Dual nature of dual number
in western South Slavic

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1. Introduction

It has recently been suggested that in three-cell paradigms with stem suppletion, there is one logically conceivable, but cross-linguistically unattested suppletion pattern, namely the *ABA pattern, which is argued to result from feature configuration and the Containment Hypothesis (Bobaljik 2012, 2015; Bobaljik & Sauerland 2018). An apparent counterexample, found in the number paradigm of Slovene nouns of the type *človek* 'man-SG' : *ljudje* 'men-PL' : *človeka* 'man-DL', is discussed in more detail in Smith, Moskal, Xu, Kang and Bobaljik (2019), where it is argued that dual actually precedes plural in Slovene in terms of feature containment and markedness, and thus represents no violation of the *ABA constraint. This analysis, however, is based on stem suppletion only and it doesn't take full declension into account.

In this paper, I provide a more detailed analysis of western South Slavic (Slovene and Serbo-Croatian) noun declension patterns, to show that there are both dual nouns patterning with the singular, such as Sln. *človek* : *človek-a* :: *ljudje*, as well as dual nouns patterning with the plural, such as Sln. *grad* :: *gradov-a* : *gradov-i*. Moreover, plural is always contained by the dual in case suffixes (e.g. *gradov-om* 'castle-DAT.PL' : *gradov-oma* 'castle-DAT.DL'), suggesting a split analysis of the dual, where there are certain features closer to the stem that precede plural, as well as others closer to the suffixes that contain it. The dual is, therefore, of a dual nature (Harbour 2017), at the same time being contained by the plural as well as containing it.

Consequences of such an analysis in terms of feature containment are drawn for syncretism patterns in noun declension in both Slovene and Serbo-Croatian, which has remnants of a dual in nouns, in addition to being Slovene's most closely related variety, thus allowing for a wider comparative analysis of the number paradigm.

2. The problem

In a cross-linguistic survey of suppletion patterns for adjectival degree, Bobaljik (2012, 2015) observes that in three (or hypothetically, more)-cell paradigms, the second (or any internal) member of a paradigm may pattern either with the first (i.e., the preceding) or the third (i.e., subsequent) member(s), so that adjacent members of a paradigm always share the pattern (AAB or ABB, in addition of course to AAA, a regular non-suppletive pattern). Although logically conceivable, no pattern "skipping" an internal member (ABA) is empirically attested. This has lead Bobaljik to formulate a universal *ABA constraint, which is argued to result from feature configuration, markedness hierarchies and the Containment Hypothesis (for the most recent elaboration, see Bobaljik & Sauerland 2018, and see Smith, Moskal, Xu, Kang & Bobaljik 2019 for an extension to pronominal and case paradigms).

An apparent counterexample is found in the number paradigm of Slovene (and, to an extent, Slavic in general) nouns of the type *človek* (SG) : *ljudje* (PL) : *človeka* (DL). The original pattern was probably regular, as in Old Church Slavonic *člověk-ŭ* : *člověc-i* : *člověk-a*. In most Slavic languages, the plural form got replaced by the suppletive root *ljud-*, and the dual number was

lost altogether, leaving behind only remnants of what modern descriptive grammars of Slavic languages call the "paucal forms" in masculine nouns. In Serbo-Croatian, for instance, such forms in -*a* (e.g., SCr *čovjek-a*) are contextually bound to phrases with numerals *dva* 'two', *oba(dva)* 'both', *tri* 'three' and *četiri* 'four', in the nominative and accusative case. Slovene, on the other hand, in most dialects and in the standard language has fully preserved all three members of the number paradigm (for a more detailed diachronic account, see Tesnière 1925; Belić 1932; Derganc 1994, 2003; Jakop 2008), giving rise to an apparent ABA pattern in *človek* : *ljud-je* : *človek-a*.

That Sln. *ljudje* represents a counterexample to the proposed *ABA constraint is noted by Smith, Moskal, Xu, Kang and Bobaljik (2019). Their solution to this problem is a typological one. Even though dual is generally viewed as more marked than plural,[1] the authors argue that this may be the case in some languages only, while in others the position of dual in the number hierarchy may be different, preceding plural in terms of feature containment and markedness. Slovene would be an example of a language where dual is in fact less marked than plural, and thus the problem of Sln. *ljudje* would be explained away as actually an instance of AAB (as Slovene is then a language with singular > dual > plural patterning).

This analysis is, however, based on stem suppletion in *človek-* : *ljud-* only and it doesn't take full declension into account, paying attention just to the shape of the stem in the nominative case forms *človek* (NOM.SG), *človek-a* (NOM.DL), and *ljud-je* (NOM.PL). When approached from the perspective of the nominal system as a whole, I believe there are arguments in favour of viewing the Sln. dual –and its sister "paucal" number in other Slavic languages, too– as morphologically and semantically more complex and more marked than the plural. Dual nouns, however, seem to be derived in two steps, with stem selection taking place before number and case features are checked in full, suggesting a split analysis of the dual, where there are certain features closer to the stem that precede plural and others closer to the suffixes that contain it, all contributing to the derivation of a dual (i.e. non-singular, non-plural) noun. Duals thus form a split system, along the lines of singular > dual (i.e. non-singular) > plural > dual (non-plural). The problem of what seems to be a violation of the *ABA constraint in Slovene is thus resolved structurally, with no need for postulating a typological distinction among languages with a dual number.

3. Split number in western South Slavic

From the genetic point of view, Slovene and Serbo-Croatian together form the western branch of the South Slavic languages. Both languages have inherited and preserved to a large extent a relatively complex declension system from Common Slavic, unlike the two eastern South Slavic languages –Bulgarian and Macedonian– which have lost nearly all morphological case distinctions in favour of analytical marking with prepositions and clitic doubling. Such genetic polarization of the South Slavic languages is obscured, however, by a more recent areal diffusion of eastern South Slavic and Balkan Sprachbund features into the West South Slavic territory, so that Serbo-Croatian, in fact, occupies a central transitory position in the South Slavic dialect continuum, areally speaking, with respect to gradual loss of the inherited nominal

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[1] Cf. Corbett (2000: 38 ff), for a discussion of a proposed Number Hierarchy singular > plural > dual > trial, on the basis of Greenberg's universal 34: "No language has a trial number unless it has a dual. No language has a dual unless it has a plural" (Greenberg 1963: 94). See also Stolz (1988), and the classical discussion in Humboldt (1830), on which see Plank (1989). Harley and Ritter (2002) provide further feature-geometric evidence for the markedness of the dual.

morphology in its dialects, starting from the more conservative North-West to the more analytical South-East (cf. Ivić 1957/58: 183–185).

In Slovene, nouns distinguish between three grammatical numbers (singular, dual and plural) and six cases (nominative, accusative, genitive, dative, instrumental, and locative), with occasional syncretisms in the plural and dual forms of certain cases (see Table 1). In standard Serbo-Croatian, on the other hand, only masculine nouns (i.e. nouns of the declension class I) still preserve a distinct "paucal" form in *-a* (cf. Belić 2008), in addition to singular and plural, and the number of morphologically distinct case forms is dramatically reduced, as the locative has systematically merged with the dative throughout the paradigm, and the instrumental has merged with the dative and the locative in the plural. An overview of Serbo-Croatian noun declension is given in Table 2.

Table 1: Slovene noun declension.

	SG				PL				DL			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
NOM	-Ø	-o/e	-a	-Ø	-i (-je)	-a	-e	-i	-a	-i	-i (-e)	=PL
ACC	=GEN/=NOM	=NOM	-o	=NOM	-e	=NOM			=NOM			
GEN	-a (-u)		-e	-i	-ov/ev	-Ø		-i	=PL			
DAT	-u		-i		-om/em	-am	-im (-em)		-oma/ema	-ama	-ma (-ema)	
LOC	=DAT				-ih	-ah	-ih (-eh)		=PL			
INSTR	-om/em		-o	-jo	-i	-ami	-mi		=DAT			

Table 2: Serbo-Croatian noun declension.

	SG				PL				PAUC
	I	II	III	IV	I	II	III	IV	I
NOM	-Ø	-o/e	-a	-Ø	-i	-a	-e	-i	-a
ACC	=GEN/=NOM	=NOM	-u	=NOM	-e	=NOM			=NOM
GEN	-a		-ē	-i	-ā (-ī)			-ī	=PL
DAT	-u		-i		-ima	-ama	-ima		
LOC	=DAT				=DAT				
INSTR	-om/em		-ōm	-i/ju					

As is evident from Tables 1 and 2, the western South Slavic case system is virtually bipolar, with NOM, ACC and GEN as one subsystem, and DAT, LOC and INSTR as another. In the second subsystem, the dative case stands out as pivotal, the other two frequently syncretizing to it, in addition to it being the only formally distinct case in the dual other than the nominative. The distribution of submorphemic elements of the western South Slavic case suffixes (such as the vowels *-i-* and *-a-* and the submorphemic element *-m-*) clearly mirrors a complex interplay of morphophonological features expressing Gender, Case and Number, an elaborate system that I will not go further into (for additional details, see the most recent analysis in Lampitelli 2009, 2013). For the purposes of this analysis, it suffices to note that the dual suffixes in Slovene either syncretize with the plural or contain pieces of plural inflection, not the other way around (cf. DAT.PL *-om*, *-em*, *-am* vs. DAT.DL *-oma*, *-ema*, *-ama*), indicating that the dual is somehow

morphologically more complex than the plural. This is equally observed in Slovene personal pronouns (Table 3), where dual forms in the nominative are basically plural pronouns + the element *dva/dve*, a grammatical morpheme indicating duality (grammaticized from the numeral *dva/dve* 'two'), while in the other case forms, mostly the same pattern applies as with nouns.

Table 3: Slovene plural and dual personal pronouns.

		1		2		3	
		PL	DL	PL	DL	PL	DL
NOM	MASC	*mi*	*midva*	*vi*	*vidva*	*oni*	*onadva*
	NEUT	*me*	*midve/*	*ve*	*vidve/*	*ona*	*onidve/*
	FEM		*medve*		*vedve*	*one*	*onedve*
ACC		=GEN					
GEN		*nas*	*naju*	*vas*	*vaju*	*njih*	*njiju*
DAT		*nam*	*nama*	*vam*	*vama*	*njim*	*njima*
LOC		=GEN					
INSTR		*nami*	=DAT	*vami*	=DAT	*njimi*	=DAT

Moving from the form inventory to the usage patterns, the same impression of the relative markedness of the dual holds. According to Toporišič (2000), Slovene dual is more marked than plural, as "under the same conditions, the plural form is used instead of dual" (Toporišič 2000: 271), e.g. for natural pairs: *roke* 'arms', *noge* 'legs', *oči* 'eyes', *ušesa* 'ears', *rokavi* 'sleeves', *nogavice* 'socks', *naušniki* 'ear warmers', *starši* 'parents', *dvojčki* 'twins', etc. Dual forms of these nouns are used only when quantity is made explicit, e.g. with numerals: *oba starša* 'both parents'. This is similar to the use of analogous SCr paucals in -*a*, which are obligatorily bound to phrases with numerals; the plural being the "elsewhere" form. In terms of markedness, Toporišič argues that the Slovene number system may be broken up into pairs of singular (unmarked) : non-singular (marked) and plural (unmarked) : non-plural (marked). Duals would thus be doubly marked as non-singulars and non-plurals. This is, in essence, analogous to Corbett's number hierarchy for Slovene (Corbett 2000: 43–45), reproduced here with slight revisions in Figure 1.

Figure 1: Slovene Number Hierarchy (according to Corbett 2000 and Toporišič 2000).
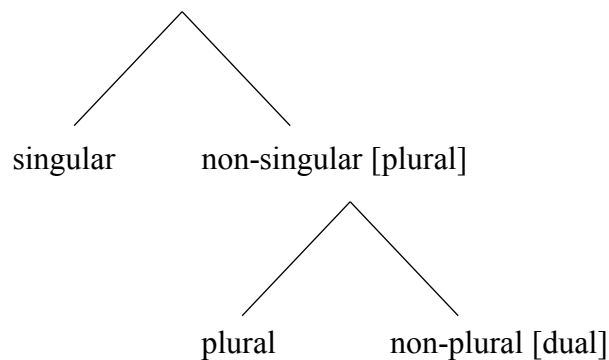
In structural terms, there ought to be at least two kinds of features to account for the Slovene or any analogous number system, say [α] and [β]. In order to capture the markedness hierarchy in Figure 1, singular should have values [−α, −β], or alternatively, [−α, +β], if [β] is some feature expressing singularity, plural would be [+α, −β] (marked as "non-singular"), and dual [+α, +β] (marked as both "non-singular" and "non-plural"). Let [α] then be some negative-valued feature

along the lines of [–F] (i.e. "non-singular" in Toporišič's terms, a negative feature common to plurals and duals), and [β] some feature along the lines of [+G] (e.g. a feature expressing some kind of singularity, viz. some feature shared by singulars and duals, which would equal to "non-plurality" in Toporišič's terms), and the feature system is derived as in Table 4.

Table 4: Features of the Number system.

Singular:	$[-\alpha, +\beta] = [-(-F), +(+G)] = [+F, +G]$
Plural:	$[+\alpha, -\beta] = [+(-F), -(+G)] = [-F, -G]$
Dual:	$[+\alpha, +\beta] = [+(-F), +(+G)] = [-F, +G]$

This is in line with the feature system developed by Harbour (2014, 2017; see also Harbour 2007, 2011), on the basis of Noyer (1992) and Hale (1973). According to Harbour, the number system singular : dual : plural arises from two features, [±atomic] and [±minimal]. Harbour's [±atomic] equals to feature "G" in Table 4, whereas [±minimal] equals to "F", so that singular has features [+atomic, +minimal], dual [+atomic, –minimal], and plural [–atomic, –minimal], which captures the fact, as observed by Harbour (2017), that duals often share some feature(s) with the singular and some other(s) with the plural. This system of features, I believe, equally captures the fact that dual is more marked than plural, as well as the fact that it semantically stands "somewhere in-between" the singular and the plural (a fact intuitively captured already by the order singular–dual–plural, so often reproduced in traditional grammars).

Another important aspect of Harbour's analysis deals with feature composition. Not only the right feature inventory, but also "the right feature semantics, one that embeds a compositional asymmetry in the form of sensitivity to order between the features that generate singular–dual–plural" (Harbour 2017: 4) is needed:

> "A nominal N has the number contrast singular–dual–plural only if ±atomic composes with N and then ±minimal composes with their output, and not the reverse. [...] That is, ±minimal(±atomic(N)), not ±atomic(±minimal(N)), is the order of composition. The explanatory appeal of this result should be immediately apparent" (Harbour 2017: 10–11).

Indeed, such feature configuration readily captures the peculiarities of stem selection in Sln. *človek-* : *ljud-*, as well as the distribution of pieces of inflection in Table 1 and 2. According to Harbour, "the morpheme closer to N registers (non)singularity, the one further away registers (non)plurality" (2017: 3), and "±atomic is the feature that contrasts singular with nonsingular, whereas ±minimal contrasts nonplural with plural" (13). "[I]n order of composition, ±atomic must be closer to the nominal than ±minimal", therefore "we have that the element responsible for (non)singular sensitivity must be closer to the nominal than the element responsible for (non)plurality" (13–14):

> "As phrased, this derivation assumes transparent correspondences between order of composition in the semantics and the locus of exponence in the morphology. It requires morpheme order to reflect semantic scope (cf. Baker 1985, Rice 2000). In terms of the syntacticocentric Y-model of grammar (Chomsky 1995), this equates to transparent interfaces, such that the features are located where they are pronounced and are interpreted where they are located" (Harbour 2017: 14).

From this, it follows that stem selection in Sln. *človek-* : *ljud-* reflects the value of [±atomic], the morpheme *človek-* itself spelling out [+atomic], the feature shared by the singular and the dual. This still does not tamper with the number hierarchy in Figure 1, because [±atomic] seems

to be a feature of little *n* in western South Slavic, not of Number.[2] This is corroborated by the Serbo-Croatian (and, to an extent, Slavic in general) singulative morpheme *-in* (e.g. SCr *Srbin* 'Serb-NOM.SG' : *Srb-i* 'Serb-NOM.PL'), which appears in the paucal form as well, in front of the paucal suffix *-a* (*Srbin-a* 'Serb-PAUC'), thus strongly suggesting that *-in* is the realization of *n* and *-a* is the realization of Num (Figure 2). As *n* usually hosts irregular morphology, it is the best candidate for the suppletion in plural *ljudje* (SCr *ljudi*), too.

Figure 2: The realization of [±atomic] in western South Slavic.
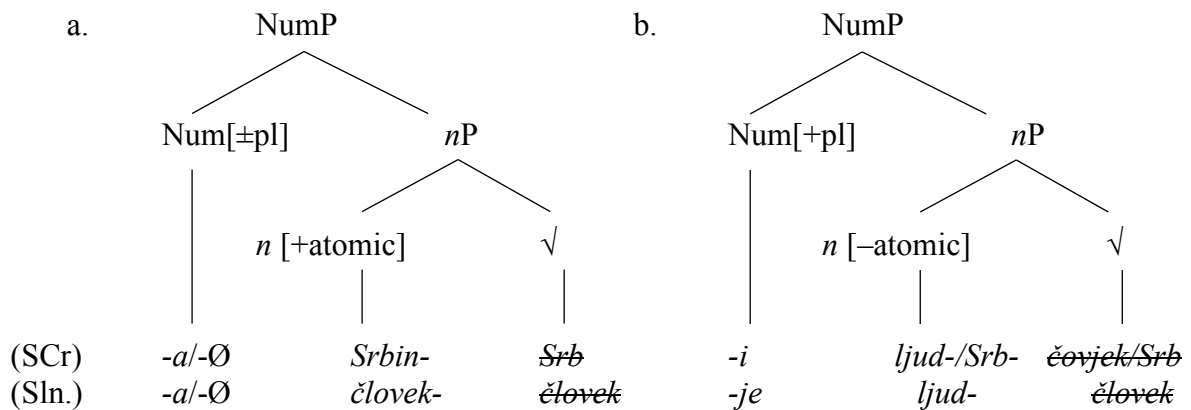
Just like *človek-* and *ljud-*, the singulative morpheme *-in* is also part of the stem, to which number and case suffixes are then attached. The feature [±atomic] is, therefore, responsible for the shape of the stem in western South Slavic. It enters the derivation before any actual number inflection, as stems derived in *n*P are still unspecified for number and case (therefore [+atomic] stems such as *Srbin-* or *človek-* may serve both singular and dual/paucal number, whereas "plural" stems such as *ljud-* may syncretize with the dual; in fact, the paradigm of Sln. *človek* has both *človek-oma* and *ljud-ema* as DAT/INSTR.DL, in contrast to DAT.PL *ljud-em*).
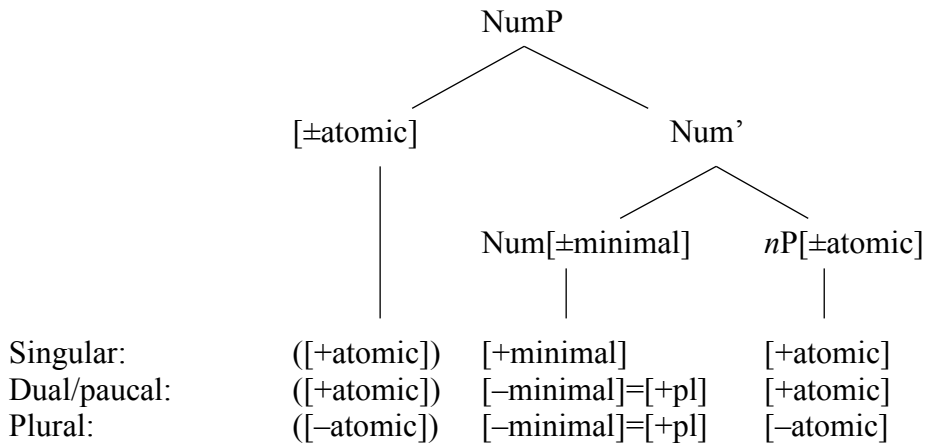
Number features will reappear at Num, though. As Harbour notes, [±minimal] is the feature contrasting plural with non-plural. For Num[+pl] to realize plural morphology, it needs to be specified as [−minimal]. If Num lacks the plural feature, it will then spell-out [+minimal], viz. singular morphology (in both Slovene and Serbo-Croatian, singular is morphologically marked with a zero morpheme, so that [+minimal] actually realizes as -Ø). Obviously, some kind of feature agreement between Num and *n* must hold, so that [+minimal] on Num agrees with [+atomic] on *n*, allowing the appropriate stem and suffixes to combine. This is because the realization of [+minimal] presupposes [+atomic], i.e. [+minimal] must apply to the head that hosts [+atomic] in order to derive singular, but [−minimal] may choose either to apply to [+atomic] for the dual or to [−atomic] for the plural. (See Harbour 2017: 14–16, with references

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[2] Here I presuppose the split analysis of number pioneered by Ritter (1991) and recently revised by Kramer (2016). Ritter proposed the existence of a Num(ber) projection between D and N, which hosts number inflection in nouns. Kramer further builds on Distributed Morphology (e.g. Marantz 1997, 2001) and the growing body of research on the so-called "lexical" and other idiosyncratic plurals (Acquaviva 2008; Lowenstamm 2008; Alexiadou 2011; Harbour 2011; among others), to show that the realization of number is in fact split between Num for "regular" number inflection and the nominalizing head *n* for irregular plural morphology.

therein, for a similar discussion on the derivation of number features. Harbour's derivation is based on movement rather than agreement.[3])

It is the presence of [+atomic] at *n* that triggers such agreement, then. Duals and paucals will therefore need to check [+atomic], or some related feature, once again on Num. This suggests a split analysis of the dual, one where [+atomic], or some related feature, enters the derivation twice, once for stem selection and the second time when number inflection is spelled-out (see Figure 3).

Figure 3: "Split" number in western South Slavic.

	([±atomic])	Num[±minimal]	*n*P[±atomic]
Singular:	([+atomic])	[+minimal]	[+atomic]
Dual/paucal:	([+atomic])	[–minimal]=[+pl]	[+atomic]
Plural:	([–atomic])	[–minimal]=[+pl]	[–atomic]

So, number is split in western South Slavic, but only the dual/paucal will actually manifest effects of this split system formally, thanks to its structural complexity. As predicted, duals in Slovene do contain pieces of plural inflection that realize [–minimal], in addition to exclusively dual elements such as *-a*, which is needed to pronounce [+atomic] once again on the output of –minimal(+atomic(N)) (cf. Table 1 and 3, e.g. systematically in DAT/INSTR.DL *-oma/ema*, *-ama* vs. DAT.PL *-om/em*, *-am*).

A split system like this allows for the possibility of dual nouns patterning with the singular as well as those patterning with the plural, and Slovene possesses instances of both. In addition to *človek* : *človek-a* :: *ljud-je*, Slovene also has a class of nouns with the stem extension *-ov* in the dual and the plural, e.g. *grad* 'castle-SG' :: *gradov-a* 'castle-DL' : *gradov-i* 'castle-PL', *grob* 'grave' :: *grobov-a* : *grobov-i*, *volk* 'wolf' :: *volkov-a* : *volkov-i*, etc. Like the singulative stem extension *-in* in Serbo-Croatian, and all other stem alternations, this element *-ov* will best be hosted by *n*, though, not Num (again, cf. Serbo-Croatian, where singular *grad* 'city', *grob* 'grave', *vuk* 'wolf' etc. contrast with plural *gradov-i*, *grobov-i*, *vukov-i*, but the paucal forms *grad-a*, *grob-a* and *vuk-a* lack the extension). In other words, *-ov* should not realize [–minimal], as it is not a piece of plural inflection, but rather [–atomic] at *n*. This suggests that Slovene duals may actually be unspecified for [±atomic] at *n*, a possibility allowed for by the feature system in Table 4, and more importantly, one that accounts for various syncretisms in the dual

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[3] As Harbour notes, some syntactic mechanisms must operate on the number features as a general prerequisite for number morphology to be derived. In addition to the right feature inventory and the right feature semantics, "we need the right feature syntax: the two number features must be merged in different locations, not collocated, copied, then differentially ignored in each locus. And last, we require a transparent syntax–semantics interface: if the connection between syntax and semantics is too loose (as on some LFG approaches), then the Frankendual Generalisation [i.e. that the morpheme closer to N registers (non)singularity, the one further away registers (non)plurality] remains underived, even if the three preceding conditions are met" (Harbour 2017: 4, et passim).

and plural case forms, e.g. in *ljudema* in addition to *človekoma* in DAT/INSTR.DL. If so, then the western South Slavic number system would be based on the set of features as reproduced here in Table 5.

Table 5: Western South Slavic Number system.

Singular:	[(+atomic) +minimal, +atomic]
Plural:	[(−atomic) −minimal, −atomic]
Dual/paucal:	[(+atomic) −minimal, ±atomic] (or alternatively, [+minimal, −atomic])

Such a system would lead us to expect singulars to take [+atomic] and plurals to take [−atomic] stems, whereas duals or paucals may choose between [+atomic] and [−atomic] ("plural") stems, which is precisely what happens in various nominal classes in western South Slavic. Singulars would then realize singular inflection, as the realization of a [+minimal] head agreeing in [+atomic] with the output of +atomic(N), whereas plurals would realize plural inflection on [−minimal] Num, viz. Num[+pl]. Duals and paucals, on the other hand, would realize pieces of plural inflection under [−minimal] Num, too, as well as the dedicated [+atomic] dual morphology.[4] This is why the dual is morphologically more complex than the plural, but at the same time lexically and morphosemantically somehow closer to the singular. Different elements of the dual at the same time precede and contain elements of the plural; this is why what at first glance seems to be a violation of the *ABA restriction in Slovene (and Serbo-Croatian), is in fact not so.[5]

Instead, West South Slavic (and perhaps Slavic in general) has a split number system, one where features of the stem precede pieces of inflection in such way that elements of the dual or paucal number pattern differently when it comes to stem selection vis-à-vis affixes. Within such a split system, what seems to be an ordinary three-cell number paradigm is virtually broken up into a complex of features along the lines of singular > dual/paucal (stem) > plural > dual (inflection), which is why dual/paucal stems may pattern with the singular and still not tamper with the markedness hierarchy in Figure 1. At the same time, dual case suffixes may (and will) contain pieces of plural inflection, or alternatively, dual/paucal forms will syncretize with the plural rather than with singular. In other words, Slovene dual is indeed a "dual" number, i.e. a split category combining elements of "singular sensitivity" and of plurality.

4. Conclusion

In this analysis, we've seen that the dual is a complex category of a dual nature, split between [±atomic]-related stem features and [±plural] number and case morphology that combines with the output of ±atomic(N). We didn't go into much detail as to the internal structure of western

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[4] Alternatively, duals and paucals may realize [+minimal] (= non-plural) inflection on [−atomic] stems. There is a tradition in Slavic grammars to treat paucal forms in *-a* as equal to GEN.SG. Note that the feature system as given in Table 5 also indicates why the dual was lost in most Slavic languages. If the dual is not specified for [±atomic] (i.e., if the dual is [−minimal, ±atomic]), it may then easily blend into the [−minimal, −atomic] plural. On the other hand, if the dual does exhibit singular morphology, viz. if the dual is [+minimal], then it may escape being replaced with the plural, and this may be exactly how Slavic paucals in *-a* got preserved even though the dual was otherwise lost as a separate category in all Slavic languages, other than Slovene and Sorbian. Therefore, Slavic paucals may very well be [+minimal, −atomic] or [+minimal, ±atomic], a situation that would make them prone to blending with the [+minimal, +atomic] singular.

[5] For a similar feature-based analysis of the SCr paucal number, see Despić (2016).

South Slavic extended nominal projections and the exact morphological composition of inflectional suffixes; this remains open for future research. The primary goal of this paper was to outline the feature composition of the western South Slavic number system, and in doing so, to show that singular–plural–dual systems such as the one in Slovene and, to an extent, Serbo-Croatian with its paucal forms, are in fact split systems that emerge from the interplay of the syntax of basic morphosemantic number features and their exponence.

Acknowledgements

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