Nominal inflection in Distributed Morphology

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1 Inflection in Distributed Morphology

Studies of inflectional systems have had pride of place in Distributed Morphology (DM) since its beginnings in Halle 1990 (see also Embick and Noyer 2001; Halle and Marantz 1993; Halle and Matushansky 2006; Noyer 1997; Marantz 1991). These early works focused primarily on patterns of allomorphy and syncretism in inflection, and in some cases, the appearance of inflection was essentially taken for granted. In this chapter, rather than surveying the influence of inflection on theories of allomorphy and syncretism, I aim to further concretize aspects of the DM model of inflection by exploring how the appearance of inflection has been and can be modeled in the theory.

I carry this out by investigating AGR (or Agr) nodes, autonomous nodes in morphological structure that are often posited to host inflectional features resulting from agreement. By "autonomous nodes", I mean they undergo Vocabulary Insertion and can be manipulated just as other nodes can. While AGR nodes play a role in many investigations of inflection, their properties—e.g., how they enter the derivation and what kind of content they have—are still poorly understood. By discussing what has been said about AGR nodes and what they must be able to do, I aim to bring us closer to having an understanding of them that is structured enough to be a theory yet flexible enough to allow for the cross-linguistic variation seen in exponence of inflection obtained through agreement.

The empirical focus is nominal concord (hereafter just 'concord'), the process that is traditionally known as "agreement with the head noun" for various nominal features, e.g., gender, number, or case (Norris, 2014, 2017, 2019a). Concord often involves agreement exponence for multiple features on multiple lexical categories. This means multiple AGR nodes, and thus concord is an ideal domain in which to study the properties of AGR nodes. In particular, I discuss concord in Ingush (ISO inh), a Nakh-Daghestanian language spoken by about 300,000 speakers in Southwestern Russia (Nichols, 2011:1). Examples and facts about Ingush come primarily from Nichols's (2011) comprehensive grammar of the language. Concord in Ingush is intricate, involving expression of gender, number, and case in different ways for different lexical elements. This variation extends even to subcategories. In this chapter, I analyze Ingush's system of adjective concord, which involves at least three subcategories of adjective based on the features expressed through concord. This allows for a discussion of the possible content of AGR nodes, and I propose that Ingush (and thus language in general) has multiple distinct AGR nodes (as opposed to, for example, one AGR node that is then split via some morphological operation). To account for different types of expression based on subcategory, I propose an analysis that treats the subcategories as inflection classes, and I propose that the presence of AGR nodes in a language can be sensitive to the inflection class features of the host.

An idea that has been reiterated in literature referencing AGR nodes is that their presence is conditioned by morphological wellformedness. For example, Marantz (1991:250) proposes that "AGR is a morpheme added to I^0 at [Morphological Structure] for those languages that demand morphological agreement to create a well-formed inflected verb as a word." The term *well-formed inflected verb* is an intuitive notion rather than a formal one, and I think there are multiple ways to interpret it. The patterns I explore in Ingush in this chapter help clarify what could be meant by morphological wellformedness. In brief, some inflection is truly obligatory in that there is no form of the corresponding word in the language without that inflection, but some inflection is only obligatory in particular syntactic contexts. These both could reasonably be described as issues of morphological wellformedness, but only the latter type (connected to syntax) has any hope of motivating the presence of AGR nodes.

The chapter proceeds as follows. As a backdrop to the discussion on adjectival inflection, I discuss existing proposals for nominal inflection in section 2. I then turn to Ingush, outlining the properties of its adjective concord system in section 3 and proposing the analysis in section 4. In section 5, I close with discussion of the notions of morphological wellformedness just mentioned.

2   Inflection on nouns

Most of this chapter puts forth new proposals concerning adjectival inflection. As a backdrop to that discussion, I consider proposals about inflection on nouns in this section, focusing on gender, number, and case. Research on nominal morphosyntax in the past three decades has largely sought to locate these features on some head(s) in the nominal spine.

2.1   Gender on nouns

Kramer's (2015) monograph develops an explicit theory of the encoding of nominal gender within DM. She thoroughly develops an analysis whereby gender is a feature of n^0, the nominalizing head widespread within DM research. This is most straightforwardly visible in situations where the n^0 has its own exponent, as in the Amharic suffix *-it* in examples in (1).[1]
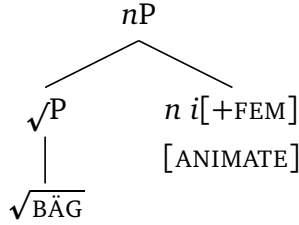
(1)   Overt gender markers in Amharic:

    a. *t'ot'a*   *t'ot'-it*
        'ape'   'ape-FEM', ie, 'female ape' (Kramer, 2015:40)

    b. *bäg*   *bäg-it*
        'ram/sheep'   'sheep-FEM', ie, 'ewe' (Leslau, 1995:163)

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[1]As it turns out, many instantiations of gendered n^0 must have a zero exponent in Amharic. At first blush, this may look like a weakness of the n^0 approach to gender. However, I contend that this is not a problem for the gender part of this analysis; rather, it is a result of analyzing gender in DM in the first place. Due to the assumption of acategorial roots, every noun root in a language must combine with n^0. So, in fact, even in languages without gender, n^0s with no overt exponent are commonplace in DM: any root which would be analyzed outside of DM as an underived noun root (e.g., 'noun' or 'root') would require a n^0 with a null exponent.

Kramer (2015) analyzes such examples with a particular n^0 head as in (2) and the vocabulary item in (3).

(2) Minimal nP for *bäg-it* 'ewe' based on Kramer (2015):

$$\begin{array}{ccc}
& n\text{P} & \\
& \diagup\diagdown & \\
\sqrt{}\text{P} & & n\ i[+\textsc{fem}] \\
\mid & & [\textsc{animate}] \\
\sqrt{\text{BÄG}} & &
\end{array}$$

(3) Vocabulary Item for the feminine suffix (Kramer, 2015:40):
n, [ANIMATE], [+FEM] $\longleftrightarrow$ *-it* / { $\sqrt{\text{BÄG}}$, $\sqrt{\text{T'OT'A}}$, ... }
"Insert *-it* for terminal n, [ANIMATE], [+FEM] in the context of roots from the list $\sqrt{\text{BÄG}}$, $\sqrt{\text{T'OT'A}}$, ..."

Kramer (2015:49-57) pairs these morphosyntactic pieces with a set of licensing conditions, which determine which roots each n^0 can felicitously combine with.

Kramer's work builds on decades of work seeking to pinpoint the location of gender. Most authors argue for locating gender on N^0 (Roca, 1989; Harris, 1991; Alexiadou, 2004; Carstens, 2011). In contrast, Ritter (1993) argues that gender features must be slightly higher, on Num^0 (see section 2.2), and Picallo (1991) proposes a novel syntactic projection, Gender^0, which selects NP as its complement. As Kramer (2015:23-31) discusses, the key considerations that these proposals—and any morphosyntactic theory of gender—must contend with are the following pieces and their interaction. First, all gender systems are based on a semantic core. For example, in a masculine/feminine gender system, most nouns denoting sociocultural female entities are feminine and likewise for male/masculine. Second, some nouns may have a default gender when the gender of the referent is not known or relevant. Third, there may be some nouns whose gender must be idiosyncratically listed, because it is not explained by the semantic core and/or default expectations in the language. Finally, in languages with gender, nominalizations may have their own gender. This is particularly interesting in the case of denominal nominalizations (e.g., *-hood* nouns, *-ship* nouns, diminutives in some languages), where the gender of the nominalization need not match the gender of the nominalized stem. An important takeaway from Kramer's work is that the head "responsible" for gender also does other things in the grammar, i.e., nominalize roots and phrases.

2.2 Number on nouns

The morphosyntax of number features has been a prominent part of DM and DM-adjacent morphosyntactic investigations of nominal structure for three decades (Carstens, 1991; Ritter, 1991; Valois, 1991; Delfitto and Schroten, 1991).[2] In the most basic analyses, number features

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[2]I wish to note for the historical record that NumP is often attributed to Ritter (1991) alone, but among Carstens (1991); Ritter (1991); Delfitto and Schroten (1991), nobody cites the other's proposal when making their own. (I have been unable to locate a copy of Valois 1991.) It thus seems to have been proposed by multiple authors at roughly the same time.

are located on the functional projection NumP (=NumberP), between N^0/n^0 and D^0, as shown in (4) below.

(4)

```
        DP
       /  \
      D   NumP
          /  \
       Num   nP
             /  \
            n   √//P
```
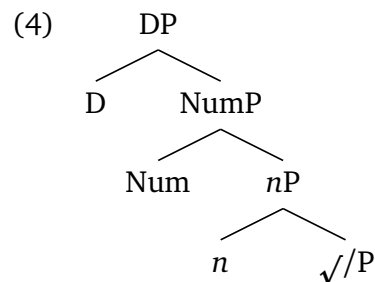
Most of the argumentation from this early work focuses on the need for a projection between N^0 and D^0 rather than it specifically being a number-related projection. However, there are arguments for severing number from the noun itself. First, while nouns often have just one fixed gender, the vast majority of nouns in a language have both a singular and a plural form (known complexities in the morphosemantics of plurals notwithstanding). Second, in denominal words in some languages, plural morphology is not possible inside of the derived word, which suggests plural is separated from the noun (root) itself in these languages.[3]

(5) No plural *-s* in English denominal words (Kramer, 2020):

a. denominal verbs: atom(*-s)-ize, game(*-s)-ify, ...

b. denominal adjectives: care(*-s)-less, sorrow(*-s)-ful, ...

c. denominal nouns: mother(*-s)-hood, book(*-s)-let, ...

As a third argument, Carstens (1991:76) notes Dryer's (1989) observation that in languages with free number words, i.e., free morphemes meaning things like PLURAL or DUAL, the order of Num & N follows the order of V & O. She thus argues that these free words must instantiate heads with NP complements, noting that Dryer makes the same conclusion.

The research on number morphosyntax since then has revealed that connecting all nominal number to one head in a particular syntactic configuration is too coarse-grained. There are now a host of different proposals concerning the location of nominal number. Authors argue for a variety of merge heights for heads with plural features; see Mathieu (2014); Ouwayda (2014) for proposals for three heights for plural, and see Kramer (2016, 2020) for arguments for just two. In addition, Wiltschko (2008) argues that some plurals are non-inflectional and should be not be analyzed as heads, but adjuncts. The arguments in support of these divisions from come both morphosyntactic and semantic evidence.

Given that it is formally explicit and squarely within DM, I illustrate again with an analysis from Kramer (2016, 2020). She divides plural morphemes into two categories: n^0-Plurals and Num^0-Plurals. The key distinction is that n^0-Plurals are nominalizers, and as a result, they have a number of defining properties, e.g., they can directly nominalize other categories and feed further derivation (see Kramer (2020) for a full list). This kind of analysis also neatly accounts
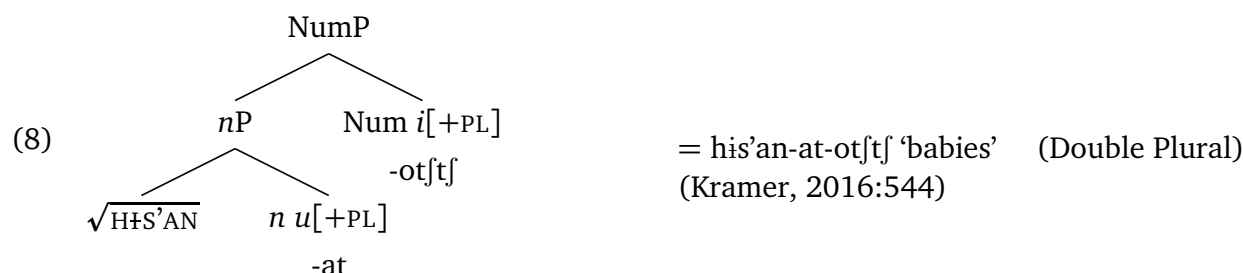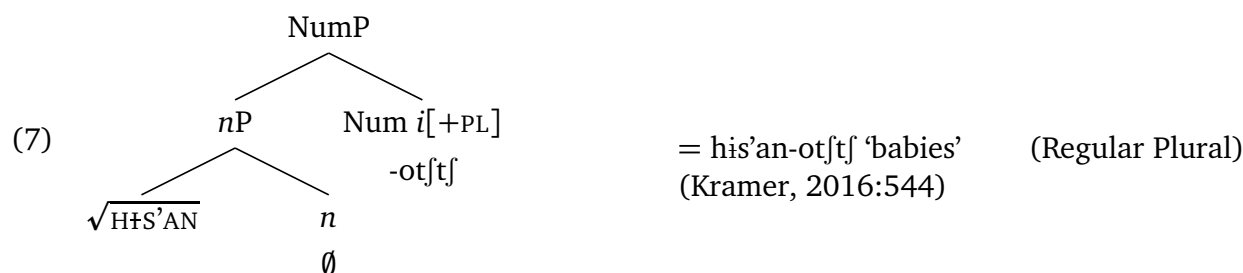
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[3]This is not a universal characteristic, and it is part of the evidence levied in favor of treating number inflection as a non-uniform category across languages, which I discuss straightaway.

for double plurals, where a single word hosts two separate exponents for plural, exemplified by the Amharic examples in (6) below:

(6) Amharic irregular, regular, and double plurals (Kramer, 2016:530,544):

SINGULAR	IRREGULAR PLURAL	REGULAR PLURAL	DOUBLE PLURAL	TRANSLATION
mämhɨr	mämhɨr-an	mämhɨr-otʃtʃ	mämhɨr-an-otʃtʃ	'teacher(s)'
mäs'haf	mäs'ahɨft	mäs'haf-otʃtʃ	mäs'ahɨft-otʃtʃ	'book(s)'
hɨs'an	hɨs'an-at	hɨs'an-otʃtʃ	hɨs'an-at-otʃtʃ	'bab{y|ies}'

The structures below show how Kramer's (2016) analysis treats regular plurals and double plurals in Amharic.[4] Note that in Kramer's analysis, number features are paired with the diacritics u 'uninterpretable' or i 'interpretable' to indicate whether they contribute to semantic interpretation.

(7)

```
            NumP
          /      \
        nP        Num i[+PL]
       /   \        -otʃtʃ
  √HɨS'AN   n
            ∅
```

= hɨs'an-otʃtʃ 'babies'   (Regular Plural)
(Kramer, 2016:544)

(8)

```
            NumP
          /      \
        nP        Num i[+PL]
       /   \        -otʃtʃ
  √HɨS'AN   n u[+PL]
            -at
```

= hɨs'an-at-otʃtʃ 'babies'   (Double Plural)
(Kramer, 2016:544)

Including two locations for number morphemes is a necessary step in analyzing double plurals, but importantly, Kramer (2016, 2020) shows that these morphemes also exhibit different morphosyntactic behavior, as referenced above.

2.3 Case on nouns

Compared to gender and number, there have been few detailed investigations of the morphosyntax of case-marking qua case morphemes in DM. There is literature focusing on case morphology itself (see especially Calabrese 2008) and there is literature exploring case morphosyntax, but moreso from the perspective of the connection between syntactic and morphological case (McFadden, 2004; Bobaljik, 2008; Legate, 2008). However, there is not as much work focusing on the syntactic terminals that ultimately get realized by case morphology.

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[4]Derivation of the irregular plural is slightly more complex; I refer the reader to Kramer (2016:545-546) for details.

These days, in the broader generative literature, it is often assumed that case features are connected to a head in the nominal spine known as KP (perhaps because CP was already taken). Lamontagne and Travis (1987); Travis and Lamontagne (1992) first proposed KP as a nominal analog to clausal CP.[5] KP is typically taken to be very high, often the highest position in the nominal spine, as represented in (9) below.[6]

(9)

```
        KP
       /  \
      K    DP
          /  \
         D    …
             /  \
            n    √/P
```
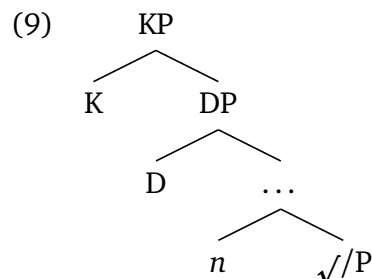
One benefit of positing KP on the edge of the nominal is that it is easier to formalize case's role as a liaison of sorts between a nominal argument and a predicate. KP has become so widely assumed that it has been used in published, peer-reviewed research without citation for over a decade (e.g., Franks and Rudin 2005, Svenonius 2006, Svenonius 2010, Radkevich 2010:5, Adger 2013:54, Ingason and Sigurðsson 2017).

There are, in fact, numerous proposals that do treat case morphemes as direct spell-outs of K^0, but in these works, K^0 is simply a piece of the broader analysis which serves as the focus of the work. Many of these proposals are not specifically within DM, though they seem to be compatible with at least a realizational approach to the syntax-morphology interface. Similar to Dryer's (1989) observation about number words and nouns, Bittner and Hale (1996:4) suggest that the order of so-called case particles and NP/DP tracks that of verb and object, as shown in the examples below.

(10) *Waitna ba* │ *sula ba* │ *ra* *kaik-an.*
     man   the deer the **ACC** see-PST.3

     'The man saw the deer.'   Mískito ISO miq, (Bittner and Hale, 1996:4)

(11) *Ka la yo"ii* **ya** │ *'u khlaa.*
     she PST see   **ACC** the tiger

     'She saw the tiger.'   Khasi ISO kha (Bittner and Hale, 1996:4)

If the relationship between case marker (in bold) and nominal phrase (in a box) is basic complementation, as the KP analysis assumes, we expect case particles to follow DP in head-final

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[5]Lamontagne and Travis cite similar proposals in Yim (1984) and some Kenneth Hale course notes, but I have been unable to obtain copies of either and so I cannot speak to the similarity alluded to.

[6]The one exception to this that I know of is Sigurðsson's (1993) analysis of Icelandic noun phrases, wherein he proposes K^0 selects an NP complement. This puts KP in essentially the position of NumP.

languages and precede in head-initial languages.[7] For additional proposals where case and K^0 are tightly linked (though, it must be noted, implementation of K/P is not uniform), see Guerssel (1992:177), Neeleman and Weerman (1999:6-7), Tremblay and Kabbaj (1990:178), McFadden (2002:353), McFadden (2004:236-239), Moskal (2015:366), and Dékány (2021).[8]

The proposals that assume a direct mapping from K^0 to case morpheme largely concern languages in which there is generally only one morpheme expressing case per nominal phrase. In many instances, these morphemes surface on the periphery (overwhelmingly on the right— suffixes or postpositions—according to Dryer (2013)).[9] However, there are languages where case morphemes are realized multiple times per noun phrase. These are languages with case concord; an Estonian example is given in (12) below.

(12) *kõigi-s*   *nei-s*   *raske-te-s*   *küsimus-te-s*
      all.PL-INE these.PL-INE hard-PL-INE question-PL-INE

      'in all these hard questions' (Estonian)   (Norris, 2018:539)

In this example, every word bears an inessive case suffix *-s*. The connection of case to K^0 is less clear in such languages: a single terminal K^0 cannot be spelled out as four instances of *-s* on separate words. Embick and Noyer (2001:558) suggest these case morphemes are not syntactic projections but are added postsyntactically via the rule in (13).

(13)   Noun $\rightarrow$ [Noun + Case$_{\text{Noun}}$]   (Embick and Noyer, 2001:558)

There are similar proposals incorporating K^0 where K^0 itself is not only or necessarily associated with a case morpheme on nouns. In these works, K^0 is perhaps the origin of case features, but the K^0 head itself is not (necessarily?) associated with case Vocabulary Items. For Ingason (2016); Norris (2012, 2014, 2018), K^0 heads themselves are not directly realized—or, at least,

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[7]It is important to note here that unlike Dryer (1989) or Carstens (1991), Bittner and Hale (1996) do not reference a typological study of case particle word order. In fact, I am not sure if one exists; for example, free-standing case particles are not included in the WALS chapter on the position of case affixes (Dryer, 2013). However, given the known fuzziness of the border between case and adpositions, we can be reasonably sure that the typological behavior of case particles would follow Bittner and Hale's expectation.

[8]Interestingly, there are also proposals that use KP but for a more syntactic purpose, e.g., to distinguish nominal phrases of different sizes. In this vein, see Neeleman and Szendrői (2007); Arregi and Nevins (2012). For a different approach, where KP is not universal and not even necessarily present in languages with case, see Bošković (2014). See also Harizanov (2014:1062), who utilizes KP to analyze object clitics in Bulgarian, which is notable beause Bulgarian lacks case-marking on non-pronominals.

[9]It is difficult to determine the overall proportion of languages with provably peripheral case morphemes. Dryer (2013) distinguishes between case suffixes and postpositional clitics. The idea is that case suffixes must attach to nouns but adpositional clitics can attach to other words, with the word being determined syntactically. Of course, in languages where nouns are always final in NPs, the difference between the two cannot be readily discerned. However, in languages where it can be discerned, I suspect the number of languages reported with case suffixes may be overestimated. For example, grammars that present case data in a paradigm format may give the impression that case must appear on the noun. In a preliminary survey of N-medial languages for which I have data, I found numerous languages coded as having "case suffixes" by Dryer (2013) where, in fact, the case marker can be adjacent to—i.e., attach to—post-nominal modifiers.

the authors do not specify how K^0 is realized.[10] This complication is connected to case's status in such languages as a word-level morphological formative that is very clearly associated with phrases in the syntax.

Perhaps as a result of this dissociation, there are also works within DM that do not adopt K^0 but instead treat case as a feature assigned to a phrase by a head. Baker and Kramer (2014:148) propose that a case feature on DP is realized as a dissociated morpheme postsyntactically (perhaps similarly to Embick and Noyer (2001), see also McFadden (2004)). Winchester (2019:12) analyzes case features on attributive adjectives as spell-outs of adjoined AGR nodes (similar to Norris (2014, 2018)).

2.4   Inflection on nouns: summary

Treating nominal inflectional features like gender, number, and case as heads in the noun's extended projection in at least some languages has been an illuminating way to explore the properties of inflection through DM. However, inflection is not just a property of nouns, and I know of no proposal that aims to treat inflection on adjectives as emerging from the structure of the extended projection of adjectives.[11] There is very little research exploring the connection between attributive adjective inflection and nominal inflection. This is surprising given that nearly half of the languages in Norris's (2019b) typological database have inflecting attributive adjectives. In the next two sections, I present an analysis of the complicated inflection patterns of adjectives in Ingush. In so doing, I survey what has been proposed about adjectival inflection, focusing on DM and DM-adjacent approaches, and I develop novel extensions of what has been proposed in order to formalize my analysis. I begin with a discussion of the properties of Ingush adjective concord.

3   Adjective concord in Ingush

As a way of introduction, I present some examples of complex Ingush nominal phrases below.

(14) *uq*   *boaqqacha* *qea*   *wazhagh*
      this.OBL   B.big.OBL   three.OBL   apple.LAT

      '(for/about) these three big apples'   (Nichols, 2011:446)

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[10]For Norris (2012, 2014, 2018), it is possible that K^0 spells out the case morpheme on the noun itself, whereas case on other modifiers is the result of nominal concord. However, this remains to be worked out in detail. Zyman and Kalivoda (2020:7fn9) assume nominals are KPs in Latin, a language with case concord, but they note this is not a crucial assumption and they do not explore how K^0 is realized.

[11]Dékány (2021) might be the closest, but this is arguably due to the properties of the Hungarian demonstrative moreso than a general approach. She builds on existing proposals treating adnominal demonstratives in Hungarian as full nominal projections themselves. Since they are full nominal projections, they also contain nominal inflectional heads.

(15) *cu*   *k'ead-vannacha* *vi'*   *saguo*
     DEM.OBL tired-V.PPL.OBL V.four.OBL person.ERG

     'those four tired guys'   (Nichols, 2011:441)

In these examples, we see Ingush's basic word order inside nominal phrases: Demonstrative-Adjective-Numeral-Noun.[12] For example, in (15), the demonstrative *cu* precedes *k'eadvannacha* 'tired' (a participial adjective), the numeral *vi'* 'four', and the noun *saguo* 'person'.

    Though many lexical categories show concord in Ingush, I focus on analyzing the system of adjective concord in this chapter. Though this is partially for reasons of space, there are good reasons to focus on adjectives as opposed to demonstratives or numerals. First, adjectives show a wide range of exponence types, ranging from just case to gender, number, and case with number expressed twice. Second, there is a relatively large number of adjectives as opposed to the other word classes, so we can get closer to analyzing a grammatical system rather than idiosyncratic properties of a few functional elements (although, there is one adjective with an idiosyncratic property in Ingush, and I do formalize an analysis of that idiosyncratic property).

    Let us now turn to a more careful presentation of the features relevant for concord in Ingush, beginning with case.

3.1   Ingush case concord: NOM vs. OBL suffixes

Case is the most active feature in Ingush concord. With just one exception, if a word expresses concord at all, it expresses concord for case.[13] Ingush has a fairly large case system, with nouns distinguishing 8 cases shown in the table below.

(16)   Forms and functions of Ingush's cases (Nichols, 2011:127):

	Singular	Plural	Main functions
NOMINATIVE	(no ending)	-azh; -ii, -i; -rch	S, O, T; citation form
GENITIVE	-a, -n	-ii, -i	Possessor
DATIVE	-na, -aa	-azh-ta	Indirect object (G)
ERGATIVE	-uo; -z, -aa, -a	-azh-a / -azh	A
ALLATIVE	-ga	-azh-ka	Indirect object (G)
INSTRUMENTAL	-ca	-azh-ca	Instrument
LATIVE	-x / -gh	-ex / -egh	Second object (G), other
COMPARISON	-l	-el	Standard of comparison

Though Ingush has case concord, the system is impoverished in that modifiers of the case-marked noun contrast only two values: nominative and oblique. Some examples are provided in the table below.

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   [12]I do not have space to discuss it here, but Ingush is notable for having a word order that violates Greenberg's (1963) Universal 20 in a rather rare way. Formal analyses of Universal 20's apparent robustness are unable to generate the word order in Ingush. See Dryer (2018); Wren-Hardin (2018) for critical discussion.

   [13]The numeral *d.i'* 'four' and numerals derived from it (e.g., *d.iitt* 'fourteen, lit. four-ten') show concord for gender but not for case.

(17) NOM/OBL forms of adjectives (order is Adj-N) (Nichols, 2011:221):

	'good person'	'cold wind'	'big dog'
NOM	*dika sag*	*shiila mux*	*doaqqa zhwalii*
DAT	*dikacha sagaa*	*shiilacha mixaa*	*doaqqacha zhwaliena*
ERG	*dikacha saguo*	*shiilacha mixuo*	*doaqqacha zhwalie/zhwalez*
ALL	*dikacha sagaga*	*shiilacha mixaga*	*doaqqacha zhwaliega*

Note that the endings on the nouns change for each case, but the modifiers oppose only two forms. The oblique form—visible for the dative, ergative, and allative examples here—has a clearly identifiable suffix *-(a)cha*.[14] Though modifiers have a reduced case paradigm when compared to nouns, it is clear that their form is still dependent on the case assigned to the Ingush nominal phrase. For this reason, I treat it as case concord, although I note that I am not aware of any example outside of languages of the Caucasus where case concord behaves this way.[15]

3.2 Ingush gender (and number) concord

In contrast to case concord, a minority of adjectives (specifically, Nichols (2011:10) puts it at 10%) participate in gender and number concord via fused gender/number prefixes.[16] There are four distinct prefixes associated with gender exponence: *v-, j-, d-, b-*. They are distributed across singular and plural versions of Ingush's 5 gender classes (or 6, depending on if we count the first/second person row) as follows (Nichols, 2011:143-144).

(18) Ingush gender/number prefixes (Nichols, 2011:144):

Gender class	SINGULAR	PLURAL
FIRST AND SECOND PERSON	*v-/j-*	*d-* ⇐
HUMAN	*v-/j-*	*b-* ⇐
(VARIOUS NON-HUMAN)	*b-*	*b-*
(VARIOUS NON-HUMAN)	*b-*	*d-* ⇐
(VARIOUS NON-HUMAN)	*d-*	*d-*
(VARIOUS NON-HUMAN)	*j-*	*j-*

The rows marked with arrows (⇐) are those that show that number is relevant for selection of the proper prefix. In the other rows, there is no difference between singular and plural. In

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[14]Of course, the morpheme could also be identified as *-cha* in these examples, but Nichols (2011:221) analyzes it as *-(a)cha* and so that is how I represent it. The optional *a* is present for underived adjectives and absent for derived adjectives. I leave the analysis of this allomorphy unresolved here.

[15]Hindi seems somewhat similar in the nouns and modifiers contrast *direct* and *oblique* forms, where oblique forms are used when the entire nominal phrase bears one of the case postpositions (Rajesh Bhatt, p.c.). The difference between Hindi and Ingush is that in Hindi, even the nouns contrast direct and oblique forms, whereas in Ingush, that analysis is not obviously tenable across the paradigm for morphological reasons, i.e., there is not a clearly identifiable oblique stem. I leave a complete investigation to future work.

[16]In addition, the numeral 'four' shows concord for gender— it is the only numeral root that shows gender/number concord (Nichols, 2011:198).

the first two rows, the choice of *v-/j-* is based on sociocultural gender of the referent: *v-* for masculine and *j-* for feminine.[17] Some examples showing gender alternations for the adjective *d.oaqqa* 'big' are provided in (19). These examples do not demonstrate the relevance of number, but that will be shown straightaway.[18]

(19) Gender (and number) concord for *d.oaqqa* 'big' (Nichols, 2011:220):

    a.   *v.oaqqa sag*   'old man'

    b.   *j.oaqqa jiwig*   'big girl'

    c.   *d.oaqqa zhwalii*   'big dog'

    d.   *b.oaqqa ch'qeara*   'big fish'

Thus, the Ingush gender system involves both sociocultural gender, visible in the choice of gender exponent in (19a) and (19b), and formal/arbitrary gender, visible in (19c) and (19d).

3.3 Ingush number concord (beyond gender markers)

The prefixes just discussed involve fusion of gender/number, so all of those adjectives also show concord for number. In addition, one adjective productively shows number concord in the form of a suffix: *d.oaqqa* 'big'.[19] As this is also one of the adjectives that shows gender/number concord with the prefixes, it thus shows number concord twice, as we can see in (20). When this adjective is both plural and oblique, the number suffix is inside of the case suffix, visible in (21).[20]

(20) *v.oaqqa*   *sag*   / *b.oaqq-ii nax*
     V.big(SG) man(SG) / B.big-PL man(PL)

     'big man' / 'elders'   (Nichols, 2011:220)

(21) *uq*   *muo-cha b.oaqq-ii-cha*   *naaxa*
     DEM.OBL like-OBL B.elder-PL-OBL people.ERG

     'elders like them'   (Johanna Nichols, p.c.)

---

[17]Of course, one puzzle that this paradigm presents is the widespread syncretism (especially the distribution of *b-* and *d-*). I do not have space to analyze this pattern in detail, but the facts are certainly relevant for morphological investigations of syncretism and gender/number systems (see, e.g., Kramer (2018) and references there).

[18]Nichols (2011) writes the adjectives that agree in gender with a period after the initial consonant as a way of indicating that that consonant is the gender prefix. I follow this convention.

[19]In addition to this example, Nichols (2011:221) observes that the adjective *zwam(iga)* 'small' shows suppletive number concord (plural form *kegii*) but only in collocation with a few words (e.g., *sag/nax* 'man/person'). As I understand it, *d.oaqqa* 'big' shows number concord more generally. There are not enough examples in Nichols 2011 of the usage of *zwam(iga)/kegii* to provide an explicit analysis here.

[20]A brief comment on this example is in order. In fact, the combination of *d.oaqqa* 'big' and *sag/nax* 'person/people' can be a fixed collocation meaning 'elders', and this is in fact the case in the example. This collocation does not affect the morphology of the adjective, so far as I have been able to tell.

In (20), note that the gender/number prefix changes from *v-* in the singular to *b-* in the plural, and in addition, the plural suffix *-ii* is added. Again, while every adjective that bears the gender/number prefix reflects number through this prefix, only *d.oaqqa* 'big' may bear a plural suffix.

3.4 Adjective concord in Ingush: summing up

Taking all of this together, I present the maximal shape of adjectives showing concord in Ingush in (22) and a list of example forms in (23).

(22) $\text{AGR}_{\text{gen/num}}$-$\sqrt{\text{ROOT}}$-$\text{AGR}_{\text{num}}$-$\text{AGR}_{\text{case}}$

(23) Morphological shapes in Ingush adjective concord

Ingush	gloss	form
b.oaqq-ii-cha	B.big-PL-OBL	$\text{AGR}_{\text{gen/num}}$-$\sqrt{\text{ROOT}}$-$\text{AGR}_{\text{num}}$-$\text{AGR}_{\text{case}}$
b.errig-acha	B.all-OBL	$\text{AGR}_{\text{gen/num}}$-$\sqrt{\text{ROOT}}$-$\text{AGR}_{\text{case}}$
shiil-acha	cold-OBL	$\sqrt{\text{ROOT}}$-AGR_{case}

On the basis of adjectives alone, there appears to be an implicational hierarchy such that showing number concord (as separate from gender/number prefixes) implies gender/number concord, and both imply case concord. In fact, the first implication is really not robust enough to motivate an analysis, since there is only one adjective. However, the analysis I ultimately propose does encode the widespread nature of case concord and the lexically-restricted nature of gender/number concord. It has to do with restrictions placed on the insertion of various kinds of AGR nodes. Let us turn to the analysis now.

4 Analysis

Before proposing the key pieces of the analysis, I must make a note about what I discuss herein. This chapter focuses on the formalization of the realization of inflection on attributive modifiers in nominal concord. However, as much as possible, I avoid discussion about how adjectives acquire the features or feature values they express through concord. This is for two reasons. First, there are multiple proposals in the literature, and with a few exceptions, authors have not argued in favor of one approach or the other but rather assumed their preferred approach (see Norris (2017) for a summary and discussion). Second, it is not clear to me that the properties of Ingush concord can empirically distinguish between the options available. Thus, this is not the appropriate venue to reconsider this debate. Instead, I focus on the realization of inflection from agreement.

Because inflection is in many cases realized via affixation with a clearly segmentable morpheme, it must have a separate position of exponence paired with particular vocabulary items in DM. This position of exponence has been encoded as AGR ([ˈæɡɚ], for the uninitiated) in representations since the beginning of DM (see, e.g., Halle (1990); Halle and Marantz (1993); Marantz (1991)). However, the properties of AGR nodes are still poorly understood and there

are important issues that are as yet unresolved in the literature. There are two issues in particular that I dedicate due consideration to in this chapter, discussing them as they become relevant: (i) how AGR nodes come into the derivation and (ii) what their content is. I hope that in making some aspects concrete, we can start to consider how we might empirically distinguish between possible theories of AGR nodes.

To begin, I discuss the first issue in a theory of AGR nodes: their origin.

4.1 The origin of AGR nodes

As mentioned, AGR nodes have figured in DM analyses from the very beginning. Though Halle (1990) does not refer to them as such, it is clear that he intends these nodes to be targets for insertion. For example, his spell-out rules (i.e., vocabulary items) for adjective concord in Russian take the form in (24) below.

(24) Some vocabulary items from Russian adjective concord (abbreviated list from Halle (1990:165)):

a. $[\text{SING}] + [\text{GEN}] \rightarrow y$ / $[\text{CLASS 1}] +$ ____

b. $\rightarrow a$ / $[\text{CLASS 2}] +$ ____

c. $\rightarrow i$ / $[\text{CLASS 3}] +$ ____

These spell-out rules concern only inflectional features and may involve contextual allomorphy based on properties of the word to which they attach. They are vocabulary items for AGR nodes *avant la lettre*.

In work since then, the literature is not consistent in its treatment of AGR nodes. Some authors posit AGR nodes in their morphological representations but either do not specify where they come from or do not choose between possible analyses (Embick and Noyer, 2001; Halle, 1990; Halle and Matushansky, 2006; Harley, 2008; Harley and Noyer, 1999; Noyer, 1997). Perhaps most relevant here is Halle and Matushansky's investigation of adjectival inflection in Russian. Their structures involve AGR nodes, such as the long-form adjective surfacing as *lesnOj* 'forest.ADJ' below.

(25) AGR nodes in Russian adjectives (Halle and Matushansky, 2006:370):
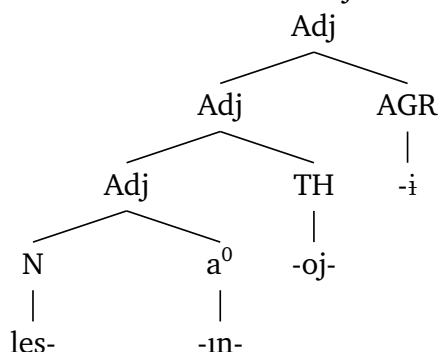
Though their analysis includes AGR nodes, they are assumed as a starting point for the investigation (Halle and Matushansky, 2006:399). This is because the focus of the analysis is not the

AGR nodes themselves, but the *-oj-* morpheme that separates the stem from the AGR node. As a result, the ins and outs of AGR nodes are orthogonal to the investigation.

Among authors who concretize the origin of AGR nodes, I am not sure it is possible to say there is one dominant approach. Under many accounts, including Embick's (2010, 2015) and Arregi and Nevins's (2012) book-length studies in DM, AGR nodes are treated as a kind of dissociated morpheme, a term due to Embick (1997), not present in the syntax but added to the representation post-syntactically. An idea beginning with Marantz (1991) is that AGR nodes are inserted for reasons of morphological well-formedness (see also Halle and Marantz 1993; Embick 2010, 2015). This motivation for AGR node insertion is presented in prose rather than as a kind of formal rule.

On the other hand, there are approaches that operationalize AGR node insertion, treating it as a rule of grammar. For some authors, this rule applies postsyntactically. Kramer (2010) is the first to propose a rule of this kind, as far as I know, but see also Arregi and Nevins (2012); Deal (2016); Hanink (2018); Harizanov (2018); Norris (2012, 2014).[21] Kramer's (2010:229) rule is presented below.[22]

(26)   Agr insertion (optional)
        A → [A Agr]

These rules do not necessarily have a stated motivation; they are just stipulations. But this character could be taken to suggest that there is no deeper formal motivation for what drives a particular category to bear agreement from inflection.[23]

There are also approaches where AGR nodes are part of the narrow syntax (Baker, 2008; Bobaljik and Thráinsson, 1998; Laenzlinger, 2005; Giusti, 2008; Siddiqi, 2010; Tyler and Yuan, 2019).[24] Not all of these approaches are strictly-speaking within DM, but they seem broadly compatible with it. For example, in Baker's (2008) account, adjectival projections include a functional head F_A, which selects AP as its complement.
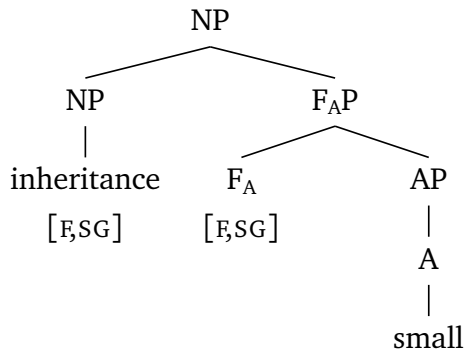
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[21]In truth, Deal (2016); Harizanov (2018) do not formalize a rule, but they refer to AGR node insertion as a kind of operation in prose, so I group them with the other approaches here. Further, Deal (2016) does not specifically propose that AGR node insertion is postsyntactic, but because she refers to it as a special operation, which none of the narrow syntax proposals do, I grouped her analysis with the postsyntactic approaches.

[22]In discussion of rules such as these, authors sometimes reference Embick (1997); Noyer (1997), but as far as I have been able to tell, the insertion of AGR nodes does not come up in those works. Embick (1997) discusses dissociated morphemes but focuses on insertion of voice-related morphemes, and though Noyer (1997) has AGR nodes in his structures, he is actually agnostic about how those nodes come to be in the structures.

[23]In some instantiations of Minimalism, what drives agreement—or rather, Agree—is the need to remove uninterpretable features from heads that have them. Note that this is not itself an explanation for why certain heads must agree, because it is still be unclear how those particular heads came to be associated with those features in the first place. If the uninterpretable features on these heads are putatively universal, then it remains a question why those features are realized morphologically only sometimes, since morphological agreement is not found in every language. See also Preminger (2014) for arguments that agreement is best viewed as an operation with no other necessary purpose in grammar.

[24]This is not an exhaustive list. Here, I am speaking specifically about approaches where the work that the AGR head does is primarily or exclusively agreement-based with little or no discussion of case-marking. AGR projections also did much work in case-licensing for around a decade, but many of those approaches are (conversely) not substantially concerned with agreement morphosyntax. For more references specifically connected to nominal concord, see Norris (2017).

14

(27) Attributive adjective agreement in Arabic (Baker, 2008:50):

```
                      NP
             ┌─────────┴─────────┐
            NP                  F_AP
            │            ┌───────┴───────┐
        inheritance     F_A             AP
         [F,SG]        [F,SG]            │
                                         A
                                         │
                                       small
```

These heads also serve as probes for a syntactic Agree relation, and (I assume) are connected to the ultimate spell-out of inflectional morphology. Thus, in this approach, the AGR node equivalent, i.e., F_A, is doing work besides serving as a target for lexical insertion. This is shared among many of the syntactic approaches, with the functional head either driving inflection, serving as a host for phrasal movement, or some other syntactic purpose.

There are also approaches where the AGR node is Fissioned (i.e., separated) from the head that does the syntactic work (Embick, 2018; Pietraszko, 2018). This is quite similar to the postsyntactic approach, but the precise nature of the AGR nodes in these works is orthogonal to the main point and so they do not need to commit to an approach. Baier (2018) occupies somewhat of a middle ground, where AGR is treated as a feature that can associate with a head that does other work (e.g., Tense) or can serve as a head all on its own (in a way similar to Tyler and Yuan (2019)). What is particularly notable about these "syntactic" approaches in the context of what I discuss here is that it is clear how the AGR nodes acquire the features they ultimately express (e.g., they are acquired through Agree). There is no need to invoke an extra operation to associate an AGR node with the relevant features.

In summary, there is a wide variety of theoretical approaches to positions of agreement exponence. It is not clear at present how the morphological or syntactic accounts can be empirically distinguished. I set aside considerations of the motivation for AGR node insertion for the majority of this article, treating it as essentially an unmotivated stipulation that does not follow from anything else. However, I come back to the notion of *morphological wellformedness* in the conclusion (section 5).

I begin discussion with the gender/number prefixes.

4.2   Ingush gender/number prefixes as inflection class markers

Recall that 10% of adjectives in Ingush show gender/number concord via a prefix. These prefixes are in some sense intrinsic parts of these adjectives, as there is no form of the adjective without one of these prefixes. They are present even in citation forms. In this respect, they seem rather like theme affixes better known from Indo-European languages. Theme vowels are treated as adjoined to functional heads (Oltra-Massuet and Arregi, 2005) or as exponents of categorizing heads (Embick, 2015). The formal details of analyses of theme vowels within DM are very similar to analyses of AGR nodes. The gender/number prefixes in Ingush, like theme vowels, are the kind of inflection that is unquestionably connected to morphological

wellformedness (Marantz, 1991; Embick, 2010, 2015).

To formalize the fact that only 10% of adjectives in Ingush take these prefixes, I propose that those adjectives instantiate an inflection class in Ingush. Following Alexiadou (2004); Müller (2005) (among others), I propose that these distinct inflectional classes are connected to morphosyntactic features associated with the categorizing heads.[25] For this inflection class, I represent the feature as $[+\Gamma]$. These are essentially inflectional/declensional subcategories of adjectives. Thus, there is an a^0 head with the feature $[+\Gamma]$, and there is a corresponding rule of AGR node insertion that looks specifically for heads bearing that feature. This operation is presented in (28) and an illustration is given in (29).[26]

(28) **AGR$_{gn}$-insertion**: $X_{[+\Gamma]} \rightarrow [X_{[+\Gamma]} \ AGR_{gn}]_X$

(29)
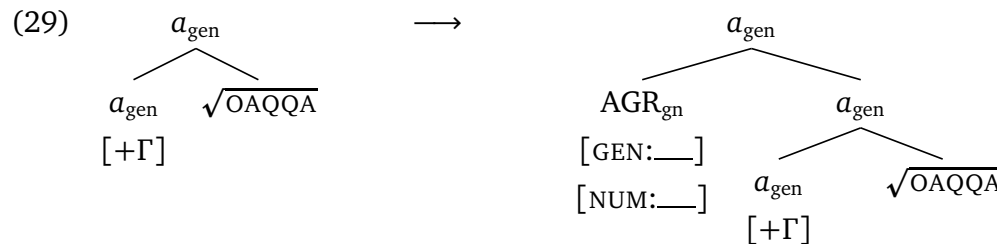
Thus, I propose that postsyntactic operations can be triggered by (more neutrally: sensitive to) morphosyntactic features of potential targets. In most of the literature discussing inflection, the association of inflection class features with category-defining heads has been used primarily to account for class-dependent allomorphy (Müller, 2005). This approach is thus an extension of the kinds of things inflection classes can do in language.[27]

In (29), the AGR node is represented as having unvalued gender and number features, but I want to stress again that this aspect of the representation is not crucial for most of the discussion I present here. The representation in (29) is most directly compatible with an approach to concord where it is not carried out by Agree in the syntax (Norris, 2014). For Norris, these AGR nodes eventually acquire their feature values from a dominating source. Alternatively, the a^0 head could be a syntactic probe starting an Agree relation, and then the gender/number features would (possibly) need to split off from the a^0 head.[28]

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[25]Alexiadou (2004); Müller (2005) actually propose that inflection classes are inherently associated with noun stems (or just nouns) but they do not otherwise adopt category-neutral roots. With category-neutral roots, the inflection class features would thus be associated with the categorizing head, in line with Acquaviva's (2009) observation that associating nominal inflection class features directly with a root effectively means the root is not category-neutral. Note as well that it may be desirable theoretically to add declension class features in the postsyntactic component as they serve no syntactic purpose. For reasons of space, I cannot explore these issues in depth, but see Embick (2010:196) and Kramer (2015:238-243) for discussion and proposals.

[26]In structural representations, I represent morphosyntactic features of the head only on the initial merge position, but I standardly assume that these features are represented on every instantiation of the head.

[27]These differing inflectional classes must be paired with licensing conditions, which require, e.g., roots to be associated with categorizing heads bearing the correct morphosyntactic features. I leave these unformalized here, but see Harley and Noyer (2000); Kramer (2015) for discussion of licensing and some formal considerations.

[28]For gender and number, it actually seems to me that those features could be represented directly on the a^0 head, although there may be some overt adjectivalizing heads that also take the gender/number prefix— I have not investigated this closely. However, it is doubtful that the number suffix borne by *d.oaqqa* and the case suffixes

The representation in (29) also shows the AGR node on the left of the adjective. This is for reasons of clarity. Recall that all the gender/number markers in Ingush are prefixes. Linear order is not generally assumed to be represented in trees under current conceptualizations of phrase structure, but there are ways to ensure that the prefix does indeed end up on the left of $\sqrt{\text{OAQQA}}$ after Vocabulary Insertion. For example, we could propose that Local Dislocation places the prefix in its rightful place either after or at the same time as Vocabulary Insertion (Embick and Noyer, 2001; Kramer, 2010), though I do not formalize this here.

In the interest of concreteness, I present some preliminary Vocabulary Items for AGR_{gn} in Ingush in (30) below.

(30)   Gender Vocabulary Items for Ingush (brute force):

    a. AGR_{gn}, [+HUM, +FEM, -PL] $\longleftrightarrow$ *j-*

    b. AGR_{gn}, [+HUM, -FEM, -PL] $\longleftrightarrow$ *v-*

    c. AGR_{gn}, [+HUM, +PL] $\longleftrightarrow$ *b-*

    d. AGR_{gn}, [GEN:B] $\longleftrightarrow$ *b-*

    e. AGR_{gn}, [GEN:B/D, -PL] $\longleftrightarrow$ *b-*

    f. AGR_{gn}, [GEN:B/D, +PL] $\longleftrightarrow$ *d-*

    g. AGR_{gn}, [GEN:D] $\longleftrightarrow$ *d-*

    h. AGR_{gn}, [GEN:J] $\longleftrightarrow$ *j-*

I say these are "brute force" because they could be refined to better account for the syncretism patterns, but I do not attempt to do so here.
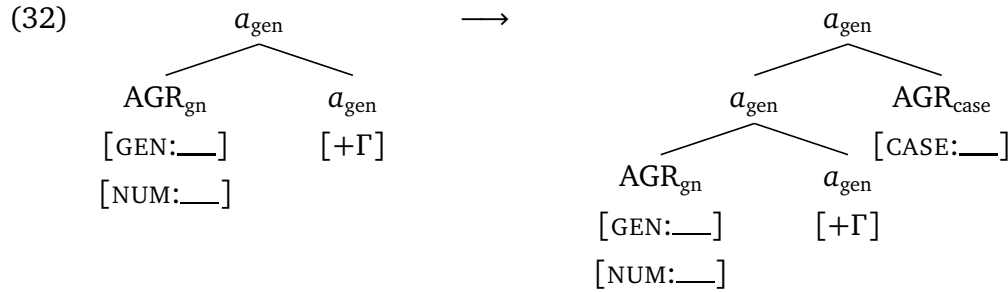
4.3   Impoverishment in Ingush case concord

While gender-number prefixes occur on only about 10% of adjectives in Ingush, case concord has a wider distribution. Every adjective that shows concord at all shows concord for case.[29] Formally, this means the AGR-node insertion rule for case could plausibly be indifferent to inflection class. A schematic for AGR_{case} node insertion is presented in (31) below and an example follows. AGR_{case} node insertion must still be sensitive to some quality of the head (e.g., lexical category), but I do not represent that in the rule in (31).

(31)   **AGR_{case}-insertion**: X $\rightarrow$ [X AGR_{case}]$_{\text{X}}$

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could be spell-outs of the categorizing a^0, so under an Agree-based view, at least some Fission (or similar) would need to play a role.

[29]There are some adjectives that are so-called 'indeclinable adjectives' and they do not inflect for concord (Nichols, 2011:228-9). They could be incorporated by adding a feature, e.g., [+INFL] and specifying that only [+INFL] heads will get a case node. Alternatively, AGR_{case} could be a conditioned zero in the context of such roots.

(32)

$$a_{\text{gen}} \longrightarrow a_{\text{gen}}$$

$$
\begin{array}{ccc}
 & a_{\text{gen}} & \\
 & \diagdown & \\
\text{AGR}_{\text{gn}} & & a_{\text{gen}} \\
\begin{bmatrix}\text{GEN:}\underline{}\end{bmatrix} & & [+\Gamma] \\
\begin{bmatrix}\text{NUM:}\underline{}\end{bmatrix} & &
\end{array}
$$

$$
\begin{array}{ccc}
 & a_{\text{gen}} & \\
a_{\text{gen}} & & \text{AGR}_{\text{case}} \\
 & & \begin{bmatrix}\text{CASE:}\underline{}\end{bmatrix} \\
\text{AGR}_{\text{gn}} \quad a_{\text{gen}} & & \\
\begin{bmatrix}\text{GEN:}\underline{}\end{bmatrix} \quad [+\Gamma] & & \\
\begin{bmatrix}\text{NUM:}\underline{}\end{bmatrix} & &
\end{array}
$$

When AGR$_{\text{case}}$ gets its case value, that value should be the value borne by the noun, all else being equal (Norris, 2017, 2018). However, while Ingush nouns distinguish eight cases, recall that modifiers distinguish only two: nominative vs. oblique. This is demonstrated in the chart in (17), repeated below.

(17) NOM/OBL forms of adjectives (order is Adj-N) (Nichols, 2011:221):

	'good person'	'cold wind'	'big dog'
NOM	*dika sag*	*shiila mux*	*doaqqa zhwalii*
DAT	*dikacha sagaa*	*shiilacha mixaa*	*doaqqacha zhwaliena*
ERG	*dikacha saguo*	*shiilacha mixuo*	*doaqqacha zhwalie/zhwalez*
ALL	*dikacha sagaga*	*shiilacha mixaga*	*doaqqacha zhwaliega*

For example, in the middle column, while *mux* 'wind' has a distinct form/ending for each case, *shiila* 'cold' only contrasts *shiila* and *shiilacha*.

I still treat this as case concord, because the case assigned to the entire DP is relevant for the forms of modifiers. However, something must be said about the lack of distinct suffixes for each of the non-nominative cases. Since it is pervasive throughout the Ingush concord system, the nominative ∼ oblique alternation in Ingush case concord is a kind of metasyncretism (Williams, 1994; Harley, 2008). Metasyncretisms are often analyzed as being the result of applications of Impoverishment rules (rather than, say, properties of particular sets of Vocabulary Items). This is the kind of approach I propose.

In order to do that, I adopt particular assumptions about morphosyntactic case features. In much of the theoretical research on morphological case, authors propose a decomposition of traditional case labels into component features (Bierwisch, 1967; Calabrese, 1998, 2008; Halle, 1997; Halle and Vaux, 1998; Keine and Müller, 2014). In other words, NOMINATIVE has no status in the grammar— rather, what we call nominative is a constellation of other features (e.g., for Calabrese (1998:84), nominative is [+SUBJECT, +DIRECT, -POSSESSOR, -LOCATION, -SOURCE, -ASSOCIATION]). This kind of decomposition has featured prominently in DM analyses of inflectional syncretism, but unfortunately, there is no agreed-upon inventory of case subfeatures in the literature. In fact, even the overlap among proposals is rather modest. With this in mind, I adopt a decomposition of traditional Ingush cases into component features. Whatever the full system may be, I propose that it includes a feature [OBL(IQUE)], and that nominative is [-OBL] and all other cases are [+OBL] (among whatever other features they have).

(33) Ingush case decomposition (partial/incomplete)

a. [-OBL]: nominative

b. [+OBL]: genitive, dative, ergative, allative, instrumental, lative, comparative

As mentioned, metasyncretisms of this type are generally analyzed using Impoverishment (Arregi and Nevins, 2012; Halle, 1997; Kramer, 2018). To make this concrete, I propose the rule of Impoverishment in (34) below.
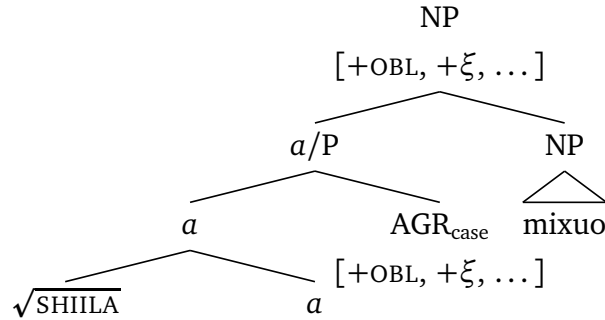
(34) **AGR$_{\text{case}}^{0}$ Impoverishment (obligatory)**:
AGR$_{\text{case}}^{0}$, $[+\text{OBL}, \ldots] \rightarrow$ AGR$_{\text{case}}^{0}$, $[+\text{OBL}]$

This rule targets any AGR$_{\text{case}}^{0}$ that is specified as $[+\text{OBL}]$ and then strips it of all remaining case features, whatever they may be. This is paired with a set of vocabulary items like those in (35).

(35) Vocabulary items for AGR$_{\text{case}}^{0}$:

a. AGR$_{\text{case}}$, $[+\text{OBL}] \longleftrightarrow$ *-(a)cha*

b. AGR$_{\text{case}} \longleftrightarrow$ *-$\emptyset$*

This results in the oblique form being inserted for all cases except the nominative. I provide a simple illustration of the derivation of *shiilacha mixuo* 'cold wind (ERGATIVE)' in (36) below.

(36) a. Structure after AGR$_{\text{case}}$ acquires case features for ergative case ($[+\text{OBL}, +\xi, \ldots]$):

$$\text{NP} \quad [+\text{OBL}, +\xi, \ldots]$$

with nodes: NP dominating a/P and NP; a/P dominating a and AGR$_{\text{case}}$ $[+\text{OBL}, +\xi, \ldots]$; a dominating $\sqrt{\text{SHIILA}}$ and a; NP dominating mixuo.

b. Structure after application of Impoverishment:

$$\text{NP} \quad [+\text{OBL}, +\xi, \ldots]$$

with nodes: NP dominating a/P and NP; a/P dominating a and AGR$_{\text{case}}$ $[+\text{OBL}]$; a dominating $\sqrt{\text{SHIILA}}$ and a; NP dominating mixuo.
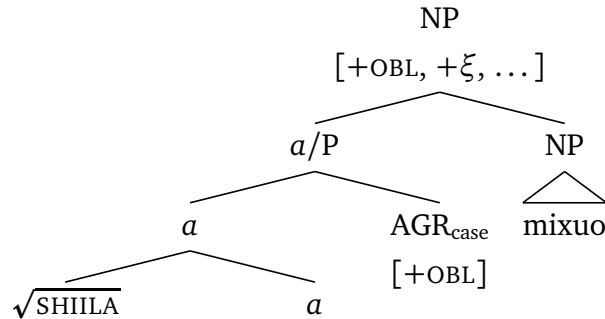
c. After Vocabulary Insertion: *shiila-cha mixuo* 'cold-OBL wind.ERG'

Importantly, the Impoverishment operation does not target case features in general— it only targets case features on AGR$_{\text{case}}$. This keeps the case-marking on the noun intact.

4.4 The lone adjective with number concord

Finally, recall that the adjective *d.oaqqa* 'big' bears a number suffix over and above the gender/number prefix. This additional number suffix is between the case suffix and the root, as shown in (21), repeated below.
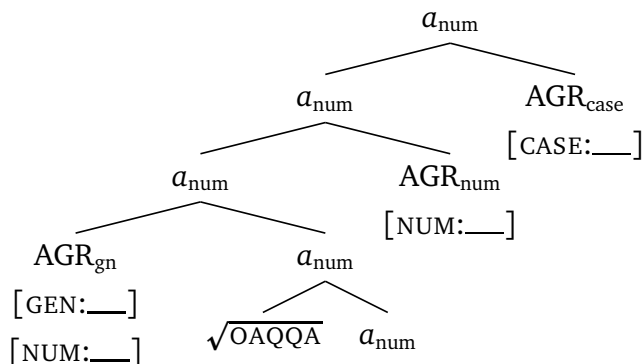
(21)   *uq*   *muo-cha* *boaqq-ii-cha*   *naaxa*
         DEM.OBL like-OBL B.elder-PL-OBL people.ERG

        'elders like them'   (Johanna Nichols, p.c.)

In DM terms, this would necessitate a structure like the following.

(37)   Plausible structure for *b.oaqq-ii-cha* based on positions of exponence:

This is another point where there are multiple options and no clear consensus on which option or options must be countenanced by an articulated theory of AGR nodes. I will now take a moment to articulate some of the possibilities.

4.4.1 Cumulative and separative exponence in AGR nodes

A theory of AGR nodes must contend with the fact that languages are of varying morphological types with respect to how certain inflectional features are expressed. Here, I focus on number and case. In Ingush, their exponence is in many cases separative, such that case and number each have distinct morphemes. But in some languages, case and number have cumulative exponence and would be associated with fusional vocabulary items in DM. Thus, the issue is whether the grammar allows (i) AGR_{num} and AGR_{case} with occasional Fusion (Halle and Marantz, 1993; Halle, 1997; Kramer, 2016), (ii) $AGR_{num+case}$ with occasional Fission (Harley and Noyer, 1999; Noyer, 1997; Arregi and Nevins, 2012), or (iii) both options simultaneously.

There is very little discussion of this issue in the Distributed Morphology literature, especially concerning feature exponence in agreement morphemes. Halle and Marantz (1993:136) suggest that AGR_{num} and AGR_{case} would be inserted separately (in all languages with case and number concord?) and then fused when necessary. This is schematized in (38) below.

(38) Separative Model (Separative exponence as default)

a. All languages (with number and case concord):

```
                a
          ┌─────┴─────┐
          a          AGR_case
     ┌────┴────┐      [CASE:___]
     a      AGR_num
            [NUM:___]
```

b. Some languages (after a morphological operation, e.g., Fusion):

```
         a
    ┌────┴────┐
    a    AGR_case+AGR_num
            [CASE:___]
            [NUM:___]
```
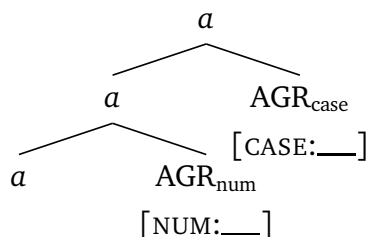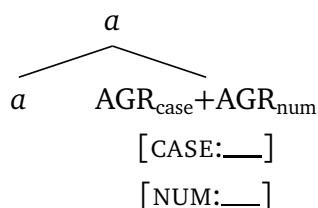
In contrast, discussion by Harley and Noyer (1999); Noyer (1997) suggest AGR_{num} and AGR_{case} would be inserted together as one node and then separated when necessary. This is schematized in (39) below.

(39) Cumulative Model (Cumulative exponence as default)

a. All languages (with number and case concord):

```
         a
    ┌────┴────┐
    a    AGR_num/case
            [CASE:___]
            [NUM:___]
```
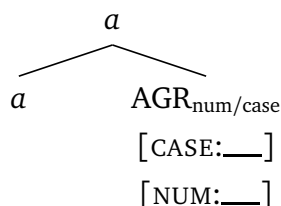
b. Some languages (after a morphological operation, e.g., Fission):

```
                a
          ┌─────┴─────┐
          a          AGR_case
     ┌────┴────┐      [CASE:___]
     a      AGR_num
            [NUM:___]
```
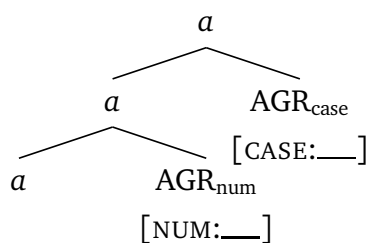
Arregi and Nevins (2012); Norris (2014) raise both options but do not decide between them. Deal (2016:328-330) comes the closest to proposing evidence in favor of a particular approach, arguing that concord features move together "as a bundle" even in languages with separative exponence. However, she does not ultimately formalize the bundle or how it comes to have separative exponence. At present, there are no empirical arguments in favor of either approach, and it is not clear that one is more complex than the other on formal grounds. Both require some morphological operation in order to capture all the exponence options cross-linguistically.

There is an argument to be made from typology that the default is for AGR_{num} and AGR_{case} to be inserted separately, i.e., the Separative Model. Bickel and Nichols (2013) observe that cumulative exponence of number and case is rather rare cross-linguistically. They show that among 87 languages with case, only 8 languages have cumulative exponence of number and case compared with 71 languages where they are exponed separately. An important caveat here is that different cases/numbers in the same language may exhibit different behavior, i.e., some may have cumulative exponence and others separative, and so it may not be possible to provide absolute numbers. However, there is still quite a large difference between these two types of languages.

If we take a view of economy whereby application of a special morphological operation is a marked choice, then a universal theory of AGR nodes would favor inserting AGR_{num} and AGR_{case} separately and fusing them when necessary.[30]

There is also tentative evidence for the Separative Model from cross-linguistic patterns of suppletion discussed by Moskal (2015). Moskal investigates suppletion in nominal roots triggered by number and case. In her sample of 79 languages, she finds that suppletion driven by number is common, but suppletion driven by case is virtually unattested. This follows from the structure Moskal (2015) assumes, as K is not sufficiently local to the nominal root. This structure is represented in (40) below (Moskal, 2015:368).[31]

(40)
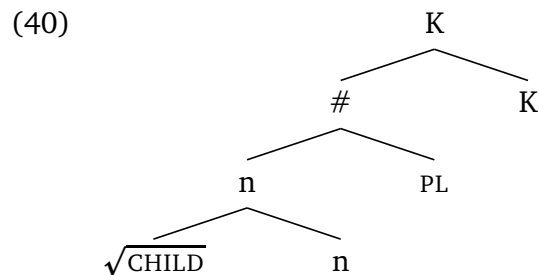
Thus, on nouns, there is evidence that case and number do not originate together in a single node. If they did, we would expect case and number to trigger nominal root suppletion equally as frequently, and they do not. Similar tentative evidence could come from contextual allomorphy. Imagine a language with separate exponence of number and case with number between the root and case, i.e., Root-PL-Case. If such a language also had root-conditioned case allomorphy irrespective of the presence or value of the intervening number morpheme, that would provide the same kind of evidence for at least a linear if not hierarchical organization of these features.[32] Thanks to Omer Preminger for discussion of this kind of prediction.

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[30]It is not obvious that this assumption about cross-linguistic economy is justified. It is not clear, for example, what it means if there are quantitatively more applications of an operation, e.g., Fusion/Fission. Ultimately, either grammar allows an operation or it doesn't. Furthermore, it is doubtful that minimizing applications of a special operation **across languages** would matter for the acquisition of grammar of a single language. Thanks to Omer Preminger for illuminating discussion of this point.

[31]Moskal's (2015) formalization for the lack of locality of K is, to my knowledge, novel. It is not purely linear adjacency. It is based on Embick's (2010) phase-based model of cyclicity and Bobaljik and Wurmbrand's (2013) notions of *phase initiators*. See Moskal (2015:367) for more complete discussion.

[32]Allow me to clarify how this differs from the kind of evidence that Moskal (2015) discusses. Moskal considers nominal roots that supplete in the presence of number or case. Importantly, these could be cumulative forms, i.e.,

I called this kind of evidence tentative. The reason is that Moskal (2015) investigates suppletion of nouns, and inflection on nouns is not typically analyzed as involving insertion of a dissociated AGR node like the analysis I am considering here. To have true evidence for a particular representation of AGR nodes, we would need to conduct an investigation like Moskal's but look at allomorphy of adjective or demonstrative roots.[33]

In looking for evidence in favor of either the Separative or Cumulative Model, we would be exploring the possibility of a universal model for AGR nodes, i.e., exploring what other mechanisms would be required if we assumed AGR nodes were introduced in a uniform way. Alternatively, we could have a more idiosyncratic or language-particular view: children must acquire the language's inventory of AGR nodes, whatever that may be, but the grammar does not rule out any particular combinations of features. This is stipulative, and it would not provide an explanation to any typological patterns that ultimately emerge, but that does not necessarily rule it out of contention, in my view.

4.4.2 Separative exponence in Ingush

There are two facts about separative exponence in Ingush that must be encoded in the grammar. First, exponence of number and case concord is separative. Second, exponence of number (apart from gender/number prefixes) is highly lexically restricted in that only one adjective, *d.oaqqa* 'big', reflects it. To formalize these facts, we could consider two scenarios in line with the above discussion. One analysis begins with the Cumulative Model presented above in (39): AGR_{num} and AGR_{case} are inserted as one node. In the context of most adjectives, number features are simply not referenced by the vocabulary items, but in the context of *d.oaqqa* 'big', number is spun off from the node (e.g., by Fission). However, it is not clear that simply lacking vocabulary items for number is the right approach here given that this lack of vocabulary items would have to be shared across most adjectives in the language since most adjectives do not take the number suffix. Further, the model still requires an additional morphological operation in order to get the exponence correct for *d.oaqqa* 'big'.

Instead, I propose that AGR_{num} and AGR_{case} are inserted as separate nodes. Furthermore, AGR_{num} is inserted only in the context of *d.oaqqa* 'big'. I model this in the same way I modeled insertion of AGR_{gn}: with a morphosyntactic inflection class feature ($[+\Delta]$). Thus, we have an additional a^0 subcategory, shown in (41), and we have an operation of AGR insertion for AGR_{num}, shown in (42). An illustration of AGR_{num}-insertion is given in (43), and vocabulary items are given in (44).

(41)   Properties of $a_{num}{}^0$:

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no distinct case morpheme, or separative forms. Situations that she does not consider (to my knowledge) would involve the case morpheme itself changing form based on the identity of the root. Crucially, we would look for this allomorphy to occur whether or not a number morpheme separated the case suffix from the root.

    [33]I must say that I expect we would find the same result. In many languages, the morphemes used on agreeing categories in the noun phrase are the same as those used on the nouns themselves, and those that are not exactly the same are at least similar. But in all analyses of nominal concord that I am aware of, there is no formal connection between the inflectional morphemes on the noun and inflectional morphemes on agreeing categories. Thus, if it turns out that suppletion on agreeing categories follows the same trend as on nouns, it is not clear to me that analyses of concord would transparently capture that fact.

a. Class features: $[+\Gamma, +\Delta]$

b. After insertion of AGR nodes: $\text{AGR}_{\text{gn}}\text{-}\sqrt{\text{ROOT}}\text{-}\text{AGR}_{\text{num}}\text{-}\text{AGR}_{\text{case}}$

(42) **AGR$_{\text{num}}$-insertion**: $X_{[+\Delta]} \rightarrow [X_{[+\Delta]} \; \text{AGR}_{\text{num}}]_X$

(43)
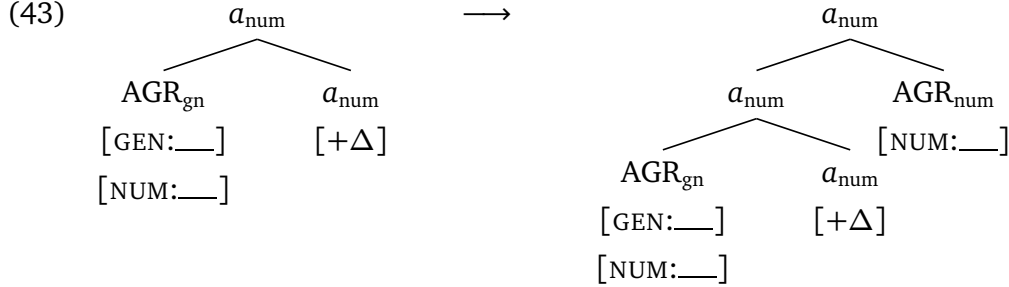
(44) Vocabulary Items for AGR$_{\text{num}}$:

a. AGR$_{\text{num}}$, $[+\text{PL}] \longleftrightarrow$ *-ii*

b. AGR$_{\text{num}} \longleftrightarrow$ *-$\emptyset$*

This analysis is simpler to state using existing proposals, and it is also more harmonious with the general typological picture presented by Bickel and Nichols (2013) in that separative exponence of number and case is the default in the grammar.[34]

4.5 Resulting system and discussion: Is Ingush concord special?

The resulting model of adjective concord in Ingush has the following properties. First, it has three separate positions of concord exponence, which I analyzed as three distinct AGR nodes, given in (45). The insertion of these AGR nodes is triggered by features of the heads which host them, and in particular, I proposed the presence of two inflection class features, shown in (46).

(45) Ingush AGR nodes:

a. AGR$_{\text{gn}}$
$\begin{bmatrix} \text{GEN:} \underline{\quad} \end{bmatrix}$
$\begin{bmatrix} \text{NUM:} \underline{\quad} \end{bmatrix}$

b. AGR$_{\text{num}}$
$\begin{bmatrix} \text{NUM:} \underline{\quad} \end{bmatrix}$

c. AGR$_{\text{case}}$
$\begin{bmatrix} \text{CASE:} \underline{\quad} \end{bmatrix}$

---

[34]There is still the issue of inserting AGR$_{\text{num}}$ inside AGR$_{\text{case}}$. Noyer (1997) proposes a hierarchy of features that governs, among other things, the order of Vocabulary Insertion depending on the feature involved. Müller (2005) has also argued that such a hierarchy is needed in order to have an elegant analysis of inflectional syncretism in Icelandic. It is reasonable to imagine that such a hierarchy would be able to apply to insertion of AGR nodes as well, though I do not formalize this suggestion here.

(46) Ingush inflection class features:

    a. $[+\Gamma]$: triggers insertion of AGR_{gn}

    b. $[+\Delta]$: triggers insertion of AGR_{num}

    c. a^0: triggers insertion of AGR_{case}

Once the AGR nodes are inserted and they acquire their features (a process I have not discussed in this chapter), they undergo Vocabulary Insertion. The system encodes the widespread nature of case concord in that it applies to all a^0 heads. The connection between $[+\Gamma]$ and $[+\Delta]$ ($[+\Delta] \rightarrow [+\Gamma]$) is not formally encoded, as only one lexical item shows this.

    Simply put, the concord system of Ingush is complex, involving varied exponence in a variety of ways. Though the system as a whole involves gender, number, and case, individual lexical items do not all express the same sets of features. Norris (2017) coins the term MIXED CONCORD for systems of this type. They are opposed to systems of UNIFORM CONCORD, familiar due to their ubiquitousness in European languages (Norris, 2017). In these languages, every element that participates in concord reflects the full set of features active in the concord system. For example, in Estonian every element that participates in concord reflects both number and case, and in French, every element that participates in concord reflects both number and gender (Norris, 2014, 2017).[35]

(47) Estonian:
kõigi-s   *nei-s*   *raske-te-s*   *küsimus-te-s*
all.PL-INE DEM.PL-INE hard-PL-INE question-PL-INE

'in all these hard questions'

(48) French:
l-a   *grand-e maison*   *vert-e*
the-FEM big-FEM house(FEM) green-FEM

'the big green house'

Languages with uniform concord have featured prominently in the literature, but I believe this is primarily because they are accessible rather than because they are known to be more common.

    Norris (2019a) reports on the results of a typological study of nominal concord, addressing (among other things) whether mixed systems or uniform systems predominate. Norris considers concord on demonstratives, cardinal numerals, and adjectives, finding that 103/174 (58.6%) languages in the sample have concord in some form. In order to see a system as mixed, concord must involve multiple features and multiple syntactic categories. It turns out that most concord systems lack the robustness necessary to be able to tell whether the system is mixed or uniform. Roughly half of languages with concord (53/103; 51.5%) involve only a single feature, only a single category, or both (e.g., demonstratives show concord for

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[35]French is, of course, slightly complicated by the fact that gender is neutralized in the plural for some lexical items and by the fact that concord is much more transparent in written French than spoken French.

number only and nothing else shows concord). I dub the concord systems in such languages "indeterminate" because they cannot be definitively categorized as either of the types I just described.

Focusing on just gender, number, and case, the remaining languages are split fairly evenly between uniform (26/103; 25.2%) and mixed systems (24/103; 23.3%).[36] Thus, while the uniform patterns are well-known, we do not have grounds for stating that they are more common than mixed systems. A language where the only question for lexical categories is "concord or no concord" (i.e., uniform concord systems) is just as common as languages where the grammar must know the answer to a follow-up question for each participating category: "Concord in what features?" (i.e., mixed concord systems). Thus, I contend that a theory of concord should equally allow mixed and uniform systems. In terms of the analysis proposed here, the difference between mixed and uniform systems would simply be the degree to which the AGR node insertion rule(s) are sensitive to (sub)category features of concord-bearing heads. When insertion of AGR nodes is less restricted, the system will be more uniform.

5 Conclusion

In this chapter, I proposed an analysis of adjective concord in Ingush. As part of it, I proposed that rules of AGR node insertion can be sensitive to inflection class features of the heads that host them.[37] I also proposed that Ingush contains multiple AGR nodes, distinguished by their featural content. One obvious next step would be to extend the system to the other categories in Ingush that show concord, e.g., demonstratives and some cardinal numerals. From a theoretical perspective, I admit without reservation that I have not attempted to derive the presence of AGR nodes from any other properties of the grammar. The rules of AGR node insertion proposed herein are stipulative. Careful consideration of motivated explanations for AGR node insertion is an important next step in understanding the connection between agreement as an abstract (morpho)syntactic operation on the one hand and an observable morphological property on the other (see Preminger (2019) for critical discussion of this frontier).

As a way of closing, I return to one of the plausibly non-stipulative motivations for AGR node insertion: morphological wellformedness. There is one sense of morphological wellformedness that is connected to Jakobson's (1959:236) observation that "languages differ essentially in what they *must* convey and not in what they *may* convey." With respect to some forms of inflection, there is simply no complete word without expression for that category. The best examples of this are theme vowels and suffixes in some Indo-European languages (e.g., in Russian as described by Halle and Matushansky (2006)), gender and number in some Indo-European adjectives, and the gender/number prefixes in Ingush. For the adjectives and verbs in

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[36]The data used for this analysis is archived as Norris 2019b. For the most current coding of the data and an expanded data set, see Norris (2020).

[37]At this point, I must note that Hanink (2018) argues quite convincingly that AGR nodes for adjectives in German must not attach to a^0 heads themselves, but to the entire phrase (a DegP). I have nothing to say here about how to encode this difference, but I suggest this may be similar to clitic doubling in the way that Embick (2018) discusses it. Either the inflection surfaces adjacent to its host, or it is expressed further out. In Embick's terms, it surfaces at the edge of the complex head containing the host. This does not straightforwardly work for the data Hanink (2018) analyzes, because the DegPs are not complex heads. However, it is a promising parallel. If we uncover more examples like this, it would be worth considering more carefully.

Ingush which take the gender/number prefix, there simply is no form of the word without them. They are present even in citation forms, which take a *d-* prefix, e.g., *d.oaqqa* 'big' (Nichols, 2011:x).

The other sense of "morphological wellformedness" is that, in some particular syntactic context, a given word must attempt to express certain features. It may be that those features end up with a zero exponent (where it is not generally possible to confirm or deny that the word is expressing those particular feature values), but the attempt is what matters, as far as the grammar is concerned. Unlike the first sense discussed, this is not a grammar-wide wellformedness issue, i.e., it is not about whether the word is recognizable as a complete word form. Instead, it is about wellformedness within a particular context. This qualification is already present in early discussions of AGR in DM. When Halle and Marantz (1993:135) discuss the distribution of AGR nodes in languages, they note that English, Latvian, Latin, and Russian all require an AGR morpheme for "well-formed finite verbs." The inclusion of "finite" is important! It suggests the relevance of syntactic context for the insertion of AGR nodes.

From the perspective of the analysis of Ingush presented here, the appropriate conceptualization of morphological wellformedness for AGR nodes cannot be of the first type wherein no phonological word form exists without the AGR morpheme. This would be too strong, and it would not be applicable for any paradigm involving a zero-allomorph. In Ingush, gender/number prefixes have no zero-allomorph, but AGR_{num} and AGR_{case} do (singular and absolutive, respectively). It is thus not possible to say for certain that an adjective must bear either AGR_{num} or AGR_{case} in all circumstances like the strong definition of morphological wellformedness would require, because when they are null, we cannot say for certain that they are there.

But if *morphological wellformedness* as it pertains to AGR nodes does not mean "the quality of being a string that speakers recognize as a correctly formed word in this language," what does it mean instead? I contend that the most reasonable interpretation connects to Preminger's (2014) notion of obligatory operations. A speaker must know which words must inflect for which features in which contexts. Words that are in the right context that do not reflect those features are thus not well-formed morphologically (though their syntactic position might nevertheless be accurate). AGR nodes are a reflection of this requirement in grammars.

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