^{w}ad-za-*la*

In the singular, the adjective distinguishes between two forms. In NOM, the adjective has no affix. In all other cases, it has an additional oblique case marker *-la*. (The oblique marker is subject to vowel harmony, and surfaces as *-lo* on some stems.) I shall treat this as case concord even though the affix only tracks the distinction between the nominative vs. the rest.[17]

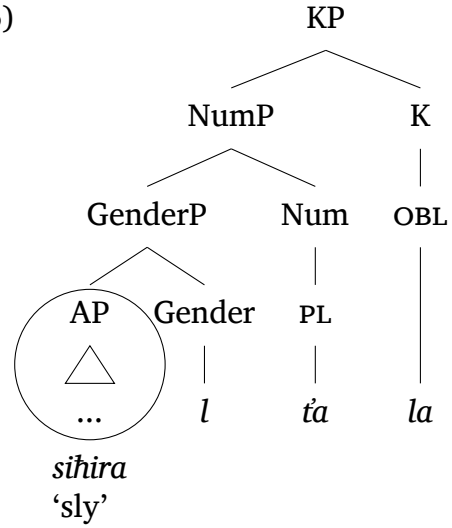
[17] In Caha (2009), it is proposed that cases come in a hierarchy, and that they stand in a contain-

In the plural, the suffix *-ťa* appears in between the root and the oblique-case marker. The structure that captures these facts is shown in (75). I assume here that the adjective has all of Gender, Number and Case projections, but its root realises the whole GenderP. As a result, only number and case suffixes are found on the adjective.

(75)



(76)



As for the adjectives that agree in gender, I propose that their root spells out a smaller structure, as in (76). This structure leads us to expect that the gender marker of such adjectives is going to be placed in between the root and the plural number marker *-ťa*. As we can see in Table (77), this is indeed the case, and the adjective 'sly' shows a non-human gender marker *-l* in between the root and the plural suffix. The ordering is fully consistent with the syntactic hierarchy (76).

(77) Adjective with suffixal gender concord (Khalilova 2009:101)

	SINGULAR		PLURAL	
	'sly'	'fox'	'sly'	'fox'
NOM	siħira-**b**	zor	siħira-**l**-**ťa**	zor-bo
ERG	siħira-**b**-*lo*	zor-i	siħira-**l**-**ťa**-*lo*	zor-za
GEN1	siħira-**b**-*lo*	zor-*is*	siħira-**l**-**ťa**-*lo*	zor-za-*s*
LAT	siħira-**b**-*lo*	zor-*il*	siħira-**l**-**ťa**-*lo*	zor-za-*l*
GEN2	siħira-**b**-*lo*	zor-*lo*	siħira-**l**-**ťa**-*lo*	zor-za-*la*

It is interesting to note, though, that the singular gender marker is different from the plural gender marker (we get the Class III marker *-b*). This comes as a surprise, since in an agglutinative system, we would not expect the gender marker to change depending on number.

In order to show that the phrasal-spellout theory is flexible enough to deal with such facts, let me turn to one possible implementation. The crucial new in-

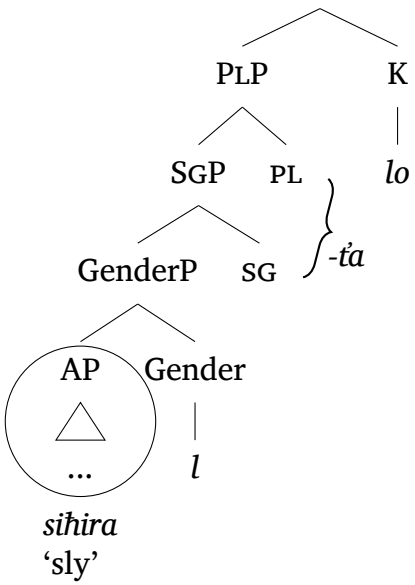
ment relation. For example, in the Khwarshi plural, we can see that the ergative form is contained in all the other cases lower down in the paradigsm. A system with case concord of the Khwarshi type can thus be understood as a system where the distinctions among obliques disappear due to the fact that not all case features are found on the modifier, with the high oblique case features missing (due to trimming).

gredient that we need to introduce is that in Nanosyntax, it is often assumed that even though the singular is structurally impoverished compared to the plural, singular is not simply the absence of number. In several works, it has been proposed that there is a dedicated projection also for the singular, separate from gender, as in (78a). The plural still has more features, as in (78b) (see Vanden Wyngaerd 2018, Caha 2021, Blix 2022).

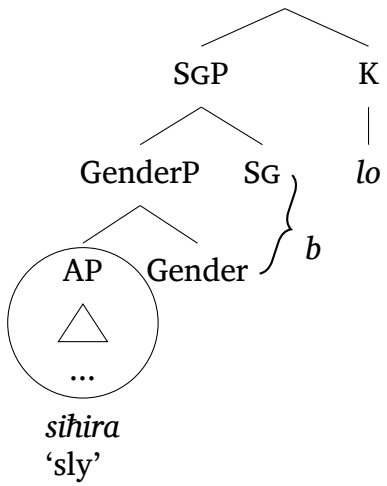
(78) a. singular [SG [gender [NP]]]
b. plural [PL [SG [gender [NP]]]]

Once this is adopted, we can depict the structure o the singular and plural in Khwarshi as in (79). Specifically, in (79), the plural *-ťa* realises both SG and PL, which leaves only the gender node for spellout, and *-l* appears here.

(79)



(80)



Now the idea about the singular is that *-b* actually spells out both Gender and SG, and that is why it is different from *-l*.[18]

Other analyses may, of course, be conceivable, but it is beyond the point to discuss them in any detail. The main point was to show that concord in gender is not necessarily a process that, on the surface, affects all adjectives in a language. In Khwarshi, about 40 percent of adjectives shows no concord in gender, while other adjectives do. This bifurcation can be captured by proposing a uniform morphosyntax, and locating the difference in the lexical entry of the adjectival root.

Another point worth repeating is that the agreeing adjectives with suffixal gender markers show the linear order ROOT-GENDER-NUMBER-CASE, an ordering that further suggests the presence of a hierarchy of projections above the root.

[18]The derivations in (79) and (80) are easily implementable using the standard Nanosyntactic spellout algorithm (Starke 2018). In the singular, since *-b* can spell out both Gender and SG, it does so. This would be achieved by the root cyclically moving out of SGP. Once the PL head is added, I assume that the only morpheme that can spell out PL is *-ťa*, which is lexically specified as SG + PL. Therefore, the derivation backtracks so that *-ťa* spells out these two heads, and *-l* emerges as a dedicated Gender marker.

7 Conclusions and speculations

The central focus of this chapter has been the morphology of concord. The point was to show that there are languages where modifiers are marked the same as nouns (Finnish, Spanish). Such systems can be elegantly captured if adjectives have the same functional projections as nouns, and agreement markers are the realisation of these projections (as in Taraldsen 2010, Starke 2020, Blix 2021). As one of its core merits, the proposal explains why the ordering of functional morphemes on adjectives is the same as on nouns, complying with potentially universal constraints on morpheme orders.

The second point was to show that this kind of approach (i.e., one where the noun and the modifiers have the same hierarchy of projections) can be extended to languages where the morphology of nouns is different from the morphology of adjectives. Descriptively, I recognised three types of such scenarios, given in (81).

(81) a. Impoverished modifiers
  (i) restructuring type (categories missing from the top)
  (ii) phrasal spellout (categroies missing from the bottom)
 b. Impoverished nouns

The first type of this scenario is represented by languages where nouns have more morphology than their modifiers (81a). I argued that this can be due to two different reasons.

First, the adjective can lack some of the projections on the top, see (81ai). Modifiers in such languages then lack case, number and/or gender marking. Second, categories can also be missing so to speak 'at the bottom' of the functional hierarchy, see (81aii). I showed that this situation can be analysed by means of phrasal spellout, where the adjectival root realises some of the categories that receive overt marking with nouns.

Finally, we also considered cases where adjectives (or modifiers in general) have more morphology than nouns, see (81b). The main idea is that such cases can also be analysed using parallel hierarchies, relying on the idea that the nouns spells out a larger constituent than the modifier.

The interest of this approach is that it models the variation in the morphological reflexes of concord by a tool that is independently needed in grammar (restructuring, portmanteau spellout). The point of this paper was to show that when we combine this tool with a layered structure of concord features, we have a theory that both explains the parallels and the differences between the morphology of nouns and their modifiers.

This position contrasts with most current ideas about concord, which is heavily influenced by the perspective offered in Chomsky (1995) and Chomsky's later work. It is interesting to note that the first three chapters of Chomsky (1995) operate under the assumption that syntactic structures contain a dedicated structural node for agreement, the so called Agr projection. This projection in the verbal domain had been motivated in the work by Pollock (1989) and Belletti (1990), who justify its existence by effects on verb morphology and verb placement: Agr nodes may both host overt agreement morphemes and attract the verb. Essentially the same reasons have led Starke (2020) and Blix (2021) to propose

that this traditional Agr node should be decomposed into several independent positions, one for each ϕ feature, which is a project that I adapt here for the purpose of concord.

Now in the final chapter of Chomsky (1995) (especially Section 4.10), considerations of Full Interpretation were invoked to cast doubt on the existence of such Agr nodes. The point that (Chomsky 1995:321) makes is that ϕ features lack interpretation at LF, and they are therefore suspect within the general model of language where every element must be interpreted at the interface. Chomsky writes: "Functional categories have a central place in the conception of language we are investigating, primarily because of their presumed role in feature checking, which is what drives Attract/Move. We have considered four functional categories: T, C, D, and Agr. The first three have Interpretable features, providing "instructions" at either or both interface levels. Agr does not; it consists of –Interpretable formal features only. We therefore have fairly direct evidence from interface relations about T, C, and D, but not Agr." This provides Chomsky with an impetus to try and eliminate Agr nodes from syntactic representations, replacing them by non-projecting features hosted by the interpretable heads instead. These non-projecting features may then be eliminated from the syntactic representation at Spell Out, and shipped to PF for realisation.

It seems fair to say that the last 25 years (or so) of syntactic research has been dominated by the idea that agreement features indeed have no semantic contribution, and that they therefore do not occupy a dedicated functional head. Current approaches thus understand concord as arising due to uninterpretable features located inside 'substantive' heads within the projection of the modifier (e.g., Carstens 2001, Norris 2012, Bayırlı 2017). These theories differ in how these features are manipulated: Carstens (2001) relies on the syntactic Agree operation, Bayırlı (2017) on syntactic feature percolation, and Norris (2012) invokes post-syntactic mechanisms, where agreement realises dissociated nodes created in the postsyntactic component.

However, it seems also fair to say that this line of research did not seriously try to address the issue of why the ordering of agreement affixes seems to obey the same logic as the ordering of uncontroversial functional heads. As far as I understand, there is no component of the current theory that would regulate this, and it is therefore not clear how these kinds of theories handle the regularities of ordering that agreement markers are subject to. Specifically, we have seen several examples where ϕ features on both nouns and adjectives exhibit the order ROOT-GENDER-NUMBER-CASE, or a relevant subset thereof. In the nominal domain (and elsewhere), such orders are often analysed as reflecting a universal hierarchy of categories, where the categories that are found closer to the root in the linear string are closer to the root also in the hierarchical structure. This article follows this logic to one of its natural conclusions, and claims that agreement affixes realise dedicated syntactic heads in the extended projection of the modifier. On this approach, the observed orders are a direct consequence of the hierarchical structure (see Cinque 2005, Abels & Neeleman 2012, Medeiros 2018 for various proposals as to how this may be achieved).

We are thus left with the following tension. On the one hand, ϕ features on modifiers seem to exhibit ordering that reflects hierarchical structures exhibited by functional projections (and "interacting with Attract/Move," in Chomsky's

terms). On the other hand, recalling the discussion in Chomsky (1995), they seem redundant in that they lack the clear meaning contribution often associated with functional heads.

Therefore, what I tentatively suggest is that it is worth exploring the possibility that ϕ features, including those on the modifier, are in fact interpretable and interpreted. There is some recent work which suggests that such an approach is viable. For example, in their recent work on gender, Sudo & Spathas (2020:Section 5.2) observe that their proposals about the interpretation of gender on nouns is compatible with the idea that ϕ features on agreeing modifiers are interpreted in exactly the same way. While their paper is non-committal as to whether that is the case, they propose that gender information on modifiers can be interpreted as contributing presuppositions regarding the nature of the noun the modifier combines with. If that approach turns out viable, the tension identified in Chomsky (1995) may only be apparent, because ϕ features, including the ones on agreeing modifiers, are interpreted by both interfaces. Needless to say, much work remains to be done to determine whether this is the case or not. The point of this article was to say why this approach would make sense from the perspective of agreement morphology.

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