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Concord as morphological realization: A novel approach to numeral constructions

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ABSTRACT

Concord refers to the kind of agreement phenomena typically found in the nominal domain. Many have argued for a unified analysis of agreement and concord since both involve the sharing of features among elements. Others contend that the differences between agreement and concord are non-negligible, and that unifying the two produces overcomplicated theories. This paper follows the latter approach and maintains a distinction between concord and agreement. Inspired by Norris' (2014) theory, I take concord to result from the spell-out of features from dominating nodes on available terminals. In addition to a simpler account of general concord, the proposed analysis offers a novel approach to the complex patterns displayed by Slavic higher numeral constructions. The strength of the system is illustrated through derivations of examples from Russian, Polish, and BCMS.

KEYWORDS concord · numerals · agreement · case · phi-features

1 INTRODUCTION

Concord is a term often used to describe agreement phenomena in the nominal domain, particularly apparent in the features shared between a noun and any local modifiers. The demonstrative and adjective in (1), for example, display concord for case, gender, and number with the head noun.

(1) ov-e star-e knjig-e
this.NOM.F.PL old.NOM.F.PL book.NOM.F.PL
'these old books' (Bosnian/Croatian/Montenegrin/Serbian [BCMS])

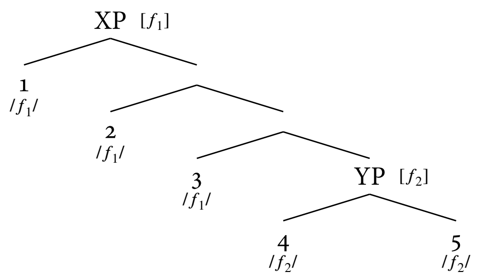
Since concord appears to involve the sharing of features among elements, many accounts have attempted to unify concord with other examples of agreement, including the familiar argument-predicate relationship (e.g., Carstens 2000, Baker 2008, Danon 2011). Given other similarities between the nominal and verbal domains, a single account of agreement and concord is theoretically desirable. However, the picture is not always as simple as the even distribution of features in (1). Example (2) demonstrates that the features realized on the modifiers do not always correspond to those of the noun: the demonstrative's nominative case matches the numeral, but its plural number matches the noun.

(2) èt-i pjat' star-yx knig
this.NOM.PL five.NOM old.GEN.PL book.GEN.F.PL
'these five old books' (Russian)

It has also been observed that while standard agreement (in the Minimalist tradition) results from a simple one-to-one mapping of features from one node to another under c-command, concord instead appears to require a many-to-one mapping, as the features involved in concord originate in different places in the extended projection (Ackema & Neeleman 2020). If a strict one-to-one mapping is enforced, the relation between nodes becomes one of domination rather than c-command. Assuming features percolate upward through the extended projection, then only the top node can be the locus of all features relevant to the concord relation (Ackema & Neeleman 2020). In light of these differences, some accounts maintain a distinction between the mechanisms required in agreement versus those required in concord (e.g., Chung 2013, Norris 2014, Ackema & Neeleman 2020). This is not to say that agreement never occurs in the nominal domain—in fact, it will play a key role in the analysis developed in this paper.[1]

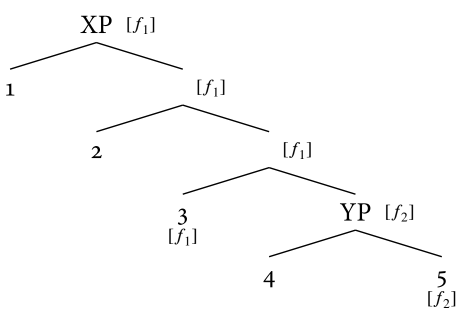
Norris (2014) in particular develops a theory whereby concord results from the realization of features from dominating nodes on available terminals (see also Ackema & Neeleman 2020). This is illustrated in (3), where the [f_1] feature located on XP is realized on terminals 1–3, and the [f_2] feature on YP is realized on 4 and 5 in the lower domain according to locality. The remainder of this paper demonstrates how such an approach provides a straightforward analysis of Slavic numeral constructions.

(3)

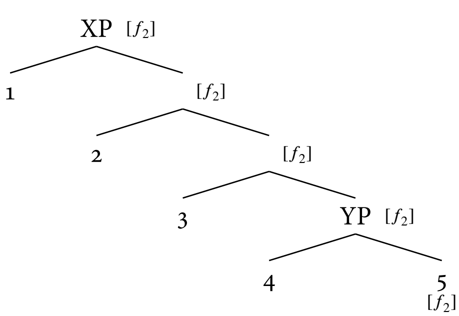


Building on Norris (2014)'s approach to concord, I argue that the system attempts to maximize the ultimate concord domain throughout the derivation. In the syntax, domain maximization takes the form of feature percolation as high as possible; more specifically, features percolate until they encounter competing features from another head. In (4), for example, [f_2] from the lower domain yields to [f_1] in the higher domain. By contrast, [f_2] continues to percolate in (5) since no head in the higher domain contributes any features.

(4)



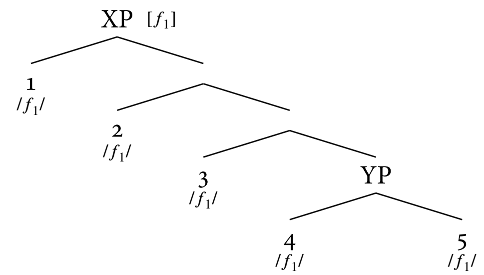
(5)



[1] This cooccurrence of agreement and concord is not unique to the theory proposed in this paper. While concord may be predominant in the nominal domain, undisputed examples of agreement can be found; similarly, agreement is common in the verbal domain, but it has also been argued that examples of concord exist (see Norris 2014, Ackema & Neeleman 2020).

In concord, features are realized as low as possible. Typically, domain maximization is restricted to the domain boundaries imposed by the extended projection, as shown above in (3). However, some of the patterns investigated in this paper will prove to be exceptions to this. For example, (6) shows that an absence of features in the lower domain allows for lower realization of features originating in the higher domain. We will see that this is a key component of derivations in lexical case environments.

(6)



2 CONCORD IN NUMERAL CONSTRUCTIONS

2.1 CENTRAL HYPOTHESES

This approach to concord provides a novel analysis of Slavic numeral constructions, a longstanding subject of interest. While many accounts have been proposed (Babby 1987, Bošković 2008, Šarić 2014, Witkoś & Dziubała-Szrejbrowska 2015, Klockmann 2017, Lyskawa 2020; a.o.), the complexity of the patterns and small variations among languages make it difficult to formulate a cohesive crosslinguistic analysis. This paper will show that a cohesive story can be maintained under the concord approach because much of the variation can be attributed to language-specific properties of the numeral; this is a desirable result since any theory of numeral constructions is necessarily forced to make assumptions about the properties of numerals.

The discussion will center around the following four concord patterns displayed by Russian, BCMS, and Polish higher numeral constructions, containing numerals 'five' and above.[2] Note that the patterns in (9) and (10) look strikingly similar but differ crucially in terms of case on the numeral; while Polish numerals are declinable, BCMS numerals are indeclinable and, consequently, are often considered caseless. Given this difference, I argue that we must posit case on the numeral in Polish. The distinction between the BCMS and Polish patterns is elaborated in §3.3 where I will argue that the Polish numeral in (10) realizes default (nominative) case.

(7) <èt-i> pjat' <èt-ix> star-yx knig
this-NOM.PL five.NOM this-GEN.PL old-GEN.PL book.GEN.F.PL
'these five old books'/'five of these old books' (Russian)

(8) <èt-im> pjat-i <èt-im> star-ym knig-am
this-DAT.PL five-DAT this-DAT.PL old-DAT.PL book-DAT.F.PL
'to these five old books'/'to five of these old books' (Russian)

(9) <ov-ih> pet <ov-ih> star-ih knjig-a
this-GEN.PL five this-GEN.PL old-GEN.PL book-GEN.F.PL
'these five old books'/'five of these old books' (BCMS)

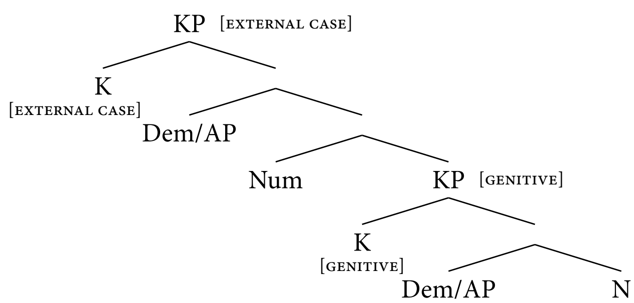
(10) <t-ych> pięć <t-ych> star-ych książek
this-GEN.PL five.DEF this-GEN.PL old-GEN.PL book.GEN.F.PL
'these five old books'/'five of these old books' (Polish)

[2] Large numerals such as 'thousand,' 'million,' 'billion' form their own class, exhibiting primarily noun-like behavior. They typically display the aligned heterogeneous pattern discussed in §3.1, though see Grabovac (2022) for discussion of some complexities.

Before we can even attempt to derive the concord patterns, we must first determine the syntax of numeral constructions. In an analysis of Universal 20 (Greenberg 1963), Cinque (2005) establishes that there are fourteen attested and ten unattested orders of demonstrative-numeral-adjective-noun in a single extended nominal projection. Because the robustness of the typological data (see Dryer 2018) suggests it is not unreasonable to accept the truth of Universal 20, we can use these attested and unattested orders to assess extended projection boundaries. Most relevant for the current discussion is that, under Cinque's analysis, Num-Dem-A-N is not found in examples uncontroversially composed of a single extended projection; if this order is available, as in (7)–(10), we should assume two extended projections. One question that may arise is why we should not consider the Num-Dem-A-N order in Slavic numeral constructions to simply constitute an exception to Universal 20. While some analyses do indeed have different accounts of the orders predicted and ruled out by Universal 20 (for relevant discussion, see Neeleman to appear), it is important to note that the low demonstrative in Slavic typically gives rise to a partitive reading. Since this is not a *neutral* reading, we can therefore reason that Num-Dem-A-N in Slavic does not constitute an exception to the universal (Neeleman to appear). For further support of the proposed analysis, we can turn to the distribution of features across the concord patterns, which is not affected by the height of the demonstrative. For example, in (7), nominative is realized on the numeral and above, with genitive below; in (8), dative is realized throughout, no matter the height of the demonstrative. In other words, the lower Dem-A-N sequence in (7) and (8) behaves like a typical NP.

Thus, I suggest that the distribution of demonstratives above and below the numeral in (7)–(10) is best modeled with two extended projections, as in (11) (see also Caha 2015), since Num-Dem-A-N is an acceptable order within numeral constructions despite being unattested within a single extended projection.

(11)



Given these two syntactic domains, I analyze the lower KP as genitive, considering the observation that Slavic numerals license genitive case on their complements (Franks 1995, Rappaport 2002, Bošković 2006, Klockmann 2017, Ionin & Matushansky 2018; a.o.). The higher KP in (11) reflects the external case environment, considering examples like (7) in which two cases are distinguishable.[3] In terms of case licensing, I assume a simple checking theory to ensure that certain KPs appear in the correct environments. For example, a KP with genitive case must appear in the context of a head that can check genitive. For the purposes of this paper, case checking is the simplest implementation of the theory, but nothing of substance hinges on this assumption.[4] Given this structure and the basic notion of concord as realization, the case distribution of (7) is already derivable. The features of the higher KP spell out on the numeral and higher modifier, while the features of the lower, genitive KP are realized on the lower modifier and noun.

[3] The structure in (11) predicts the possibility of numeral constructions containing both higher and lower demonstratives. This type of construction is usually considered odd, although some speakers allow it under contrastive focus. While the examples containing concurrent demonstratives are rare, each type of numeral discussed in this thesis allows both higher and lower demonstratives individually with no change to the concord pattern associated with the numeral.

[4] The current analysis is compatible with a case valuation system, though the case priority interactions discussed in §3.4 may require us to stipulate that valuation occurs prior to feature percolation. However, it is also conceiveable that unvalued case features percolate, and upon valuation, all copies are valued.

With the syntax of numeral constructions in place, we can now examine three central hypotheses which regulate the concord system: (i) potential head-head agreement between the numeral and the higher (local) K; (ii) language-specific impoverishment that is restricted to heads and the nodes to which their features have percolated; and (iii) complementarity of case licensing and case concord (see Grabovac 2022). These can loosely be considered parameters, and the extent to which each applies in a given language derives the cross-Slavic differences in the distribution of concord patterns.

The first hypothesis concerning potential agreement for case on the numeral is a source of language variation. The derivations covered in this paper will show that Russian higher numerals always agree for case, while their BCMS and Polish counterparts never do. This crosslinguistic variation in agreement potential can in part be attributed to the specific properties of the numeral, which I analyze as a semi-lexical category (see Klockmann 2017). As such, I propose that the numeral's feature specification can vary, and it does not always agree for case.[5] This assumption follows the analysis put forth by Ackema & Neeleman (2020), who argue that features present on heads are there either inherently or as a result of agreement. Some may question the necessity of representing case both on K and on the numeral; admittedly, I can find no way to avoid this assumption, since we will see that the numeral's participation in agreement (or lack thereof) is key to capturing the difference between the pattern in (7), on one hand, and (9) and (10) on the other. Nevertheless, given the complexity of the patterns, any theory of Slavic numeral constructions must make assumptions about the properties of the numeral. Among other assumptions that are not specific to my theory, I suggest that numerals license genitive case in addition to potentially realizing case. While this means that the genitive features the numeral licenses must be represented differently from the features it realizes (if any), we can draw a parallel with nouns, which commonly license genitive case but which may also realize a different case.[6]

The second hypothesis regarding impoverishment—a post-syntactic feature-deletion operation (Bonet 1991, Harley & Noyer 1999; a.o.)—falls out naturally from the setup of the concord system. Since features are located on heads (N, Num, K) and then percolate to dominating nodes, it follows that these are the possible loci of impoverishment, rather than, for example, AP which realizes features in concord. This constrains the overall application of impoverishment in the system. The impoverishment rules are assumed to be language-specific, though given some overlap in concord patterns, certain rules, such as (17), may be applicable to more than one language.

Finally, the third hypothesis on the complementarity of case licensing and case concord is especially relevant in deriving the contrast between the BCMS and Polish patterns. This hypothesis implies that if a numeral licenses (genitive) case, it cannot realize case in concord; it may, however, agree with K. The condition further implies that the spellout rules of concord cannot accept an element which has a case feature it needs to license, a property that is encoded in the numeral. While the hypothesis is somewhat stipulative, a parallel may be found in the verbal domain; verbs are commonly held to license case on their complements but do not appear to realize case themselves.

2.2 SOME PREDICTED EFFECTS

The predicted effects of these three hypotheses are schematized in Figure 1 and elaborated below.

Beginning with the first hypothesis, suppose that the numeral agrees for case. In the absence of impoverishment, we then derive what I term the ALIGNED HETEROGENEOUS

[5] Grabovac (2022) further suggests that the numeral's semi-lexicality contrasts with the fully lexical noun, which always agrees for case with the lower K. Since this assumption is not necessary for the patterns discussed in this paper, it has been omitted.

[6] An alternative to the noun directly licensing genitive case would be to introduce a functional head that does the work. This type of analysis also seems compatible with the current account of numeral constructions, although a slight revision of the complementarity condition in hypothesis (iii) would be necessary.

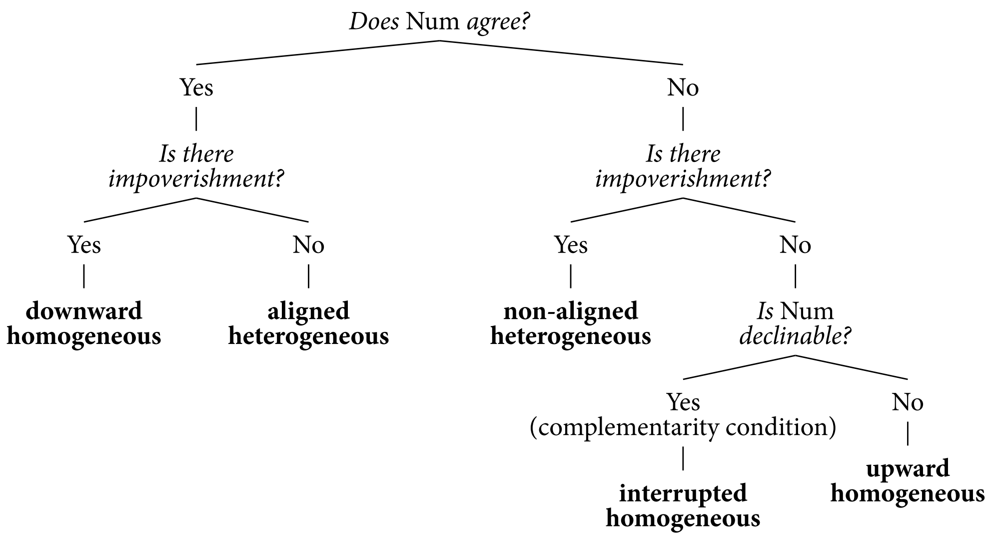


Figure 1: Predicted Effects of Hypotheses

pattern (a further specification on Babby's (1987) 'heterogeneous' versus 'homogeneous' agreement), observed in (7). Here, two domains of concord are distinguishable on the basis of case, and these align with the underlying syntactic domain boundary. If the numeral agrees *and* impoverishment applies prior to spellout (in accordance with the second hypothesis), then we derive the DOWNWARD HOMOGENEOUS pattern in (8) where only one domain of concord is apparent, reflecting the externally assigned case realized downward throughout the construction. Now, suppose instead that the numeral does not agree for case. This allows the internally assigned genitive to percolate upward for realization throughout the construction, deriving the UPWARD HOMOGENEOUS pattern in (9). If the numeral does not agree for case *and* the complementarity condition in hypothesis (iii) takes effect because the numeral is capable of exponing case, then we derive the INTERRUPTED HOMOGENEOUS pattern of (10) where genitive is realized above and below the numeral, but the numeral itself surfaces in a default form. Finally, if the numeral does not agree but impoverishment applies, the NON-ALIGNED HETEROGENEOUS pattern is derived; this pattern is limited to lower numeral constructions and due to space constraints, will not be examined in this paper. The four patterns to be addressed are summarized in Table 1.

Aligned heterogeneous	[$_{\text{KP}}$EXTERNAL CASE … [$_{\text{KP}}$GENITIVE …]]
Downward homogeneous	[$_{\text{KP}}$EXTERNAL CASE … [$_{\text{KP}}$EXTERNAL CASE …]]
Upward homogeneous	[$_{\text{KP}}$GENITIVE … [$_{\text{KP}}$GENITIVE …]]
Interrupted homogeneous	[$_{\text{KP}}$GENITIVE … Num$_{\text{DEF}}$ [$_{\text{KP}}$GENITIVE …]]

Table 1: Concord Patterns

§3 proceeds through the derivations of each pattern. §3.5 takes a closer look at the BCMS pattern, which will necessitate a slight revision of the hypotheses. Finally, §4 concludes with a reflection on some of the larger implications of the analysis, as well as the kinds of concord patterns excluded by the system.

3 DERIVATIONS OF CONCORD

3.1 ALIGNED HETEROGENEOUS: CASE AGREEMENT ON THE NUMERAL

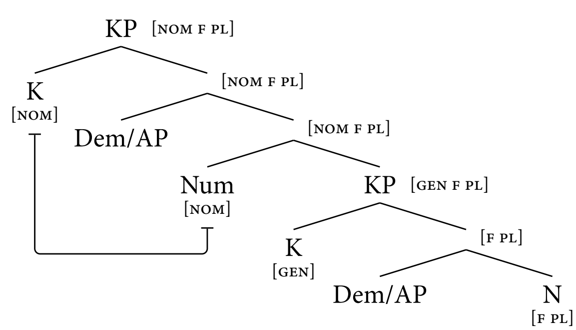
The aligned heterogeneous pattern, exemplified with Russian in (12), is characterized by two domains of concord that align with the underlying syntactic domains. This pattern is common in structural (nominative/accusative) case environments both in Russian and more generally across Slavic (Babby 1987, Franks 1995, Rappaport 2002, Pesetsky 2013).

(12)	èt-i	pjat'	star-yx	knig	
	this-NOM.PL	five.NOM	old-GEN.PL	book.GEN.F.PL	
	'these five old books'				(Russian)

The derivation begins in the syntax, with feature percolation and participation of the numeral in case agreement. As mentioned above, I assume that Russian numerals agree for case, unlike their BCMS and Polish counterparts; if they did not participate in case agreement, we would not be able to derive the aligned heterogeneous pattern because genitive would be predicted to percolate upward through the higher domain. In general, a numeral's agreement status can be determined based on its declinability as well as the height of genitive percolation in the construction. BCMS higher numerals, in contrast to their Russian counterparts, are indeclinable and consistently display the upward homogeneous pattern where genitive is realized above the numeral. I therefore assume that the BCMS numerals never agree for case. In other words, they do not enter the derivation with a case feature that needs to be checked. Similarly, we will see that Polish numerals do not agree (at least in the structural case contexts covered in this paper). The Polish numerals are declinable, but I interpret the realization of genitive in the higher domain of the interrupted homogeneous pattern as evidence of their lack of participation in agreement.

Percolation occurs in accordance with relativized heads (see Di Sciullo & Williams 1987).[7] This means that the φ-features of the lower domain are able to percolate through the higher domain, since the numeral contributes no φ-features of its own. Note that for simplicity, the tree in (13) depicts the noun as being specified for both number and gender; the analysis does not hinge on this assumption—these features could be introduced in their own projections and percolate up from higher in the tree depending on one's choice of theory (see e.g., Ritter 1992, Merchant 2014). The genitive case licensed in the lower domain, however, is blocked from percolating into the higher domain since the numeral participates in agreement.

(13)

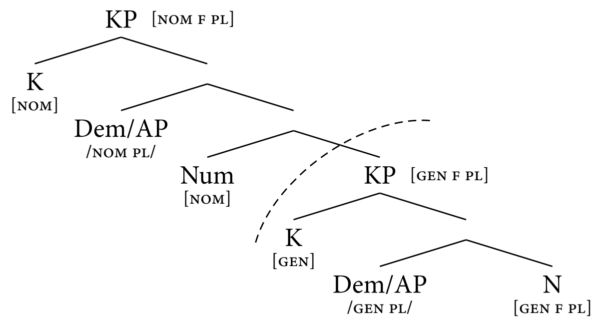


The tree in (14) depicts the post-syntactic mapping and realization stage. Note that I have disregarded the intermediate nodes merely for simplicity of presentation. In concord, the

[7]In contrast to Norris (2014), I assume that both case and ϕ-feature percolation are upward in line with Inclusiveness. Roughly speaking, the features of nodes must be recoverable from dominated structure Chomsky (1995). As discussed in (Neeleman & van de Koot 2002: p.535), downward copying of features can give rise to Inclusiveness violations, if, for example, features fail to be copied all the way down.

features of dominating nodes spell out on available terminals. Thus, NOM.PL is realized in the higher domain and GEN.PL in the lower domain. The result is two domains of concord that align with the underlying syntactic domains.

(14)



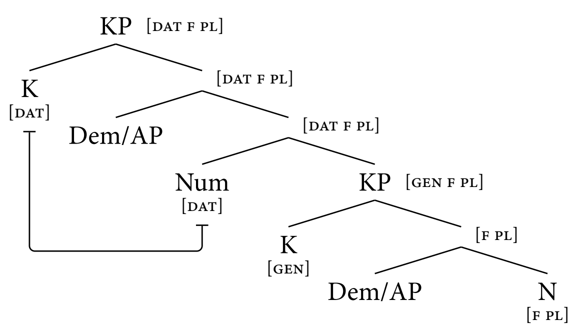
3.2 DOWNWARD HOMOGENEOUS: APPLICATION OF IMPOVERISHMENT

The downward homogeneous pattern is commonly found in lexical case environments, both in Russian, as in (15), and more generally in Slavic.[8] Here, the externally assigned case is realized throughout the construction in a single domain of concord.

(15) èt-im pjat-i star-ym knig-am
this-DAT.PL five.DAT old-DAT.PL book-DAT.F.PL
'to these five old books' (Russian)

The derivation begins as we saw before: agreement for case on the numeral and feature percolation in the syntax. Again, the φ-features are able to percolate into the higher domain, but the dative case of the numeral blocks percolation of the genitive from the lower domain.

(16)



Moving out of the syntax, this time, impoverishment applies prior to morphological realization. Just as the features of dominating nodes are realized in concord, I hypothesize that impoverishment can also refer to the features of dominating nodes. In particular, the rule in (17) triggers deletion of genitive in the context of a dominating dative feature.

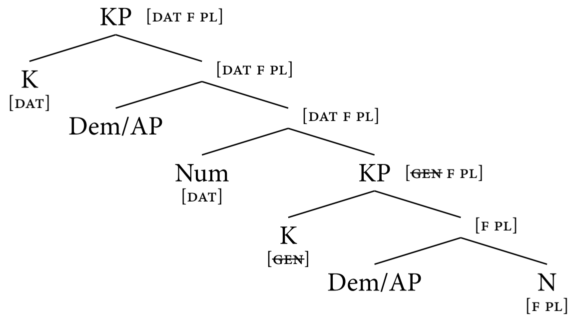
(17) [GEN] → ∅ / nodes dominated by [DAT]

A couple of points are important to highlight: for one, I assume that the semi-lexicality of the numeral creates a transparent boundary between the two domains. This allows for the observed cross-domain effects of impoverishment without compromising locality.[9] The second point is that impoverishment triggers deletion of genitive throughout the

[8] The cases that I call 'lexical' may also be referred to as 'oblique' or 'inherent' cases. Any distinctions between these terms are not relevant to the analysis here.
[9] Crucially, we would not predict similar cross-domain effects in a true binominal construction.

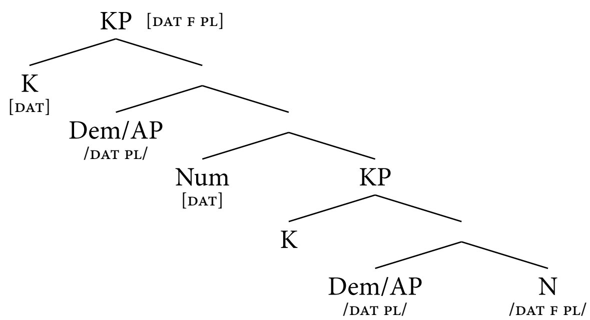
entire lower domain. This follows from the setup of the system—since feature percolation occurs before impoverishment, the nodes along the spine of the construction all contain at least a subset of the same features. By taking advantage of the domination relations among nodes, a single impoverishment rule can result in widespread deletion.

(18)



Finally, dominating features are spelled out on available terminals. This results in DAT.PL realized throughout the construction, depicted in (19).

(19)



3.3 INTERRUPTED HOMOGENEOUS: THE COMPLEMENTARITY CONDITION

In the interrupted homogeneous pattern, exemplified with Polish in (20), genitive is realized above and below the numeral while the numeral itself realizes a default (nominative) form. Since the Polish numerals are declinable—in contrast to BCMS, which we will cover in the next section—I argue that case must be analyzed on the numeral (see also Willim 2015, Klockmann 2017). For reference, the declension paradigm of 'five' in BCMS and Polish is provided in Table 2.

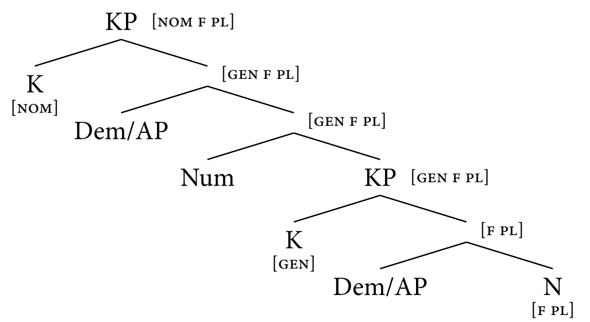
(20) t-ych pięć star-ych książek
this-GEN.PL five.NOM old-GEN.PL book.GEN.F.PL
'these five old books' (Polish)

	BCMS	Polish
NOM	pet	pięć
ACC	pet	pięć
GEN	pet	pięciu
LOC	pet	pięciu
DAT	*pet	pięciu
INS	*pet	pięcioma

Table 2: Declension of 'five'

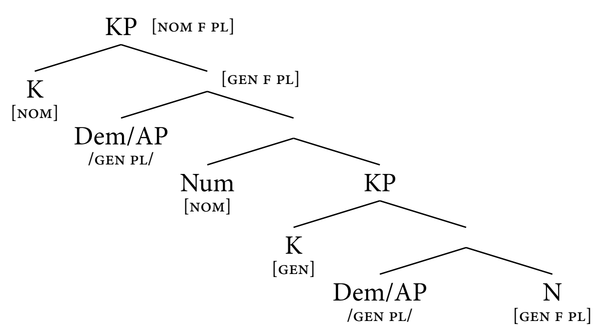
The derivation again begins in the syntax. In contrast to Russian, however, I assume that the numeral does not agree for case.[10] As a result, the genitive case assigned to the lower domain is allowed to percolate through the higher domain, along with the φ-features. One might wonder why it is necessary to assume genitive percolation; could the higher modifier not originate below the numeral where it is assigned genitive before raising to its surface position? This low base position of the higher modifier is strange semantically, not to mention problematic in light of Universal 20 (for more discussion see Willim 2015). In particular, movements to derive the attested orders of demonstrative, numeral, adjective, and noun must include the noun phrase (Cinque 2005).

(21)



In concord, dominating features are realized on available terminals according to locality. Thus, GEN.PL is realized throughout the construction, as shown in (22). However, given the complementarity of case licensing and case concord (hypothesis iii), the numeral cannot realize case in concord. It therefore surfaces in a default nominative form (see Klockmann 2017: p.137 for evidence that nominative is the default case in Polish). In general, the complementarity condition predicts that the interrupted homogeneous pattern should never appear with anything other than default case on the numeral. When a declinable numeral assigns genitive and does not agree for case, it must realize a default form.

(22)



The interrupted homogeneous pattern is only one of the patterns displayed by Polish higher numeral constructions. Alongside the case environment (lexical or structural), the gender of the noun is also a factor in determining the concord pattern. Polish distinguishes between virile (or masculine-personal), which denotes male human referents, and non-virile (or non-masculine-personal) in the plural forms of modifiers and nouns (Przepiórkowski 1999, Miechowicz-Mathiasen 2011, Dziubała-Szrejbrowska 2014, Willim 2015, Klockmann 2017; a.o.). While the pattern in lexical case environments is always downward homogeneous, gender has a noticeable impact on structural case environments. In particular, non-virile examples alternate between the interrupted homogeneous pattern and the aligned heterogeneous pattern. Space constraints preclude a

[10] Although, like Russian numerals, Polish higher numerals are declinable, I assume they do not agree for case. This lack of participation in agreement is deduced from the height of percolation of the genitive—more specifically, genitive is realized on the modifier in the higher domain.

full discussion of the aligned heterogeneous derivation in Polish (see Grabovac 2022), but note that it differs slightly from what we saw in Russian. In particular, many have argued that the NOM/ACC syncretic case which results in the higher domain must be accusative (see Franks 1995, 2002, Przepiórkowski 1999, Miechowicz-Mathiasen 2011). Commonly referred to as the Accusative Hypothesis, the analysis arose, in part, as an attempt to explain why aligned heterogeneous constructions in subject position occur with default agreement on the verb.

(23) T-e pięć książek spad-ł-o.
this-NOM/ACC.PL five.NOM/ACC book.GEN.F.PL fall-PST-3SG.N
'These five books fell.' (Polish)

To address this pattern, I suggest that the Polish higher numerals have an alternate form that is pre-specified as accusative. As such, it necessarily blocks genitive percolation from the lower domain and allows accusative case to percolate through the higher domain.

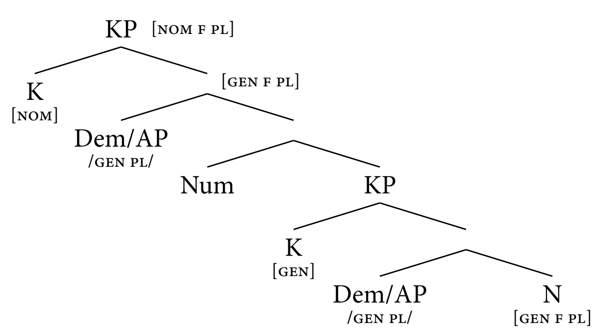
3.4 UPWARD HOMOGENEOUS: NO CASE AGREEMENT ON THE NUMERAL

The upward homogeneous pattern in (24) closely resembles the interrupted homogeneous pattern, apart from one key difference. Whereas the Polish numerals in the interrupted homogeneous pattern are declinable, BCMS numerals are indeclinable. This has often been taken as evidence of caselessness (see Wechsler & Zlatić 2003, Bošković 2006).

(24) ov-ih pet star-ih knjig-a
this-GEN.PL five old-GEN.PL book-GEN.F.PL
'these five old books' (BCMS)

In the derivation, the numeral does not agree for case, so the genitive assigned to the lower domain percolates through the higher domain along with the φ-features. This exactly resembles the start of the Polish derivation depicted in (21). In concord, GEN.PL is realized throughout according to locality, as shown in (25). Since the numeral is indeclinable, I assume that the complementarity condition set out in hypothesis (iii) does not take effect. However, some accounts suggest that the BCMS numerals realize a frozen NOM/ACC syncretic form rather than being caseless (see e.g., Franks 1995, Bošković 2008). While I pursue the caseless route here, the NOM/ACC alternative is not problematic for the concord system. The outcome of the derivations would instead be interrupted homogeneous concord (as we saw with Polish) rather than upward homogeneous.

(25)



This derivation is simple enough, but BCMS numeral constructions pose an interesting complication. We have seen that Russian allows two patterns—one in structural case environments and one in lexical case environments. This distribution is also very common across Slavic. BCMS, on the other hand, does not exhibit this alternation. While numeral constructions are allowed in genitive contexts, they are considered ungrammatical in verb-governed dative and instrumental case environments, exemplified in (26) and (27). Neither the upward homogeneous nor the downward homogeneous pattern is allowed.

(26) a. *V(j)eruj-u t-ih pet nov-ih proizvod-a.
trust.3PL that.GEN.PL five new.GEN.PL product.GEN.M.PL
'They trust those five new products.'
b. *V(j)eruj-u t-im pet nov-im proizvod-ima.
trust.3PL that.DAT.PL five new.DAT.PL product.DAT.M.PL
'They trust those five new products.' (BCMS)

(27) a. *Kraljica vlada t-ih pet velik-ih zem-a-lja.
queen rules that.GEN.PL five large.GEN.PL country.GEN.F.PL
'The queen rules those five large countries.'
b. *Kraljica vlada t-im pet velik-im zemlj-ama.
queen rules that.INS.PL five large.INS.PL country.INS.F.PL
'The queen rules those five large countries.' (BCMS)

This set of facts necessitates a slight revision of the initial hypotheses set out in §2.1.

3.5 A CLOSER LOOK AT BCMS

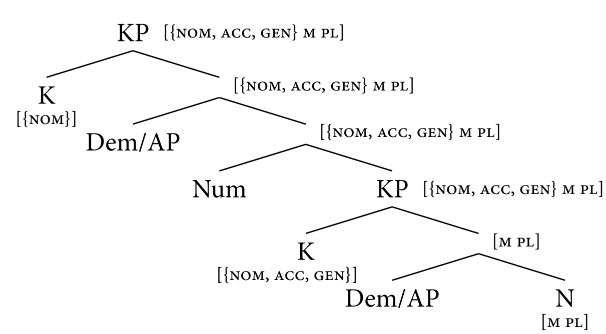
I have thus far treated case as a simplex feature, but this is not quite enough. Instead, I will assume the hierarchical decomposition of case in (28), drawing upon work on case sycretism by Caha (2009). Note that while this decomposition resembles Caha's, the nanosyntactic framework he adopts is not necessary here.

(28) *Case features*

Nominative:	{NOM}
Accusative:	{NOM, ACC}
Genitive:	{NOM, ACC, GEN}
Locative:	{NOM, ACC, GEN, LOC}
Dative:	{NOM, ACC, GEN, LOC, DAT}
Instrumental:	{NOM, ACC, GEN, LOC, DAT, INS}

This particular layout of the case system allows us to make use of subset-superset relations, and I will assume that one case can 'override' another when the former contains the features of the latter.

We can now return to the upward homogeneous derivation in a simple nominative context. The numeral does not agree for case, so the genitive licensed in the lower domain percolates up along with φ-features. Since genitive is a superset of nominative, genitive overrides the nominative feature on the higher KP, as shown in (29).[11]

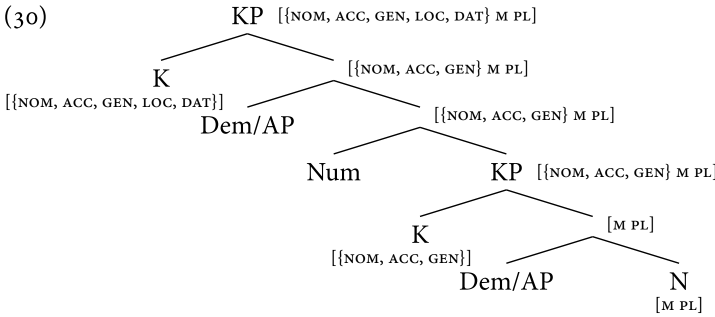
(29)


[11] If we continue to adopt a case checking theory, then we predict that an agreeing numeral should be able to check its case against a K that carries a superset of these features. To derive the various concord patterns, we will have to assume that if case on Num is a (proper) subset of case on K, K's features are copied to Num (see Grabovac 2022).

In concord, GEN.PL spells out as we saw previously in (25).[12]

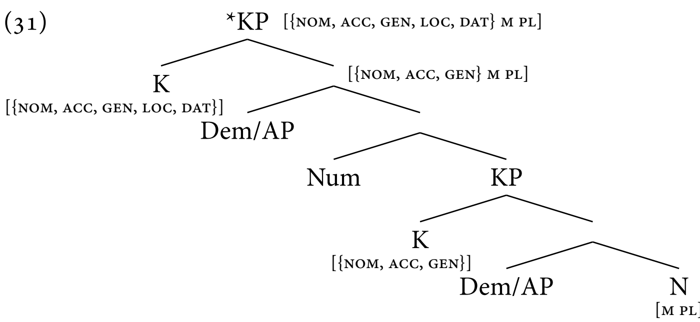
In a dative context, genitive again percolates into the higher domain, but this time fails to reach KP since genitive is not a superset of dative.

(30)



Concord is sensitive to locality, so genitive rather than dative would be realized on available terminals as the closest dominating set of case features. If we require the case features of the dominating node to be realized in concord, then we correctly predict the derivation to crash, as there are no available terminals to realize the dative features of KP.

(31)



While this condition has only now become necessary, it extends naturally to the Polish and Russian derivations previously covered.[13]

The completion of this derivation begs a crucial question: why doesn't case override apply in concord as it does in syntactic feature percolation? To correctly predict the ungrammaticality of examples like (26) and (27), it is clearly desirable that case override not apply in concord, but this is not a strong enough motivation. To answer this question, we must recall concord's sensitivity to locality. While case override can be attempted during percolation, concord simply spells out the closest set of features. Another difference between percolation and concord is apparent in the possible loci for each process; features never percolate from modifiers, but modifiers can realize features in concord.

[12] The derivation of the Polish interrupted homogeneous pattern would proceed similarly. Genitive is predicted to percolate through the higher domain, overriding nominative on KP. Given the complementarity condition, the numeral surfaces in a default form.

[13] The BCMS derivations have shown that case override is attempted on KP, and the outcome depends on simple subset-superset relations between cases. In the Russian derivations, however, it was argued that a numeral agreeing for nominative case blocked percolation of the lower genitive features. Why is it that genitive cannot override nominative and percolate into the higher domain? In addressing this presence or absence of override potential, we can refer to the principles of extended projection (Grimshaw 2005). Features percolate through the extended projection, but the break in extended projections is where relativized heads take effect. Any feature specification on the numeral, as the head of an extended projection, blocks the percolation of equivalent features from the lower domain. By contrast, in BCMS, the genitive features only encounter the functional head K, rather than the head of the extended projection, so override is possible. The same reasoning applies to the Polish interrupted homogeneous pattern.

3.5.1 SPECIAL PROPERTIES OF PREPOSITIONS

As it turns out, there is still more to the BCMS patterns. While numeral constructions are ungrammatical as complements of dative- and instrumental-case-licensing verbs, they are allowed as complements of prepositions, exemplified in (32).The behavior of numeral constructions as complements of prepositions is not unique. Indeclinable nouns, typically loanwords, are also unacceptable as complements of lexical-case-licensing verbs but are grammatical with prepositions (Wechsler & Zlatić 2003).[14]

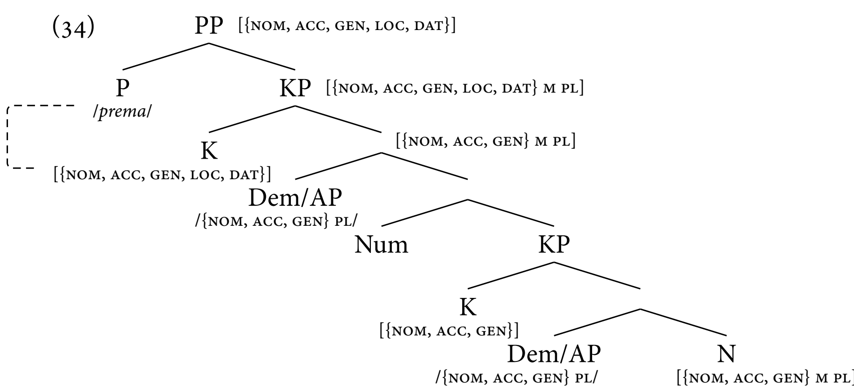
(32) prema {izlaz-u / pet izlaz-a}
toward exit-DAT.M.SG / five exit-GEN.M.PL
'toward the exit/five exits' (BCMS)

I propose a spanning analysis to account for this possibility. A span is defined as a complement sequence of heads realized as a single morpheme (Svenonius 2012 et seq.). Portmanteau morphemes, such as the French preposition-determiner combinations *du* (*de* + *le*) and *au* (*à* + *le*), provide independent evidence of prepositions and functional heads realized together as single exponents (see also Merchant 2015, Taraldsen 2018). Similarly, the BCMS examples can be analyzed with a span between a preposition and the functional head K. Consider the tree in (34): without PP, we saw the derivation crash, since KP's case features were unable to be realized. With PP, however, the features of P and K identify and spell out as *prema* as a last resort. This is represented in the spellout rule below.

(33) $\text{P}_{[\{\text{NOM, ACC, GEN, LOC, DAT}\}]} + [\{\text{NOM, ACC, GEN, LOC, DAT}\}] \Longleftrightarrow$ /*prema*/

This satisfies the requirement that the dominating dative case be realized, so the derivation proceeds successfully.[15]

(34)



If case is specified in the lexical entry of the preposition, then spanning easily accounts for the apparent ability of prepositions to both assign and realize case. When identical sets of case features are present in both P and K and the features on KP cannot be realized elsewhere, the features of P and K identify and spell out as one.

A plausible question concerns the inability of dative- and instrumental-case-licensing verbs to span with K and prevent a crash. Svenonius (2012) notes that spanning is usually confined to a single extended projection. Since V and K are located in separate extended projections, we correctly predict that V cannot span with K to save the construction. However, it is not entirely clear whether P and K should be analyzed as part of the same

[14] This behavior appears to be idiosyncratic to BCMS. More specifically, BCMS seems to require lexical case to be realized overtly, whereas Russian and Polish are less strict. We can see this because Russian and Polish allow indeclinable complements (again, often loanwords) of lexical-case-licensing prepositions and verbs, while BCMS does not tolerate such examples. It is unclear why BCMS differs in this respect.

[15] As a last resort, spanning is not predicted to occur when the dominating case features can otherwise be realized—e.g., when P selects a declinable complement.

extended nominal projection. Grimshaw (2005) hypothesizes that the categorial status of prepositions may be compatible with both nominal and verbal extended projections, but like numerals, the status of prepositions has long been subject to debate (see Rauh 1993, Corver & van Riemsdijk 2001, Baker 2003; a.o.). Nonetheless, the literature indicates that spanning exists independently among prepositions and functional heads; to the best of my knowledge, examples of spanning between verbs and functional heads are rare.

3.5.2 *s(a)*-INSERTION

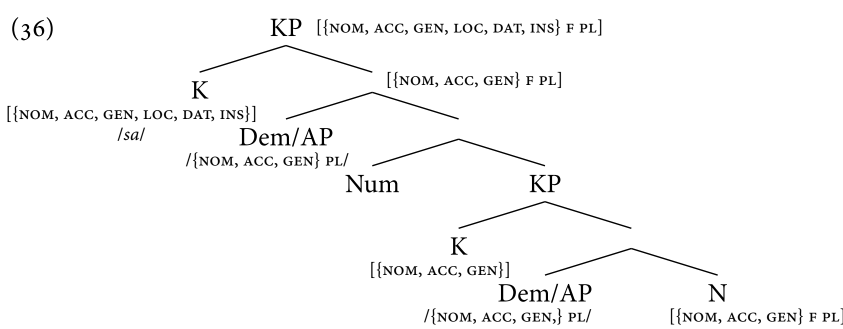
The instrumental-case-licensing preposition *s(a)* 'with' has the additional ability to save examples in which a numeral construction occurs as the complement of an instrumental-case-licensing verb (Bošković 2006).[16] This is demonstrated in (35); note that *s(a)*-insertion does not elicit the comitative reading typical of *s(a)* as a preposition.

(35) Kraljica vlada s(a) t-ih pet velik-ih zem-a-lja.
queen rules with that-GEN.PL five large-GEN.PL country-PL-GEN.F
'The queen rules those five large countries.' (BCMS)

Given the status of *s(a)* as an instrumental preposition, it seems reasonable to apply the spanning analysis from the previous section, whereby P and K are realized as a single morpheme. However, this option would presumably require look-ahead. PP is merged in the syntax, but a crash is not guaranteed until later on in the derivation. This is because some derivations make use of post-syntactic impoverishment, and it is conceivable that impoverishment is a possible method of repair when the relevant rules exist in a particular language. For example, one could imagine an impoverishment rule that reduces the set of dative or instrumental features on KP to genitive; genitive would then spell out as the most local case, and the derivation would be successful. In fact, similar rules do seem to exist for certain speakers, who accept numeral constructions as complements of dative-licensing verbs. Therefore, the derivation cannot fail until all possibilities of repair are exhausted post-syntactically, and a spanning analysis does not seem appropriate for *s(a)*-insertion.

In these particular examples, *s(a)* seems to be semantically light. Thus, a better alternative to spanning may treat *s(a)* as a case particle, or a semantically-suppressed form of the preposition that is realized directly on K. This approach differentiates *s(a)*-insertion from its normal prepositional use, as well as from BCMS prepositions in general, which do not have the same rescue capacity. In an instrumental environment, then, genitive ultimately spells out on the modifiers as the local set of case features, but *s(a)*-insertion on K saves the derivation. Since the dominating case is realized, the derivation is successful.

(36)



[16] *S(a)* can be realized as *sa* or *s* according to the first sound of the subsequent word, as well as language-specific preferences. According to Alexander (2006), Bosnian alternates between *s* and *sa*, while Croatian uses *s*, except before words beginning with *s*, *z*, *š*, or *ž*, where the vowel functions as a pronunciation aide. Serbian tends toward *sa*.

If *s(a)* is a mere realization of instrumental case, it is consistent with a view of *s(a)*-insertion as a last resort operation, which occurs only when instrumental case cannot otherwise be realized (see Franks 2002, Bošković 2006, 2008).[17] Moreover, if this operation involves a special version of *s(a)*, the fact that the rescue strategy is unique to instrumental-licensing verbs is easily explained. Assuming that other prepositions lack a semantically-suppressed version, and the verbal head cannot span with K, there is no way to save the derivation.[18]

4 CONCLUSION

Expanding on work by Norris (2014), this paper takes concord to result from the realization of features from dominating nodes on available terminals. I emphasize a theme of domain maximization, where features percolate as high as possible in the syntax and are realized as low as possible in concord. The major contribution of this paper is a novel analysis of Slavic numeral constructions. A benefit of the concord approach, particularly in light of Slavic numerals, is that a majority of language variation can be attributed to properties of the semi-lexical numeral. This is a desirable outcome, since many agree that numerals constitute a somewhat flexible category. By attributing much of the variation to the numeral, we are able to formulate an overall more cohesive account of numeral constructions.

This paper has shown that the proposed analysis captures a variety of complex patterns. We have only been able to delve into four derivations, so it is worth spelling out more explicitly the kinds of patterns ruled out by the system. One key prediction is that modifiers within the same domain should not realize different features, unless they have different morphological paradigms. We have seen that any impoverishment applies throughout a given domain; the resulting dominating features are then realized throughout that domain in concord, so any modifiers should realize the same subset of features. In other words, impoverishment cannot be used to target features on individual modifiers. Another impossible pattern is interrupted homogeneous where the numeral realizes a case other than default: $*[_{\text{KP}}\text{GENITIVE} \ldots \text{Num}_{\text{NON-DEF}}[_{\text{KP}}\text{GENITIVE} \ldots]]$. Since the pattern results when the numeral does not agree and the complementarity condition applies, only default is predicted to be realized on the numeral. If the numeral instead participates in agreement, the interrupted homogeneous pattern is not derived since case on the numeral blocks genitive percolation into the higher domain. Moreover, only the numeral should 'interrupt' the interrupted homogeneous pattern since any modifiers will realize the dominating case features in concord: $*[_{\text{KP}}\text{GENITIVE AP}_{\text{NOM}} \ldots \text{Num}_{\text{GEN}}[_{\text{KP}}\text{GENITIVE} \ldots]]$. Thus far, I have not found evidence of these patterns that we predict would be excluded, but a logical direction for future research involves thoroughly testing these predictions beyond Slavic.

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[17] Some speakers extend the usage of *s(a)* beyond the numeral examples. In addition to numeral complements, Wechsler & Zlatić (2003) point out that *s(a)* is sometimes used with declinable complements of instrumental-licensing verbs. It is possible that *s(a)*-insertion originated as a repair but with time has been subject to over-generalization.

[18] *S(a)*-insertion cannot be used to repair instrumental adjuncts containing numeral constructions (Franks 2003, Bošković 2008). In contrast to complements, Bošković (2008) contends that the instrumental declension of adjuncts specifies a particular semantic role. If *s(a)* is semantically light, it seems logical that *s(a)* fails to repair instrumental adjuncts. Nonetheless, as a reviewer points out, this sensitivity to semantics is potentially problematic if we take *s(a)*-insertion to be a PF operation, as above. It is unclear whether this behavior of adjuncts can be made to follow from the current proposal, but future research should consider how the effects of instrumental case are construed.

doctoral dissertation, which benefited greatly from discussion with Ad Neeleman, Klaus Abels, Peter Ackema, and Jonathan Bobaljik. Any remaining errors are my own.

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ABBREVIATIONS

3	third person	INS	instrumental
ACC	accusative	LOC	locative
BCMS	Bosnian/Croatian/Montenegrin/Serbian	M	masculine
		N	neuter
DAT	dative	NOM	nominative
DEF	definite	PL	plural
F	feminine	SG	singular
GEN	genitive		

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