

## Paradigmatic saturation in Nuer

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### Abstract

Nouns in Nuer (Western Nilotic) nouns have been presented as an extreme example of inflectional complexity, where a ‘chaotic’ distribution of suffixes combines with dozens of different stem modifications to yield dozens of inflection classes, (Frank 1999, Baerman 2012). We show that all of the apparent surface variety can be reduced a handful of operations. The proliferation of inflection classes is due to a property we call PARADIGMATIC SATURATION: practically every combination of inflectional operations is attested, yielding the maximum variety with the minimum of means.<sup>1</sup>

Keywords: inflection class, paradigms, morphophonology, allomorphy, Nilotic

### 1 Introduction

The nominal inflection classes of the Western Nilotic language Nuer, as described by Frank (1999), appear to defy any known principle of systematicity. As normally understood, inflection classes reflect the organization of allomorphy into implicative relationships. For example, in the Sahaptin language Nez Perce, inflectional values may display two different suffixal allomorphs, which split the verbal lexicon into two classes (Table 1).<sup>2</sup> This is because the allomorphs occur in two non-overlapping sets: either a verb inflects like ‘eat’, with the suffixes *-se*, *-s*, *-e* and *-u?*, or it inflects like ‘see’, with the suffixes *-ce*, *-n*, *-ne* and *-nu?*.

	‘eat’	‘see’
1SG PRS	hipí-se	hekí-ce
1SG PRF	híp-s	héki-n
1SG PST	híp-e	héx-ne
FUT	hip-ú?	hex-nú?

Table 1. Inflection classes in Nez Perce (Aoki 1994: 109–114)

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<sup>2</sup> Abbreviations employed in this paper: ATR = advanced tongue root, COP = copula, FUT = future, GEN = genitive, LOC = locative, NOM = nominative, PL = plural, POSS = possessor, PRF = perfect, PRS = present, PST = past, SG = singular, TR = transitive.

Based on the description and analysis by Frank (1999), Baerman (2012) observed that Nuer noun inflection most decidedly does NOT adhere to this principle, to an extent probably unmatched by other languages for which descriptions are available. Table 2 gives a representative illustration of how case-number suffixes are distributed across different inflection classes in Frank's (1999) corpus. Across the six cell paradigm (nominative, genitive and locative, both singular and plural) two suffixes are found, *-kΛ* in the singular and *-ni* in the plural; the absence of a suffix is also possible for every cell in the paradigm, and is the only option for the nominative singular. The varying distribution of these options yields sixteen inflection classes. While this falls short of the 64 classes one would get if every possible combination were found, there is no indication that this restriction follows from any structural constraints on inflection class organization. Baerman (2012) uses the term PARADIGMATIC CHAOS to describe this seemingly unregulated distribution of exponents.

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
NOM SG	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅	∅
GEN SG	∅	kΛ	kΛ	∅	∅	∅	∅	kΛ	kΛ	kΛ	kΛ	kΛ
LOC SG	∅	kΛ	kΛ	∅	∅	∅	kΛ	∅	∅	kΛ	kΛ	kΛ
NOM PL	∅	∅	ni	ni	∅	∅	∅	ni	∅	∅	∅	∅
GEN PL	ni	ni	ni	ni	∅	ni	ni	ni	ni	∅	ni	∅
LOC PL	ni	ni	ni	ni	∅	∅	ni	ni	ni	∅	∅	ni

	XIII	XIV	XV	XVI
NOM SG	∅	∅	∅	∅
GEN SG	kΛ	kΛ	∅	∅
LOC SG	∅	kΛ	kΛ	kΛ
NOM PL	∅	ni	ni	∅
GEN PL	ni	∅	ni	∅
LOC PL	∅	ni	ni	ni

Table 2. Distribution of inflectional suffixes by noun class in Nuer (Baerman 2012: 470, based on Frank 1999)

The typological and theoretical interest of Nuer noun inflection has been addressed in a number of works over the last decade, e.g. Baerman 2012, Ackerman and Malouf 2013, Stump & Finkel 2013, Enger 2014, Sims & Parker 2016, and Arkadiev & Klamer 2019. The context for this is the idea that inflection class systems are so constituted as to maximize the predictability of inflectional forms, as reflected in such concepts as the Paradigm Structure Conditions (Wurzel 1984), Paradigm Economy Principle (Carstairs 1983), the No Blur Principle (Carstairs-McCarthy 1994), Implicational Economy (Blevins 2016) or the Low Entropy Conjecture (Ackerman & Malouf 2013). Nuer noun paradigms represent a seeming counterexample to these putatively cross-linguistic tendencies.

At the same time, Nuer noun paradigms evince a complementary morphological property which is equally striking, namely their wealth of stem alternations. Frank (1999) describes around 60 distinct operations. This is clearly a manifestation of the

same kind of system that Ladd, Remiisen and Manyang (2009) describe for Dinka, a Western Nilotic language closely related to Nuer. They identify 83 distinct operations which, they observe, “... make it appear entirely possible for a rich inflectional system not to have any patterns that can be identified as regular at all” (p. 659). Tables 3 to 5 illustrate how this is manifested in Nuer. Table 3 gives some examples of alternations in the quality of stem vowels, such as the addition of breathy voice (‘gourd’), the removal of breathy voice (‘witness’), removal of breathy voice plus lowering (‘dura’), raising (‘tongue’), raising with the addition of breathy voice (‘tilapia’), diphthongization (‘fence’) and monophthongization (‘shin’). Table 4 shows different length alternations: both ‘mountain’ and ‘elephant’ have a long nominative singular, but the nominative plural is overlong for the first and short for the second. ‘Hole’ and ‘nose’ have the reverse patterns. Table 5 shows some consonant mutations, where there is a change in the manner of articulation. In ‘dog’, a stem final stop in the nominative singular alternates with a voiced fricative in the nominative plural, in ‘navel’ a stop alternates with a voiceless fricative, while ‘strap’, ‘leg’ and ‘dream’ show further patterns in the alternation of these three manners of articulation.

NOM SG	NOM PL	
kěeer	kér	‘gourd’
néëen	nêeen	‘witness’
béëel	běel	‘dura (type of sorghum)’
lêp	lêep	‘tongue’
lèek	lěey	‘tilapia’
rêek	rêax	‘fence’
(a)têaaal	(a)těel	‘shin’ <sup>3</sup>

Table 3. Examples of stem vowel quality alternations (own data)

NOM SG	NOM PL	
pǎam	páam	‘mountain’
gwóor	gwór	‘elephant’
kǎaay	kóaay	‘hole’
wǔm	wúum	‘nose’

Table 4. Examples of length alternations (own data)

<sup>3</sup> The element represented as (a) is a floating mora which has prosodic and tonal effects on the preceding word (see Crazzolara 1933: 24-25); in some varieties of West Nuer it may be realized as a homorganic nasal before oral stops. It is cognate with the prefix *a-* seen in some other Western Nilotic languages, such as Dinka and Anywa.

NOM SG	NOM PL	
ɟjɔ̌ok	ɟjɔ̌ooy	'dog'
lɔ̌ok	lɔ̌x	'navel'
lɔ̌aay	lɔ̌ak	'strap'
cjɔ̌ooy	cjɔ̌x	'leg'
(a)lɔ̌ax	(a)lɔ̌aay	'dream'

Table 5. Examples of consonant mutations (own data)

Given the theoretical interest of Nuer noun inflection, due both to the paradigmatic 'chaos' of its suffixation, and to the extreme irregularity of its stem alternation patterns, in this paper we use new data to take a closer look at the system. Because two-thirds of the nouns in Frank's corpus (167/252) contain some kind of stem alternation, concentrating just on suffixal patterns, as in Baerman 2012, has meant that a substantial component of the inflectional system has been omitted. But the information available from earlier studies (Frank 1999, and also Crazzolara 1933, Vandevort n.d.) has not been sufficient to enable a more integrated approach to the system. In particular, work on related Western Nilotic languages (e.g. Andersen 1992-94) suggests that the phonology had not been fully understood, preventing crucial morphological patterns from being identified. Our own work with speakers makes a more detailed and accurate assessment possible. On the one hand, nominal inflection can be shown to be far more constrained than previously described. This does not reduce the number of distinct inflectional patterns that need to be recognized as compared to prior accounts. The difference lies instead in how these patterns are generated. In place of the random 'scattershot' way the cells are filled in Table 2, the system can be shown to be one where the available set of options is systematically exploited to the maximum. We propose the term PARADIGMATIC SATURATION to describe this.

The paper is structured as follows. §2 provides background on the language and its phonology, and §3 describes the case system. The morphology of noun inflection is described in §4, divided between two sets of operations that are largely independent of each other: suffixation and stem vowel alternations on the one hand (§4.1) and length and stem-final consonant mutation on the other (§4.2). §5 concludes with observations about the typological and diachronic position of the Nuer system.

## 2 Background

Nuer is spoken in South Sudan, where it is the second largest language after Dinka, and in adjacent parts of Ethiopia. The consultants who participated in our research are all native speakers of Nuer, born in South Sudan but forced to abandon the land of their birth as teenagers or adults due to war and civil strife. All currently reside outside of South Sudan (UK and USA) but are part of close-knit Nuer-speaking communities and employ Nuer daily. While most of our consultants left (South) Sudan in 1990s, they maintain close connection with family members in South Sudan and in the surrounding refugee communities in Ethiopia, Kenya and Sudan. Of the twelve consultants, four are representative of the western variety of Nuer (Bentiu), while eight are speakers of the eastern dialect of Nuer (Jikany; seven represent the Gatjiok subvariety and one the Gatjiak variety). Unless otherwise noted, the examples used here are taken from the western variety. This is because certain phonological and morphophonological distinctions are neutralized in East Nuer (involving stem-final consonants and vowel

length alternations), so data from West Nuer provides a fuller picture. Otherwise, the components of the inflectional system appear to be largely the same across all varieties. Note that most other studies of Nuer have looked at eastern varieties (Vandevort n.d., Yigezu 1995, Frank 1999, Storch 2005, Faust 2017, Gjersøe 2019, Reid 2019, Faust & Grossman, forthcoming); only Crazzolaro (1933) and Monich & Baerman (2019) look at West Nuer.

Figure 1 shows the vowel inventory. Most monophthongs and diphthongs occur in either a modal (i.e. plain) or a breathy variant, in some cases associated with a slight difference in place of articulation (e.g. breathy /i/ is more peripheral than modal /i/). The breathy central vowel /ɘ/ has no exact modal counterpart.

ɪ ɪ̥ e e̥ o o̥ ɛ ɛ̥      ɔ ɔ̥ ɘ a ḁ	u u̥ ɪɛ ɪ̥ɛ̥ ɛa ɛ̥a      ɔa ɔ̥a
a. Monophthongs	b. Diphthongs

Figure 1. Vowel inventory <sup>4</sup>

Like many other Western Nilotic languages (Andersen 1990, Reid 2019, and Remijsen, Ayoker & Jørgensen 2019), Nuer distinguishes three degrees of vowel length, which we refer to as short, long and overlong, and represent with one to three vowel graphemes. (In the case of diphthongs, length is indicated by the non-initial component; e.g. *ɪɛ* is short, *ɪɛɛ* is long and *ɪɛɛɛ* is overlong.) There are three phonemically distinct tones: low ( $\hat{v}$ ), rising ( $\check{v}$ ), and one which for convenience we will call high, but which is only realized as high with breathy vowels ( $\acute{v}$ ), while with modal vowels it is falling ( $\hat{v}$ ). Tone is represented just on the first vowel grapheme of any graphic sequence of vowels.

Consonants are shown in Table 6. Some contrasts are restricted by position. Stops display a voicing contrast only in stem- or suffix-initial position. Otherwise, stem-final stops are voiced intervocally and before nasal-initial suffixes, and voiceless in final position. Stop and fricative modes of articulation are contrastive only in stem-final position. The voiceless fricatives and the voiced dental fricative /ð/ are found only in stem-final position, and only in West Nuer; in East Nuer the corresponding stops are found instead.

<sup>4</sup> The back high-mid vowels are somewhat centralized, and might more accurately be represented as /ə, ɘ/. We use the [o] grapheme for typographical convenience.

		labial	dental	alveolar	palatal	velar
Stops	Voiceless	p	t̪	t	c	k
	Voiced	b	d̪	d	ɟ	g
Fricatives	Voiceless*	f	θ	ɾ	ç	x
	Voiced		ð*			ɣ
Nasal		m	ɱ	n	ɲ	ŋ
Lateral				l		
Trill				r		
Glides		w			j	

\* West Nuer only

Table 6. Consonant inventory

The present study is based on a corpus of 451 lexemes. Because of the existence of variation (between speakers or between varieties, as well as alternative forms offered by a single speaker), this comes to a total of 680 paradigms. The full set of paradigms can be found in Bond et al. 2020. The forms were elicited via translation from English, both in isolation (for the nominative) and in several different sentence frames. The latter was done in part to clarify the case inventory, and partly to provide the diagnostic environments necessary to determine tone and length contrasts.

### 3 The case system

Nouns in Nuer inflect for three cases, nominative, genitive and locative. Table 7 gives the full paradigm of the noun meaning '(large) river'.

	SG	PL
NOM	kĩr	kîɛr
GEN	kĩɛɛɛr	kîɛr-ɿ
LOC	kîĩr	

Table 7. Paradigm of '(large) river'

Case use is illustrated in the following examples. The nominative is the general default case, used for subject, for object (as in 1), in preverbal topic position, and after prepositions.<sup>5</sup> The genitive is used in adnominal constructions, as in 2, where it is the

<sup>5</sup> The equivalent form in Dinka is subdivided by tonal contrasts, marking a case distinction that Andersen (2002) terms absolute versus oblique. The absolute is the default case, while the oblique is used for post-verbal subjects, and following the preposition ɛ̄ 'of, by'. We have so far been unable to find a comparable contrast in Nuer. (Note that core cases ARE distinguished in pronouns, though not by means of tone.) Since the present paper does not explicitly address tone, our observations about the rest of the inflectional system hold one way or another.

To date, only Tucker & Bryan (1966: 414-15) have offered evidence of a core case distinction in the noun system, based on examples taken from Crazzolaro 1933. They present some nouns where a stem-final consonant alternation and/or tonal alternation appears to contrast subject versus object. However, the actual material in Crazzolaro's grammar does not support this claim. The stem-final consonant alternation Crazzolaro describes (the voiceless fricative variant shown below in Table 18) occurs in two contexts: (i) when the noun directly precedes the copular verb *a*, and (ii) before demonstrative enclitics *ɛ(mi)*, *i(mi)* and *ɔ(mɔ)*. Thus (retaining Crazzolaro's orthography) *ɣʃh à lwááɣ* 'the cattle are in the barn', where *ɣʃk* 'cattle'

complement of the verbal noun ‘thinking about’. The locative indicates location, as in (3), or goal of motion, as in (4). In the plural the nominative has a distinct form, shown in (5), while the genitive and locative are systematically conflated, shown in 6-7.<sup>6</sup> In fact, the two cases are usually conflated in the singular as well. A distinct locative singular is found with only two types of nouns: (i) those which can be understood as locations or goals (including body parts), and (ii) gerunds, which are a kind of verbal noun whose locative form is used in the formation of progressive constructions, and as a complement to verbs of motion (Baerman, Monich & Reid 2019).

- (1) câaar-ḷ kîr  
 think.about.TR-1SG river.NOM.SG  
 ‘I am thinking about a river.’
- (2) gôoor-ḷ cǎar kîεεr  
 want.TR-1SG thinking.about.NOM.SG river.GEN.SG  
 ‘I want to think about a river.’
- (3) yḷn à kîir  
 I COP river.LOC.SG  
 ‘I am in a river.’
- (4) rîεη-ḷ kîir  
 run-1SG river.LOC.SG  
 ‘I am running to a river.’
- (5) câaar-ḷ kîer  
 think.about.TR-1SG river.NOM.PL  
 ‘I am thinking about rivers.’
- (6) gôoor-ḷ cǎar kîer-ḷ  
 want.TR-1SG thinking.about.NOM.SG river-GEN/LOC.PL  
 ‘I want to think about rivers’
- (7) kén à kîer-ḷ  
 they COP river-GEN/LOC.PL  
 ‘They are in rivers.’

#### 4 Inflectional forms

Noun inflection involves suffixation, and alternations of stem vowel quality, length, stem final consonants, and tone. Suffixation and stem vowel quality alternations interact with

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→ *yóh* (p. 91), and *lǎk* ‘tribunal’ → *lǎh=ɔ* ‘this tribunal’ (p. 74). When these contexts are taken together (Tucker & Bryan consider only the first one), this looks more like a morphophonological effect conditioned by certain vocalic formatives, rather than any kind of case distinction. In any event we have not observed this particular phenomenon with our Nuer consultants. The tonal distinction that Tucker & Bryan claim to observe is not mentioned by Crazzolara, nor is it consistently manifested in his examples (he also records tonal variation WITHIN the contexts flagged by Tucker & Bryan).

<sup>6</sup> This is what our research has found, in contrast to Frank’s (1999) data (reproduced in Baerman 2012; see Table 2). Our findings in this respect match what Crazzolara (1933) and Vandevort (n.d.) report. See also fn 5.

each other, and are presented together in §4.1. Length and stem-final consonant mutations are also entwined, and are presented together in §4.2. Tone will not be explicitly addressed here, although we represent it to the best of our abilities. While tone in the verbal system has been extensively analysed (Reid 2019, Monich & Baerman 2019, Monich 2020), its precise role in noun inflection still eludes us.<sup>7</sup> (Gjersøe (2019) studies tone in the Nuer noun paradigm, but it deals with a different variety from the ones we concentrate on here, so it is not clear how much her account can be extended.)

#### 4.1 Suffixation and vowel quality alternations

There are only two distinct suffixes, each with phonologically predictable allomorphs. Genitive/locative singular *-kɿ* retains its initial consonant only following a vowel-final stem (Table 8). Since most noun stems end in a consonant, the usual realization is simply *-ɿ*.<sup>8</sup> The suffix *-nɿ* is found in the plural, either for all cases, or just with genitive/locative, depending on the noun. The initial /n/ is not realized following a stem-final /l/, /n/ or /r/.

genitive/locative singular	gwèɛɛ-kɿ	'pebble'	after vowel
	kèɛɛt-ɿ	'stick'	after consonant
plural	tèr-ɿ̥	'chicken'	after /l/, /n/, /r/
	kèt-nɿ̥	'stick'	elsewhere

Table 8. Case-number suffixes

It is the vowel quality alternations that contribute most heavily to the proliferation of stem alternation types. But understood in terms of morphophonological features, much of the surface complexity evaporates. The verbal system provides the key, since verbal morphology is much more regular and consistent than that of nouns (see Reid 2019, Monich & Baerman 2019). Consider the representative forms of the verb 'sing' in Table 9, shown with its 3SG and 1SG subject forms in the basic transitive paradigm and the antipassive (a derived intransitive). If one takes the 3SG transitive form as the starting point, it is a modal monophthong, and the vowel of the 1SG transitive form is diphthongized. The vowels of the corresponding forms of the antipassive have breathy voice (and are slightly raised). This is a typical but not universal pattern. Thus the verb 'welcome' in Table 9 deviates from this pattern by having modal monophthong in its 1SG antipassive, rather than a breathy diphthong. This is not lexically determined, it is predictable from the stem vowel itself: for any verb, it is enough to know the vowel of the 3SG transitive in order to list the vowels for all the other forms. Because the overarching pattern cannot be stated directly in phonological terms, it is useful to abstract out a morphophonological feature. Therefore we describe these vowel alternations in terms of abstract morphophonological features, following the system proposed by Reid (2016, 2019), which adapts and expands the approach of Crazzolara (1933), as well as Andersen (1992-94, 2017) in his description of closely-related Dinka. The alternation seen between

<sup>7</sup> See fn. 5 on the possibility of a purely tonal distinction between core case functions.

<sup>8</sup> This phonologically conditioned allomorphy is consistent with all of our consultants. However, in some East Nuer varieties which we have not investigated, *-kɿ* may be found after consonants too. The Nuer translation of the Bible (*Ruac Kuɔth in Rel Ro*) shows some variation across lexemes, though the allomorphy described here is what predominates. In Frank's (1999) material both options are reported as occurring within the SAME paradigm, with the genitive taking one allomorph and the locative the other. We suspect may reflect the juxtaposition of two distinct paradigm types, as opposed to a stable paradigmatic principle.



3SG and 1SG we label GRADE A versus GRADE B, and the alternation seen between the transitive and the antipassive we label GRADE 1 versus GRADE 2.

	‘sing’		‘welcome’	grade
3SG transitive	kîiit-è <i>modal monophthong</i>		gôɔɔŋ-è <i>modal monophthong</i>	1A
1SG transitive	kîεεet-ḷ <i>modal diphthong</i>		gôaaaŋ-ḷ <i>modal diphthong</i>	1B
3SG antipassive	kîr-ê <i>breathy monophthong</i>		gôŋ-ê <i>breathy monophthong</i>	2A
1SG antipassive	kîèr-ḷ <i>breathy diphthong</i>		gôŋ-ḷ <i>modal monophthong</i>	2B

Table 9. Vowel quality alternations in the verbal paradigm

Characterizing the vowels and diphthongs of Nuer in terms of this system results in seven alternating sets (Table 10). Note that /a/ does not display a distinction between grades 1A and 1B, while the low-mid breathy vowels do not display a distinction between grades 1 and grade 2.<sup>9</sup>

Grade 1		Grade 2	
Grade A	Grade B	Grade A	Grade B
ɪ	ɪε	ḷ	ḷε
ʊ	ʊɔ	ḷ	ḷɔ
ε	εa	ḷ	e
ɔ	ɔa	ḷ	o
----	----	ḷ	ḷa
----	----	ḷ	ḷa
a	a	ḷ	ḷ

Table 10. Vowel grade alternations

Noun inflection is now much easier to describe if vowel grade can be referred to, rather than the surface phonology of stem vowels. Table 11 illustrates how case-number inflection is expressed through suffixation and vowel grade alternation. (Typically a noun is lexically specified as having a grade 1 or grade 2 vowel; for consistency these examples all have grade 2 vowels.) The nominative singular is always unsuffixed, and may have a grade A or B stem vowel. The nominative plural likewise may have grade A or B stem vowel, and in addition may or may not be suffixed. The genitive singular may either be suffixed with a grade A stem vowel, or unsuffixed with a grade B stem vowel. The genitive/locative plural is practically always suffixed; there is though a small set of irregular nouns where it is unsuffixed (see Table 29). The stem of the suffixed genitive/locative plural is always the same as that of the nominative plural. This means that where the nominative plural itself is suffixed, the two plural forms are identical and

<sup>9</sup> Alternations involving /ḷa/ are restricted to a handful of lexemes and difficult to interpret. Alongside the ‘regular’ alternation of /ḷ/ ~ /ḷa/, basic plural nouns with an underlying short root vowel (see discussion following Table 17) show /e/ ~ /ḷa/; thus kḷḷḷ-kḷ (GEN SG) ~ kḷḷḷ (NOM SG) ‘firstborn’ versus rḷj (NOM SG) ~ rḷḷḷ (GEN SG) ‘fish’. The status of /ḷ/ itself seems to vary across different varieties of Nuer: it is absent as a distinct phoneme in the Lou dialect (Reid 2019), and is not represented in written Nuer. Thus ‘firstborn’ and ‘fish’ are written with the same vowel alternation in the Nuer Bible: kḷḷḷ (GEN SG) ~ kḷḷ (NOM SG) and rḷc (NOM SG) ~ rḷc (GEN SG).

there are no case distinctions, as with *rǔḏ-ní* ‘rice’ (PL) and *rǔḏm-ní* ‘porcupine’ (PL). The locative singular, where it has a distinct form, is unsuffixed with a grade A vowel. But as noted in §3, only a minority of nouns have such a form, subject to semantic and lexical conditions, as well as a morphological condition: only paradigms with an unsuffixed genitive singular can have a distinct locative singular. In all other contexts, the locative singular is identical to the genitive singular.

a. Nominative singular:		
grade A vowel	rúḡp	‘forest’
grade B vowel	(a)rúḡm	‘seroot fly’
b. Nominative plural:		
grade A vowel	(a)rǔm	‘seroot fly’
grade B vowel	rúḡf	‘forest’
grade A vowel with suffix	rǔḏ-ní	‘rice’
grade B vowel with suffix	rǔḏm-ní	‘porcupine’
c. Genitive singular:		
grade A vowel with suffix	(a)rúḡm-ḏ	‘seroot fly’
grade B vowel	rǔḡḡḡp	‘forest’
d. Genitive/locative plural		
grade A vowel	(a)rǔm-ní	‘seroot fly’
grade B vowel	rúḡf-ní	‘forest’
e. Locative singular		
grade A vowel	rúḡp	‘forest’

Table 11. Inventory of case-number morphology

There is thus some predictability in the paradigms of most nouns: the form of the genitive/locative plural is predictable from the nominative plural (with handful of exceptions; see Table 29), and the form of the locative singular – if there is a distinct form – is predictable from the genitive singular. We therefore only need three forms to describe regular inflection: the nominative singular and plural, and the genitive singular. The description can be expressed as four binary choices: (i) vowel grade A or B in the nominative singular, (ii) vowel grade A or B in the nominative plural, (iii) suffix or no suffix in the nominative plural, and (iv) suffix or no suffix in the genitive singular.<sup>10</sup> The basic paradigm template is summarized in Table 12.

	SG	PL
NOM	i. grade A or B	ii. grade A or B iii. suffix or no suffix
GEN	iv. suffix or no suffix	= NOM PL + suffix
LOC	predictable from GEN SG	

Table 12. Paradigm template

<sup>10</sup> We could also include the presence or absence of a distinct locative singular as a fifth parameter. But since this is in part semantically determined, this seems to be a qualitatively different choice from the purely formal options we focus on here.

The four binary choices yield sixteen possible inflectional patterns (2 x 2 x 2 x 2). Table 13 exemplifies these, using nouns that have a grade 2 stem vowel. Two patterns appear to not be found, or are at least heavily disfavored; an explanation for this is offered in the final paragraph of this section.

vowel grade		suffix		NOM SG	NOM PL	GEN SG	
NOM SG	NOM PL	NOM PL	GEN SG				
A	A	-	-	ṭáák	ṭááay	ṭáaay	'ox'
			+	póool	pól	póol-à	'cloud'
		+	-	líiir	líiir-í	líer	'breeze'
			+	bááar	bááar-í	bááar-à	'arrow'
	B	-	-	rúup	rúuf	rúup	'forest'
			+	bááar	báaar	bááar-à	'shooter'
		+	-	(a)kíið	(a)kíeθ-ní	(a)kíeθ	'pocket'
			+	(a)kúm	(a)kúm-nì	(a)kúm-à	'hat'
B	A	-	-	tíet	tít	tíet	'sorcerer'
			+	cíel	cíl	cíl-à	'elbow'
		+	-				<i>no examples</i>
			+				
	B	-	-	míem	míeem	míem	'hair'
			+	(a)riét	(a)riéet	(a)rít-à	'word'
		+	-	tíeep	tiép-nì	tíep	'shadow'
			+	gôor	gôor-í	gôor-à	'snake species'

Table 13. Inflectional patterns (nouns with grade 2 stem vowel)

Some patterns clearly have greater type frequency. Grade A singulars typically take an unsuffixed genitive, grade B singulars typically have a suffixed genitive singular, which is often an option even for those nouns which otherwise take the unsuffixed form; e.g. the genitive singular forms *tíet* 'sorcerer' and *míem* 'hair' in Table 13 may be replaced by *tít-à* and *mím-à*.<sup>11</sup> This is particularly characteristic of East Nuer, where suffixed forms tend to predominate: some unsuffixed forms produced by our West Nuer consultants were rejected outright by East Nuer consultants. Productive deverbal nouns (which have overlong grade 2 stems) have a grade A nominative singular and a suffixed genitive singular, with the nominative plural showing an animacy split, illustrated by the nouns 'arrow' and 'shooter' in Table 13, both derived from the verb *báár* 'shoot'. The inanimate instrumental noun 'arrow' has a suffixed grade A nominative plural, while the animate agentive noun 'shooter' has an unsuffixed grade B form. Recent borrowings (e.g. from English) typically inflect through suffixation alone, as in *kòm pjútèr* (NOM SG), *kòm pjútèr-à* (GEN SG), *kòm pjútèr-í* (PL) 'computer', thus following the pattern of 'arrow'.

<sup>11</sup> With body part nouns this contrast appears to correlate with an alienability distinction: thus the unsuffixed genitive is used for 'of my heel' in *ηùɔl-lá* 'heel.GEN.SG-1SG.POSS' where it is referring to one's own heel, while the suffixed genitive *ηùl-áá-dá* 'heel-GEN.SG-1SG.POSS' refers to one I own, e.g. a piece of meat. (Note that the 1SG possessive suffix *-dá* assimilates to the final consonant of the noun stem in the first example, and the genitive suffix regularly lengthens when followed by the possessive suffix in the second example.)

One combination of the inflectional parameters seems not to be found: nouns with a grade B nominative singular and grade A plural cannot take suffixation in the nominative plural. The evidence of morphological variation suggests that this configuration is actively avoided, and not simply a gap in our data. A number of nouns in our corpus show optional use of a nominative plural suffix; typically this has no bearing on the way the stem vowel behaves, but just in case this would yield the disfavored pattern, the stem vowel switches grade. Thus in Table 14, ‘drum’ has a grade A ~ B alternation between the nominative singular and plural, and the optional use of a nominative plural suffix does not change this. But ‘seroot fly’ in Table 14 has a grade B nominative singular and grade A nominative plural, when unsuffixed. The addition of the suffix goes hand-in-hand with the switch of the nominative plural stem vowel to grade B, thus avoiding the disfavored pattern.

vowel grade		suffix			
NOM SG	NOM PL	NOM PL	NOM SG	NOM PL	
A	B	-	(a)bŭl	(a)bŭɔl	‘drum’
	B	+		(a)bŭɔl-i	
B	A	-	(a)rúɔm	(a)rŭm	‘seroot fly’
	B	+		(a)rŭɔm-ní	

Table 14. Nouns with optional nominative plural suffix

The explanation for this, we suggest, can be found in a lexical distinction between BASIC SINGULAR and BASIC PLURAL nouns. In order to describe this, one further piece of evidence will be useful. Besides the alternation between vowel grades A and B, some nouns additionally show an alternation between grades 1 and 2. In most cases this involves grade 1 in the singular and grade 2 in the plural (Table 15), overlaid on a subset of the patterns seen in Table 13. A smaller number of nouns show the reverse alternation, with grade 2 in the singular and grade 1 in the plural, e.g. ‘dura’: *běeɛl* (NOM SG, grade 2A) ~ *bèel* (NOM PL, grade 1A).

vowel grade		suffix			
NOM SG	NOM PL	NOM PL	NOM SG	NOM PL	
1A	2A	-	lèɛk	lěeey	‘tilapia’
1A	2A	+			<i>no examples</i>
1A	2B	-	(a)lêk	(a)lêeey	‘pestle’
1A	2B	+	rîp	rĭeep-ní	‘fishing blade’
1B	2A	-			<i>no examples</i>
1B	2A	+			<i>lacking also in Table 13</i>
1B	2B	-	(a)ŋèaɬ	(a)ŋêeeð	‘ashes’
1B	2B	+	dîɛɛr	dĭer-í	‘cricket’

Table 15. Nouns with a grade 1 singular and grade 2 plural

This alternation has a clear historical explanation, which can further be linked to the alternation between grades A and B, and ascribed to earlier patterns of suffixation. To

see this, consider the comparison in Table 16 between Nuer and cognate forms in Anywa, a Western Nilotic language of the Northern Luo branch (Reh 1996, 1999), which is phonologically more conservative than Nuer. The plural forms in Anywa are all suffixed (with progressive ATR harmony inducing the variation between *-i* and *-i*), corresponding in Nuer to a grade B vowel and/or lengthening. The contrast between grade 1 and grade 2 in Nuer corresponds to -ATR and +ATR in Anywa. The nouns in Table 17 show the reverse pattern: in Anywa it is the singular that has a suffix (-ATR *-o* and +ATR *-o*), and where there is an ATR alternation, it is the singular form that is +ATR ('dura'). Nuer shows grade B and/or lengthening in the singular, and the noun 'dura' has grade 2 in the singular.

NOM SG	NOM PL	Nuer		Anywa (Reh 1999)				
		NOM SG	NOM PL	SG	PL	SG	PL	
1A	1A	d̥íɪt	d̥íɪt	-ATR		ādíɪt	ādèd-é	'bird'
2A	2A	w̥úm	w̥úum	+ATR		ūm	úmm-í	'nose'
1A	1B	ɲ̥íɪ̄	ɲ̥íɪ̄ɛð	-ATR		ɲ̥ēth	ɲ̥éth-í	'brain'
2A	2B	t̥ík	t̥íeeey	+ATR		t̥ík	t̥íg-í	'chin'
		l̥òoc	l̥òç			l̥òoç	l̥òo-ì	'peg'
		t̥ùuɲ	t̥ùɲ			t̥ùuɲ	t̥ùɲ-ì	'horn'
		ɣ̥ám	ɣ̥áam			ám	ám-í	'thigh'
1A	2B	l̥ép	l̥éep	-ATR	+ATR	l̥ép	l̥éep-í	'tongue'

Table 16. Nuer nouns and their Anywa cognates with plural suffixation

NOM SG	NOM PL	Nuer		Anywa (Reh 1999)				
		NOM SG	NOM PL	SG	PL	SG	PL	
1A	1A	(a)cw̥èɛɛj	(a)cw̥êj	-ATR		cw̥ì-ō	cw̥èy	'leech'
2A	2A	w̥áár	w̥àr	+ATR		w̥ár-ò	w̥àr	'dung'
1B	1A	r̥íɛɛm	r̥ím	-ATR		r̥è̄m-ō	r̥è̄m	'blood'
		t̥ùɲɲ	t̥ùɲ			t̥òɲ-ō	t̥òɲ	'egg'
2B	2A	r̥úɲm	r̥úum	+ATR		r̥ùm-ō	r̥ùm	'seroot fly'
		c̥ìɛɛn	c̥íin			c̥ín-ó	c̥iin	'intestines'
2A	1A	b̥é̄el	b̥èel	+ATR	-ATR	b̈èel-ō	b̈èel	'dura'

Table 17. Nuer nouns and their Anywa cognates with singular suffixation

The two contrasting patterns in Table 16 and Table 17 have been extensively discussed by Dimmendaal (2000) for Nilo-Saharan as a whole, by Storch (2005) for West Nilotic, and by Andersen (2014) specifically for Dinka, which corresponds closely to Nuer. Nouns with a morphologically marked singular and morphologically unmarked plural will typically have been those whose semantics were inherently plural, e.g. herd animals, plants, swarming insects, or (typical for Western Nilotic) liquids; though other nouns have no obvious semantic motivation along those lines, e.g. *t̥íɛt* (NOM SG) ~ *t̥ít* (NOM PL) 'witch doctor' (compare *t̥id-at* (SG) ~ *t̥it* (PL) 'doctor' in Mayak, a Western Nilotic language of the Northern Burun branch; Andersen 2000). Morphological marking involved

affixation and, in some cases, +ATR contrasting with basic -ATR; this in turn may originally have been due to regressive ATR harmony induced by a suffix (Andersen 2000: 33, 39). The Nuer nouns in Table 17 thus represent reflexes of what we can call BASIC PLURALS, in which the singular is formed on the basis of the plural; for contrast we can refer to the other type as BASIC SINGULARS. Provided a noun has a number alternation in the nominative between grade A and B or between grade 1 and 2, grade B and grade 2 represent the ‘marked’ value: plural with basic singular nouns, and singular with the basic plural nouns. The length correlations are discussed in §4.2.

There is no reason to think that the basic singular ~ basic plural contrast remains in any way productive. It is now simply a lexical characterization of two sets of inflectional patterns, though one which has important echoes throughout the system. As the following section shows, this contrast is crucial for understanding length and stem-final consonant alternations. And the gaps seen in Table 13 may also become explicable in these terms. Recall that two of the sixteen patterns generated by the inflectional rules for suffixation and vowel grade are unattested. These gaps occur precisely where a basic plural type vowel grade alternation (grade A in the plural and grade B in the singular) would take a nominative plural suffix. In other words, a (historically) unmarked nominative plural form cannot serve as the host for overt suffixal marking. We are unable to say whether that is a synchronically accurate characterization, but as we have argued, the configuration does appear to be avoided.

## 4.2 Length alternations and consonant mutation

Length alternations have proved to be particularly difficult to analyse, because the three-way length contrast creates a particularly rich array of possibilities. The key to unlocking the regularities of the system has been to understand them as the result of operations of lengthening and shortening, and not simply as the paradigmatic juxtaposition of stems of different length. The evidence for this comes from the consonant mutations found in West Nuer. Using the data from Crazzolara (1933), some earlier studies have suggested these consonant mutations should be treated as an autonomous alternation (e.g. Lieber 1987, Akinlabi 1996, Trommer 2011, Wolf 2007). But our data indicate that they are morphophonologically bound to length alternations. Consider first the forms of the noun in 8: each differs in length, and also in the mode of articulation of the stem-final consonant: stop /k/, voiced fricative /ɣ/, and voiceless fricative /x/. This in itself suggests a relationship between length and the mode of articulation of the stem-final consonant. But that relationship is not simply the static equation of short = voiceless fricative, long = stop and overlong = voiced continuant, as shown by 9. The short nominative singular *lêk* ends in stop, not a voiceless fricative, and the long genitive singular *lêaay* ends in a voiced continuant, and not a stop.

(8)	NOM SG	GEN SG	NOM PL	
	rêek	rêaaay	rêax	‘fence’

(9)	NOM SG	GEN SG	
	(a)lêk	(a)lêaay	‘pestle’

What does unite the patterns in 8 and 9 is the RELATIONSHIP between the forms in the paradigm: in both nouns the genitive singular is longer than the nominative singular, and this corresponds to the alternation of stop to voiced continuant. This allows us to

propose that a stop represents the basic, underlying consonant, and that a voiced continuant reflects lengthening of the stem. On analogy with this, the voiceless fricative of the nominative plural *rĕax* in 8, where the stem is shorter than that of the nominative singular, can be understood as a reflection of shortening of the stem.

The full system of consonant mutation is shown in Table 18. Not all consonant phonemes are equally affected. Thus apical /t/ and labial /p/ do not have a distinct alternant associated with lengthening, at least not in the speech of our consultants; see §4.2.3 for some effects of this.<sup>12</sup> Resonant consonants do not alternate.<sup>13</sup> Examples of the alternations are given in Table 19.

stop (basic stem)	voiced continuant (lengthened stem)	voiceless fricative (shortened stem)
c	j	ç
k	ɣ	x
t̥	ð	θ
t	(t)	ɾ
p	(p)	f

Table 18. Inventory of stem-final consonant mutations

basic	lengthened	shortened	
lŏoç (NOM SG)	lŏooj (GEN SG)	lŏç (NOM PL)	‘peg’
rĕək (NOM SG)	rĕaaaɣ (GEN SG)	rĕax (NOM PL)	‘fence’
liit̥ (NOM PL)	liεεð (NOM SG)	liεθ (GEN SG)	‘butter’
dúut (NOM SG)	dűűűt (GEN SG)	dúɾ (NOM PL)	‘grass species’
dĕep (NOM SG)	dĕeep (GEN SG)	dĕf (NOM PL)	‘cattle rope’

Table 19. Examples of stem-final consonant mutations

The same processes are also found in verbal inflection (Monich 2018). Across both nouns and verbs the native lexicon shows a primary contrast between short and long stems, while overlong stems appear to be derived, and hence lengthened. That means that nouns with overlong stems show the characteristic features of lengthening, even where there is no length alternation within their own inflectional paradigm. This is regularly seen in deverbal nouns that are formed from a verbal base via lengthening (and a grade 2 vowel), e.g. *cáay* (NOM SG) ~ *cáay* (NOM PL) ‘creator’, derived from the verb *căk* ‘create’.

#### 4.2.1 Length alternations for number

As a general rule nouns show a length alternation for number, or more precisely, between the nominative singular and nominative plural (since length in the other cases is derived from the corresponding nominative; see §4.2.2). The basic principles are illustrated in Table 20, showing nouns whose nominative singulars manifest the three different

<sup>12</sup> In Crazzolara’s (1933: 14) grammar the lenited grade of apicals and labials are presented as distinct, with apical /d/ and labial /b/, i.e. with contrastively voiced final stops. We have not encountered this with our consultants.

<sup>13</sup> This leads to possible ambiguity in the case of stem-final /j/, which can be either an alternant of /c/ in a lengthened stem, or an underlying non-alternating /j/.

lengths. The nominative plurals of short and long stem nouns lengthen by one degree, to long and overlong respectively. But the nominative plural of the overlong stem shortens. This is quite consistent and regular: shortening is the equivalent of lengthening applied to overlong stems. This means we can treat lengthening and shortening as complementary manifestations of a single operation that moves along the sequence  $V \rightarrow VV \rightarrow VVV \rightarrow V$ . In order to generalize across these different surface patterns of lengthening and shortening, we adopt the term INCREMENTATION for the morphophonological operation of shifting to the right in this sequence.

NOM SG	NOM PL	NOM SG	NOM PL	
V	VV	mók A	môoγ B	'buffalo'
VV	VVV	lǔum A	lúǔǔm B	'(kind of) grass'
VVV	V	cjôoγ A	cjôx B	'leg'

Table 20. Basic length alternations in the plural (simple incrementation)

The nouns in Table 21 show a different set of alternations: the short stem nominative singular lengthens to overlong, and the long stem shortens. This can still be understood as part of the same morphophonological operation of incrementation as described for Table 20, if this is allowed to advance *two* places along the sequence  $V \rightarrow VV \rightarrow VVV \rightarrow V$ . Overlong singulars do not participate, as there is no further slot in the sequence for them to land on (showing that this is not a chain shift). To distinguish this from the first type we term it COMPOUND INCREMENTATION.

NOM SG	NOM PL	NOM SG	NOM PL	
V	VVV	tǐk A	tíeeeγ B	'chin'
VV	V	tîk A	tîex B	'bead'

Table 21. Compound incrementation in the plural

The nouns in Table 20 and Table 21 are all of the basic singular type, as evidenced by the vowel grade alternation A (NOM SG) ~ B (NOM PL).<sup>14</sup> Basic plural nouns display the same set of alternations, but with the nominative plural as the starting point of the operation (Table 22, Table 23).

NOM PL	NOM SG	NOM PL	NOM SG	
V	VV	rím A	rièem B	'blood'
VV	VVV	lǎk A	lăaay B	'belt'
VVV	V	(a)ηîij A	(a)ηèç B	'ant species'

Table 22. Simple incrementation in the singular of basic plural nouns

<sup>14</sup> Vowel grade does not always identify whether a noun should be classed as basic singular or basic plural. But length and consonant mutations suggest that it is still an organizing principle even in the absence of a vowel grade alternation. For example, ηǐt (NOM SG, grade A) ~ ηîð (NOM PL, grade A) 'brain' (a variant inflection of the noun in Table 16), and lðt (NOM SG, grade B) ~ lðoð (NOM PL, grade B) 'bell' behave like basic singulars with simple and compound incrementation, respectively.



NOM PL	NOM SG	NOM PL	NOM SG	
V	VVV	dôŋ A	dòwòwòŋ B	'ostrich shell bead'
VV	V	téēt A	těř B	'hand'

Table 23. Compound incrementation in the singular of basic plural nouns

There are thus three factors relevant to the assignment of length alternations for number: (i) whether the noun is basic singular or basic plural, which determines where the operation starts from, (ii) lexical length of the base, and (iii) length alternation type (simple or compound incrementation). These multiply out into ten patterns of singular ~ plural length alternations, shown in Table 24.

basic	derived	basic singular			basic plural		
		NOM SG	NOM PL		NOM PL	NOM SG	
V	VV <i>simple incrementation</i>	mók A	môoy B	'buffalo'	cêṭ 1A	céṛḏ 2A	'excrement'
	VVV <i>compound incrementation</i>	ṭik A	ṭíṛṛṛṛṛ B	'chin'	ṛiṭ A	ṛíṛṛṛḏ B	'butter'
VV	VVV <i>simple incrementation</i>	lèek 1A	lṛṛṛṛṛ 2A	'tilapia'	ḷṛṛk A	ḷàaay B	'belt'
	V <i>compound incrementation</i>	ṭik A	ṭíex B	'bead'	ṭéṛt A	ṭṛḡ B	'hand'
VVV	V <i>simple incrementation.</i>	cj̣óṛṛṛṛ A	cj̣ôx B	'leg'	(a)c̣ṛṛṛṛ A	(a)c̣ṛṛx B	'ant'

Table 24. Inventory of length alternations for number

#### 4.2.2 Length alternations for case

Length alternations for case are predictable on the basis of other morphological information in the paradigm, and need not be lexically specified. In the unsuffixed genitive singular of basic singular nouns, length is dependent on the vowel grade of the nominative singular. If it is grade A, the genitive singular shows simple incrementation: short becomes long, long becomes overlong, and overlong becomes short (Table 25). If the nominative singular is grade B, the genitive is always short (Table 26).

NOM SG	GEN SG	NOM SG	GEN SG	
V	VV	(a)lêk A	(a)lêaay B	'pestle'
VV	VVV	tîk A	tîεεy B	'bead'
VVV	V	(a)tîiyy A	(a)tîex B	'door'

Table 25. Length in the genitive singular of basic singular nouns with a grade A nominative singular

NOM SG	GEN SG	NOM SG	GEN SG	
V	V	mîem B	mîem B	'hair'
VV	V	bîεel B	bîel B	'color'
VVV	V	dúccp B	dúcf B	'path'

Table 26. Length in the genitive singular of nouns with a grade B nominative singular

With basic plural nouns the genitive singular always shortens, regardless of the vowel grade of the nominative singular. Compare the two nouns in Table 27. 'Heart' is a basic singular noun, signalled by the alternation of grade 1 (SG) ~ grade 2 (PL), while 'breast' is a basic plural noun, signalled by the alternation of grade 2 (SG) ~ grade 1 (PL). The nominative singular of both nouns is long, but the genitive singular of 'heart' lengthens, while that of 'breast' shortens.

NOM SG	GEN SG	NOM PL	NOM SG	GEN SG	NOM PL	
VV	V	V	tîin 2A	tîen 2B	tîn 1A	'breast' <i>basic plural</i>
VV	VVV	V	lòc 1A	lòaaaj 1b	lóc 2A	'heart' <i>basic singular</i>

Table 27. Shortening in the genitive singular of basic plural nouns vs. lengthening with basic singular nouns

The locative singular (that is, where has a distinct form) usually matches the genitive singular, lengthening where it lengthens and shortening where it shortens (Table 28).

NOM SG	GEN SG	LOC SG	NOM SG	GEN SG	LOC SG	
VV	VVV	VVV	rêek A	rêaaɣ B	rêεɣ A	'fence'
VVV	V	V	(a)lòool A	(a)löl B	(a)löl A	'valley'
VV	V	V	ηêer B	ηêr B	ηér A	'harvest'
VVV	V	V	dúɔɔp B	dúɔf B	dúf A	'path'

Table 28. Length in the locative singular

Finally, there is a small number of nouns whose genitive/locative plural is marked by a length alternation instead of the usual *-ni* suffix. All such nouns have plural stems which are irregular in some way (Table 29): either the stem formation is exceptional ('tree' has both an irregular stem vowel and stem-final consonant mutation) or suppletive ('cow' and 'eye'), or the noun is plurale tantum ('milk'). In addition, a few basic plural nouns with a grade 1 ~ grade 2 alternation are included here as well, such as 'fish' and 'dura'. All these nouns have a grade A stem vowel in the plural, and the genitive/locative is distinguished by simple incrementation. Thus, in terms of length, this unsuffixed genitive plural behaves like the unsuffixed genitive singular of basic singular nouns.

NOM SG	NOM PL	GEN/LOC PL	
jjàat	jjéen	jjéεen	'tree'
jǎaŋ	ɣǔɔk	ɣǔɔɔɣ	'cow'
wàŋ	ɲíin	ɲíiin	'eye'
-----	cáak	cáaay	'milk'
rěj	rěc	rěej	'fish'
béeeel	bèel	bèεel	'dura'

Table 29. Nouns with unsuffixed genitive plurals

### 4.2.3 Absence of length alternations

Length alternations for number are systematically absent in a sizeable portion of the lexicon. The main source in the native lexicon is productive deverbal derivation, which yields overlong stems, e.g. *táat* (NOM SG) ~ *táaat* (NOM PL) 'cook', from the verb *taal* 'cook'.<sup>15</sup> Non-alternating overlength is also sporadically attested elsewhere in the lexicon, e.g. with some basic plural nouns denoting animals, such as 'sheep', that have a grade B singular (*ràaam*) and a grade A plural (*rɔɔm*). In addition, recent borrowings typically inflect through suffixation alone, and do not undergo length alternations.

There is also a phonological constraint which results in the suppression of one of the length alternations. Simple incrementation that lengthens a short vowel to a long vowel (V → VV) appears to depend on a voiced continuant to close the syllable (there is no comparable restriction on lengthening to an overlong syllable). Recall from Table 18 that there are no voiced continuant counterparts to /t/ and /p/, hence the conditions for

<sup>15</sup> As a reviewer points out, the absence of length alternations here may derive from the presence of the characteristic overt singular and plural suffixation of deverbal nouns in a prior period, as in Anywa: e.g. *tèet-i* (SG) ~ *tèett-è* (PL) 'cook' (Reh 1996: 148); note that the geminate consonant in the plural reflects that the suffix was originally consonant-initial.

closing the lengthened VV syllable are not met.<sup>16</sup> In these cases, what one typically finds in West Nuer is a short syllable accompanied by a voiceless fricative stem-final consonant. If this variant of the consonant is understood as the consequence of shortening of the stem vowel, this suggests that – diachronically or synchronically – lengthening occurred and was then reversed (Table 30). This is sporadically found also with other stem-final consonants, even where a voiced continuant alternant should be available (‘stomach’ in Table 30).

NOM SG	GEN SG	NOM SG	GEN SG	
V	*VV→V	ɣòt A	ɣǒr B	‘hut’
		ɟóp A	ɟòf B	‘axe’
		ɟìc A	ɟěç B	‘stomach’

Table 30. Secondary shortening of lengthened VV syllables in West Nuer

## 5 Conclusion

Prior accounts of Nuer noun inflection have suggested it represents a typologically exceptional extreme of inflectional complexity, with a lexically ‘chaotic’ distribution of suffixes yielding numerous inflectional patterns, on top of which there are dozens of different stem modifications. Other accounts have further posited an independent set of stem-final consonant alternations. The reanalysis offered here shows that all of the apparent surface variety can be represented in terms of a small number of operations involving (i) two suffixes, (ii) a four-way set of vowel alternations, and (iii) two length alternations, with stem-final consonant alternations as a predictable concomitant. (As noted in §4, tone adds yet another dimension that we have not considered here.) The rules for suffixation and vowel alternation are entwined in the genitive singular, but otherwise the three systems operate independently of each other.

The wealth of inflection classes shown by Nuer nouns comes about through the property we have called PARADIGMATIC SATURATION, where the combinatorial possibilities of independent inflectional rules are exploited to the maximum (see Table 13 and Table 24). The only constraint on this is associated with the lexical distinction between basic singular and basic plural nouns: basic plural forms cannot bear a nominative plural suffix. The resulting inflection class system an extreme example of what Baerman, Brown and Corbett (2017) call the cross-classifying type, characterized by the many-to-many mapping between allomorphs across different paradigmatic cells. This differs starkly from a ‘canonical’ inflection class system (Corbett 2009) such as that of Nez Perce in Table 1. In a canonical system, the notion of class refers to the mutual interpredictability of forms in the paradigm, where a particular form in one cell unambiguously determines – and is determined by – the forms found in other cells. In Nuer, the notion of class is merely a label of convenience for a list of independently specified variables.

This kind of inflectional organization is in fact a characteristic feature of nominal morphology in the Western Nilotic languages, at least in the realm of number inflection: typically there is a many-to-many mapping between singular and plural morphological markers (Storch 2005). For example, consider the Anywa forms in Table 31. Four singular markers (including zero; recall also that Anywa displays root-driven ATR harmony)

<sup>16</sup> The effects of this constraint are even more widely seen in East Nuer, with its more limited inventory of stem-final consonants.

cross-classify with three plural markers, yielding all possible combinations, except the one where the same suffix would occur both in singular and plural.

singular	plural		plural suffixes			
nààŋ	nλŋ	‘crocodile’		∅	ɪ/i	ɛ/e
gwáŋ	gwàŋ-è	‘wildcat’	∅	✓	✓	✓
tīk	tíg-í	‘chin’	ɪ/i	✓	---	✓
ātúód-ā	ātùót	‘wound’	a/Δ	✓	✓	✓
ābáy-ā	ābày-è	‘flail’	ɔ/o	✓	✓	✓
cús-ā	cwéy-ī	‘tamarind’	u/u	✓	✓	✓
ajálág-ī	ajλλk	‘eland’				
ādúrr-í	ādúrr-é	‘cat’				
pòòl-ō	pòòl	‘cloud’				
bóór-ó	bòòr-è	‘bull elephant’				
dóól-ó	dòòl-í	‘colobus monkey’				
būl-ū	bùl	‘bracelet’				
kùg-ù	kúg-é	‘(tree) trunk’				
agūl-ū	agúl-í	‘beer pot’				

Table 31. Number suffixation in Anywa (Storch 2005, Reh 1996)

The corresponding patterns in Nuer number marking must have descended from a system of suffixation which was at least similar to, if not identical with, that of Anywa. That portion of the Nuer paradigm needs no other explanation than conservatism, once the probable effects of sound change are factored in. What is more remarkable though is the behavior of case marking, namely the genitive singular, which manifests the same cross-classifying spirit. But unlike the opposition of singular to plural, the genitive case appears to be a recent innovation, restricted to Nuer and the closely related Reel language (Reid 2010, Cien et al. 2015). Other West Nilotic languages use an adnominal construction which at least originally had a linking particle between the two components, which in most languages has fused to the end of the first noun, yielding a construct state-like form (Storch 2005, Andersen 2012). Its morphology is clearly cognate across all the languages, and just as clearly not cognate with the genitive of Nuer and Reel. That suggests that the type of morphological organization that leads to paradigmatic saturation may not just be a static archaism, but rather a persistent property that applies even as new inflectional forms are created.

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