Maximization of the concord domain

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1 Introduction

The term 'concord' refers to the agreement phenomena typically found in the nominal domain. In (1), for example, the demonstrative and adjective show concord for case, gender, and number with the head noun[1].

(1) *de-m* *neu-en* *Student-en*
the-DAT.M.SG new-DAT.M.SG student-DAT.M.SG
'to the new student' (*German*)

Since concord involves the sharing of features among elements, it has been popular to simply define concord as a form of agreement. To this end, many have attempted to unify analyses of nominal concord with more familiar examples of argument-predicate agreement, such as (2).

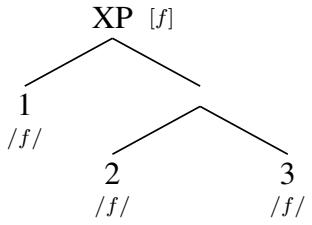
(2) [The student]$_{3SG}$ reads$_{3SG}$ a book.

Despite apparent similarities, others have argued that the differences between concord and this kind of agreement are not trivial. Norris (2014) outlines several differences, including the number of loci of expression, locality, and sensitivity to case. Regarding the first, Norris points out that the features involved in concord typically have multiple loci of expression in various syntactic positions, such as heads, adjuncts, and specifiers. Agreement features, by contrast, are often limited to a single locus of expression—usually a head. In terms of locality, concord is typically restricted to a single extended projection, whereas agreement can occur between elements in different extended projections. Finally, agreement appears to be conditioned by case (often nominative), while concord displays no such restriction.

In light of these differences, it has been argued that analyses of concord should not be subsumed under agreement (Ackema & Neeleman 2020; Giusti 2008; Norris 2012, 2014; Polinsky 2016). Norris (2014) proposes that concord results from the realization of features from dominating nodes on available terminals (see also Ackema & Neeleman 2020). This general idea is demonstrated in (3), where the [f] feature located on XP is realized on terminals 1–3 (slashes denote the result of concord).

[1]Glossing abbreviations: 3 = third person, SG = singular, PL = plural, M= masculine, NOM = nominative, GEN = genitive, DAT = dative

(3)



While concord patterns can be—and indeed have been—modeled under agreement-based approaches, the forced unification of concord and agreement comes at a cost: the resulting analysis is unnecessarily complicated. This complexity stems from the fact that in generative literature, standard agreement is a simple one-to-one mapping of features between nodes under c-command (Chomsky 2000, 2001). For example, person and number features are mapped from the subject to the verb in (2). By contrast, concord appears to be derived via a many-to-one mapping since the features involved in concord, such as case, gender, and number, originate in different places within the extended projection (and in fact may be introduced in their own projections) (Ackema & Neeleman 2020). In concord, these features are then individually mapped to their location of expression, such as the adjective in (1)[2]. If, instead, a strict one-to-one mapping is maintained in concord, then the relation becomes one of domination rather than c-command; assuming that features percolate through the extended projection, only the topmost node contains all of the relevant features (Ackema & Neeleman 2020). Subsequent sections will return to this idea and the complications that arise in a purely agreement-based approach to concord.

Expanding on Norris's (2014) theory of concord as the spellout of features from dominating nodes, I emphasize the importance of domain maximization throughout the derivation (see Grabovac 2022). In the syntax, domain maximization consists of feature percolation as high as possible, and in concord (post-syntax), features are realized as low as possible. Normally, domain maximization respects the boundaries imposed by extended projections, but subsequent sections will reflect on feature percolation and impoverishment as possible methods of domain extension.

The remainder of this paper is organized as follows: in the next section, I discuss examples of basic concord, comparing a purely agreement-based analysis and the concord-as-spellout approach. In §3, I use Slavic numeral constructions to demonstrate how the concord-as-spellout approach easily derives a number of complex concord patterns. This section returns to an evaluation of agreement-based analyses in light of these complex patterns and discusses the outcomes of domain extension. §4 concludes with a reflection on some of the major implications of the concord-as-spellout approach.

[2]Although I take agreement to be a one-to-one mapping, this does not mean that agreement features cannot appear on multiple elements. For example, Norris (2014) points out that in the Bantu languages, agreement features appear on both the auxiliary and the verb. I analyze this as two instances of a one-to-one agreement mapping.

2 Evaluating Agree

The precise formulation of Agree, the Minimalist operation underlying agreement (Chomsky 2000, 2001), has been subject to revision over the years. However, there is general consensus that the probe, which bears uninterpretable features, and the goal, which bears interpretable features, are in a c-command relation[3]. When agreement occurs, the features of the goal value the uninterpretable features of the probe (a one-to-one mapping). In the remainder of this section, I evaluate Agree against typical argument-predicate agreement and nominal concord.

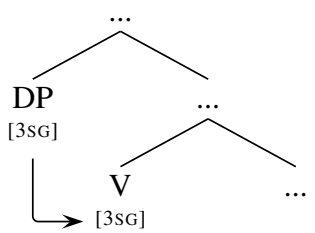
2.1 Argument-predicate agreement

The general concept of Agree involving c-command and a mapping of features from goal to probe is simple enough to apply to canonical argument-predicate agreement. Let us consider how this plays out with the example in (4), where the verb agrees with the subject in person and number features.

(4) [The student]$_{3SG}$ reads$_{3SG}$ a book.

In the simplified structure in (5), the DP subject clearly c-commands the verb, and the 3SG features located on the DP can be copied to the verb in agreement. Thus, subject-verb agreement results from a simple one-to-one mapping under c-command.

(5)



2.2 Nominal concord

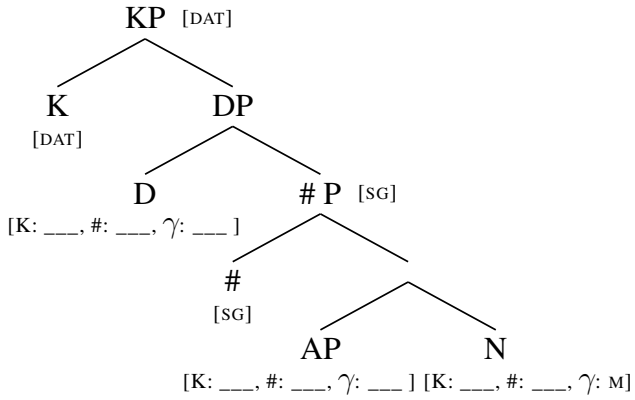
2.2.1 The application of Agree in concord

Let us now consider the application of standard Agree mechanisms—c-command and a one-to-one mapping—against the distribution of features in (6). I will assume the structure in (7), where gender (represented by γ) originates on the noun (see Kramer 2016), number is introduced in #P just above NP (Ritter 1992), and case is introduced in KP (Bittner & Hale 1996).

[3]There is some discussion in the literature on whether the probe should c-command the goal or vice versa (see Ackema & Neeleman 2018; Carstens 2016). For simplicity, I will merely assume that Agree requires a c-command relation between probe and goal, but I remain agnostic as to the directionality of agreement.

(6) *de-m* *neu-en* *Student-en*
the-DAT.M.SG new-DAT.M.SG student-DAT.M.SG
'to the new student' (*German*)

(7)



Considering first the AP in (6), it is necessary to account for its dative, masculine, and singular features. Assuming agreement results from a one-to-one mapping under c-command, then one logical possibility is that AP agrees with N. However, N itself requires values for case and number. Thus, the one-to-one nature of agreement is compromised, since the individual gender, number, and case features originate in distinct projections. In order to derive the desired features on AP, we would have to assume that it probes upward for number and case but downward for gender[4]. Similar issues arise with D, which would probe downward for number and gender but upward for case. If, instead, a strict one-to-one mapping is forced, c-command must be abandoned. Since features percolate through an extended projection (see Anderson 1992; Cole *et al.* 1993; Grimshaw 2000), KP is the only node that contains all relevant features for a single mapping to AP and D.

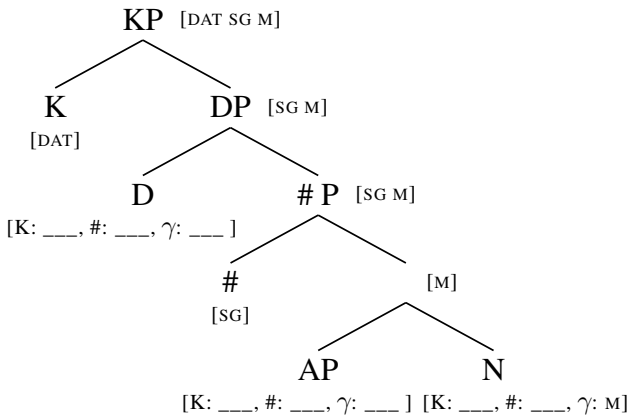
It could be possible to maintain a one-to-one mapping by introducing an ordering of valuation. More concretely, AP and D could agree with N once N's features have been valued. Alternatively, we could adopt the feature-sharing version of Agree (Danon 2012; Frampton & Gutmann 2006; Pesetsky & Torrego 2007), which does not require the goal to contain valued instances of the features needed by the probe. Thus, elements could enter into an agreement relation with N even before N's number and case features have been valued. Through feature-sharing, values for case and number are later supplied. While it is possible to make modifications to Agree to reconcile its definition with the distribution of features in simple examples like (6), §3 will show that not all examples are this straightforward. In particular, we will see that a one-to-one mapping from N to one of its modifiers is not always a viable analysis, as N may not realize the same features as the modifier. On the other hand, both basic and more complex examples of concord follow easily from the concord-as-spellout analysis.

[4]The fact that AP functions as a probe at all is somewhat questionable, as probes are typically heads. Abney (1987) takes adjectives to be heads, but this is not a common assumption in current work. Regardless, it is clear that the theory of phrase structure one adopts plays a role in agreement (see Norris 2014).

2.2.2 Concord as spellout

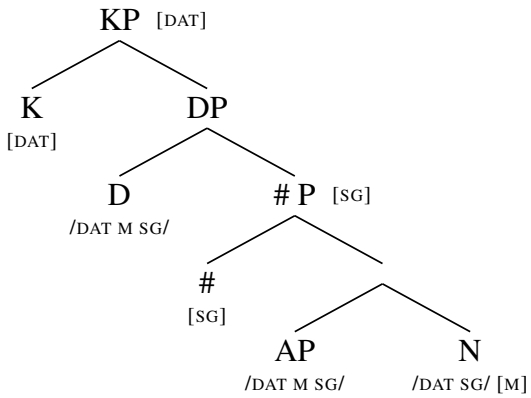
Following work by Norris (2014) and Ackema and Neeleman (2020), I take concord to result from the spell-out of features from dominating nodes on available terminals. Using this theory to derive the distribution of features in (6), we have the following derivation, adopting a broadly Minimalist, Distributed Morphology (DM) architecture of the grammar. Beginning in the syntax, features percolate through the extended projection and collect on KP, as shown in (8)[5].

(8)



Moving out of the syntax, we arrive at the concord stage of the derivation. In this stage, the features located on the dominating KP are spelled out on available terminals. Case, gender, and number features are realized throughout the entire construction. As mentioned in §1, I use slashes to denote the result of concord.

(9)



The next section applies these stages of the concord-as-spellout analysis to more complex examples of concord.

[5]I assume upward percolation of all features in contrast to Norris (2014), who assumes upward percolation of ϕ-features but downward percolation of case. Upward percolation avoids violations of Inclusiveness (Chomsky 1995), which roughly states that the properties of nodes must be recoverable from dominated structure (see Neeleman & van de Koot 2002).

3 Domain extension: Evidence from Slavic numeral constructions

Slavic numeral constructions such as the Russian and Bosnian/Croatian/Serbian (BCS) examples in (10)–(12) have long been a topic of contention in the literature[6]. This continued interest in numeral constructions largely stems from the complexity of their associated concord patterns. Slight variations in patterns across the Slavic languages pose difficulty for the formulation of a cohesive analysis. This section will demonstrate how concord as spellout straightforwardly accounts for these complex patterns. Note that (10)–(12) are merely a sampling of the Slavic patterns, but see Grabovac (2022) for a broader set of data.

(10) *<èt-i>* *pjat'* *<èt-ix>* *nov-yx* *student-ov*
this-NOM.PL five.NOM this-NOM.PL new-GEN.PL student-GEN.M.PL
'these five new students'/ 'five of these new students' (*Russian*)

(11) *<èt-im>* *pjat-i* *<èt-im>* *nov-ym* *student-am*
this-DAT.PL five.DAT this-DAT.PL new-DAT.PL student-DAT.M.PL
'to these five new students'/ 'to five of these new students' (*Russian*)

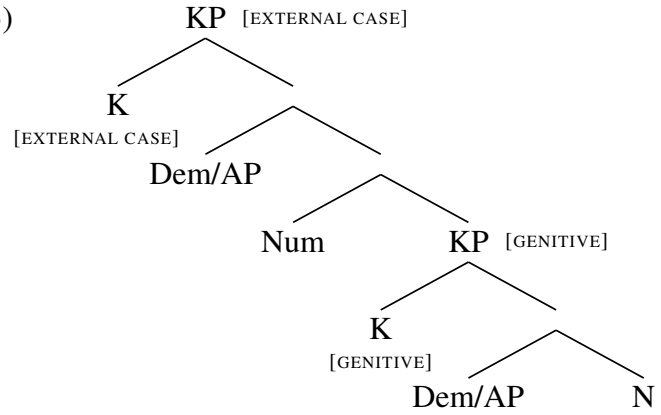
(12) *<ov-ih>* *pet* *<ov-ih>* *nov-ih* *studen-a-ta*
this-GEN.PL five this-GEN.PL new-GEN.PL student-PL-GEN.M
'these five new students'/ 'five of these new students' (*BCS*)

Before discussing the derivations of the patterns in (10)–(12) it is first necessary to clarify the syntactic structure of these examples and establish some terminology in order to better evaluate the patterns. In each of the examples, a demonstrative is allowed above or below the numeral with no effect on the concord pattern (though the lower demonstrative typically gives rise to a partitive reading). Given Cinque's (2005) analysis of Universal 20 (Greenberg 1963), which predicts the possible orders of demonstrative, numeral, adjective, and noun within the extended nominal projection, I analyze the numeral constructions with the structure in (13). Crucially, (13) consists of two extended projections—two syntactic domains—since a demonstrative below the numeral gives rise to unattested orders within a single extended projection[7]. For simplicity, I will disregard #P in this discussion, but this has no effect on the analysis.

[6]Given space constraints, I restrict the focus to three patterns displayed by higher numeral constructions, which contain numerals 'five' and above, but this is by no means the full range of patterns. The concord patterns displayed by Slavic numeral constructions vary according to language, numeral class, and case environment.

[7]The structure in (13) predicts the possibility of examples containing two demonstratives simultaneously. Though rare, these types of examples are available for some speakers under a focus reading.

(13)



I analyze the lower domain with a genitive case phrase given the common observation that Slavic numerals impose genitive case on their complements (see e.g., Bošković 2006; Franks 1995; Ionin & Matushansky 2018; Klockmann 2017). The higher domain reflects the external case environment considering examples like (10) in which two distinct cases are realized. However, it is also necessary to address (11) and (12) in which the distribution of demonstratives suggests two syntactic domains, but the case distribution—only a single case realized throughout—suggests one concord domain.

Now that the structure has been motivated, let us establish names for the patterns, all of which are based on Babby's (1985) heterogeneous-homogeneous distinction. I will refer to (10) as aligned heterogeneous. The example is heterogeneous in the sense that two concord domains are distinguishable on the basis of case, and aligned because the break in these domains aligns with the break in the underlying syntactic domains. (11), then, is downward homogeneous since only one concord domain is apparent, and the externally assigned case is realized downward throughout the construction. (12) is upward homogeneous since the internally assigned genitive case percolates upward to be realized throughout the construction in a single domain of concord.

The derivations also rely on three key hypotheses (see Grabovac 2022): (i) obligatory head-head agreement between N and the lower K; (ii) potential head-head agreement between Num and the higher K; (iii) impoverishment restricted to heads and the dominating nodes to which features have percolated. Further motivation for each of these will be provided as they apply in the following derivations. We will also see that impoverishment and feature percolation are two methods of domain extension. While impoverishment can extend the domain lower, percolation extends the domain higher. This is critical in the derivations of homogeneous patterns.

3.1 Deriving the aligned heterogeneous pattern

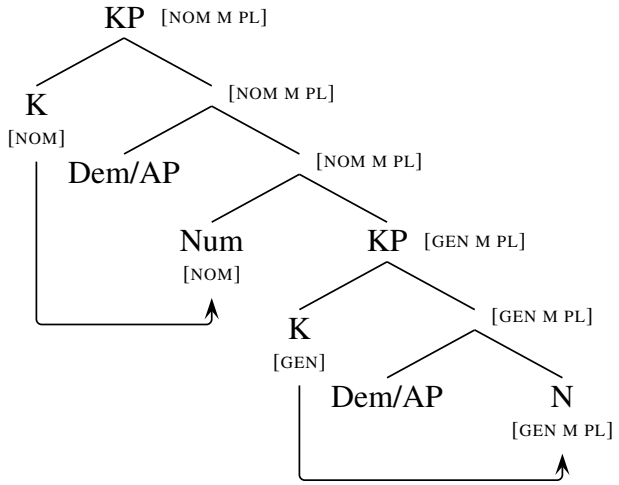
The aligned heterogeneous pattern is repeated in (14). While this example is from Russian, the pattern is prevalent more generally for Slavic numeral constructions in structural case environments (see e.g., Franks 1995). Here, the externally assigned case (nominative) is realized on the numeral and above, while genitive is realized on the elements below the numeral.

(14) *èt-i* *pjat'* *nov-yx* *student-ov*
this-NOM.PL five.NOM new-GEN.PL student-GEN.M.PL
'these five new students' (*Russian*)

In this derivation, I assume that the numeral does participate in an agreement relation with the higher K, following hypothesis (ii). This assumption stems from the observation that Russian numerals are declinable; by contrast, we will later see that BCS numerals, which are indeclinable, do not participate in agreement. This potential for agreement is partly conditioned by the numeral's semi-lexical status, which translates to a variability in feature specification (see Corver & van Riemsdijk 2001; Klockmann 2017; Vos 1999). This variability of the numeral contrasts with the fully lexical noun, which I assume always agrees with the lower K.

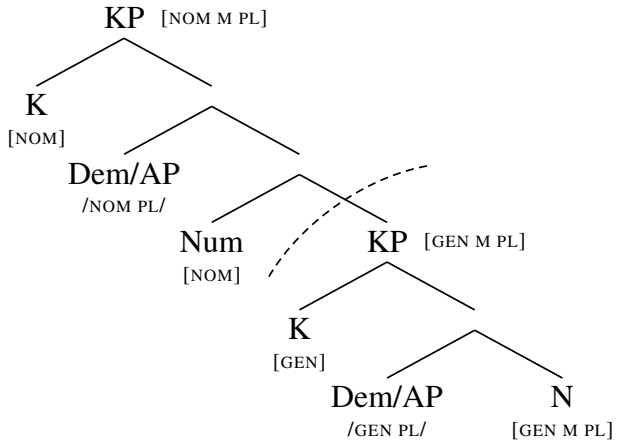
In (15), the numeral and noun both agree for case. Feature percolation also occurs in this stage, as we saw earlier in (8). Here, the ϕ-features are able to percolate from the lower domain through the higher domain. On the other hand, the numeral's participation in agreement for case blocks percolation of the genitive assigned to the lower domain. This trade off in percolation takes insight from the concept of relativized heads as discussed in Di Sciullo and Williams (1987). It is also important to highlight the numeral's semi-lexical status. §1 mentioned that one of Norris's (2014) criteria for distinguishing agreement and concord is that concord is normally limited to features within a single extended projection. The structure in (15) is composed of two extended projections, but I assume that the boundary between them is more transparent than usual because of the numeral's semi-lexicality (see Vos (1999) for a discussion of transparency and semi-lexicality).

(15)



Moving out of the syntax, (16) depicts the result of concord. Here, the features from dominating nodes are spelled out on available terminals. This results in NOM.PL in the higher domain and GEN.PL in the lower domain. The break in concord domains corresponds to the break in syntactic domains—the aligned heterogeneous pattern.

(16)



Recalling the discussion of the purely agreement-based analysis in §2, let us suppose that the modifiers agree with the head noun for a one-to-one mapping established under c-command. In the aligned heterogeneous pattern, this works well enough to derive the GEN.PL features of the lower modifier. However, this does not derive the NOM.PL features of the demonstrative in the higher domain, since nominative case is never present on the noun. Similarly, there is no empirical motivation to assume that plural is present on the numeral, so it is also not possible for a one-to-one mapping between the numeral and the demonstrative. It may be possible to assume a kind of roll-up movement whereby the required features are collected, allowing for a one-to-one mapping to be established. For example, Klockmann (2017) suggests that the numeral is initially merged lower in structure before moving to derive the correct word order. As the numeral moves, features are collected. However, this kind of approach to agreement seems to be making the essentially the same assumptions as the concord-as-spellout analysis in which features are collected on KP. Moreover, this additional movement is uncommon for theories of agreement and is problematic in light of Universal 20 (see Cinque 2005). Thus, the agreement-based derivation of the aligned heterogeneous pattern seems unnecessarily complicated when compared to the concord-as-spellout approach in which the pattern follows naturally.

The following sections further illustrate possible outcomes of the concord-as-spellout approach when domain maximization is leveraged.

3.2 Downward extension of the concord domain

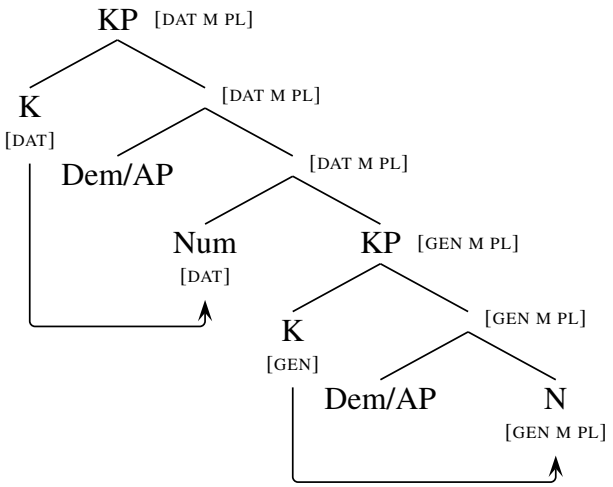
We have seen that the system attempts to maximize the ultimate concord domain first by percolating features as high as possible in the syntax and then by realizing features as low as possible in concord. While domain maximization is typically restricted to extended projection boundaries, the next two derivations demonstrate that the concord domain can be extended downward or upward.

The downward homogeneous pattern is exemplified with Russian in (17), where the externally assigned case is realized throughout the construction in a single domain of concord. This pattern is commonly displayed by Slavic numeral constructions in lexical case environments.

(17) *èt-im* *pjat-i* *nov-ym* *student-am*
this-DAT.PL five.DAT new-DAT.PL student-DAT.M.PL
'to these five new students' (*Russian*)

As before, the derivation begins in the syntax. Since (17) is a Russian example, I assume that the numeral agrees for case as we saw in (15). Feature percolation occurs in line with relativized heads—the ϕ-features are able to percolate through the higher domain since the numeral contributes no ϕ-features of its own, but the case of the numeral blocks percolation of genitive from the lower domain.

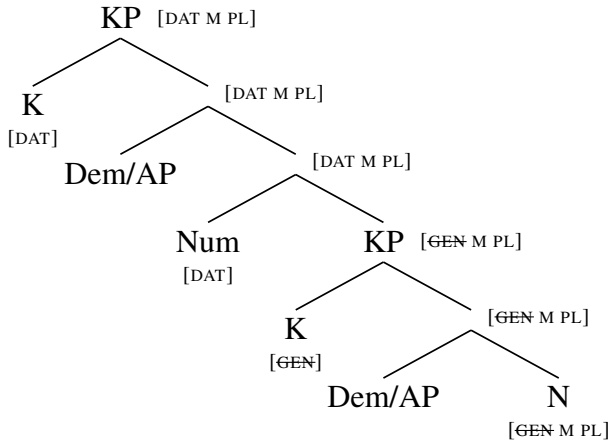
(18)



Moving out of the syntax, the impoverishment rule in (19) applies to delete genitive in the lower domain. A couple of points are worth noting: for one, I assume that impoverishment rules can refer to the content of dominating nodes. This follows from the setup of the system since features are located on heads and then percolate. Additionally, the semi-lexical status of the numeral plays an important role. While the cross-domain effects of (19) may at first be concerning on the basis of locality, I assume that the semi-lexicality of the numeral creates a more transparent boundary between the two domains than would a fully lexical noun (see Vos 1999).

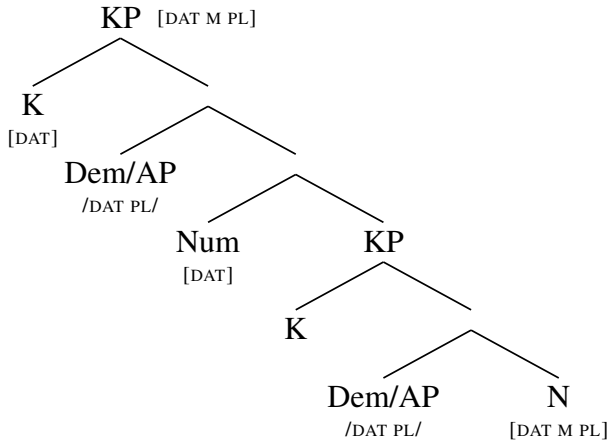
(19) [GEN] cannot occur on nodes dominated by [DAT]

(20)



Finally, the content of dominating nodes is spelled out on available terminals in concord. Since case has been eliminated altogether from the lower domain, the dative of the higher domain is spelled out throughout the construction as the most local case. This produces an extended domain of concord for the externally assigned case.

(21)



3.3 Upward extension of the concord domain

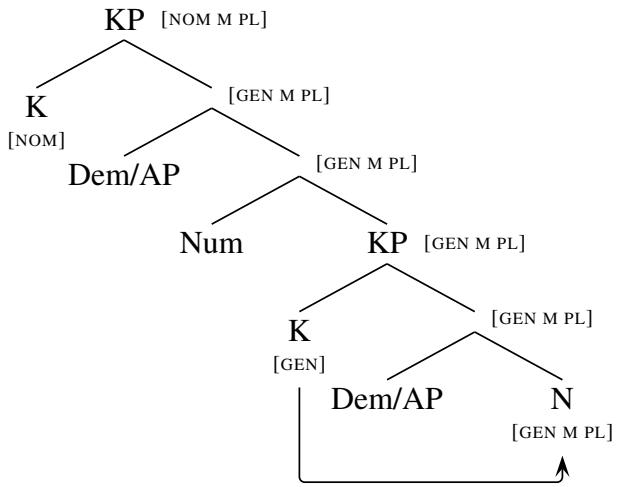
This section will demonstrate how upward extension of the concord domain is obtained in examples such as (22). Here, we see the internally assigned genitive case realized both above and below the numeral.

(22) *ov-ih* *pet* *nov-ih* *studen-a-ta*
this-GEN.PL five new-GEN.PL student-PL-GEN.M
'these five new students' (*BCS*)

Example (22) comes from BCS. In BCS, numerals are indeclinable which is often taken as evidence for caselessness (Bošković 2006; Stjepanović 2012; Wechsler

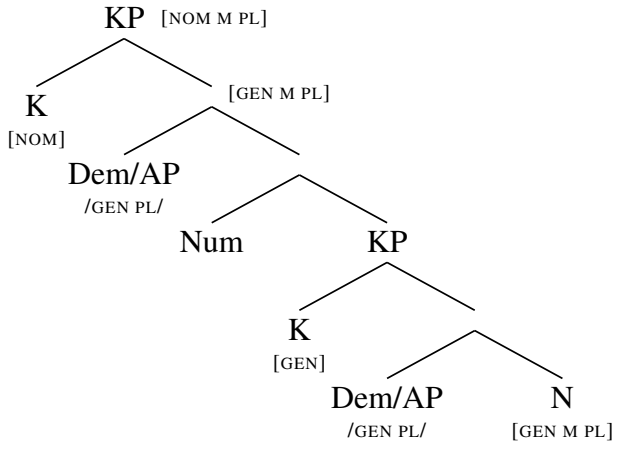
& Zlatić 2003)[8]. Thus, I assume that the numeral does not participate in agreement with K. In (23), we see that this lack of agreement allows the internally assigned genitive to percolate upward into the higher domain, along with the ϕ-features. This is allowed because the numeral contributes no features of its own. Here, we see the semi-lexicality of the numeral and its lack of participation in agreement allowing for upward extension of the concord domain, through percolation higher than usual.

(23)



The result of concord is very straightforward. GEN.PL spells out throughout the construction as the most local set of dominating features[9].

(24)



[8]Technically speaking, only the class of higher numerals (5+) is indeclinable in BCS. Lower numerals (2, 3, 4) are subject to speaker variation, but some speakers do decline them.

[9]It is logical to wonder whether the genitive case realized by the higher modifier/demonstrative is really the result of upward percolation. Alternatively, some analyses have proposed that this modifier originates below the numeral where it is assigned genitive case, and then subsequently moves (e.g., Caruso 2011). This violates Universal 20, as a demonstrative below the numeral gives rise to an unattested order of elements within a single extended nominal projection. Moreover, moving the demonstrative alone is problematic—Cinque (2005) argues that all movements to derive Universal 20 must include N (see also Abels & Neeleman 2012).

4 Conclusions

This paper has argued that concord results from the spell out of features from dominating nodes on available terminals. This concept of concord as spellout was inspired by Norris's (2014) theory but expanded through the concept of domain maximization. To this end, I argued that the system attempts to maximize the concord domain first by percolating features as high as possible and then by realizing features as low as possible. Domain maximization can also be extended through impoverishment (as in the downward homogeneous pattern) or higher percolation due to the feature specification of the heads involved (as in the upward homogeneous pattern). The resulting system is able to derive a variety of patterns, some of which involve a mismatch between the concord domains and underlying syntactic domains.

More broadly, I have argued that concord as spellout provides a simpler alternative to analyses of nominal concord than those based solely on standard agreement mechanisms. While it would be desirable to unify concord and agreement under a single analysis, I have shown that unnecessary complications arise from agreement-based analyses which are avoidable under the concord-as-spellout account.

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