CHAPTER 2
Inflectional morphology and number marking in Shilluk nouns

Bert Remijsen & Otto Gwado Ayoker, University of Edinburgh

Abstract · This chapter offers a descriptive analysis of two topics in the morphology of Shilluk nouns: the inflectional paradigm, and number marking. Aside from the base form, the inflectional paradigm includes the following four forms: a) pertensive with singular possessor; b) pertensive with plural possessor; c) construct state; and d) proximal demonstrative. All of these can be interpreted as instances of head marking, which is characteristic of Shilluk morphosyntax in general (cf. Chapter 1). Following a description of the morphosyntactic functions of the base form and the four inflections, we describe in detail the patterns of morphophonological exponence through which the inflections are expressed. This pattern of exponence includes vowel length, tone, nasalisation, floating quantity, and suffixation. Floating quantity is of particular note: this marker has not been postulated in earlier work. Overall, we find that the inflectional paradigm is largely productive and regular. In contrast, the morphological marking for number is neither regular nor productive, and this is why we do not consider it to be part of the inflectional paradigm. The newly discovered marker of floating quantity supports Gilley's (1992) tripartite analysis of number marking for Shilluk. For the sake of clarity and accountability, sound examples are embedded in relation to each of the numbered illustrations.

1 Introduction

1.1 Scope and structure

This chapter presents descriptive analyses of two dimensions that are central to the morphology of nouns in Shilluk. One is the inflectional paradigm; the other is the marking of number, which we will argue to be a separate matter. It is the latter topic, the marking of number, which has been the focus of much of the earlier work on the morphology of Shilluk nouns (Gilley 1992, 2000; Storch 2005; Reid 2009; Remijsen, Miller-Naudé & Gilley 2015; Xu 2017). All of these studies note the complexity of number marking in Shilluk. The same characteristic has been observed in closely-related languages such as Dinka (Ladd, Remijsen & Manyang 2009) and Nuer (Frank 1999, Baerman 2012), and also in relation to the Nilo-Saharan languages as a whole (Dimmendaal 2000). We will show that number marking in Shilluk is neither regular nor productive, and for these reasons we interpret it as derivational rather than inflectional (cf. Haspelmath 1996:47).

As for the inflectional paradigm of nouns, the following four functions are expressed: a) pertensive with singular possessor; b) pertensive with plural possessor; c) construct state; and d) proximal demonstrative. This inflectional paradigm has not yet been described in full; it is center stage here. The common characteristic of these inflections is that all four represent instances of head marking. That is, they are inflections on the head of the noun phrase, signposting a functional meaning in relation to a constituent within its own syntactic domain (cf. Creissels 2009). For example, pertensive signposts that the head noun is accompanied by a possessor. It is insightful to contrast head marking with dependent marking, familiar from languages like Latin, where the nominal inflections known as cases express a particular dependency relation of the marked noun to a head, be it the head of the clause (e.g. accusative), or to the head of the noun phrase (e.g. genitive). In Shilluk, in contrast, it is the head of the syntactic domain that is morphologically marked, rather than the dependent. This head-marking nature is not specific to nouns; it is equally characteristic of Shilluk verbs, where three voices signpost the nature of the dependents. This voice system is described in Chapter 1.

Various instances of morphological marking that are found on nouns are beyond the scope of this chapter, as it covers a) inflections that are specific to nouns; and b) number marking. This excludes morphological marking for vocative and for associative plural: both of these functions are marked at

the right edge of the noun phrase, irrespective of whether the domain-final constituent is a noun, a verb or an adjective. However, because they are most often marked on nouns, we will briefly illustrate the functions of these morphological processes in this chapter, without describing their formal realization in detail. Also beyond the scope of this chapter are compounding, borrowing, and various derivations through which nouns are formed on the basis of roots that belong to other lexical categories. Finally, we exclude the morphological marking of sex and maturity on cattle terms. This part of the nominal morphology has been described in detail in Martin (2018). All of these morphological processes are orthogonal to the inflectional system described in this chapter. That is, a compound noun like **ɔ̄ɔt-jāaṯ** 'hospital', a borrowing like **bɛ́ɛk** 'bag', a deverbal nominalization like **à-mǎk** 'captive', and a cattle term marked for sex such as **á-dík-ɔ̀** 'cow (female, mature) with deep red hide color' – all of these display the inflectional morphology described in this chapter.

The chapter is structured as follows. In Section 2, we present an overview of the functions that are marked through inflection. As noted above, they are pertensive with singular possessor, pertensive with plural possessor, construct state, and demonstrative. At the end of that section, we will also illustrate the morphological marking for associative plural and for vocative, even though these two phenomena are not specific to nouns. The following two sections, Section 3 and Section 4, are dedicated to the description of the morphophonological forms that express the four inflections. In line with the above interpretation of the nature of number marking, the paradigms of singular and plural nouns will be treated separately: Section 3 describes the inflectional paradigm marking the four functions outlined above in relation to singular nouns, and Section 4 describes the same paradigm in relation to plurals. The morphological marking of number on nouns is described in Section 5. A brief summary of Shilluk phonology and the conventions used in transcriptions can be found in the introduction to Chapter 1.

1.2 Methods

Our descriptive analysis is based primarily on a dataset of around 1600 Shilluk nouns. This is counting singulars and plurals separately; there are over 900 singular nouns, the remainder being plurals. The dataset consists of two types of data: a) transcriptions of nouns in various inflections, and b) over 5000 sound clips of noun targets elicited in sentence frames. Both are publicly available as part of archived lexicographic materials (Remijsen, Ayoker &

Martin 2018).

The dataset and the resulting analysis of Shilluk nouns were built up gradually, over a ten year period, as we studied Shilluk through controlled elicitation and through the analysis of narrative text. The narratives were useful to establish the functions of the various inflections. In this chapter, illustrations drawn from this corpus of narratives are marked using a ˆ following the illustration number; in each case, the name of the narrative and the time interval of the relevant extract in that recording are specified between square brackets. The audio recordings and annotations of the narratives in question are publicly available online, through Edinbugh DataShare (Remijsen & Ayoker, no date).

We used controlled elicitation to determine the formal realization. Here we describe the frames used most in controlled elicitation. Whenever we encountered a new noun, we collected three forms: the base form, the 1st singular possessed form, which is based on the pertensive, and the demonstrative. We collected these three forms for those levels of number that exist for that lexeme, be it singular, plural, or both. This is illustrated in (1) for the nouns **àḏʌ́ʌṱ** 'bottle', which has both singular and plural forms. As seen from (1), the frame sentence we used is headed by the irrealis existential predicate marker **díı**, which takes a noun phrase argument.[1] Because of it general meaning, i.e., existential, this predicate can accommodate any noun as its argument (cf. Pike 1948). In addition, the same frame sentence can be used with singular and plural nouns: the predicate marker is not marked for number.

(1) a. **kɛ̀ díı àḏʌ́ʌṱ**
CND EXSP:IRR bottle
'If there is a bottle.'

b. **kɛ̀ díı àḏʌ́ʌʌṱ̄-āa**
CND EXSP:IRR bottle-1S
'If there is my bottle.'

c. **kɛ̀ díı àḏʌ́ʌʌǹ̍ᵘ**
CND EXSP:IRR bottle:CS:DEM
'If there is this bottle.'

d. **kɛ̀ díı àḏʌ́ʌ̄-ī**
CND EXSP:IRR bottle-P
'If there are bottles.'

e. **kɛ̀ díı àḏʌ́ṱ-áa**
CND EXSP:IRR bottle:P-1S:P
'If there are my bottles.'

f. **kɛ̀ díı àḏʌ́ṱ-ì**
CND EXSP:IRR bottle:P-DEM
'If there are these bottles.'

We used the sound recordings to ensure that our transcriptions are accurate. This was important in relation to tone and vowel length, because Shilluk phonology is particularly rich in terms of both of these dimensions of

---

1   The symbol ᵘ stands for mora or weight unit; we use it as a representation of floating quantity. Its role in Shilluk morphophonology is described in Sections 3.3 and 4.3.

phonological contrast. Aside from its 'broad spectrum' applicability in semantic terms, the frame sentence (**kè díɪ** [target]) presents characteristics that are conducive to establishing the phonological characteristics of the target word with accuracy. First, the target noun appears in utterance-final position, where its realization is maximally salient thanks to final lengthening. Second, because the utterance is so short, the fundamental frequency (f0) range is wide, which helps in the identification of tone patterns. Third, the specification for High tone on **díɪ** is like a tuning fork: it offers a reference of the f0 level at the high end of the speaker's range, and this reference is helpful in determining the specification for tone of the noun target, be it in impressionistic auditory analysis or in the inspection of the f0 pattern.

There is one phonological contrast in the realm of tone that cannot be discriminated easily using the **kè díɪ** frame: Low Fall vs. High Fall. In the context of an immediately preceding High tone target, the Low Fall is very similar in its tonal realization to the High Fall. Preceded by a Low tone target, in contrast, the difference between Low Fall and High Fall is salient, but here the realization of the Low Fall is similar to that of the Low. Hence, the tonal specification of nouns that have an early-aligned falling melody on the stem syllable cannot be determined accurately in the **kè díɪ** context, and for these nouns we have used a second preceding context, namely **dî-a**, the realis existential predicate marker, which is phonetically realized as [dâa]. In this frame sentence, the noun is immediately preceded by a Low tone target. The allophonic range serves as the heuristic to determine unambiguously whether a noun stem carries a Low Fall as opposed to a High Fall. This is illustrated in (2), which shows how the Low, the Low Fall and the High Fall are realized in the two preceding contexts. The embedded sound illustrations reveal that, following after High-toned **díɪ**, the melody of **mʌ̂ʌt̪**, which carries a Low Fall (2c), is akin to that of **mʌ̋ʊt̪**, which carries the High Fall (2e). In contrast, following after **dî-a**, which ends in a Low target, the melody on **mʌ̂ʌt̪** in (2d) is similar to that of **lʊ̀ʊt̪** in (2b). By collecting nouns with an early-aligned falling melody in both of these frames, Low Fall and High Fall can be distinguished with accuracy.

(2)   a.   **kὲ   díɪ   lʊ̀ʊ̪t**
             CND EXSP:IRR stick
             'If there is a stick.'

       b.   **dî̵=a   lʊ̀ʊ̪t**
             EXSP=F stick
             'There is a stick.'

       c.   **kὲ   díɪ   mʌ̂ʌ̪t**
             CND EXSP:IRR friend
             'If there is a friend.'

       d.   **dî̵=a   mʌ̂ʌ̪t**
             EXSP=F friend
             'There is a friend.'

       e.   **kὲ   díɪ   mʊ́ʊ̪t**
             CND EXSP:IRR banana
             'If there is a banana.'

       f.   **dî̵=a   mʊ́ʊ̪t**
             EXSP=F banana
             'There is a banana.'

1.3 The shape of Shilluk nouns

In this subsection, we describe the word structure of the base forms of Shilluk nouns. The base form is the form within the inflectional paradigm which tends to reflect the root most closely, albeit not completely.[2] We do not make a distinction here between native monomorphemic nouns and other types of nouns (i.e., derived nouns, compounds, loan words), because the inflectional morphology applies in the same way to all nouns. The shape of the base form is particularly important because so much of Shilluk morphology is stem-internal.

The base form, along with the other forms of the inflectional paradigm, has at its center a stem that consists of a single syllable.[3] The phonotactic structure of this stem is C(w/j)V(V)(V)C. That is, the template of the stem includes an onset, which may be complex, in which case the second element is a semivowel (either /j/ or /w/); a vocalic nucleus, which is short (V), long (VV), or overlong (VVV) (Remijsen, Ayoker & Jørgensen 2019); and a coda consonant. A sizeable proportion of Shilluk nouns, both singular and plural ones, display this monosyllabic template in the base form. Illustration (3) presents several examples of this template.

(3)   **d̪ɔ́k**   **lēk**   **bjél**   **mɛ̂ɛl**   **lwáak**   **ràaw**   **jʌ́ʌʌ̪ı̄ᵘ**   **mwɔ̌ɔɔlᵘ**   **ŋ̊uuur**
       'mouth'   'teeth'   'grain'   'drought'   'byre'   'millet'   'boats'   'morning'   'lion'

Onsetless nouns are very rare in the native vocabulary – the only cases we know of are: **ɔ̄ɔt/ɔ̂ɔt** 'house:S/:P' and **ɔ́l-ɔ̀/ɔ́l̄-ī** 'deep hole in ground-S/-P' and **ɔ̀ook** 'wickerwork fish traps'. Open-syllable nouns, e.g. **t̪ʌ̌ʌʌ** 'desert date', are also uncommon.

---

2   In suffixed nouns, the base form may display morphological lengthening (see Section 3.2).

3   That is, unless it is a compound, in which case there is more than one stem syllable.

The monosyllabic stem that is at the center of the base form can be flanked by a suffix and a prefix. We will describe each of these in turn, starting with suffixes. In singular base forms, the suffix **-ɔ** is common, as in **twóooŋ-ɔ̄** 'insect (generic)-S' and **bɔ̀ɔɔṯ-ɔ̀** 'craftsman-S', and many plural base forms present the suffix **-ɪ**, as in **púk̄-ī** 'big clay pot-P' and **pùk-ì** 'turtle-P'. The only other suffix that is found in base forms is the derivational suffix **-īɪ**, which derives instrument nouns from transitive verbs, as in **góooc-īɪ** 'machete' (from {gɔ̀ɔc} 'hit') and **ŋíc-īɪ** 'symbol' (from {ŋìc} 'recognize').

The monosyllabic stem may be preceded by another syllable.[4] The inventory of these prefixes is highly restricted: only two of them are found with frequency in the lexicon, both of them vocalic: **a-** and **ʊ-**. For each of these, there are hundreds of nouns that are formed with them.[5] We will discuss these two prefixes in turn. It will become clear that the phenomena run parallel.

Some nouns formed with prefix **a-** are transparently derived. For example, Low-toned **à-** serves to derive nouns referring to the undergoer of the event referenced by a transitive verb, as in (4a). And High-toned **á-** derives cardinal numbers from ordinal numbers, as in (4b). High-toned **á-** and Low-toned **à-** also derive cattle nouns referring to cows, in the sense of mature female cattle, as in (4c).

(4) a. **à-mǎk**   b. **á-kjèl**   c. **á-dùk**
          PAT-catch   CRD-first   FEM-grey
          'captive'   'one'   'grey cow'

          à-ɲwǒm   **á-dʌ̀k**   **à-cwíil**
          PAT-marry   CRD-third   FEM-many.colours
          'married woman'   'three'   'cow with many colours'

In other cases, there is a clear semantic relation between a word with a prefix and a word without one, but the semantic relation cannot be defined as easily. For example, **álwɛ́ɛɛt-ɔ̄** 'crab' is related to **lwɛ́ɛɛt-ɔ̄** 'finger', and **áwāaac-ɔ̄** 'kind of plant with bitter fruit' to **wâc** 'bitter'. Finally, there are words with initial **a-** that are not obviously related to a word without prefix. Examples

---

4   There are words that present two syllables before the stem, in a particular morphological derivation: cattle terms in which both gender and maturity are marked (Martin 2018). Martin (2018:44,45) lists examples such as **ɲāa-dī-lwāl** 'light red bull calf (DIM-BULL-light.red)' and **ɲāa-ʊ́-gwêl** 'bull calf with many colours (DIM-BULL-many.colours)'. However, this could also be interpreted as a compound noun.

5   Segmentally identical prefixes, i.e., **a-** and **ʊ-**, with a various specifications for tone, have a high functional load in Shilluk verb morphology, marking levels of tense-aspect-modality (cf. Chapter 1).

include **áŋwāʌk** 'oryx' and **ápîɪj** 'ice'. Either there was a derivational base
and it has been lost subsequently, or there never was a derivational base,
for example in the scenario of borrowing, and the Shilluk word was formed
with initial **a-** to begin with. It is worthwhile to note that restrictive relative
clauses are formed using **à**. Hence, it is plausible for nouns beginning with this
segmental sequence to represent reinterpretations of what was once a relative
clause. This diachronic path, i.e., for nouns to develop diachronically out of
headless relative clauses, has been noted in various other Nilotic languages,
including Maa (Vossen 2015) and Turkana (Dimmendaal to appear).

The situation is similar in relation to **ʊ-**. Some derivations with this prefix
have a transparent semantic relation with the source. For example, nouns
marked with **ʊ̀-** can refer to the result of the action referenced by the source
verb, as in (5a). Also, again drawing on Martin (2018), Low-toned **ʊ̀-** is a
morphological marker of mature female cattle, as in (5b), and High-toned **ʊ́-**
marks a male member of a group, or a bull (5c).

(5) a. **ʊ̀-pɛ̀ɛt**
         NOM-cut.to.dry
         'dried fish'

     ʊ̀tút
     NOM-tie.together
     'knot'

     b. **ʊ̀-bwôoor-ɔ̀**
         FEM-brown
         'brown cow'

     ʊ̀-bɔ́ɔw
     FEM-white
     'white cow'

     c. **ʊ́-cɔ́ʊʊlɔ̀**
         MAL-Shilluk
         'Shilluk man'

     ʊ́-wéer
     MAL-horns.upwards
     'bull with horns pointing upwards'

There are also cases where there is a semantic relation with a root, although
it is difficult to pinpoint, as in the case of **ʊ́-cŭɲ** 'liver', which is related
to **cúɲ** 'emotion'.[6] Finally, there are words with the prefix **ʊ-** for which no
derivational base is known, such as **ʊ́gĭik** 'buffalo' and **ʊ́pŭun** 'cake'. Just
as is the case with comparable phenomena involving **a-**, either there was
a derivational base and it has been lost subsequently, or there never was a
derivational base to begin with, and the word was formed in analogy with the
derivational use of this prefix.

Other prefixes have a much lower functional load. We note **dī-**, observed
in seven nouns, including **dī-kɔ́k** 'hoe' and **dī-lāal** 'bronze'. The derivation
is transparent in most cases.[7] Most of these refer to instruments. In addition,

---

6   Many languages express emotional states with reference to body parts (see e.g. Klamer
2001). Thus, the similarity between the Shilluk words for 'emotion' and 'liver' is not surprising.

7   For example, **dī-kɔ́k** 'hoe' is transparently derived from the transitive verb {kɔ̂k} 'hoe'. In
the case of **dī-lāal** 'bronze', the sequence */lāal/ is not found as a monosyllabic noun, but it
is found in **á-lāal** 'flat-topped acacia', presumably with reference to the reddish colour of its
bark. This is likely, because another variety of acacia, namely **ácàaar-ɔ̀** 'yellow-bark acacia', is

Martin (2018), a study on Shilluk cattle nouns, reports many terms referring to bulls, such as **dī-dùk** 'grey bull' and **dī-bwōoor** 'brown bull'. The final two prefixes are **ɲɪ-** and **ɲaa-**. The form **ɲī** is used almost exclusively in relation to cattle terms, where it is found both in bull terms like **ɲī-bɔ́ɔŋ** 'white bull' and heifer terms **ɲī-bɔ́ɔw** 'white heifer' (Martin 2018:43). Outside this domain, it is used to refer to offspring, as in **ɲī-rʌ̄t** 'prince' and **ɲī-wâaac-ɔ̀** 'cousin'. The situation for **ɲaa-** is similar. It is found in terms referring to immature cattle and in kinship relations, e.g. **ɲāa-dī-dùk** 'grey bull calf' and **ɲáa-dùk** 'grey heifer' (Martin 2018:43).

In summary, the set of nominal prefixes is restricted to **a-, ʊ-, dɪ-, ɲɪ-, ɲāa**. Of this set, only **a-** and **ʊ-** occur with high frequency in the lexicon. Interestingly, all five of these prefixes figure prominently in the marking of sex and maturity on cattle terms. For the analysis of inflectional morphology, the prefixes to the monosyllabic stem are irrelevant, in that the morphophonological processes apply identically to nouns that have prefixes as to nouns that do not. In other words, nouns with prefixes do not present separate inflectional paradigms, irrespective of whether the derivational function of a prefix is a) transparent, productive and regular, as in **à-mǎk** 'captive', b) transparent but not productive and regular, as in **ʊ́-cǔɲ** 'liver', and c) even if there is no synchronically transparent derivational relation at all, as in the case of of **ʊ́gǐik** 'buffalo'. These affixes in Shilluk mirror comparable phenomena in other Nilo-Saharan languages, many of which present prefixes whose synchronic function is not always clear (Dimmendaal to appear).

2 Shilluk noun inflections and their functions

Apart from the base form, nouns appear in four inflections:

- pertensive with singular possessor
- pertensive with plural possessor
- construct state
- demonstrative

This set of inflections defines nouns as a lexical category in Shilluk. That is, the paradigm listed above distinguishes nouns from members of the two other major lexical categories, i.e., verbs and adjectives, which present different inflectional paradigms. Specifically, verbs are regularly inflected for tense-

---

also named with reference to the color of its bark: **câar** means 'light'.

aspect-modality, voice and subject (Chapter 1), and adjectives have a stage-level form. In this section we describe the functional range of the base form and each of these four inflections.

2.1 The base form

If a noun is not modified, it appears in the base form. This is illustrated by the narrative example in (6). There are two nouns here that do not have any modifiers. One is **lʌ̋ʌʌj** 'animals' in the first clause; the other is **úgǐik** 'buffalo' in the third.

(6)ˆ **cjʌ̀ŋ á-kjèl gɛ́ á-mɔ̀ɔɔl bēɛ dwāar kí lʌ̋ʌʌj**
day CRD-first PR3P PST-go.early SUB hunt:INF.A PRP animal:P
'One day, they went early to hunting animals,

  kå̋ā gɛ́ ú-rɔ̂ɔɔm-ɔ̀ kí úgǐik mɛ́ dwɔ̋ɔŋ
  CONJ PR3P IMPF-meet PRP buffalo REL.S big
  and they encounter a big buffalo,

  kå̋ā úgǐik réŋí=a jǐii gɛ́n
  CONJ buffalo run:DEST:NT=F AD:P PR3P
  and the buffalo runs towards them.' [KeepTheSecret 26.9-33.3]

In addition, the base form is used with two particular modifiers. One of these is a constituent marked by **mɛ́/mɔ́**, which marks modifiers and relative clauses of indefinite referents.[8] Note that, in the second clause in (6), the buffalo is introduced as **úgǐik mɛ́ dwɔ̋ɔŋ** 'a big buffalo'. This is the first mention of this entity in the narrative, and hence it is indefinite. The allomorph **mɛ́** is used if the head is grammatically singular, as in (6) and (7a), and the allomorph **mɔ́** is used if the head is grammatically plural, as in (7b).

(7) a. **dî=a úgǐik mɛ́ dwɔ̋ɔŋ**   b. **dî=a úgìik mɔ́ dɔ̀ɔŋ-ɔ̀**
      EXSP=F buffalo REL.S big   EXSP=F buffalo:P REL.P big-P
      'There is a big buffalo.'   'There are big buffalos.'

Nouns that do not have a modifier are not marked for indefiniteness by **mɛ́/mɔ́**, nor by any other function morpheme. However, the inflection for voice on the verb heading a clause is determined by information structure, and in particular by what the topic is. In this way, the voice of the verb conveys whether referents are to be interpreted as definite within the discourse (see Section 3.1 of Chapter 1).

---

8   We know of two nouns that have forms that are specific to junctures with **mɛ́ /mɔ́**. One is **ɟâal-ɔ̀** 'man', which appears as **ɟâal** when followed by **mɛ́**. The other is **ɟɔ̂k** 'men', which appears as **jâak** 'men' when followed by **mɔ́**.

Illustration (8) presents two additional narrative examples illustrating the same facts. In (8a), **úgɔ̀t̪ mɛ́ lúʋʋɛ̀** 'a black cloth' is the first reference to this entity. In (8b), **g̈ic-ɔ̀** 'something' is inherently (i.e., lexically) indefinite. In both cases, the modifier marked by **mɛ́/mɔ́** is an adjective.[9] It may equally be a verb or a relative clause.

(8)　a.ˆ　**gìn-ání**　　　**rí**　**gɔ̀**　　**kùm-ɛ̀**　　**kí úgɔ̀t̪ mɛ́ lúʋʋɛ̀**
　　　　something:CS-DEF REFL PR3S.OBL cover:NEVP-3S PRP cloth REL.S black:CTG
　　　　'That thing, it had covered itself with a black cloth.' [DownWithIllness 42.6-46]

　　b.ˆ　**bǎa gìc-ɔ̀**　　**mɛ́**　**lêt̪**　**càaarɔ̀ kí mɛ́ñ dwɔ́ɔŋ t̪wɔ̀ɔw**
　　　　NOMP something-S REL.S painful very PRP IDP.S big anyway
　　　　'It is something very painful, massive really.' [SweetnessOfTheDrum 36.7-38.3]

The other modifier with which the base form is used is a cardinal number. This is illustrated in (6) by **cjʌ̂ŋ á-kjɛ̀l** 'one day'. Cardinal numbers belong to the lexical category of nouns, on the basis of their inflectional paradigm. This means that junctures such as **cjʌ̂ŋ á-kjɛ̀l** 'one day' and **úgìiik á-dʌ̀k** 'three buffaloes' are noun-noun junctures.

2.2 The pertensive forms

Possessive noun phrases express a range of semantic relations between a possessed term, which is the head, and a possessor term, which is a modifier. Aside from the most obvious one, i.e., ownership (e.g., Anna's book), in many languages possessive noun phrases may express part-whole relationship (e.g., the cover of the book), kinship (e.g., Anna's mom), the attribute of an entity (e.g., the duration of the event), orientation / location (e.g., the side of the mountain), or association (e.g., Anna's manager) (cf. Dixon 2010:262-263). In Shilluk, all of these semantic relations are most often expressed using a possessive construction in which the possessed term is inflected. Following Dixon (2010:268), we refer to this morphological marking as 'pertensive'. Importantly, pertensive refers to morphological marking of the possessive relationship on the possessed term, which is the head of the possessive noun phrase.[10]

The Shilluk pertensive is illustrated in the narrative examples in (9). In (9a), **pjēeen úg̈iik** 'hide of the buffalo', has **pjēeen** as its head, and **úg̈iik** as

---

9　This is ascertained on the basis of the morphological paradigm, which is different for verbs vs. adjectives: verbs inflect for TAM, voice and subject; adjectives inflect for stage-level.
10　In contrast, 'genitive' refers to marking on the possessor, the modifier in the possessive noun phrase.

the possessor-noun modifier. The possessive relationship is marked on the head: **pjēeeñ**[μ] is the pertensive form of **pjēn** 'hide'. The possessor term is not morphologically marked. There are three other pertensive forms in the same sentence. In the case of **jéeep̄-ɛ̄**, the base form of the noun is **jép** 'tail', which has the pertensive form **jéeep̄**[μ]. Here the possessor is expressed pronominally, through the 3rd singular suffix **-ɛ̄**, which attaches to the pertensive inflection of the noun.

(9)   a.ˆ   **káā pjēeeñ**[μ]   **úgĭik gé-kí**   **jéeep̄-ɛ̄**   **kwɛ́ɲ**   **īī**   **ɲíɪɪmĭii**   **bʊ̆ʊl**
       CONJ hide:PERT buffalo PR3P-PRP tail:PRT-3S take:OV:NT PRP.P siblings:PRT Bol
       'And then Bol's siblings took the hide of the buffalo and its tail.'
       [KeepTheSecret 142.3-145.4]

       b.ˆ   **já**   **ɲí**   **kɪ́t̪ì=à**   **ɔ̄ɔt-jāaat̪**[μ]   **káaaī̄**[μ]   **àbɔ́ʊn jĭii jáā sìstèrâat**
       PR1S HAB carry:PET=F hospital:PRT camp:PRT priest   AD:P APL order.of.nuns
       'They used to take me to the hospital of the Catholic mission (lit.: to the hospital of the camp of the priest, to those of the order of the nuns.'
       [DownWithIllness 120.2-123.6]

The clause in (9b) presents an embedding of one possessive noun phrase inside another. The more deeply embedded possessive noun phrase is **káaaī̄**[μ] **àbɔ́ʊn** which refers to a Catholic mission post, literally, 'the camp of the priest'. The base form of the word meaning 'camp' is **kâal**. In (9b), however, this noun appears as **káaaī̄**[μ], with an overlong vowel and a High Fall to Mid specification for tone. These suprasegmental features are the exponents of the pertensive inflection. The noun **kâal** is in the pertensive because it has the possessor modifier **àbɔ́ʊn** 'priest'. The last noun, the possessor, is not morphologically marked; it appears in the base form – rather than in its pertensive form, which would be **àbɔ́ʊʊñ**[μ]. The noun **ɔ̄ɔt-jāaat̪** 'hospital:PRT' is the pertensive form of **ɔ̄ɔt-jāat̪** 'hospital'.[11] It is modified by the possessor modifier **káaaī̄**[μ] **àbɔ́ʊn**; this is why **ɔ̄ɔt-jāat̪** appears in the pertensive.

For singular nouns, there are in fact two pertensive forms: one used with singular possessors, and the other used with plural possessors. They are illustrated in (10) using the nouns **úgĭik** 'buffalo' in (10a,b,c), and **gwôk** 'dog' in (10d,e,f). For these two nouns, the pertensive with singular possessor and the one with plural possessor both have an overlong stem vowel, and they additionally involve tonal exponence. The grammatical number of the possessor is expressed through tone. If the possessor is plural, this is marked on the possessed term through the addition of a High tone target, which is added to the lexical specification for tone. Hence, **úgìiik**[μ], the pertensive form

---

11 This is a compound of the words **ɔ̄ɔt** 'house' and **jāat̪** 'plant, tree, medicine'.

used with a singular possessor, has a Low tone on its stem syllable (10b), but **úgĭiik**, which is followed by a plural possessor, has a Low Rise on its stem syllable (10c). Similarly, **gwôk** 'dog' has the High Fall to Mid when the possessor is singular (10e), whereas it has a High tone when the possessor is plural (10f). In this way, High Fall to Mid plus High yields High, and Low plus High yields Rise.[12]

(10) a. **dî̠=a úgĭik**
          EXSP:F buffalo
          'There is a buffalo.'

  b. **dî̠=a úgìiikᵘ   twɔ́ɔŋ**
      EXSP:F buffalo:PRT Twong
      'There is Twong's buffalo.'

  c. **dî̠=a úgĭiik   mʌ́ʌn**
      EXSP:F buffalo:PRT:P women
      'There is the women's buffalo.'

  d. **dî̠=a gwôk**
      EXSP:F dog
      'There is a dog.'

  e. **dî̠=a gwɔ́ook̄ᵘ twɔ́ɔŋ**
      EXSP:F dog.S:PRT Twong
      'There is Twong's dog.'

  f. **dî̠=a gwóook   mʌ́ʌn**
      EXSP:F dog.S:PRT:P women
      'There is the women's dog.'

The examples in (10) show that the tonal specification of the pertensive forms is determined by the number of the possessor, rather than by a contextual tone process: the singular possessor **twɔ́ɔŋ** (a person's name) and the plural noun **mʌ́ʌn** 'women' are identical in terms of tonal specification: both possessors are High-toned. The morphological rather than phonological nature of the tonal contrast is equally in evidence when the following possessors are Low-toned, as in (11).

(11) a. **dî̠=a úgìiikᵘ   bɔ̀ɔɔt̠-ɔ̀**
          EXSP:F buffalo:PRT craftsman
          'There is the craftsman's buffalo.'

  b. **dî̠=a úgĭiik   ɟì̀ı**
      EXSP:F buffalo:PRT:P people
      'There is the people's buffalo.'

  c. **dî̠=a gwɔ́ook̄ᵘ   bɔ̀ɔɔt̠-ɔ̀**
      EXSP:F dog.S:PRT.S craftsman-S
      'There is the craftsman's dog.'

  d. **dî̠=a gwóook   ɟì̀ı**
      EXSP:F dog.S:PRT.P people
      'There is the people's dog.'

In the case of plural nouns, there is only one pertensive form. For example, the plural noun **gwɔ́ook** 'dogs' has the pertensive **gwók-í**, which is used both with a singular possessor, e.g. **gwók-í bɔ̀ɔɔt̠-ɔ̀** 'the craftsman's dogs' and with a plural possessor **gwók-í ɟì̀ı** 'the people's dogs'

   The pertensive stem forms are also used when the possessor is expressed pronominally. Here again, the specification for tone on the possessed term marks the number of the possessor, e.g. **gwɔ́ook̄-ɛ̄** 'her/his dog' vs. **gwóook**

---

12 The same morphophonological processes can be found in the verb system. See Chapter 1, illustration (1), and associated discussion.

gɛ́n 'their dog'. Note that the specification for tone when the noun is marked by the singular pronominal suffix is the High Fall to Mid (**gwɔ́ook̄-ɛ̄**), just as in (11c), where the possessor noun in singular. Similarly, the stem carries a High tone when the noun is followed by a plural pronominal possessor (**gwóook gɛ́n**), just as in (11d), where the possessor noun is plural.

2.3 The construct state form and the proximal demonstrative

A fourth form in the inflectional paradigm of nouns is the construct state form. It is used in a variety of constructions in which the head noun is modified by a constituent that is neither a) a possessor (in which case the pertensive inflections are used), b) nor marked by **mɛ́ / mɔ́** (in which case the base form is used), and c) nor is it modified by a cardinal numeral (which also goes with the base form). One of these is illustrated in (12a), where the head noun is directly followed by an adjective. The same inflection is used when the noun is modified by a demonstrative (e.g. **gwɔ́ooŋ꞊àcà** 'that dog'), a verb modifier (**gwɔ́ooŋ mʌ̀ʌʌt̪-ɔ̀** 'the drinking dog'), or a restrictive relative clause.[13] The key characteristic distinguishing the construct state form from the pertensive is nasalisation of any root-final plosive. This can be seen from the comparison between the construct state form in (12a) and the pertensive with singular possessor form in (12b). Note that the forms of **gwôk** in (12a) vs. (12b) are identical but for the nasalization in (12a).

(12) a. **dî꞊a gwɔ́ooŋ dwɔ́ɔŋ**
        EXSP:F dog:CS big
        'There is a big dog.'

      b. **dî꞊a gwɔ́ook̄ᵘ twɔ́ɔŋ**
        EXSP:F dog:PRT Twong
        'There is Twong's dog.'

The proximal demonstrative inflection is found on the head noun of a noun phrase when proximal demonstrative represent the only modification, as in (13a). If there is any other modifier within the the noun phrase following the noun, the proximal demonstrative is expressed as a morpheme with segmental content, which is **ɛ̀n** if the head is grammatically singular, and **ɛ̀k** if the head is grammatically plural. These morphemes appear at the end of the end of the noun phrase, as in (13b). A noun inflected for proximal demonstrative differs from a noun inflected for construct state primarily in terms of tone, through the addition of a Low tone target. Added to the construct state form **gwɔ́ooŋ**, for instance, this results in a Late Fall specification for tone: **gwóooŋ̀ᵘ**. A second marker of the proximal demonstrative is floating quantity. This feature is phonetically realized only in a particular following context, which we

---

13 Non-restrictive relative clauses are marked by **mɛ́ / mɔ́**, which conveys indefiniteness.

describe in Section 3.3. If the word is in utterance-final position, as in (13), then floating quantity is not realized.

(13) a. **dî̠=a   gwóooɲ̍ᵘ**
          EXSP=F dog:DEM
          'There is this dog.'

      b. **dî̠=a   gwɔ́̍ooŋ à   têɛk   èn**
          EXSP=F dog:CS   REL strong DEM.S
          'There is this strong dog.'

Illustration (14) presents examples from a narrative illustrating the use of the construct state form. Here the noun **pâac** 'village' appears three times in this inflection, which is **pâaan**.[14] In (14a), this noun is modified by the definiteness-marking suffix **-ání**. Then, further on in the same narrative (14b), the same noun is modified by a restrictive relative clause and by an adjective.

(14) a.ˆ **pâaan-ání   à á-péekì ̠ì̠   ɲíkāaaŋɔ̄ kì   tjɛ̀ɛl-ì mâal**
           village:CS-DEF F PST-settle PRP Nyikango PRP leg-CS first
           'That (aforementioned) village is where Nyikango settled down first.'
           [TheDescendantsOfWaang 173.6-175.4]

      b.ˆ **á-pêekì=a   àjīɪcd̠áaɟ-ɔ̄**
           PAST-settle=F Ayijdhajo

           pâaan   à cwɔ̀lì-áa   pâaan   dwɔ́ɔŋ àjīɪcd̠áaɟ-ɔ̄ ànàn
           village:CS REL call:ITER-ARG village:CS big   Ayijdhajo now
           'He settled in Ayijdhajo, the village that is now called the big village Ayijdhajo.'
           [TheDescendantsOfWaang 179.9-183.1]

2.4 Inflection at the level of the noun phrase

The inflections listed in the previous sections are specific to nouns: they cannot be marked on members of any other word classes. In addition, there are two instances of morphological marking that occur on noun phrases, specifically on the rightmost constituent within the NP. As a consequence, they are most often found on nouns but they can also be marked on members of other lexical categories. One of these is the vocative; the other is the associative plural. In this chapter, we limit ourselves to describing their function. Section 2.4.1 deals with the vocative, and Section 2.4.2 with the associative plural. However, they are not included in the descriptive analysis of nominal morphological exponence in Sections 3 and 4, where the scope is restricted to inflectional marking specific to nouns.

---

14 This construct state form is irregular; the regular derivation would have been ***pâaaɲ**, i.e., with the same place of articulation as the base form **pâac**.

2.4.1 Vocative

The vocative is used when a noun phrase is used as a term of address. Its
use is illustrated by the narrative examples in (15). In (15a), the vocative
noun phrase is **jáaak gɔ́l** 'Men of this family!'. Without vocative marking, it
would have been **jáaak gɔ́l**ᵘ, with a Late Fall on the possessor (**gɔ́l**ᵘ), which
is inflected for proximal demonstrative. In (15b), **mʌ́ʌt̪** is a vocative form of
mâʌʌt̪ 'friend'. In both instances, the vocative contributes a High end target to
the tonal specification.

(15) a.ˆ **jáaak   gɔ́l   bá   kɛ̂t̪=wāa   bēɛ lît̪-í   ɟʌ́m-ì**
       men:PRT family:DEM:VOC HORT go.away=PR.1P.INC:N SUB look:INF-PRT.P things-P
       'Men of this family, let's go check out the things.'
       [TheDescendantsOfWaang 428.6-430.3]

      b.ˆ **cùŋ-í   mʌ́ʌt̪,   tɔ́ŋ kóʋ pùt̪**
       stand:2s friend:VOC spear PROH pull.out:2s
       'Wait my friend, don't pull out the spear!' [KeepTheSecret 56.1-58.2]

In the above examples, the vocative happens to be marked on nouns. However,
this is not invariably the case: vocative marking is found on whichever
constituent appears at the right edge of the noun phrase. This is illustrated in
Table 1. Note that the head noun **ɟùr** 'woman' is marked for vocative only if
it appears at the end of the noun phrase. Otherwise, the vocative is expressed
on the modifier at the right edge of the noun phrase, be it a verb, an adjective,
or a demonstrative. In each case, a High tone target is associated with the last
word. The combination of this High tone with a Low tone target yields a Low
Rise (e.g. **ɟùr** +´ > **ɟǔr**); when combined with a Low Fall, the result is a High
Rise (e.g. **têɛk** +´ > **těɛk**).

Table 1. Examples of the morphological marking of vocative in noun phrases in
which the final constituent belongs to different lexical categories.

NP final constituent	Noun phrase without vocative	Noun phrase with vocative	Translation of the vocative
Noun	**ɟùr**	**ɟǔr**	'Woman!'
Verb	**ɟùr à nèeen-ɔ̀**	**ɟùr à nèeen-ɔ̌ɔ**	'Woman who is watching!'
Adjective	**ɟùr à têɛk**	**ɟùr à těɛk**	'Strong woman!'
Demonstrative	**ɟùr àcà**	**ɟùr àcǎaa**	'Woman over there!'

In this way, the marking of vocative is appended to the right of the lexical-
morphological specification of the target syllable. Even if an NP-final noun
has a suffix already, the High target that marks vocative can be added on. In

addition, final vowels are lengthened in the vocative. For example, **wʌ́́ʌʌ̄-āa**
'son:PRT-1S' yields the vocative **wʌ́́ʌʌ̄-ǎaa** 'son:PRT-1S:VOC'. This is further
illustrated in Table 1 by **nèeen-ɔ̌ɔ** 'watch-INF:VOC'.

2.4.2 Associative plural

The associative plural serves the function of widening the scope of reference
from a referent to entities that belong with it or are conceptually similar to
it. A cross-linguistic analysis of this phenomenon can be found in Moravcsik
(2003). In Shilluk, the associative plural construction involves the constituent
jáā, which is followed by a noun phrase referring to the entity that is central
to the set. The final word in this noun phrase is morphologically marked for
associative plural. The phenomenon is illustrated in (16) by an example drawn
from a narrative. The associative plural expression is **jáā dǎɛɛŋ**. The base form
of the name 'Deng' is **dēɛŋ**, and **jáā dǎɛɛŋ** refers to Deng and his associates, in
this case his kinship group.

(16)ˆ **ácàaarɔ̀ pǎaa**   **jáā**   **dǎɛɛŋ**
Acaro   village:PRT:P group.of Deng:APL
'Acaro, the village of the people of Deng, […]' [DengsFish 4.5-8.1]

Cross-linguistically, associative plural constructions tend to be restricted to
human referents (Moravcsik 2003:472). In Shilluk, however, the functional
scope of the associative plural is not restricted in this manner. This is shown
by the narrative example in (17). The noun **àkwàrìcòoot-ɔ̀** refers to a
particular bitter herb, and **jáā àkwàrìcòoot-īi** extends the reference to the
wider set of herbs that it belongs to, i.e., to other bitter herbs.

(17)ˆ **jáā**   **àkwàrìcòoot-īi cɛ́k**   **kʌ́a gûuur-ɔ̀ ɔ̀**   **ɲí kîṭ-ì**   **kêɲ-ání**
group.of k.o.herb-APL   AUX:OV PRP:F grind-INF CONJ HAB carry-DEST place:CS-DEF
'Herbs like *akwaricoto* [a bitter kind of herb] were ground and then put on the place.'
[DownWithIllness 152.2-155.2]

So far, we have only considered the associative plural in noun phrases
consisting solely of the head noun, i.e., without any modifiers. Now we will
present evidence to support the interpretation that the associative plural is
marked on the final constituent in the noun phrase. Consider the noun phrase
bɔ̀ɔṭ-ì pâac 'craftsman of the village' in (18a). When this noun phrase appears
in an associative plural, the morphological marking appears on the possessor
pâac 'village', which is realized **pǎaac**, as in (18b).

(18) a. **dî̠ = a   bɔ̀ɔt̠-ì   pâac**
      EXSP = F craftsman-PRT.S village
      'There is a village craftsman.'

      b. **dî̠ = a   já̠ā   bɔ̀ɔt̠-ì   pǎaac**
      EXSP = F group.of craftsman-PRT.S village:APL
      'There is a village craftsman and his associates.'

The same is true when the final constituent in a noun phrase is not a noun.
This is illustrated in (19) for a noun phrase involving an adjective modifier.
In (19b), the adjective **tê̠ɛk** displays the morphological marking of associative
plural in the same way as the possessor **pâac** does in (18b).

(19) a. **dî̠ = a   bɔ̀ɔn̠-ì   tê̠ɛk**
      EXSP = F craftsman-CS strong
      'There is a strong craftsman'

      b. **dî̠ = a   já̠ā   bɔ̀ɔn̠-ì   tě̠ɛɛk**
      EXSP = F group.of craftsman-CS strong:APL
      'There is a strong craftsman and his associates.'

2.5 Conclusion

The inflections that are specific to nouns are pertensive, construct state,
and demonstrative. These are all instances of head-marking, i.e., they are
inflections on the head of the noun phrase, signposting a morphological
meaning in relation to a constituent within its own syntactic domain. This is
characteristic of Shilluk grammar as a whole: within the verb phrase as well,
the relations between the verb and its arguments are morphologically marked
primarily on the head (voice), rather than on the verb arguments (case).
Similar head-marking inflections on nouns have been reported for several
other West Nilotic languages, including Dinka (Andersen 2002) and Anywa
(Reh 1996).

Given the head-marking character of the inflectional morphology
of Shilluk, it is convenient that vocative and associative plural are not
(necessarily) marked on the noun. If vocative and associative plural were to
be marked on the head of the noun phrase, then they would be competing for
expression with the construct state and pertensive. In (19b), for example, the
noun meaning 'craftsman' would need to express both associative plural and
construct state. This would be problematic, in particular considering the fact
that Shilluk morphology is predominantly fusional rather than agglutinative.

3 Morphological exponence in the inflectional paradigm of singular nouns

In Section 2, we described the functions of the different forms in the nominal
paradigm. Now we will describe the patterns of morphological exponence
through which these inflections are expressed – here in Section 3 in relation

to singular nouns, and in Section 4 in relation to plural nouns. In relation
to singular nouns, five morphophonological parameters play a role in the
expression of these inflections: suffixation, vowel length, tone, floating
quantity, and nasalization of the stem coda. The role of each of these is
described in a dedicated subsection, and the final subsection, Section 3.6,
offers an overview of exceptions.

3.1 Suffixation

The great majority of singular nouns display one of two patterns: they may be
suffixless throughout the nominal paradigm introduced in Sections 2.1-2.3, or
they may be suffixed throughout this paradigm. In our dataset, which includes
over 900 singular nouns, roughly 60 percent of singular nouns are suffixless,
and most of the remainder are suffixed.[15] These two patterns are illustrated
in Table 2. The great majority of suffixed nouns carry the suffix **-ɔ** in the base
form, and in the inflected forms they have the suffix **-ɪ**. Suffixal marking in the
base form is described in Section 3.1.1; suffixal marking in the inflected forms
is described in Section 3.1.2.

Table 2. Illustration of the division between suffixless
and suffixed singular nouns.

	Suffixless		**Suffixed**	
Base	🔊	lwáak 'byre'	🔊	bɔ̀ɔɔṯ-ɔ̀ 'craftsman'
Pertensive (sg)	🔊	lwɑ̃́aak̄ᵘ	🔊	bɔ̀ɔṯ-ɪ̀
Pertensive (sg)	🔊	lwáaak	🔊	bɔ̀ɔṯ-ɪ́
Construct state	🔊	lwɑ̃́aaŋ	🔊	bɔ̀ɔṉ-ɪ̀
Demonstrative	🔊	lwáaaɲ̀ᵘ	🔊	bɔ̀ɔṉ-ɪ̀

There is only one other suffix that is found in the base form of singular nouns:
-ɪ̄ɪ, which is derivational, deriving instrument nouns from transitive verbs. Just
as nouns that have the suffix **-ɔ** in the base form, these derived nouns ending
in **-ɪ̄ɪ** also have the suffix **-ɪ** in the inflected forms. For example, **ŋíc-ɪ̄ɪ** 'symbol-
NOM' has the pertensive form **ŋɪ́c̄-ɪ̄**. In contrast, suffixless nouns do not take
a suffix in the base form, nor in the inflections listed in Table 2. However,

---

15 Exceptions to these patterns will be described further along in this section.

all nouns take suffixes marking pronominal possessors. We will describe this system in Section 3.1.3.

If we consider suffixation in the base and in the inflected forms as independent factors, there are actually four different possible combinations: a) suffixless both in base and in inflections; b) suffixless in base but suffixed in inflections; c) suffixed in base but not in inflections; and d) suffixed both in base and inflections. In fact, all four of these combinations are attested. Each of them is illustrated by an example in Table 3. However, as noted at the beginning of this section, almost all nouns are either suffixless throughout or suffixed throughout. The other two patterns are very rare: we know of 23 nouns that are suffixless in the base form but suffixed in inflections, and seven that are suffixed in the base form but suffixless in inflections. We treat these patterns as exceptional, and discuss them in Sections 3.6.2 and 3.6.4, respectively.

Table 3. Illustration of the orthogonal crossing between suffixation in base and suffixation in the inflected forms.

| | | | Base | |
			Suffixless	Suffixed
Inflected forms	Suffixless	Base	lʊ̀ʊt̪ 'stick'	tôoor-ɔ̀ 'socket'
		Pertensive (sg)	lʊ̀ʊʊt̪ᵘ	tôoorᵘ
		Construct state	lʊ̀ʊʊn̪	tôoor
	Suffixed	Base	kĭtᵘ 'mountain'	lɛ̀ɛɛl-ɔ̀ 'pebble'
		Pertensive (sg)	kìt-ì	lɛ̀ɛl-ì
		Construct state	kìn-ì	lɛ̀ɛl-ì

3.1.1 Suffixal marking in the base form of singular nouns

In relation to suffixed singular nouns, the suffix **-ɔ** is found with either Low, Mid, or High specification for tone, i.e., **-ɔ̀,-ɔ̄,-ɔ́**. But the specifications for tone on this suffix are not orthogonally crossed with specifications for tone on the stem syllable. Table 4 lists, for each specification for tone on the suffix, which specifications are attested on the preceding stem syllable. As seen from this table, each specification for tone on **-ɔ** combines with between two and four specifications for tone on the stem syllable: **-ɔ̀** occurs with Low, Low Fall, High Fall, and Late Fall on the stem; **-ɔ̄** occurs with Mid and High Fall to Mid, Mid; and **-ɔ́** combines with Low Fall, Low, Mid, and High.

Table 4. Illustrations of the specifications for tone on the stem syllable that are attested with different specifications for tone on the the suffix **-ɔ**.

	-ɔ̀ (Low)	**-ɔ̄ (Mid)**	**-ɔ́ (High)**
Common	**bɔ̀ɔɔṭ-ɔ̀** 'craftsman'	**ɟáaak̄-ɔ̄** 'chief'	**bjêeel-ɔ́** 'sorghum plant'
	mûn-ɔ̀ 'neck'	**bwōɲ-ɔ̄** 'Arab(s)'	**pʌ̀ʌʌt-ɔ́** 'bark'
	tɛ́l-ɔ̀ 'owl'		**àpāk-ɔ́** 'wave'
Rare	**káaak-ɔ̀** 'island'		**dɔ́ɔɔr-ɔ́** 'axe'

Approached the other way around, each specification for tone on the stem combines either with one or with two specifications for tone on **-ɔ**. This is shown in Table 5. If the stem syllable of a noun suffixed with **-ɔ** has the High Fall, then the following **-ɔ** suffix invariably has the Low tone. Similarly, High Fall to Mid on the stem invariably goes with Mid on the following **-ɔ**. If the stem syllable has either the Low, the Low Fall or the High, the suffix **-ɔ** can have carry either Low or High tone. Finally, Mid-toned stem syllables combine with Mid and High tone on the suffix **-ɔ**.

Table 5. Illustrations of the specifications for tone on the suffix **-ɔ** that are available for different specifications on the stem syllable.

Tone on stem	Attested specifications on suffix -ɔ
Low	**bɔ̀ɔɔṭ-ɔ̀** 'craftsman', **pʌ̀ʌʌt-ɔ́** 'bark'
Low Fall	**mûn-ɔ̀** 'neck', **bjêɛɛl-ɔ́**
High Fall	**tɛ́l-ɔ̀** 'owl'
High Fall to Mid	**ɟáaak̄-ɔ̄** 'chief'
Mid	**bwōɲ-ɔ̄** 'Arab(s)', **àpāk-ɔ́** 'wave'
High	**káaak-ɔ̀** 'island', **dɔ́ɔɔr-ɔ́** 'axe'

It is worthwhile to note that there are no suffixed singular nouns with a Low Rise or a High Rise on the stem syllable, even though these specifications are found on suffixless nouns. That is, nouns **pʌ̀ʌʌt-ɔ́** 'bark' and **bjêeel-ɔ́** 'stalk of grain' may be phonetically realized with rising F0 on the stem syllable. Crucially, however, there is no evidence of contrast between **CV̂C-ɔ́** and **CV̌C-ɔ́**, and likewise between **CV̂C-ɔ́** and **CV̌C-ɔ́**.

Aside from **-ɔ**, the base form may alternatively end in the suffix **-īī**. This is a derivational suffix, yielding instrument nouns derived from transitive verbs (e.g. **ŋíc-īī** 'marker, symbol' < {ŋìc} 'recognize', and **kóook-īī** 'reward, payment' < {kɔ̀ɔk} 'pay to'). The combination of tonal specifications of stem syllable and suffix – High on stem, Mid on suffix – is particular to this

derivation: as noted in relation to Table 4, if a noun ending in **-ɔ** has a Mid tone on the suffix, then the stem syllable carries either the High Fall to Mid tone or the Mid tone, but not a High tone. In the inflected forms, singular nouns whose base forms end in **-īɪ** carry the suffix **-ɪ**, just as singular nouns that end in **-ɔ** do. For example, **kóook-īɪ** 'reward' yields pertensive with singular possessor **kɔ́oŋ-ī**, just as **ɟáaāk-ɔ̄** 'chief' yields **ɟáaŋ-ī** in the same inflection.

3.1.2 Suffixal marking in inflected forms (apart from pronominal possession)

Leaving aside the pronominal marking of possession – we will go into it in Section 3.1.3 – suffixed singular nouns have the suffix **-ɪ** in all of their inflected forms. The specification for tone on this suffix is determined completely by the morphology in some inflections, whereas in others there is an interaction between the morphological specification and the tonal specification of the stem syllable, in other words, the stem's lexical specification.

The suffix **-ɪ** is invariably Low-toned in the demonstrative, and High-toned in the pertensive with plural possessor, whatever the specification for tone on the stem syllable. This is illustrated in Table 6. In contrast, in the pertensive with singular possessor and in the construct state, the specification for tone of the suffix **-ɪ** is predictable from the tone of the stem: it is Low-toned following a stem that carries a Low or a Low Fall, and Mid-toned following a stem that carries a Mid or a High Fall to Mid – these four being the only specifications for tone the stem can carry in the pertensive with singular possessor and in the construct state. In other words, the tone on the suffix **-ɪ** in pertensive (sg) and construct state matches the end target of the tonal specification of the preceding stem syllable. This is illustrated in Table 6, which shows the construct state forms **tîm-ɪ̀**, with a Low-toned suffix following the Low Fall, and **wún̄-ī**, with a Mid-toned suffix following the High Fall to Mid. The tonal alternations of the stem syllable in the inflected forms will be laid out in Section 3.4.

Table 6. Illustrations of the relation between tone on the suffix **-ɪ** and tone on the stem syllable.

	Low Fall on stem	High Fall to Mid on stem
Base	**tîp-ɔ́** 'shadow'	**wún̄-ɔ̄** 'tethering rope'
Pertensive (sg)	**tîp-ɪ̀**	**wún̄-ī**
Pertensive (pl)	**tîp-í**	**wún-í**
Construct state	**tîm-ɪ̀**	**wún̄-ī**
Demonstrative	**tîm-ɪ̀**	**wún-ɪ̀**

3.1.3 Suffixal marking of pronominal possession

All singular nouns, i.e., whether they belong to a suffixless paradigm or a suffixed one, take suffixal markers to express pronominal possession for certain combinations of person, number and clusivity. These paradigms are illustrated in Table 7, in relation to the nouns in Table 2 above. The pronominally marked forms are based on the pertensive inflections. This can be seen from Table 7: note that the pronominally marked forms (e.g. **lwá̱aak̄-āa**, **bɔ̀ɔt̪-āa**) display the same level of vowel length as the pertensive inflections (e.g. **lwá̱aak̄**, **bɔ̀ɔt̪-ɪ̀**), as opposed to the level of vowel length of the base form (**lwáak**, **bɔ̀ɔɔt̪-ɔ̀**). Moreover, the forms marked for a singular pronominal possessor (e.g. **lwá̱aak̄-āa**, **bɔ̀ɔt̪-āa**) display the same specification for tone on the noun stem as the pertensive with singular possessor (**lwá̱aak̄**, **bɔ̀ɔt̪-í**). And likewise, the forms marked for plural pronominal possessors – e.g. **lwáaak-έɛ**, **bɔ̀ɔt̪-έɛ** – display the same specification for tone on the noun stem as the pertensive with a plural nominal possessor: **lwáaak**, **bɔ̀ɔt̪-í**.[16]

Table 7. Illustration of the expression of pronominal possession on suffixless and suffixed singular nouns.

	Suffixless	Suffixed
Base	lwáak 'byre'	bɔ̀ɔɔt̪-ɔ̀ 'craftsman'
Pertensive (sg)	lwá̱aak̄ᵘ	bɔ̀ɔt̪-ɪ̀
Pertensive (pl)	lwáaak	bɔ̀ɔt̪-í
1st sg	lwá̱aak̄-āa	bɔ̀ɔt̪-āa
2nd sg	lwá̱aak̄-ɪ̄ɪ	bɔ̀ɔt̪-ɪ̄ɪ
3rd sg	lwá̱aak̄-ɛ̄	bɔ̀ɔt̪-ɛ̀
1st pl incl	lwáaak-έɛ	bɔ̀ɔt̪-έɛ
1st pl excl	lwáaak wɔ́n	bɔ̀ɔt̪-í wɔ́n
2nd pl	lwáaak wún	bɔ̀ɔt̪-í wún
3rd pl	lwáaak gén	bɔ̀ɔt̪-í gén

We interpret as inflectional the expression of pronominal possession when the number is singular, and also in the 1st plural inclusive. Note how, in suffixed paradigms, the suffixes marking 1st, 2nd, and 3rd sg., and also the

---

16 The tonal alternations of the stem syllable in the inflected forms will be laid out in Section 3.4.

one marking 1st pl. incl., appear instead of the pertensive suffixes **-ì/-ī** (sg) and **-í** (pl). We interpret this interaction with the stem as an indication of the inflectional nature of this juncture. We do not consider to be inflectional the pronominal expression of 1st plural exclusive, 2nd plural and 3rd plural, i.e., **wɔ́n**, **wún**, **gɛ́n**. These free pronominal forms combine with the full form of the pertensive with plural possessor. Moreover, the pronominal expression of 1st plural exclusive, 2nd plural and 3rd plural is identical to the independent pronouns used as clause arguments. In contrast, 1st singular **-āa**, 2nd singular **-īı**, 3rd singular **-è/-ē**, and 1st plural inclusive **-ɛ́ɛ** are different from the corresponding independent pronouns used as clause arguments, which are **ján**, **jín**, **ɛ́n**, and **wāa**, respectively.

For the possessor-marking suffixes 1st singular **-āa**, 2nd singular **-īı**, and 1st plural inclusi**ve -ɛ́ɛ**, the specification for tone is fixed. In the case of 3rd singular **-è/-ē**, however, there is a tonal alternation. The allomorphy is determined in the same way as for **-ì/-ī** in pertensive (sg) and construct state (cf. Section 3.1.2): the Low-toned allomorph follows stems that carry Low and Low Fall, and the Mid-toned allomorph follow stems that carry Mid or High Fall to Mid.[17] Hence we find **bɔ̀ɔt̪-ì kùl** 'Kul's craftsman' and **bɔ̀ɔt̪-è** 'her/his craftsman', both with Low-toned suffixes, but **ɟáaŋ-ī** 'Kul's chief' and **ɟáaŋ-ē** 'her/his chief', both with Mid-toned suffixes.

3.2 Vowel length

Singular nouns follow one of three patterns of length alternation in their inflectional paradigms (Remijsen, Miller-Naudé & Gilley 2015). We will lay out these patterns first in relation to suffixless nouns, and then in relation to suffixed nouns. The patterns of vowel length alternation in suffixless singular nouns are illustrated in Table 8. First, the stem vowel in the base form may be long (VV), as it is in the case of **māac** 'fire' in Table 8. All such nouns have an overlong stem vowel (VVV) in the inflected forms, which are illustrated here by the pertensive with singular possessor. Nouns that follow this pattern can be referred to as Long nouns. In contrast, if the stem vowel in the base form is short (V), there are two possibilities. For some nouns, the stem vowel remains short throughout its inflectional paradigm. The noun **líɲ** 'war' illustrates this pattern. These nouns can be referred to as Fixed Short. For other nouns with a short vowel in the base form, the stem vowel becomes overlong (VVV) in the inflected forms, as in the case of **bâk** 'garden'. These are the Short with Grade nouns.

---

17 Low, Low Fall, Mid, and High Fall to Mid are the only specifications for tone that can be found on the stem syllable in the pertensive with singular possessor.

Table 8. The three patterns of vowel length alternation in the stem syllable of suffixless singular nouns, each illustrated by one noun: **líɲ** 'conflict', **bâk** 'garden', and **māac** 'fire'.

	Fixed short (V~V)	Short with grade (V~VVV)	Long (VV~VVV)
Base	🔊 líɲ	🔊 bâk	🔊 māac
Pertensive, sg. poss	🔊 líɲ̄ᵘ	🔊 bâaakᵘ	🔊 māaacᵘ

Whether a suffixless singular noun with a short stem vowel in the base form is Fixed Short or Short with Grade is predictable on the basis of its vowel quality: if the vowel is /a/ or /ʌ/, i.e., if the vowel is low (open), then the paradigm is Short with Grade, and the same is true when the onset of the stem syllable is complex and includes a semivowel (/w/ or /j/). Otherwise, if the stem vowel is neither low nor preceded by a complex onset involving a semivowel, then the paradigm is Fixed Short.[18]

The other way around, i.e., approached from an inflected form such as the pertensive (sg), it is impossible to predict whether a form with an overlong vowel that either has the quality /a/ or /ʌ/ or is preceded by a complex onset with a semivowel is part of a Short with Grade paradigm – and therefore has a short stem vowel in the base form – or rather part of a Long paradigm – in which case the base form has a long stem vowel. For example, whereas the pertensive (sg) **māaacᵘ** goes with the base form māac, there is no way to predict that the base form is **māac** and not ***māc**.

Suffixed singular nouns display the same three patterns of vowel length alternation in the stem syllable as suffixless singular nouns, i.e., Fixed Short, Short with Grade and Long. This is illustrated in Table 9. Note that **pîc-ɔ̀** 'tethering pole' has a short vowel throughout its paradigm. This is the Fixed Short pattern. In Short with Grade suffixed nouns, such as **pâaal-ɔ̀** 'knife' in Table 9, the stem vowel alternates in length between short and overlong. The stem vowel is short in the inflected forms, and overlong in the base. Finally, if the stem vowel of a suffixed noun is long in the inflected forms, then it will be overlong in the base form. This is the Long pattern, illustrated in Table 9 by **pʌ̀ʌʌt-ɔ́** 'bark'.

---

18 We know of one exception to this generalization. The noun **bác** 'amniotic sac' has a short vowel in the stem, and a vowel /a/, and yet it is Fixed Short: the pertensive (sg) is **bấcᵘ** and the construct state **báɲ̀**.

Table 9. The three patterns of vowel length alternation in the stem syllable of suffixed singular nouns, each illustrated by one noun.

	Fixed Short (V~V)	**Short with Grade** (V~VVV)	**Long** (VV~VVV)
Base	**pîc-ɔ̀** 'tethering pole'	**pâaal-ɔ̀** 'knife'	**pʌ̀ʌʌt-ɔ́** 'bark'
Pertensive, sg. poss.	**pîc-ì**	**pâl-ì**	**pʌ̀ʌt-ì**
Construct state	**pîɲ-ì**	**pâl-ì**	**pʌ̀ʌn-ì**

As in suffixless nouns, the Long pattern of alternation is found with any vowel quality, whereas whether a noun is Fixed Short or Short with Grade is predictable on the basis of vowel quality and the composition of the onset of the stem syllable. If, in the inflected forms, a short stem vowel is open, i.e., /a/ or /ʌ/, or if it is preceded by a complex onset, with semivowel /j/ or /w/, then the corresponding base form has an overlong vowel (Short with Grade). Otherwise, the stem vowel in the base form is short (Fixed Short).

The vowel length alternation works the same way in nouns carrying the other suffix that is found in singular base forms, that is, in instrument nouns ending in **-īɪ** (cf. Section 3.1.1). In the paradigms of those nouns as well, if the base form has an overlong stem vowel, then the inflected forms have either a long or a short stem vowel. For example, **góooc-īɪ** 'machete' has the construct state form **gɔ́oɟ-ī**, and **lʌ́ʌʌt̪-īɪ** 'spindle' has the construct state form **lʌ́ʌ̪n̪-ī**. The pattern of quantity alternation (Fixed Short, Short with Grade, Long with Grade) in the inflected forms of such instrument nouns is the same as that of the transitive verb from which the instrument noun is derived (cf. Remijsen, Miller-Naudé & Gilley 2016).

Comparing the length of the stem vowel in suffixed and suffixless noun paradigms, the patterns of alternation between base form and inflected forms are the exact opposite. That is, the suffixless nouns are in the short grade in the base form, and lengthen in inflected forms (unless the paradigm is Fixed Short). This is illustrated in the top half if Table 10. The suffixed singular nouns, in contrast, are in the short grade in the inflected forms and lengthen in the base form (unless the paradigm is Fixed Short), as seen from bottom half of Table 10. So, suffixed singular nouns display the same three patterns of quantity alternation in the stem vowel as sufixless singular nouns (Fixed Short, Short with Grade, Long), but the direction of the alternation between the base and the inflected forms is the reverse.

Table 10. The relation between stem vowel length alternation and suffixation in singular noun paradigms, illustrated by **ḍɔ́k** 'mouth', **káŋ** 'trumpet', **gʌ̀ʌt** 'riverbank', **pîc-ɔ̀** 'tethering stick', **pâaal-ɔ̀** 'knife', **bɔ̀ɔɔṭ-ɔ̀** 'craftsman'.

		Fixed Short (V~V)	Short w. Grade (V~VVV)	Long (VV~VVV)
Suffixless	base	ḍɔ́k	káŋ	gʌ̀ʌt
	pert, sg poss	ḍ̪ɔ́k̚ᵘ	kâaaŋ̄ᵘ	gʌ̀ʌʌt̚ᵘ
Suffixed	base	pîc-ɔ̀	pâaal-ɔ̀	bɔ̀ɔɔṭ-ɔ̀
	pert, sg poss	pîc-ì	pâl-ì	bɔ̀ɔṭ-ì

It is worthwhile to note that the same three patterns of quantity alternation or the lack of it, i.e., Fixed Short, Short with Grade, Long with Grade are also found in the inflectional paradigms of verbs and adjectives. This is illustrated in Table 11.

Table 11. The three patterns of length alternation that are found for the stem vowel in transitive verbs and in adjectives, illustrated by the verbs {ŋɔ̀l} 'cut', {càm} 'eat', and {lèɛŋ} 'throw', and by the adjectives **mêt** 'tasty', **wâc** 'sour', **pêɛt** 'smelling badly'.

		Fixed Short (V~V)	Short w. Grade (V~VVV)	Long (VV~VVV)
Transitive verbs	INF.A	ŋɔ́l	cám	léɛŋ
	INF	ŋɔ̀l-ɔ̀	càaam-ɔ̀	léɛɛŋ-ɔ̀
Adjectives	base	mêt	wâc	pêɛt
	CTG	ʊ̀-mɛ̀t-ɔ̀ɔ	ʊ̀-wàaac-ɔ̀ɔ	ʊ̀-pɛ̀ɛɛt-ɔ̀ɔ

Across the morphological paradigms of different word classes, stem forms followed by the suffixes **-ɔ** and **-ɔɔ** go with an overlong vowel in the stem, and stem forms followed by the suffix **-ɪ** never do (i.e., they have either a short vowel or a long one). Both generalisations are specific to content words that display a morphological alternation in vowel length, i.e., they do not apply if the paradigm is Fixed Short or Fixed Overlong.[19]

3.3 Floating quantity

The notion of floating quantity refers to a weight unit or mora (μ) that is not associated with any segmental content, and that associates across a word boundary, giving rise to increased duration of a vocalic prefix in the following

---

19 Fixed Overlong is an exceptional pattern of vowel length alternation in inflectional noun paradigms, found in a handful of nouns. It is described in Section 3.6.5.

word (Remijsen 2018). This weight unit is an instance of morphological marking, that is, it is part of morphological exponence. In the inflectional paradigm of suffixless singular nouns, it is found in two inflections: the demonstrative (Section 3.3.1), and the pertensive with singular possessor (3.3.2). Finally, we show that floating quantity is unattested in the pertensive with plural possessor and in the construct state (Section 3.3.3). Floating quantity is not found in suffixed singulars.

3.3.1 Floating quantity in the demonstrative inflection

Illustration (20) displays the base form (20a,b) and the demonstrative form (20c,d) of the noun **kùl** 'warthog'. In utterance-final context (20a,c), the two forms are phonetically indistinguishable in terms of segmental composition and quantity. The reader can assess this by playing the embedded sound examples. However, in the context of a following prefix **á-**, a past-tense marker, there is a difference in quantity: the prefix **á-** has a greater duration when it follows the demonstrative inflection (20d) than when it follows the base form (20b). This can be ascertained by listening to the embedded sound clips. In the embedded sound examples, the duration of the /á-/ prefix is 101 milliseconds (ms) in (20b), and 136 milliseconds in (20d).

(20) a. **[dàa   kùl]**
          dî = a   kùl
          EXSP = F warthog
          'There is a warthog.'

      b. **[kùl   álîɪɖà]**
          kùl   á-lîɪʈ-à
          warthog PST-look.at-1S
          'I looked at the warthog.'

      c. **[dàa   kùl]**
          dî = a   kùl$^\mu$
          EXSP = F warthog:CS:DEM
          'There is this warthog.'

      d. **[kùl   ăalîɪɖà]**
          kùl$^\mu$ **á-lîɪʈ-à**
          warthog:CS:DEM PST-look.at-1S
          'I looked at this warthog.'

We refer to the quantity that is realized on the following vocalic prefix as floating quantity, along the lines of the concept of floating tone (Welmers 1970, McKendry 2013). Just as a floating tone in a language like Mixtec, the realization of floating quantity in Shilluk is contingent on a docking site to the right, beyond the word domain, and it is not realized otherwise.[20] We represent it using the superscript **µ** (mora), as in **kùl**$^\mu$ 'warthog:CS:DEM' in

---

20 Floating morae have been postulated before: see e.g. Hyman & Byarushengo (1984) on Haya, and van den Heuvel (2006) on Biak. A salient difference between the Shilluk phenomenon on the one hand and the phenomena reported in earlier studies is that only in Shilluk the floating weight unit is dependent for its realisation on a docking site across a word boundary. In contrast, in Haya and in Biak floating quantity associates within the same word.

(20c,d). Measurements of the duration of the **á-** prefix following a noun that has floating quantity are around 40 percent longer, on average, than following a noun that does not have floating quantity.

Aside from vowel duration, there is also a difference in melody between (20b) and (20d). The fundamental frequency (F0) starts rising from the end of the stem vowel in the base form **kùl** (20b), but only from the beginning of the prefix **á-** in the case of the demonstrative inflection **kùl**ᵘ (20d). It appears that the floating quantity invariably carries through the specification for tone from the preceding stem syllable, for example, a Low tone after stem syllable that carries a Low or a Low Fall. For this reason, we do not postulate a tonal specification associated with the floating quantity.[21]

The demonstrative inflection is marked on nouns that are at the right edge of the noun phrase. In clause-initial position, the following constituent is therefore typically a verb. In addition to the Past tense marker **á-**, the other vocalic tense-aspect-modality prefixes, that is, **ò-** for Imperfective and **ó-** for Future and Non-Evidential Past, also accommodate floating quantity. This is shown in (21), again contrasting base forms of nouns with corresponding demonstrative forms.[22] The durations of the following prefix /ʊ-/ in (21a,c,e) are 93, 84 and 96 milliseconds, respectively; the corresponding durations of the same prefix in (21b,d,f), where floating quantity is involved, display durations of 147, 156, and 118 milliseconds.

(21) a. **[kùl   ólîːɳɖà]**
          kùl   ó-lîːɳʈ-à
          warthog FUT-look.at-1S
          'I will look at the warthog.'

      b. **[kùl   ʊ̆ʊlîːɳɖà]**
          kùlᵘ   ó-lîːɳʈ-à
          warthog:CS:DEM FUT-look.at-1S
          'I will look at this warthog.'

      c. **[kùl   ólîːɳɖɔ̀]**
          kùl   ó-lîːɳʈ-ɔ̀
          warthog NEVP:OV-look.at
          'Smb. apparently looked at the warthog.'

      d. **[kùl   ʊ̆ʊlîːɳɖɔ̀]**
          kùlᵘ   ó-lîːɳʈ-ɔ̀
          warthog NEVP:OV-look.at
          'Smb. apparently looked at this warthog.'

      e. **[kùl   òlîːɳɖɔ̀]**
          kùl   ò-lîːɳʈ-ɔ̀
          warthog IMPF-look.at
          'Smb. is looking at the warthog.'

      f. **[kùl   ʊ̀ʊlîːɳɖɔ̀]**
          kùlᵘ   ò-lîːɳʈ-ɔ̀
          warthog IMPF-look.at
          'Smb. is looking at this warthog.'

---

21 In this context, it is worthwhile to note that the tone-bearing unit in Shilluk is the syllable rather than the mora (cf. Remijsen & Ayoker 2014:443).

22 For the Future tense forms (21a,b), we illustrate using forms that display with 1st singular person marking, just as we did in (20) in relation to the Past tense. The Non-Evidential Past and Imperfective forms cannot display subject marking.

In contrast, if the verb is in the No Tense form, which does not involve a TAM prefix, then the floating quantity is not realised. This is illustrated by the sound examples in (22a,b) in relation to a consonant-initial stem.

(22) a. **kùl   mâar   a nˈɪ́ɪ̄ɲ**
      🔊 warthog love:NT F sleep:INF
          'The warthog loves to sleep.'

      b. **kùlᵘ   mâar   a nˈɪ́ɪ̄ɲ**
      🔊 warthog:CS:DEM love:NT F sleep:INF
          'This warthog loves to sleep.'

Floating quantity equally cannot dock across a word boundary onto a vowel-initial stem. This is illustrated in (23b), where the demonstrative inflection is followed by the No Tense form of an onsetless verb stem.[23] Here as well, the floating quantity of the demonstrative inflection is not realized: there is no audible difference between (23a) and (23b) in the duration of the vowel of the verb stem as a function of floating quantity. As a result, the difference between the demonstrative inflection and the base form is not realized in any way in (23). It should be noted that verbs that lack an onset are extremely rare: {òr} 'send' is the only such verb we know of.

(23) a. **kùl   ő̄r̄   a wʌ̂ɲ-ɔ̀**
      🔊 warthog send:NT F letter
          'The warthog sends a letter.'

      b. **kùlᵘ   ő̄r̄   a wʌ̂ɲ-ɔ̀**
      🔊 warthog:CS:DEM send:NT F letter
          'This warthog sends a letter.'

Following the verb, a noun carrying a floating mora may be followed by an adverb that begins with a vocalic prefix (in the sense introduced in Section 1.3), such as **áwàa** 'yesterday', **átīní** 'earlier on same day', and **ácɔ̄ɔɔn** 'this morning'. These equally display increased duration under the influence of the floating mora.

   In summary, the demonstratives of suffixless singulars are marked by a floating mora. This mora can dock only on the vocalic prefix of a following word, in which case this prefix displays increased duration.

3.3.2 Floating quantity in pertensive with singular possessor

Like the corresponding demonstrative inflection, the pertensive with singular possessor of suffixless singular nouns also displays floating quantity. When floating quantity marks pertensive with singular possessor, however, its ability to dock across a word boundary is more restricted. Nouns inflected for pertensive (sg) are invariably followed by a modifier noun phrase which expresses the possessor. Within this noun phrase, the head noun is in initial position. If this possessor noun has a vocalic prefix

---

23 Underlining marks argument focus.

with vowel quality /a/ and specified for High tone, then the floating quantity of the pertensive (sg) can dock. This scenario is illustrated in (24a), where the name **ábác** follows the pertensive (sg) inflection of the suffixless noun **gɔ̂ɔt** 'corner'. Illustration (24b) is included for the sake of comparison; here **ábác** is the internal argument of a verb in subject voice, and this verb form (**á-lîīɳṭ**) does not have floating quantity. Crucially, the initial vowel of **ábác** sounds saliently longer following the pertensive (sg) **gɔ̂ɔtᵘ** in (24a) than after the verb in (24b). This is evidenced by the embedded sound examples. The duration of the initial /á/ in **ábác** is 120 ms in (24a), where it is affected by floating quantity, and 87 ms in (24b), where it is not.

(24) a. **[dàa   gɔ̀ɔɔt   ăabác]**
          dî = a   gɔ̂ɔɔtᵘ   á-bác
          EXSP = F corner:PRT FEM-amniotic.sac
          'There is the corner of Abac.'

      b. **[álîīɖ   ábác]**
          á-lîīɳṭ   á-bác
          PST-look.at:FUG FEM-amniotic.sac
          'S/he went to look at <u>Abac</u>.'

The intial vowel of **ábác** is a prefix, marking the derivation of a woman's name.[24] However, the fact that the **á-** can indeed be analysed as a prefix does not matter for the docking of floating quantity. As explained in Section 1.3, we interpret all vowels preceding the closed monosyllabic stem as prefixes.

In the case of the demonstrative form of singular suffixless nouns, any following vocalic prefix is a docking site for floating quantity. In relation to the pertensive (sg), floating quantity can only dock if a) the vowel phoneme of the vocalic prefix is /a/, and b) that prefix carries a High tone. The importance of these conditioning factors is illustrated in Table 12 and the associated sound examples. The first condition, i.e., that the vowel needs to be /a/, is illustrated in the top row by the pair **á-tɔ̀r** 'Ator' vs. **ú-tɔ̀r** 'Otor'. These are personal names, for a woman and a man respectively, both derived from **tɔ̀r** 'wilderness' through prefixation. Vowel quality is the only feature that distinguishes them. Playing the sound files, the reader can ascertain that this factor is critical. In the case of **á-tɔ̀r**, where the /á-/ constitutes a docking site, the duration of this prefix vowel is 120 ms following **gɔ́l̄ᵘ** 'compound. PRT' and 108 ms following **páaal̄ᵘ**. In the case of **ú-tɔ̀r**, where the /ú-/ does not represent a docking site, the duration of the /ú-/ is 68 ms following **gɔ́l̄ᵘ** 'compound.PRT' and 57 ms following **páaal̄ᵘ**.

---

24 The name **ábác** 'Abac' is a woman's name, referring to a person who is born with the amniotic sac (**bác**) around her.

Table 12. Junctures between the pertensive (sg) forms **gɔ́ĺ**ᵘ 'compound:PRT' and **páaaĪ**ᵘ 'spoon:PRT' and four possessor terms in which the floating quantity can vs. cannot dock onto a following vocalic prefix.

Floating quantity can dock			Floating quantity cannot dock		
[gɔ́Ī	/ páaaĪ	ǎatɔ̀r]	[gɔ́l	/ páaal	útɔ̀r]
gɔ́Ī ᵘ	/ páaaĪ ᵘ	á-tɔ̀r	gɔ́Ī ᵘ	/ páaaĪ ᵘ	ú-tɔ̀r

house:PRT / spoon:PRT FEM-wilderness
'The house / spoon of Ator.'

house:PRT / spoon:PRT MAL-wilderness
'The house / spoon of Otor.'

[gɔ́Ī	/ páaaĪ	ǎabác]	[gɔ́Ī	/ páaaĪ	àcʌ̀k]
gɔ́Ī ᵘ	/ páaaĪ ᵘ	á-bác	gɔ́Ī ᵘ	/ páaaĪ ᵘ	à-cʌ̀k

house:PRT / spoon:PRT FEM-amniotic.sac
'The house / spoon of Abac.'

house:PRT / spoon:PRT NOM-compose
'The house / spoon of the composer.'

The second condition is that the specification for tone of the following prefix has to be High. This is illustrated by **à-cʌ̀k** 'composer (NOM-compose)'. Even though the vowel is /a/, the prefix does not display a salient increase in duration: its duration in the embedded example is 96 ms following **gɔ́Ī**ᵘ and 86 following **páaaĪ**ᵘ. This indicates that the floating mora cannot dock.

3.3.3 No floating quantity in pertensive with plural possessor and construct state

As described in Section 2, the other two inflected forms that are specific to nouns are the pertensive with plural possessor and the construct state. These do not display floating quantity at all. The examples in Table 13 illustrate this in relation to the pertensive (pl). This table and the associated sound examples contrast the pertensive (sg) and pertensive (pl) forms of **pâac** 'village', which are **pāaar**ᵘ and **pǎaar**, respectively.[25] Following the pertensive (sg) form **pāaar**ᵘ, which has floating quantity, the initial /a/ of **álāal** has a duration of 151 ms; in contrast, following the pertensive (pl), the initial /a/ of **álʌ̀lì** is only 108 ms long. This represents evidence that pertensive (sg) **pāaar**ᵘ has floating quantity, whereas pertensive (pl) **pǎaar** does not. There is also a difference in tone: the floating quantity in the pertensive (sg) carries the specification for Mid tone from the preceding stem syllable, and this Mid tone replaces the specification for High tone on the initial syllable of **álāal**. That is, from the end of the vowel

---

25 The paradigm of the noun **pâac** 'village' is irregular. It is discussed in Section 3.6.6.

of **pāaar**ᵘ to the middle of the vowel of the initial /a/ in **álāal**, the F0 remains virtually unchanged – the actual values are 150 Hz and 146Hz. In the case of **pǎaar álʌ̂lì**, F0 increases by 20 Hz over the same domain (156 Hz to 176 Hz).

Table 13. The pertensive (sg) form **pāaar**ᵘ 'village:PRT' and the pertensive (pl) form **pǎaar** 'village:PRT:P', with different possessors.

Pertensive (sg): floating quantity			Pertensive (pl): no floating quantity		
🔊	**pāaar**ᵘ	**álāal** 'acacia'	🔊	**pǎaar**	**álʌ̂l-ì** 'acacia-P'
🔊	**pāaar**ᵘ	**ápwōooc-ɔ̄** 'rabbit-S'	🔊	**pǎaar**	**ápwôoc-ì** 'rabbit-P'

Similarly, we have not found any evidence of floating quantity in the construct state inflecton. This is illustrated by the examples in (25), which contrast the use of the relativizer **à**, which requires the preceding head noun **kùl** 'warthog' to be in the construct state, with the use of focus marker **à**, which requires the preceding head noun to be in the base form. The paradigm of **kùl** 'warthog' is syncretic. Hence, evidence for the fact that these function morphemes indeed do condition the use of construct state and base form, respectively is presented in (25c,d): **gwôk** 'dog' does have different forms in these inflections. Crucially, the relativizer **à** in (25a,c) is not saliently longer than the phonologically identical focus marker in (25b,d). Specifically in relation to the sound examples embedded in (25), the durations of the relativizer in (25a,c) are 104 and 98 ms, respectively, and the durations of the segmentally identical focus marker in (25b,d) are 89 and 107 ms, respectively.

(25) a. **kùl à lóʊʊɛ̀ bǎa mjáā**
🔊 warthog:CS REL black:CTG NOMP REL.S:PRT:1S
'The black warthog is mine.'

b. **kùl à mâar nɪ́ɪɪ̄n-ɔ̄**
🔊 warthog F love:NT sleep:INF
'Specifically the warthog loves to sleep.'

c. **gwɔ́ooŋ à lóʊʊɛ̀ bǎa mjáā**
🔊 dog:CS REL black:CTG NOMP REL.S:PRT:1S
'The black dog is mine.'

d. **gwôk à mâar nɪ́ɪɪ̄n-ɔ̄**
🔊 dog F love:NT sleep:INF
'Specifically the dog loves to sleep.'

An alternative interpretation of the data in (25) is that the lack of evidence for floating quantity is due to the following environment, the Low toned relativizer **à**. Indeed, in relation to the pertensive (sg) inflection, the following vowel /a/ needs to be High-toned for floating quantity to dock. However, we know of no following context that presents this environment. This is because adjectival modifiers are invariably consonant-initial, and modifiers that go with the construct state tend to require the presence of the relativizer. For example, when a noun is modified by a verb through the use of the construct

state form, a modifier past-tense verb cannot follow immediately after the noun. This is shown in (26), where the relativizer cannot be omitted.

(26) **dî-a   pùuuŋ   *(à) á-mʌ̂ʌʌt̪ [á:mʌ̂ʌʌt̪]**
      EXSP = F turtle:CS   REL PST-drink:ATP:PST
      'There is the turtle that drank.'

In summary, we have no evidence for floating quantity in the construct state form, nor in the pertensive with plural possessor.

3.4 Tone

In this section we describe the specifications for tone of singular nouns, both in the base form (Section 3.4.1) and in the inflected forms (Section 3.4.2-3.4.5). In relation to the latter, each inflection comes with a specification for tone. They are listed in Table 14. In the case of the pertensive (pl), it is a High target, and in the case of the demonstrative, a Low target. In the case of the pertensive (sg) and the construct state, there are two possible specifications: Low and Mid; which of these a noun appears with depends on the specification for tone of the stem syllable. In Section 3.1.2, we described these specifications in relation to suffixed singulars, where they are associated with the suffix -ɪ. In the case of suffixless singulars, the specification for tone that is associated with an inflection appears on the stem syllable. However, it does not replace the lexical specification; rather, it is added to the right of the lexical specification of the stem, in a fusional manner (cf. Pike 1948). The interaction between the lexical and inflectional specifications is center stage in Sections 3.4.2-3.4.5.

Table 14. Specifications for tone associated with different inflections of singular nouns. The difference between LF (L) and LF (H) is explained in Section 3.4.4.

Inflection	Specification for tone
Pertensive (sg), and Construct state	Low if stem syllable has Low, Low Fall (LF), or Low Rise Mid if stem has Mid, High, High Fall to Mid, High Rise, Low Fall (H)
Pertensive (pl)	High
Demonstrative	Low

3.4.1 The tonal specification of singular base forms

Shilluk has a total of nine phonologically distinctive tone categories (Low, Mid, High, Low Fall, High Fall, Late Fall, High Fall to Mid, Low Rise, High Rise), but not all of these are found in singular base forms. Table 15 displays the patterns of vowel length and tone that are found on native non-derived

stems, crossing vowel length in the stem with tone on the stem syllable, for suffixless nouns with a stem vowel that is either short or long. Most base forms of suffixless singular nouns consist of a single closed syllable (Section 1.3), and the vowel is either short or long, but not overlong (Section 3.2).[26] Aside from monosyllables, there are also many nouns that begin with an initial **a-** or **ʊ-**. As explained in Section 1.3, these initial syllables do not interact in any way with inflection, and for this reason they are not treated separately.

Table 15. The lexical specifications for tone on the stem syllables of base forms of suffixless singular nouns.

Tone on stem	V		VV	
Low	🔊	**ɟùr** 'young woman'	🔊	**lòʊt̪** 'stick'
Mid	🔊	**kāc** 'hunger'	🔊	**māac** 'fire'
High	🔊	**àkúr** 'pigeon'	🔊	**dúup** 'k.o. rodent'
Low Fall	🔊	**dâk** 'cooking pot'	🔊	**lôʊl** 'steep river bank'
High Fall	🔊	**àtwa̋k** 'peacock'	🔊	**ke̋ɛw** 'boundary'
Rise	🔊	**kɔ̌cᵘ** 'hoe'	🔊	**úgǐik** 'buffalo'

The High Fall is rare in native suffixless singular base forms: we know of only five native words that have this specification. It is found more often in loan words, such as **mőʊt̪** 'banana' (<Arabic), and **be̋ɛk** 'bag' (<English). Here the High Fall can be interpreted as an adaptation to Shilluk phonology of culminative accentual prominence in the source language.

　　There are three phonemic tone categories which do not appear in Table 15: the Late Fall, the High Fall to Mid, and the High Rise. The High Fall to Mid and the Late Fall are not found in suffixless singular base forms at all, whereas they appear regularly in inflections: the High Fall to Mid is part of the inflectional marking of pertensive and construct state, and the Late Fall is part of the inflectional marking of demonstrative. For eample, the High tone in the base form of **pjéɛt̪** 'peg driver' alternates regularly with a High Fall to Mid in the noun's pertensive (sg.) form, as in **pje̋ɛɛt̪̄ᵘ twɔ́ɔŋ** 'Twong's peg driver', and with a Late Fall in **pjéɛɛ̦̀** 'this peg driver'. In addition, the High Fall to Mid

---

26　Suffixless singular base forms with an overlong vowel are exceptional. We describe these patterns in Sections 3.6.2 and 3.6.5.

is also found in the base form of plural nouns, e.g. **pjɛ́ɛɛt̪** 'peg drivers'. This means that the occurrence of either of these specifications on a noun restricts lexical decision in perceptual processing, ruling out that it could be a singular base form. The fourth tonal specification that is not found regularly in singular base forms is the High Rise. The only cases we know of are **ŋǎaawᵘ** 'domestic cat' and **mwɔ̌ɔɔlᵘ** 'morning'. Each of these nouns has an overlong vowel and floating quantity, both features that are indicative of morphological marking. We will discuss these exceptional patterns in Section 3.6.2. In the inflectional paradigms of singular nouns, the High Rise is found in pertensive (pl).

The specifications for tone and vowel length that are found in the stem syllable of suffixed singular base forms are illustrated in Table 16. As seen from these examples, the stem vowel in the base form is either short or overlong. There are some exceptions, i.e., suffixed nouns that have a long stem vowel in the base form; we discuss these in Section 3.6.1. Five of the specifications that are found on suffixed singulars are also found on suffixless singulars: Low, Mid, High, Low Fall, and High Fall.

Table 16. The lexical specifications for tone that are regularly found on the stem syllables of the base forms of suffixed singular nouns.

Tone	V		VVV		Tone on suffix /-ɔ/
Low	🔊	**kìt-ɔ̀** 'colour'	🔊	**bɔ̀ɔɔt̪-ɔ̀** 'craftsman'	Low or High
Mid	🔊	**álāŋ-ɔ̄** 'echo'	🔊	**ápwɔ̄ɔɔc-ɔ̄** 'rabbit'	Mid or High
High	🔊	**àwír-ɔ̀** 'harpoon head'	🔊	**dɔ́ɔɔr-ɔ́** 'axe'	Low or High
Low Fall	🔊	**mûn-ɔ̀** 'neck'	🔊	**bɔ̂ɔɔŋ-ɔ́** 'pelican'	Low or High
High Fall	🔊	**ɟʌ́ŋ-ɔ̀** 'Dinka'	🔊	**d̪ʌ́aan̪-ɔ̀** 'person/baby'	Low
High Fall to Mid	🔊	**wṹñ-ɔ̄** 'tethering rope'	🔊	**ɟʌ́aak̄-ɔ̄** 'chief'	Mid

As for the discrepancies in terms of tonal specification between suffixed and suffixless nouns, High Fall to Mid is found on suffixed singular nouns, while it is unattested on suffixless singulars. And, in turn, Low Rise is found on suffixless singulars but not on suffixed ones. Actually, a suffixed noun can have a rising melody on the stem syllable, namely if the stem is Low-toned and the suffix is High-toned, as in **t̪jàaaŋ-ɔ́** 'stalk'. However, the timing of the rising melody is not distinctive, so that there is no ground to postulate cv̌c-v́ as a phonological configuration distinct from cv̀c-v́.

3.4.2 Tonal inflection on nouns that have Low or Low Rise

Table 17 illustrates the inflectional paradigms of Low-toned nouns. In the case of the suffixed nouns, the inflectional specifications (cf. Table 14) are realised on the suffix **-ɪ**. In the case of the suffixless nouns, these specifications for tone appear on the stem syllable, combining compositionally with the lexical specification. In the pertensive (sg), the construct state and the demonstrative inflections, the addition of a Low target to a lexical specification on the stem that is Low to begin with applies vacuously. But in the case of pertensive (pl), the lexical Low plus the inflectional High combine to yield a Low Rise. It is characteristic of Shilluk tonal phonology that the vowel length of the stem syllable is irrelevant here: the morphophonological process that yields a Rise applies identically when the stem vowel is short (e.g. **kɔ̌t̪**) as when it is overlong (e.g. **gʌ̌ʌʌt**).[27]

Table 17: The inflectional paradigms of five singular nouns, either suffixless or suffixed, that have a Low tone on the stem syllable.

Base	kɔ̀t̪ 'rain'	gʌ̀ʌt 'river bank'	cìŋ-ɔ̀ 'hand'	bɔ̀ɔɔt̪-ɔ̀ 'craftsman'	t̪jàaaŋ-ɔ́ 'stalk'
Pertensive, sg. poss.	kɔ̀t̪ᵘ	gʌ̀ʌʌtᵘ	cìŋ-ì	bɔ̀ɔt̪-ì	t̪jàaŋ-ì
Pertensive, pl. poss.	kɔ̌t̪	gʌ̌ʌʌt	cìŋ-í	bɔ̀ɔt̪-í	t̪jàaŋ-í
Construct state	kɔ̀n̪	gʌ̀ʌʌn	cìŋ-ì	bɔ̀ɔn̪-ì	t̪jàaŋ-ì
Demonstrative	kɔ̀n̪ᵘ	gʌ̀ʌʌn̪ᵘ	cìŋ-ì	bɔ̀ɔn̪-ì	t̪jàaŋ-ì

In suffixed singulars, the specification for tone on the **-ɔ** suffix in the base form is irrelevant to tonal marking in the inflected forms. In Table 17 this is illustrated by **t̪jàaaŋ-ɔ́**. Note that the specifications for tone in the inflected forms are identical to those of **bɔ̀ɔɔt̪-ɔ̀**, which ends in Low-toned **-ɔ̀**.

Interestingly, the same goes for the High target that is part of the Low Rise configuration on a suffixless noun: nouns that have a Low Rise in the base form are indistinguishable from Low-toned nouns in the inflected forms. This is illustrated by the paradigms in Table 18. The specification for tone on the stem syllable in the inflected forms of these two nouns are the same as those the Low-toned nouns in Table 17. This is in line with a compositional interpretation of the Rise, as a sequence of Low and High targets.

---

27 As explained in Section 3.2, the pertensive with plural possessor of a suffixless singular noun never has a long vowel.

Table 18: The inflectional paradigms singular nouns that
have a Low Rise on the stem syllable.

Base	**gwăŋ** 'wildcat'	**ámǎʌʌt̪** 'saddle-billed stork'
Pertensive, sg. poss.	**gwàaaŋ**ᵘ	**ámʌ̀ʌʌt̪**ᵘ
Pertensive, pl. poss.	**gwǎaaŋ**	**ámǎʌʌt̪**
Construct state	**gwàaaŋ**	**ámʌ̀ʌʌn̪**
Demonstrative	**gwàaaŋ**ᵘ	**ámʌ̀ʌʌn̪**ᵘ

3.4.3 Tonal inflection on nouns that have High, High Fall to Mid, and High Fall

Table 19 presents paradigms for High-toned nouns. Starting with the suffixed paradigms, we see again that the tonal specification of the **-ɔ** suffix in the base form is irrelevant to the tonal specification in the inflected forms: there is no difference in the tonal specifications of the inflected forms of **dɔ́ɔɔr-ɔ́** vs. **ábóoop-ɔ̀**. The Mid tone on the suffix in the pertensive (sg) and in the construct state conditions the lexical specification for High tone on the stem to alternate to High Fall to Mid. This is a regular process. In the suffixless High-toned nouns, we see the same tonal targets as in suffixed nouns, albeit compressed onto a single syllable. Of particular interest here is what happens when the Low tone is added in the demonstrative inflection. The addition of this Low target to the High lexical specification on the same syllable yields a Late Fall, irrespective of the vowel length of the stem syllable.

Table 19: The inflectional paradigms singular nouns that have a High tone on the stem syllable.

Base	🔊 **dúup** 'k.o. rodent'	🔊 **líɲ** 'conflict'	🔊 **dɔ́ɔɔr-ɔ́** 'axe'	🔊 **ábóoop-ɔ̀** 'ambatch'
Pertensive, sg. poss.	🔊 **dúuup̄**ᵘ	🔊 **líɲ̄**ᵘ	🔊 **dɔ́ɔ̄r-ī**	🔊 **ábɔ́m̄-ī**
Pertensive, pl. poss.	🔊 **dúuup**	🔊 **líɲ**	🔊 **dɔ́ɔr-í**	🔊 **ábóm-í**
Construct state	🔊 **dúuum̄**	🔊 **líɲ̄**	🔊 **dɔ́ɔ̄r-ī**	🔊 **ábɔ́m̄-ī**
Demonstrative	🔊 **dúuum̀**ᵘ	🔊 **líɲ̀**ᵘ	🔊 **dɔ́ɔr-ì**	🔊 **ábóm-ì**

These same specifications for tone are found in the inflected forms of nouns that have a High Fall or High Fall to Mid. That is, the contrast between base-

form specifications for High, High Fall to Mid and High Fall is neutralized in the inflected forms. This is illustrated by the paradigms in Table 20.

Table 20: The inflectional paradigms of some singular nouns that have a High Fall or High Fall to Mid on the stem syllable.

Base	wʌ́ʌr 'night'	úrʌ́ap 'spider'	ɟʌ́aak̄-ɔ̄ 'leader'	túl-ɔ̀ 'owl'
Pertensive, sg. poss.	wʌ́ʌʌɾ̄ᵘ	úrʌ́aap̄ᵘ	ɟʌ́aŋ-ī	túl̄-ī
Pertensive, pl. poss.	wʌ́ʌʌr	úráaap	ɟʌ́aŋ-í	túl-í
Construct state	wʌ́ʌʌɾ̄	úrʌ́aam̄	ɟʌ́aŋ-ī	tʌ́l̄-ī
Demonstrative	wʌ́ʌʌɾ̀ᵘ	úráaam̀ᵘ	ɟʌ́aŋ-ì	ṭúl-ì

The High Fall to Mid, is not found in the base form of suffixless singular nouns, but only in the base form of suffixed singulars.

3.4.4 Tonal inflection on nouns that have Low Fall

For the majority of singular nouns, the tonal specifications in the inflected forms are predictable on the basis of the tonal specification in the base form. However, the situation is more complicated in relation to nouns that a) are suffixless and b) carry a Low Fall in the base form. In the inflected forms, these divide into two paradigms. These are illustrated in Table 21, each by two nouns. In this table, the nouns **tɔ̂k** 'edge', **dâak** 'herd', **kwôt** 'shield' and **mâal** 'sky' are indistinguishable with respect to tone in the base form: they all have the Low Fall. In the inflected forms, however, only **tɔ̂k** 'edge' and **dâak** 'herd' display tone patterns that can be conceived of in terms of the composition of a Low Fall lexical specification plus an inflectional tone. In contrast, the inflected forms of **kwôt** 'shield' and **mâal** 'sky' display the same specifications for tone as suffixless singular nouns that have a High or a High Fall in the base form.[28] High-toned **ṭɔ́ɔl** 'rope' is included alongside to facilitate this comparison. Just like High-toned **ṭɔ́ɔl, kwôt** 'shield' and **mâal** 'sky' have a High Fall to Mid in the pertensive (sg) and in the construct state, a High tone in the pertensive (pl), and a Late Fall in the demonstrative.

---

28 The stem specification of High Fall to Mid is only found in suffixed singular base forms; it is not found in suffixless singulars.

Table 21: The inflectional paradigms of some singular nouns that have a Low Fall on the stem syllable. A High-toned noun is included for the sake of comparison.

	Low Fall (Low Fall)		Low Fall (High)		High
Base	tɔ̂k 'edge'	dâak 'herd'	kwôt 'shield'	mâal 'sky'	ţɔ́ɔl 'rope'
Pertensive, sg. poss.	tɔ̂kᵘ	dâaakᵘ	kwɔ́ooῑᵘ	mɑ́aaῑᵘ	ţɔ́ɔɔῑᵘ
Pertensive, pl. poss.	tɔ̌k	dǎaak	kwóoot	máaal	ţɔ́ɔɔl
Construct state	tɔ̂ŋ	dâaaŋ	kwɔ́ooñ	mɑ́aaῑ	ţɔ́ɔῑ
Demonstrative	tɔ̂ŋᵘ	dâaaŋᵘ	kwóooǹᵘ	máaaľᵘ	ţɔ́ɔɔľᵘ

We refer to nouns like **kwôt** 'shield' and **mâal** 'sky' as Low Fall (High) nouns. While they have a Low Fall lexically in the base, they have a High lexically in the inflected forms. This High tone combines compositionally with the inflectional tone in the derivation of the tones in the inflected forms. Most nouns that have a Low Fall in the base follow the Low Fall (High) pattern, like **kwôt** and **mâal**. Confronted with a suffixless singular that has a High Fall to Mid in the pertensive with singular possessor, it is impossible to predict the specification in the base form, which may be High, High Fall or Low Fall.

The other group of Low Fall nouns, illustrated in Table 21 by **tɔ̂k** 'edge' and **dâak** 'herd', retain the Low Fall in the pertensive with singular possessor and in the construct state. These are the Low Fall (LF) nouns, and they constitute the minority pattern, as the majority of nouns that have a Low Fall in the base are Low Fall (High) nouns. And because the construct state ends in a Low target, it is identical to the demonstrative, which is derived through the addition of a Low tone target to the construct state form. The pertensive with plural possessor has a High Rise, which can be interpreted as the compositional outcome of adding an inflectional High tone to the Low Fall in the pertensive with singular possessor. Suffixed singulars with a Low Fall on the stem in the base form invariably follow the latter pattern.

3.4.5 Tonal inflection on nouns that have a Mid or High Rise

Nouns that have a Mid tone in the base form have a Mid tonal allomorph in the pertensive (sg) and in the construct state (cf. Table 22). Because this Mid tonal inflection is identical to the lexical specification of the root, it follows naturally that the surface phonological result is a Mid tone. In contrast, the pertensive (pl) and the demonstrative involve High and Low tone targets respectively. In suffixless paradigms, when they appear on the same syllable as the lexical Mid tone, the result is a High Rise in the case of the pertensive with plural possessor, and a late-aligned fall from Mid to Low in the demonstrative.

The late-aligned fall from Mid to Low – transcribed **c̄v̄(vv)c̀** – is limited in its distribution to this particular morphonological environment: the combination of a lexical Mid with a morphological Low in the demonstrative singular. Because its compositional nature is transparent and restricted in this way, we have not included it in our inventory of tone categories.

Table 22. The inflectional paradigms of some singular nouns with Mid tone in the base form.

Base	k̄c 'hunger'	gɔ̄ɔl 'wild dog'	átāaj 'big clay bowl'	àpāk-ɔ́ 'wave'	djēer-ɔ̄ 'truth'
Pertensive, sg. poss.	k̄ʌʌcᵘ	gɔ̄ɔlᵘ	átāaajᵘ	àpāk-ī	djēer-ī
Pertensive, pl. poss.	ǩʌʌc	gɔ̌ɔl	átǎaj	àpāk-í	djēer-í
Construct state	k̄ʌʌɲ	gɔ̄ɔl	átāaj	àpāŋ-ī	djēer-ī
Demonstrative	k̄ʌʌɲ̀ᵘ	gɔ̄ɔl̀ᵘ	átāaajᵘ	àpāŋ-ì	djēer-ì

Nouns with a High Rise in the base are very rare – the two items in Table 23 are the only base forms with this specifications that we know of. Their inflected forms are suffixed, even though the base forms are suffixless. We will come back to this in section 3.6.2. At this point we focus on their specification for tone. Interestingly, the tonal specifications in the inflected forms are identical to those of the corresponding forms of Mid-toned nouns. This is illustrated by the paradigms in Table 23, which can be compared with those in Table 22 above.

Table 23: The inflectional paradigms of singular nouns that have a High Rise in the base form.

Base	mwɔ̌ɔlᵘ 'morning'	ɲǎaawᵘ 'domestic cat'
Pertensive, sg. poss.	mwɔ̄ɔl-ī	ɲāaw-ī
Pertensive, pl. poss.	mwɔ̄ɔl-í	ɲāaw-í
Construct state	mwɔ̄ɔl-ī	ɲāaw-ī
Demonstrative	mwɔ̄ɔl-ì	ɲāaw-ì

The relation of the High-Rise-toned nouns to Mid-toned nouns runs parallel to the relation of Low-Rise-toned nouns to Low-toned nouns. In both the cases, the High target of the rising configuration is only in evidence in the base form. In the inflected forms, the tonal specification is identical to that of Low-toned nouns in the the case of Low-Rise-toned nouns, and to that of Mid-toned

nouns in the case of High-Rise-toned nouns. This supports the compositional interpretation of the two rising contours.

3.5 Nasalisation of the coda

3.5.1 In construct state and demonstrative

Nasalisation plays a prominent role in the marking of the construct state form, and also of the demonstrative form, which is derived from the construct state. This regular process of nasalization applies in suffixless and suffixed singular paradigms alike. The construct state form is identical to the pertensive (sg) in terms of affixation, vowel length, and tone. These two inflections differ only in terms of the coda consonant of the stem syllable. If the stem-final consonant is a plosive, then the construct state form has the homorganic nasal instead. That is, stem-final /p,t̪,t,c,k/ in the pertensive inflections and in the base form correspond to /m,n̪,n,ɲ,ŋ/, respectively, in the construct state form. The phenomenon is illustrated in Table 24, by suffixless paradigms; it is the same for suffixed paradigms. Other, i.e., non-plosive, coda consonants remain unchanged. This is illustrated in Table 24 by **pâal** 'spoon'. As seen from Table 24, the nasalization of the stem-final plosive consonants is also found in the demonstrative, which is derived from the construct state form through the addition of a Low tone target.

Table 24: Suffixless singular nouns illustrating nasalization in the construct state and demonstrative, by place of articulation of the stem-final plosive.

	/p/	/t̪/	/t/	/c/	/k/	/l/
Base	bûp 'mud'	àd̪ʌ́ʌt̪ 'bottle'	wût-ɔ́ 'ostrich'	lèeec-ɔ̀ 'tooth'	lɛ̀ɛk 'pestle'	pâal 'spoon'
Pertensive (sg)	búp̚ᵘ	àd̪ʌ́ʌʌt̪̚ᵘ	wût-ì	lèec-ì	lɛ̀ɛɛk̚ᵘ	páaaĺᵘ
Pertensive (pl)	búp	àd̪ʌ́ʌt̪	wût-í	lèec-í	lɛ̆ɛɛk	Páaal
Construct state	búm̄	àd̪ʌ́ʌn̪̄	wûn-ì	lèeɲ-ì	lɛ̀ɛɛŋ	páaaĪ
Demonstrative	búm̀ᵘ	àd̪ʌ́ʌǹ̪ᵘ	wûn-ì	lèeɲ-ì	lɛ̀ɛɛŋᵘ	páaaÌ̀ᵘ

The process of nasalization in the construct state and the demonstrative is regular and fully productive. This productivity is illustrated by the fact that it equally applies in loanwords; for example, the noun **bɛ́ɛ́ɛk**, derived from English *bag*, and with the same meaning, has the construct state form **bɛ́ɛɛ̄ŋ** and the demonstrative form **bɛ́ɛɛ̀ŋ**; and **rʌ́ʌʌt-ìī** 'radio' has construct state **rʌ́ʌn̄-ī** and the demonstrative form **rʌ́n-ì**.

3.5.2 In the pertensive of certain suffixed nouns

As described in Section 3.5.1, nasalization of stem-final plosives applies productively in the formation of the construct state and the demonstrative of all singular paradigms, both suffixless and suffixed. In addition, it is found in the pertensive inflections of certain nouns, both with singular and with plural possessors. This phenomenon is limited to a subset of the suffixed singular nouns; sufixless singulars never have nasalization in the pertensive inflections. Examples are presented in Table 25. For the sake of comparison, a few comparable nouns that lack nasalisation are included at the bottom of the table.

Table 25. Examples of suffixed nouns with and without nasalization in the pertensive (sg).

Base	Pert. (sg.)	Meaning	Base	Pert. (sg.)	Meaning
NASALISATION					
wɔ́ooꞮ-ɔ̄	wɔ́on-ī	'message'	ápɛ̂ɛɛt-ɔ̀	ápɛ̂ɛn-ì	'squirrel'
káaak-ɔ̀	kâaŋ-ī	'crack'	ábóoop-ɔ̀	ábɔ́m̄-ī	'ambatch'
tíɪꞮk̄-ɔ̄	tíɪŋ-ī	'bead'	ápwɔ̄ɔɔc-ɔ̄	ápwɔ̄ɔɲ-ī	'rabbit'
jɛ́eeꞮ-ɔ̄	jɛ́eɲ-ī	'rat'	àt̪ìɪṭ-ɔ́	àt̪ìɱ-ì	'okra'
còook-ɔ́	còoŋ-ì	'bone'	àjɛ́ɛc-ɔ́	àjɛ́ɛɲ-ī	'sand'
NO NASALIZATION					
lwɛ́ɛɛꞮ-ɔ̄	lwɛ́ɛꞮ-ī	'finger'	álêp-ɔ́	álêp-ì	'cormorant'
jôʊʊt-ɔ̀	jôʊt-ì	'finding'	àcwàat-ɔ̀	àcwàat-ì	'headband'

Based on our lexicographic data, we estimate that around a third of the suffixed singulars that have a plosive stem-final consonant in the base form display nasalisation in the pertensive forms. Whether the plosive stem-final consonant of a suffixed singular nasalizes or not cannot be predicted with certainty on either semantic or phonological grounds. Note for example how, in Table 25, **lwɛ́ɛɛꞮ-ɔ̄** 'finger' does not nasalize in the pertensive, whereas **jɛ́eeꞮ-ɔ̄** 'rat' does, even though the specification for tone of these two nouns is the same. Nonetheless, there are tendencies. First, nouns that have a High, a High Fall, a High Fall to Mid, a Mid or a Late Fall on the stem syllable tend to display nasalization in the pertensive forms. In contrast, Low and the Low Fall predominate as tonal specifications on the root of nouns that do not nasalize. Alternation in vowel length is also relevant. Suffixless nouns that nasalize in the pertensive inflections tend to present vowel length alternation, i.e., they are Short with Grade or Long. In contrast, this process of nasalization is rare in Fixed Short nouns (cf. Section 3.2).

A third factor is morphological. Nasalization of root-final plosives in the pertensive (sg) is more likely if the noun is derived (cf. Gilley 1992:184). For example, whereas **lwɛ́ɛɛ̄-ɔ̄** 'finger-s' does not nasalise – see **lwɛ́ɛɛ̄-ī** 'finger-PRT' – the noun **á-lwɛ́ɛɛ̄-ɔ̄** 'crab', which is derived from it, does: **álwɛ́ɛñ̄-ī** 'crab-PRT'. Similarly, **bɔ̀ɔɔ̯-ɔ̀** 'blacksmith-s' does not nasalise – **bɔ̀ɔ̯-ì** blacksmith:PRT' – but the compound noun **ɲāa-bɔ̀ɔɔ̯-ɔ̀** 'woodpecker-s', which is derived from it through the prefixation of the diminuitive morpheme **ɲāa-**, does: **ɲāa-bɔ̀ɔŋ̯-ì** 'woodpecker-PRT'.[29] However, derivation is not to be interpreted as a determining factor either. Some nouns are clearly derived, but do not display nasalisation. In particular, the patient-oriented infinitive nominalization does not nasalize. For example, **jɔ̂ʊʊt-ɔ̀** 'find-INF' is derived from {jɔ̂ʊt} 'find', and has the pertensive (sg) **jɔ̂ʊt-ì** 'find-INF:PRT', rather than *__jɔ̂ʊn-ì__.

Nasalization in the pertensive inflections is found consistently in singular instrument nouns marked by the suffix **-īɪ**. These nouns are derived from transitive verbs (cf. Section 3.1.1, see also Remijsen, Miller-Naudé & Gilley 2016). Some examples are presented in Table 26.

Table 26. Nasalization in the pertensive (sg.) of instrument nouns ending in **-īɪ**.

Base	Pert. (sg.)	Meaning	Base	Pert. (sg.)	Meaning
gʌ́ʌʌp-īɪ	**gʌ́m̄-ī**	'ladle'	**kóook-īɪ**	**kɔ́oŋ-ī**	'reward'
góooc-īɪ	**gɔ́oɲ-ī**	'machete'	**ŋíc-īɪ**	**ŋíɲ-ī**	'symbol'
jíṯ-īɪ	**jín̯-ī**	'ladder'	**áŋút-īɪ**	**áŋúñ-ī**	'spittoon'

3.6 Exceptional patterns

In this section we describe several exceptions, i.e., phenomena in the inflectional morphology of singular nouns that go beyond the patterns of exponence described in Sections 3.1 to 3.5. The ordering of the sections covering the various exceptions is determined by the number of cases, going from exceptional patterns affecting more singular nouns to exceptional patterns affecting fewer nouns.

The great majority of Shilluk singular nouns are either suffixless in both the base form and the inflections, or suffixed in both the base form and the inflections. As noted in Section 3.1, and especially in Table 3, there are two other logical combinations: a) base form suffixless and inflections suffixed;

---

29 The literal meaning of 'woodpecker' is 'little blacksmith'.

b) base form suffixed and inflections suffixless. These patterns are in fact also attested, albeit in a small number of cases. They constitute the topic of Sections 3.6.2 and 3.6.4, respectively.

In addition, we distinguish six other exceptional patterns: nouns involving a suffixed base with a long (VV) vowel (Section 3.6.1); irregular paradigms of certain kinship terms (Section 3.6.3); nouns that have an overlong vowel throughout the singular paradigm (Section 3.6.5); exceptions involving the elision of the stem coda in some inflections (Section 3.6.6); exceptions involving suppletion (Section 3.6.7); and, finally, singular nouns that have a long stem vowel throughout their paradigm (Section 3.6.8).

3.6.1 Suffixed nouns with a long stem vowel in the base

The majority of suffixed nouns have either a short stem vowel or an overlong one in the base form. This is illustrated in Table 27, repeated from Table 9. As seen from this Table, a long vowel in the inflected forms combines with an overlong vowel in the base form.

Table 27. The three patterns of vowel length alternation in the stem syllable of suffixless singular nouns, each illustrated by one noun.

	Fixed short (V~V)	**Short with Grade (V~VVV)**	**Long (VV~VVV)**
Base	**pîc-ɔ̀** 'tethering pole'	**pâaal-ɔ̀** 'knife'	**pʌ̀ʌʌt-ɔ́** 'bark'
Pertensive (sg. possessor)	**pîc-ì**	**pâl-ì**	**pʌ̀ʌt-ì**
Construct state	**pîɲ-ì**	**pâl-ì**	**pʌ̀ʌn-ì**

However, there are also suffixed nouns with a long (VV) root vowel. Examples are presented in Table 28. Our lexicographic data includes 25 cases, and on this basis we estimate that they make up around five percent of the suffixed singular nouns.

Table 28. Some suffixed nouns with a long vowel in the base form.

Base	**wéel-ɔ̀** 'guest'	**kīīj-ɔ́** 'water lily root'	**àkēɛl-ɔ́** 'sorghum noodles'	**kōon-ɔ̄** 'alcoholic drink'
Pertensive (sg)	**wéeĪ-ī**	**kīīj-ī**	**àkēɛl-ī**	**kōon-ī**
Pertensive (pl)	**wéel-í**	**kīīj-í**	**àkēɛl-í**	**kōon-í**
Construct state	**wéeĪ-ī**	**kīīj-ī**	**àkēɛl-ī**	**kōon-ī**
Demonstrative	**wéel-ì**	**kīīj-ì**	**àkēɛl-ì**	**kōon-ì**

For most of these suffixed nouns with a long stem vowel in the base form, vowel length remains long in the inflected forms, just like the vowel is long in the inflected forms of regular Long suffixed nouns (see e.g. **pʌʌʌt-ɔ́** 'bark' in Table 27). But there are also several terms related to kinship that have a long stem vowel in the base form, and which display other irregularities. For example **ɟàal-ɔ̀** 'man, husband' is suffixless in the inflected forms (cf. Section 3.6.4), and **mîi-ɔ̀** 'caregiver mother' has irregular pertensive forms, in particular with pronominal possessors (cf. Section 3.6.3).

3.6.2 Suffixless base, suffixed inflections

This exceptional pattern is illustrated in Table 29. Note that **kǐt^μ**, **ŋŏoom^μ**, and **mwɔ̌ɔɔl^μ** have suffixes in the inflected forms, just as the regular suffixed noun **pʌʌʌt-ɔ́** 'bark' does. But unlike regular suffixed nouns such as **pʌʌʌt-ɔ́**, the base forms are suffixless in this set of exceptions.

Table 29. The inflectional paradigms of four nouns that display a suffixless base form but suffixed inflections. A regular suffixed noun is presented alongside.

	Suffixless base, suffixed infl.				Regular suffixed
Base	**kǐt^μ** 'mountain'	**ŋŏoom^μ** 'awl'	**mwɔ̌ɔɔl^μ** 'morning'	**áɲwâaak^μ** 'Anywa'	**pʌʌʌt-ɔ́** 'bark'
Pertensive (sg)	**kìt-ì**	**ŋòom-ì**	**mwɔɔl-ī**	**áɲwâŋ-ì**	**pʌʌt-ì**
Pertensive (pl)	**kìt-í**	**ŋòom-í**	**mwɔɔl-í**	**áɲwâŋ-í**	**pʌʌt-í**
Construct state	**kìn-ì**	**ŋòom-ì**	**mwɔɔl-ī**	**áɲwâŋ-ì**	**pʌʌn-ì**
Demonstrative	**kìn-ì**	**ŋòom-ì**	**mwɔɔl-ì**	**áɲwâŋ-ì**	**pʌʌn-ì**

For these nouns, the pattern of vowel length alternation follows that of suffixed paradigms. That is, if there is a length alternation in the stem vowel, then the vowel is overlong in the base form, and either short or long in the inflected forms. This pattern of vowel length alternation is identical to that of suffixed nouns (cf. Table 9). In regular suffixless nouns, the pattern of length alternation within the paradigm is the reverse, i.e., the vowel is short or long in base, and overlong in inflected forms (cf. Table 8). As a result, regular suffixless nouns do not appear with an overlong vowel in the base form, whereas nouns like **ŋŏoom^μ** 'awl' do.

Our dataset includes a total of 23 nouns that are suffixless in the base form and suffixed in the inflected forms. Five of these are Fixed Short: **bět^μ** 'fishing spear', **kɔ̌c^μ** 'hoe', **kǐt^μ** 'mountain', **pǔk^μ** 'pot for storage', **ókǐt^μ** 'dough; and 18 have an overlong vowel in the base and either a short or a long vowel in the

inflected forms: **cĕeew**ᵘ 'porcupine', **cjĕeen**ᵘ 'curse', **dĭiim**ᵘ 'sieve', **dŭuul**ᵘ 'door bar', **gŭuuʈ**ᵘ 'thick short stick', **gʌ̆ʌʌc**ᵘ 'baobab', **jŏoo**ᵘ 'road',[30] **kĭiil**ᵘ 'crutch', **kʌ̆ʌʌk**ᵘ 'harpoon', **lĕeew**ᵘ 'house lizard', **lĭiip**ᵘ 'awl (for taking out thorns)' **ŋŏoom**ᵘ 'awl (for piercing)', **ʈʌ̆ʌʌ**ᵘ 'desert date (tree)', **ʈăaak**ᵘ 'hat', **kwĕɛɛr**ᵘ 'hoe for weeding', **ɲăaaw**ᵘ 'domestic cat' and **mwɔ̆ɔɔl**ᵘ 'morning', and **áɲwâaak**ᵘ 'Anywa'. Apart from the last one, **áɲwâaak**ᵘ 'Anywa', they all have a rising contour tone in the base form. In all but two cases, it is the Low Rise; **ɲăaaw**ᵘ 'domestic cat' and **mwɔ̆ɔɔl**ᵘ 'morning' are the only ones that have the High Rise.

There are no regular suffixless nouns with an overlong vowel in the base form. Therefore, if a noun has a suffixless base form with an overlong vowel, and either the Low Rise or the High Rise, it belongs to this exceptional pattern. In contrast, a suffixless base form with a short vowel and a Low Rise may follow the regular suffixless paradigm. A case in point is **gwăŋ** 'wild cat'. Its inflected forms are suffixless, as seen from its demonstrative form, which is **gwàaaŋ**. In contrast, a noun like **kĭt**ᵘ 'mountain' has suffixed inflections. For example, the demonstrative inflection is **kĭn-ì**. Finally, nouns whose base form displays a long vowel and carry a Low Rise on the stem, such as **úgĭik** 'buffalo', invariably display the regular pattern of suffixless nouns, i.e., the inflected forms are suffixless, as seen from the demonstrative inflection **úgìiiŋ**.

We hypothesize that the nouns that are suffixless in the base form but suffixed in their inflected forms used to have a suffix **-ɔ́** in their base form, i.e., that they displayed the regular paradigm of suffixed singulars, but that this suffix has been subsequently lost.[31] This hypothesis explains why the stem vowel is either short or overlong in the base form – i.e., the same levels of vowel length attested for suffixed singular base forms. Crucial support for this

---

30 The noun **jŏoo**ᵘ 'road' presents is additionally exceptional in that the vowel changes to /**u**/ in the inflected forms, and the vowel remains overlong. That is, we find pertensive (sg) **jùuu**ᵘ, pertensive (pl) **jŭuu**, construct state **jùuu**, and demonstrative **jùuu**ᵘ. The change in vowel quality fits with the interpretation that this noun, like all the other ones discussed in this section, had suffixed inflected forms at an earlier diachronic stage. That is, in Shilluk morphology in general, the vowel qualities /**ɪ,ʊ,e,o**/ are avoided by the morphology in the short level of vowel length (Remijsen, Gilley & Naudé 2015). For example, centripetal associated motion is marked by a change to to +ATR. Hence **á-ŋɔ́l̀** 'PST-cut:FUG:ov' is expected to have the corresponding centripetal form *á-ŋól. However, because /**o**/ is avoided, the actual form is **á-ŋúl** 'PST-cut:PET:ov'. The change from /**o**/ to /**u**/ makes sense if the stem would otherwise have had a short /**o**/, and this is precisely what would have been the case if the inflected forms were suffixed (cf. Table 29). We speculate that, in step with the loss or lack of a root coda, the suffix was subsequently reinterpreted as increased vowel length.

31 The suffix **-ɔ** is realized weakly (i.e., with reduced duration, centralized vowel quality, little intensity) in Shilluk morphology in general, suggesting that it may be on a diachronic trajectory to be lost.

interpretation comes from the fact that the quantity of this hypothesized lost suffix can still be observed synchronically, through floating quantity. As noted in Section 3.3, nouns that have floating quantity trigger lengthening across a word boundary on following vocalic prefixes. The presence of floating quantity in this set of exceptions is illustrated in (27). The vocalic prefix **á-**, which marks cardinal number, is an environment that can reveal floating quantity. The nouns in (27a,b,c) are part of the exceptional set of nouns at issue in this section; the nouns in (27d,e,f) are regular suffixless base forms in the same environment, for the sake of comparison. The latter do not have floating quantity. The embedded sound examples illustrate that the prefix **á-** sounds saliently longer following after the nouns that have floating quantity (27a,b,c) than after the nouns that do not (27d,e,f).

(27) a. **[pǔg   áa-kjèl]**
          pǔkᵘ   á-kjèl
          storage.pot CRD-first
          'One storage pot.'

      b. **[kǐd   áa-kjèl]**
          kǐtᵘ   á-kjèl
          mountain CRD-first
          'One mountain.'

      c. **[kǎʌʌg áa-kjèl]**
          kǎʌʌkᵘ á-kjèl
          harpoon CRD-first
          'One harpoon.'

      d. **[bàd ákjèl]**
          bàt á-kjèl
          arm CRD-first
          'One arm.'

      e. **[gwǎŋ ákjèl]**
          gwǎŋ á-kjèl
          wild.cat CRD-first
          'One wild cat.'

      f. **[úgǐig á-kjèl]**
          úgǐik á-kjèl
          buffalo CRD-first
          'One buffalo.'

The case of **áɲwâaakᵘ** 'Anywa' lends further support to the interpretation that the base form was originally suffixed. As noted in Section 3.5, nasalization of plosive root coda is found in a subset of suffixed singular nouns. It is not normally found in suffixless singulars. Here again, this set patterns along with the suffixed singulars.

In summary, there are nouns that present a suffixless base form but suffixed inflections. Their pattern of vowel length alternation is identical to that of the regular suffixed singulars. Evidence from floating quantity and coda nasalization supports the hypothesis that the irregular suffixless base form has developed out of a suffixed form: the quantity of the lost quantity suffix is still realized in the context of a following vocalic prefix.

3.6.3 Irregular pertensive paradigms of kinship terms

Many kinship terms present irregularities in their inflectional paradigms. We discuss these in this section. However, before going into the morphophonological properties, a few comments on this part of the lexicon are in order. First, the Shilluk lexicon distinguishes relations on father's vs. mother's side using different terms. For example, the term **nâʌʌj-ɔ̀** means

uncle, but specifically on the mother's side. This division makes sense in the context of the exogamous nature of marriage: a wife leaves her family to join her husband's family, often in a different village, and the marriage establishes strong connections with the husband's family. As a result, a person will have strong connections with relatives on their father's side and weaker connections with relatives on their mother's side.

For some kinship relationships, there are different but morphologically related words for the relation in a biological sense, vs. a comparable relation of caregiving that does not imply a biological connection. For example, **mɛ́j** refers to mother in a biological sense, whereas **mîi-ɔ̀** refers to a mother-like role of caring, without the actual biological relation. This reflects the fact that the network of social responsibility extends well beyond the nuclear family. For example, a child living with relatives will refer to the female caregiver as **mîi-ɔ̀** rather than **mɛ́j**. Similarly, the biological term for aunt (father's sister), i.e., **wɔ́ɲ**, is matched by **wâaac-ɔ̀**, a term that may extend to all women who belong to the father's kin group. The relevant terms are given in Table 30. If, for a given kinship relation, there are separate terms for the biological relation as opposed to the wider caregiving relation, then the paradigm of the term referring to the biological relation tends to be more regular in a morphophonological sense.

Table 30. Kinship relations displaying separate terms for biological and caregiver relationships.

	Biological	**Caregiver**
mother	**mɛ́j**	**mîi-ɔ̀**
father, father's brother	**wíij**	**wîi-ɔ̀**
grandmother, female ancestor	**wɔ́ŋ**	**wâaaŋ-ɔ̀**
grandfather, (male) ancestor	**kwɛ́j**	**kwâaaj-ɔ̀**
aunt (father's sister)	**wɔ́ɲ**	**wâaac-ɔ̀**

Sibling relations are expressed with reference to either father or mother, by attaching prefixes **ʊ́-** 'son of' and **ɲī** 'daughter of' to the words for mother and father. This makes sense in the context of polygyny, i.e., Shilluk men may be married with more than one woman. Thus we find **ʊ́-mēn** 'brother of the same father and same mother', versus **ʊ́-wān** 'stepbrother, sharing the same father but not the same mother, or male cousin (father's side)'.

Turning now to the morphophonology of the forms in Table 30, the monosyllabic roots of **mîi-ɔ̀** 'caregiver "mother"' and **wîi-ɔ̀** 'caregiver "father"'

lack a stem coda, which is highly uncommon in Shilluk for members of all three of the main lexical categories, i.e., nouns, verbs and adjectives. Also atypical is the fact that, as suffixed nouns, they have a long stem vowel (Section 3.6.1). When these open-syllable roots combine with vocalic suffixes, stems and suffixes coalesce. This is illustrated in Table 31. Note how, in the forms inflected for 1st, 2nd, and 3rd singular possessors, the singular pronominal markers have coalesced with the stem syllable. In the 1st singular, **mjāʌʌ** can be analysed as coming from **mīi** + **-āa**, with the +ATR vowel quality triggering the change from /a/ to /ʌ/ in the suffix. In the 3rd singular, the rhyme /ɛn/ is segmentally identical to the full form of the personal pronoun, which is **ɛ́n**. The rhyme of the 2nd singular possessed noun, **mjōw**, cannot be related to 2nd singular marking anywhere else in Shilluk grammar. In the inflected forms, the suffix **-ɪ** has integrated with the stem syllable. The High Rise in the pertensive (sg), which is **mǐii**, as in **mǐii Kùl** 'Kul's mother (caregiver)', is also highly unexpected; the regular specification would have been ****mîii**. It appears that there is just a single pertensive form, used with singular and plural possessors alike, and the pattern of exponence is like that of a pertensive with plural possessor. Note for example, that there is no floating quantity in the pertensive, irrespective of whether the possessor is singular or plural, e.g. **mǐii ábác** 'the caregiver mother of Abac'. In this respect, the pertensive of these nouns is like the pertensive with plural possessor of regular paradigms. The morphological marking for plural pronominal possessors is the same as for regular nouns (cf. Section 3.1.3). That is, this marking is inflectional in the case of the 1st plural inclusive, whereas for the other plural levels, the structures can be interpreted as a juncture of the pertensive plural followed by the full form independent personal pronoun. Similar observations apply to the inflectional paradigm of **wîi-ɔ̀** 'caregiver father'.

Table 31. The inflectional paradigm incl. possessed forms of **mîi-ɔ̀** 'mother (c[aregiver])' and **wîi-ɔ̀** 'father (c[aregiver])'.

	Inflections			Pronominal possession	
	'mother (c.)'	'father (c.)'		'mother (c.)'	'father (c.)'
Base	**mîi-ɔ̀**	**wîi-ɔ̀**	1st sg	**mjāʌʌ**	**wāʌʌ**
Pertensive (sg)	**mǐii**	**wǐii**	2nd sg	**mjōw**	**wōw**
Pertensive (pl)	**mǐii**	**wǐii bòoṭ-ɪ̀**	3rd sg	**mēn**	**wān**
Construct state	**mîii**	**wîii**	1st pl incl	**mii-ɛ́ɛ**	**wēee**
Demonstrative	**mîii-ì**	**wîii-ì**	1st pl excl	**mǐii wɔ́n**	**wǐii wɔ́n**
			2nd pl	**mǐii wún**	**wǐii wún**
			3rd pl	**mǐii gɛ́n**	**wǐii gɛ́n**

Two more paradigms are given in Table 32. Here again, there is only a single pertensive form for each noun: **kwǎaaj** and **mǎaaj**, respectively. The High Rise, which ends in a High target, is part of the regular pattern of exponence of the pertensive (pl). For both nouns, the forms marked for a pronominal possessor involve a Low tone target on the stem, out of step with the base form, which has the Low Fall. It is also remarkable that **kwâaaj-ɔ̀** 'grandfather (caregiver)' does not have a demonstrative inflection formed on its own root. Instead, the form used is the same as that of 'grandfather (biological)', i.e., **kwɛ́j-ì**.

Table 32. The inflectional paradigm incl. possessed forms of **kwâaaj-ɔ̀** 'grandfather (c[aregiver])' and **mâaaj-ɔ̀** 'aunt (m[other's sister])'.32

| | Inflections | | | Pronominal possession | |
	'grandfather (c.)'	'aunt (m.)'		'grandfather (c.)'	'aunt (m.)'
Base	**kwâaaj-ɔ̀**	**mâaaj-ɔ̀**	1st sg	**kwǎaa**	**màaaj-áa**
Pert. (sg)	**kwǎaaj**	**mǎaaj**	2nd sg	**kwàaaj-ú**	**màaaj-ú**
Pert. (pl)	**kwǎaaj**	**mǎaaj**	3rd sg	**kwǎn**	(3rd pl used instead)
Constr. st.	**kwâaaj**	**mâaaj**	1st pl incl	**kwàaaj-ɛ́ɛ**	**màaaj-ɛ́ɛ**
Demonstr.	**kwɛ́j-ì**	**mâaaj**	1st pl excl	**kwàaaj wɔ́n**	**màaaj wɔ́n**
			2nd pl	**kwàaaj wún**	**màaaj wún**
			3rd pl	**kwàaaj gɛ́n**	**màaaj gɛ́n**

Outside kinship terms, there is just one noun we know of that is comparable in terms of irregularity in the inflected forms and the forms with a pronominal possessor. This is **ɖjààŋ** 'cow'; its paradigm is listed in Table 33. Like **mîi-ɔ̀** 'mother (caregiver)' and **wîi-ɔ̀** 'father (caregiver)', it has an open syllable in various inflected forms. As a result, the latter display coalescence of the root with the suffix.

Table 33. The inflectional paradigm including possessed forms of **ɖjààŋ** 'cow'.

Base	**ɖjààŋ**	1st sg	**ɖjǎaa**
Pertensive (sg)	**ɖ̱ìɪɪᵘ**	2nd sg	**ɖ̱ìɪɪ**
Pertensive (pl)	**ɖ̱ǐɪɪ**	3rd sg	**ɖ̱èɛɛ**
Construct state	**ɖ̱ìn̪**	1st pl incl	**ɖ̱ìɪɪ-ɛ́ɛ**
Demonstrative	**ɖ̱ìn̪-ì**	1st pl excl	**ɖ̱ìɪɪ wɔ́n**
		2nd pl	**ɖ̱ìɪɪ wún**
		3rd pl	**ɖ̱ìɪɪ gɛ́n**

---

32 In relation to **mâaaj-ɔ̀** 'aunt (mother's sister)', the Shilluk lexicon does not distinguish between biological and caregiver meanings.

The irregular paradigm of 'cow' can be understood in terms of its central role in Shilluk culture. In fact, cattle terms are morphologically marked sex and maturity. We do not cover this phenomenon here, but it is described in detail in Martin (2018). In Table 34 we merely give a few paradigms, citing from that study.

Table 34. Some instances of the morphological marking for sex and maturity on cattle terms, cited from Martin (2018).

Cattle term	bull	bull calf	cow	heifer
'black'	dī-tʌ̄ʌŋ	ɲāa-dī-tʌ̄ʌŋ	ʊ̀-tʌ̂ʌʌŋ-ɔ̀	ɲī-tʌ̂ʌʌŋ-ɔ̀
'white'	ɲī-bɔ́ɔ́ŋ	ɲâa-ɲī-bɔ́ɔ́ŋ	ʊ̀-bɔ́ɔ́w	ɲī-bɔ́ɔ́w
'white, with red spots all over'	ɲī-dīɪŋ	ɲāa-ɲī-dīɪŋ	dīɪŋ	ɲáa-dīɪŋ

3.6.4 Suffixed base, suffixless inflections

There are also a handful of irregular nouns that carry a suffix in the base form, but not in the inflected forms. Consider the case of **lɔ̂ɔɔk-ɔ̀** 'other side of river'. Given that the base is suffixed and has an overlong stem vowel, we would expect the inflected forms to be suffixed and in the short grade, i.e., ****lɔ̂ɔk-ì** in the pertensive (sg) and ****lɔ̂ɔŋ-ì** in the construct state, on a par with **bɔ̀ɔɔt̪-ɔ̀** 'craftsman', which yields **bɔ̀ɔt̪-ì** and **bɔ̀ɔn̪-ì**, respectively. Instead, the pertensive is **lɔ̂ɔɔkᵘ**, and the construct state form is **lɔ̂ɔɔŋ**. These are the forms that would be regularly derived from base form ****lɔ̂ɔk**, which in fact does not exist.

Table 35 presents the paradigms of all the nouns we know of that follow this irregular pattern. In the case of **ɟàal-ɔ̀** 'man', the paradigm is also anomalous in a different way, in that the stem vowel in the suffixed base form is long rather than overlong (cf. Section 3.6.1 above).

Table 35. The paradigms of seven nouns that have a suffixed base form and suffixed inflections.

Base	úrɔ̀m-ɔ̀ 'nostril'	tɔ̂ŋ-ɔ̀ 'egg'	lɔ̂ɔɔk-ɔ̀ 'other side'	ágôoor-ɔ̀ 'collarbone'	kwâaar-ɔ̀ 'descendant'	tôoor-ɔ̀ 'socket'	ɟàal-ɔ̀ 'man'
Pert. (sg)	úrɔ̀mᵘ	tɔ̂ŋᵘ	lɔ̂ɔɔkᵘ	ágôoorᵘ	kwâaarᵘ	tôoorᵘ	ɟàaalᵘ
Pert. (pl)	úrɔ̌m	tɔ̌ŋ	lɔ̌ɔɔk	ágǒoor	kwǎaar	tǒoor	ɟǎaal
Constr. st.	úrɔ̀m	tɔ̂ŋ	lɔ̂ɔɔŋ	ágôoor	kwâaar	tôoor	ɟàaal
Demonstr.	úrɔ̀mᵘ	tɔ̂ŋᵘ	lɔ̂ɔɔŋᵘ	ágôoorᵘ	kwâaarᵘ	tôoorᵘ	ɟàaalᵘ

We attribute this type of paradigm to the existence, at an earlier diachronic stage, of two parallel paradigms, one suffixless, one suffixed. There is synchronic evidence for this scenario. In the case of the noun meaning 'gull', there is a suffixless base form, **úcāal**, alongside a suffixed base form, **úcâaal-ɔ̀**. While there are two alternatives for the base form, the inflected forms are only available from the suffixless paradigm, e.g. the pertensive (sg) is **úcāaalᵘ**, and not **úcâal-ɨ̀**. Another such case is the noun meaning 'truth', which has both the suffixless base form **djēer**, and the suffixed base form **djēeer-ɔ̄**. In this case, the inflected forms are available only from the suffixed paradigm – for example, the pertensive (sg) is **djēer-ɨ̄**. The existence of alternative base forms is a scenario out of which a paradigm like that of **lɔ̂ɔɔk-ɔ̀** 'other side (of river)' in Table 35 may have developed: there may originally have been two alternative base forms, and over time the suffixless base form from which the inflected forms are derived became obsolete and then lost.

Related to this irregular paradigm is the situation with the paradigm of **úrɔ̂ŋ-ɔ̀** 'mythical snake', which appears to be related to that of **úrɔ̂ŋ** 'rainbow'. While **úrɔ̂ŋ** 'rainbow' is regularly suffixless, **úrɔ̂ŋ-ɔ̀** 'mythical snake' has **úrɔ̂ŋᵘ** as its pertensive (sg), and its construct state form is either **úrɔ̂ŋ** or **úrɔ̂ŋ-ɨ̀**. We speculate that the paradigm of 'rainbow', arguably the diachronic origin of 'mythical snake', continues to supply the pertensive inflections, and optionally, also the construct state.

3.6.5 Fixed Overlong nouns

Suffixless singulars that have an overlong stem vowel in the inflected forms have either a short vowel or a long vowel in the base form (cf. Section 3.2). This is shown in (28); in (28a-b) for a Short with Grade noun, and in (28c-d) for a Long noun.

(28) a. **dî=a   bàt**
EXSP=F arm
'There is a branch.'

b. **dî=a   bàaanᵘ**
EXSP=F arm:CS:DEM
'There is this branch.'

c. **dî=a   cùʊr**
EXSP=F vulture
'There is a vulture.'

d. **dî=a   cùʊʊrᵘ**
EXSP=F vulture:CS:DEM
'There is this vulture.'

A handful of suffixless singulars have an overlong stem vowel in the inflected forms, but equally in the base form. An example is **pàʌʌr** 'hippo'. The anomaly in its paradigm is the fact that the suffixless base form has an overlong vowel.

(29) a. **dî = a   pλʌʌr**
    EXSP = F hippo
    'There is a hippo.'

    b. **dî = a   pλʌʌrᵘ**
    EXSP = F hippo:CS:DEM
    'There is this hippo.'

We know of four such nouns in total; they are listed in Table 36. Note how, by having the same vowel in the base form as in the inflected forms, syncretism is greater in these paradigms than in regular paradigms.[33]

Table 36. The paradigms of the four fixed overlong in our dataset.

Base	**ŋùuur** 'lion'	**pλʌʌr** 'hippo'	**pjλʌʌr** 'tenth'	**tòoor** 'valley'
Pertensive (sg)	**ŋùuurᵘ**	**pλʌʌrᵘ**	**pjλʌʌrᵘ**	**tòoorᵘ**
Pertensive (pl)	**ŋŭuur**	**pˇλʌʌr**	**pjˇλʌʌr**	**tˇoor**
Construct state	**ŋùuur**	**pλʌʌr**	**pjλʌʌr**	**tòoor**
Demonstrative	**ŋùuurᵘ**	**pλʌʌrᵘ**	**pjλʌʌrᵘ**	**tòoorᵘ**

All four of these nouns have the coda /r/. This offers a suggestion for the diachronic origin of this pattern. In Dinka, a closely-related language with whose speakers the Shilluk are in a contact situation, coda /r/ represents a phonotactic environment that is conducive to overlengthening of the preceding vocalic nucleus (cf. Remijsen & Gilley 2008; Remijsen & Manyang 2009). In this regard, it is worthwhile to note that the nouns in Table 36 do not have floating quantity in their base form. This is relevant here, because, as noted in Section 3.6.2, suffixless nouns whose base form is overlong as a result of compensatory lengthening for a lost suffix, e.g. **ŋŏoomᵘ** 'awl', do have floating quantity. Hence, the fact that the overlong suffixless base forms like **ŋùuur** 'lion' do not have floating quantity suggests that overlength developed in a different manner here, arguably as a sporadic phonological process.

3.6.6 Irregular paradigms involving coda elision

A handful of singular nouns display elision of the stem coda in the pertensive inflection, but only in a specific phonological environment. The phenomenon is illustrated in (30). The base form of the head noun in these examples is **t̪áw** 'buttocks'. This noun can be used with a relational meaning, meaning 'below, under'. This relational meaning is mostly found when the noun

---

33 Not included here is **jŏooᵘ** 'road', even though has an overlong vowel in the inflected forms as well. This is because it can be interpreted more insightfully in terms of the exceptional paradigm described in Section 3.6.2. See footnote 30.

appears in the pertensive inflection, which is irregularly ṭ́áaa(r̄)ᵘ.[34] The latter form is used when the possessor is vowel-initial, as in (30b,c). But when the possessor is consonant-initial, the coda is dropped and the vowel is short, as in (30a).

(30)   a.   ṭá̄   tʌ̌ʌʌ
🔊   bottom:PRT desert.date
       'Under the desert date.'

       b.   ṭ́áaa(r̄)ᵘ   álāal
🔊   bottom:PRT ko.o.acacia
       'Under the flat-topped acacia tree.'

       c.   ṭáaa(r)   óláam
🔊   bottom:PRT fig
       'Under the fig tree.'

The narrative example in (31) displays two instances of such nouns. Both of these nouns combine body-part reference with spatial orientation. The first one is above-mentioned **ṭáw** 'buttocks, under', which has the pertensive (sg) **ṭ́áaa(r̄)ᵘ**. The second one is **kʌ́w** 'chest', which has the additional relational meanings 'along' (space) and 'during' (time). It has the pertensive form **kóoo(r̄)ᵘ**, and when the possessor is consonant-initial, the form is **kó̄**, on a par with **ṭá̄** in (30a)

(31)ˆ   **cʌ̂ŋ á-kjèl   ɟɔ̂k-dɔ̀ɔŋ-ɔ̀ gɛ́   bèeet   àa   ṭ́áaar̄   óláam kì   kó̄   mwǯɔɔl**
🔊   day CRD-first men-big-P   PR3P stay:NT PRP:F under:PRT fig   PRP along:PRT morning
       'One day, the elders were sitting under a fig three throughout the morning.'
       [AchangVillage 28.7-31.7]

We know of four nouns overall that display this pattern. They are shown in Table 37. The third one, **ḍɔ́k** 'mouth', also has the relational meaning 'entrance to'. The fourth word that displays this pattern, **pâac** 'village', does not have a relational meaning. As seen from Table 37, if the pertensive with singular possessor appears before a consonant-initial possessor, then its stem syllable has a short vowel and no coda. If the possessor is vowel initial, then the stem syllable of the head noun is in the long vocalic grade. Elision of coda /r/ is optional here. If the following possessor begins with a consonant, in contrast, then the /r/ is consistently elided. Floating quantity in the pertensive with singular possessor is conditional on the following context, which needs to be a High-toned prefix **á-**, in line with the descriptive analysis in Section 3.3.2. Hence the following **á-** displays inclreased duration, but the following **ó-** does not.

---

34   The floating quantity feature is realised in (30b) but not in (30c): in the pertensive with singlar possessor, the realisation of floating quantity is conditional on the following context being a High-toned prefix /á-/ (cf. Section 3.3.2).

Table 37. Pertensive singular and pertensive plural forms of the four nouns that drop the coda in the pertensive, as a function of the following context (**ábác** 'Abac (name)', **ògwàal** 'frog', **twɔ́ɔŋ** 'Twong (name)', **ájwòm-ì** 'monkeys', **àmàaak** 'captives', **mʌ́ʌn** 'women'). The _ refers to the position of the target noun, # to a word boundary, and V́, V̀, and C to the following context.

	kʌ́w 'chest'	**ṭáw** 'buttocks'	**ḍɔ́k** 'mouth'	**pâac** 'village'
Pert. (sg.), _#V́	**kóoo(r̄)ᵘ ábác**	**ṭáaa(r̄)ᵘ ábác**	**ḍɔ́k̄ᵘ ábác**	**pāaa(r)ᵘ ábác**
Pert. (sg.), _#V̀	**kóoō(r)ᵘ ògwàal**	**ṭáaā(r)ᵘ ògwàal**	**ḍɔ́k̄ᵘ ògwàal**	**pāaa(r)ᵘ ògwàal**
Pert. (sg.), _#C	**kó̄ twɔ́ɔŋ**	**ṭá̄ twɔ́ɔŋ**	**ḍɔ́̄ twɔ́ɔŋ**	**pā twɔ́ɔŋ**
Pert. (pl.), _#V̀	**kóoo(r) ájwòm-ì**	**ṭáaa(r) ájwòm-ì**	**ḍɔ́k ájwòm-ì**	**pǎaa(r) ájwòm-ì**
Pert. (pl.), _ V̀	**kóoo(r) àmàaak**	**ṭáaa(r) àmàaak**	**ḍɔ́k àmàaak**	**pǎaa(r) àmàaak**
Pert. (pl.), _ C	**kóoo mʌ́ʌn**	**ṭáaa mʌ́ʌn**	**ḍɔ́ɔɔ mʌ́ʌn**	**pǎaa mʌ́ʌn**

In the plural forms, if the possessor is consonant-initial, then the head noun does not have a coda, and its stem vowel is overlong. If the possessor is vowel-initial, then elision of the stem coda of the head noun is optional. The specifications for tone are in line with the patterns described in Section 3.4.

The construct state and the demonstrative inflection do not display coda elision. This is shown in Table 38. The /n/ coda in the case of **pâac** is irregular (cf. Section 3.6.7).

Table 38. Construct state and demonstrative of the nouns that display coda elision in pertensive.

Base	**ḍɔ́k** 'mouth'	**kʌ́w** 'chest'	**ṭáw** 'buttocks'	**pâac** 'village'
Construct state	**ḍɔ́ŋ̱**	**kʌ́ʌʌw̄**	**ṭáaaw̄**	**pâaan**
Demonstrative	**ḍɔ́ŋ̱ᵘ**	**kʌ́ʌʌw̄ᵘ**	**ṭáaaw̄ᵘ**	**pâaañᵘ**

From a comparative perspective, it is worthwhile to note that three of the four nouns that display this particular exceptional pattern are relational nouns or "body part locatives" (Stirtz 2011:266), that is, body part nouns used as adpositions expressing the relative location of a noun referent. Dimmendaal (to appear) writes that this phenomenon is widespread among Nilo-Saharan languages, and notes specifically that possessive constructions with morphological marking on the possessed term are typically involved in this phenomenon.

3.6.7 Suppletion and other irregular changes
The onset consonant is the only phonological feature of the root syllable that is never exploited by the morphology in Shilluk, and for this reason, a difference

in the onset consonant is a reliable hallmark of suppletion. There are not many suppletive paradigms; two examples are presented in Table 39.

Table 39. The suppletive paradigms of **kà**l 'compound' and **ḓ́áaan̯-ɔ̀** 'person'.

Base	**kàl** 'compound'	**ḓ́áaan̯-ɔ̀** 'person'
Pertensive (sg)	**gɔ́l̄ᵘ**	**ŋàaanᵘ**
Pertensive (pl)	**gɔ́l**	**ŋăaan**
Construct state	**gɔ́l̄**	**ŋàaan**
Demonstrative	**gɔ̀l̀ᵘ**	**ŋàaanᵘ**

There are also some other unexpected changes in paradigms, without the onset consonant being implicated, and these we do not interpret as suppletive. For example, **pâac** 'village' has Mid tone and a rhotic coda in the pertensive with singular possessor, i.e., **pāaarᵘ**, and an alveolar nasal in the construct state **pâaanᵘ**. Both of these forms are unexpected; the regular forms would have been *pâaac and *pâaaɲ. And yet, the similarities between the different stem forms are such that we consider these three forms to be morphologically related. The same goes for **kʌ́w** 'chest', where we find the pertensive (sg) **kɔ́oor̄ᵘ**, rather than *kʌ́ʌ́ʌw̄ᵘ.

3.6.8 Fixed Long nouns

The nouns **ɔ̄ɔt** 'house' and **īic** 'stomach, inside' are anomalous, in the sense that they have a long vowel throughout their paradigm. In this respect they deviate from the pattern of vowel length alternation described in Section 3.2, whereby suffixless nouns that have a long vowel in the base have an overlong vowel in the inflected forms. The complete paradigms of these nouns are given in Table 40. We speculate that this anomaly has to do with the fact that they lack an onset consonant, which is highly unusual for a Shilluk stem.

Table 40. The paradigms if suppletive paradigms of **ɔ̄ɔt** 'house' and **īic** 'stomach, inside'.

Base	**ɔ̄ɔt** 'house'	**īic** 'stomach, inside'
Pertensive (sg)	**ɔ̄ɔtᵘ**	**īicᵘ**
Pertensive (pl)	**ɔ̌ɔt**	**ĭic**
Construct state	**ɔ̄ɔn**	**īiɲ**
Demonstrative	**ɔ̄ɔǹᵘ**	**īiɲ̀ᵘ**

4 Morphological exponence in the paradigms of plural nouns

The paradigms of plural nouns present less complexity than those of singular nouns, in various ways. First, there is only one pertensive form, i.e., the same form is used with singular and plural possessors. Second, there is less variation in the inflectional paradigms, in that the pertensive, construct state, and demonstrative inflections invariably carry the suffix **-ɪ**. This suffix combines systematically with the short grade of the stem. This means that, a handful of exceptions aside, plural nouns have either a short stem vowel or a long one in the inflected forms, but not an overlong one.

The various elements of morphological exponence in the inflectional paradigm of plural nouns are laid out in the following subsections. These elements are suffixation (Section 4.1), vowel length (Section 4.2), floating quantity (Section 4.3), and tone (Section 4.4). Different from the paradigms of singulars, nasalization is not part of the morphophonological exponence of inflectional marking for plural nouns. Just as in relation to singular nouns in Section 3, the section concludes with a discussion of some exceptions (Section 4.5).

4.1 Suffixation

The base form of a plural noun can be suffixless or suffixed. This is illustrated by the examples in Table 41. As seen from the table, suffixed base forms invariably have the suffix **-ɪ**. The specification for tone on this suffix in plural base forms is either Low or Mid, and which of these it is is fully predictable on the basis of the tonal specification of the stem syllable. Because of this dependency relation, we describe the specification for tone on the suffix together with the specification for tone on the stem, in Section 4.4.1.

Table 41. Some inflectional paradigms of plural nouns, both with suffixless and with suffixed base forms.

	Suffixless base form			Suffixed base form		
Base	**lùm^μ**	**lɛ̄ɛl**	**ɟʌ́ʌʌt̪^μ**	**ɟʌ́m-ì**	**lòok-ì**	**gwʌ́ʌŋ-ī**
	'grasses'	'pebbles'	'boats'	'things'	'words'	'wild cats'
Pertensive	**lùm-í**	**lɛ̄ɛl-í**	**ɟʌ́t̪-í**	**ɟʌm-í**	**lòok-í**	**gwʌ́ʌŋ-í**
Construct state	**lùm-ì**	**lɛ̄ɛl-ì**	**ɟʌ́t̪-ī**	**ɟʌ́m-ī**	**lòok-ì**	**gwʌ́ʌŋ-ī**
Demonstrative	**lùm-ì**	**lɛ̄ɛl-ì**	**ɟʌ́t̪-ì**	**ɟʌm-ì**	**lòok-ì**	**gwʌ́ʌŋ-ì**

The inflected forms of these plural nouns are all suffixed, both if the base form is suffixed, and equally if it is suffixless. This is shown in Table 41. As noted above, the suffix is invariably **-ɪ**. Its tonal specification is the main exponent distinguishing the three inflected forms. In the pertensive inflection, the suffix is High-toned, just as in the pertensive (pl) of singular suffixed nouns (Section 3.1.2). In the demonstrative inflection, the suffix is invariably Low-toned, again just as in the demonstrative of singular suffixed nouns (Section 3.1.2). In the construct state, the tonal specification is either Low or Mid. Which of these it is is predictable on the basis of the tonal specification of the stem syllable; we will go into this in Section 4.4.2.

The marking of pronominal possession with plural possessed terms is illustrated in Table 42. The paradigm of the corresponding singular noun is included for the sake of comparison. Note that the stem form is the same as in the pertensive. Just as when the possessed term is singular, pronominal possession on plural nouns is inflectional in nature only if the possessor is singular or 1st plural inclusive. In these four forms, the pronominal possessors is suffixed to the pertensive stem, replacing the suffix **-í**. As seen from Table 42, the four suffixes are all High-toned. In relation to the suffixes marking of 1st, 2nd, and 3rd person possessors, i.e., **-áa, -íɪ, -ɛ́**, their High tonal specification sets them apart from the corresponding possessed forms of singular nouns, which take **āa, -īɪ, -ɛ̀/ɛ̄**, respectively.

Table 42. Illustration of the pronominal marking of possession, for a singular and a plural noun.

Base	**gwôk** 'dog'	**gwɔ́ook**ᵘ 'dogs'
Pertensive, sg. poss.	**gwɔ́ook̄**ᵘ **kùl**	**gwók-í kùl**
Pertensive, pl. poss.	**gwóook ɟìɪ**	**gwók-í ɟìɪ**
1st sg.	**gwɔ́ook̄-āa**	**gwók-áa**
2nd sg.	**gwɔ́ook̄-īɪ**	**gwók-íɪ**
3rd sg.	**gwɔ́ook̄-ɛ̄**	**gwók-ɛ́**
1st pl. incl.	**gwóook-ɛ́ɛ**	**gwók-ɛ́ɛ**
1st pl. excl.	**gwóook wɔ́n**	**gwók-í wɔ́n**
2nd pl.	**gwóook wún**	**gwók-í wún**
3rd pl.	**gwóook gɛ́n**	**gwók-í gɛ́n**

Just as with singular nouns, we do not consider as inflectional the pronominal expression of 1st plural exclusive, 2nd plural and 3rd plural possessors, i.e., **wɔ́n, wún, gɛ́n** – note the lack of a hyphen before these pronominal

elements in Table 42. These possessive pronominal forms are identical to the corresponding independent pronouns used as clause-level arguments.

4.2 Vowel length

As seen from Table 43, the base forms of plural nouns can have a short, long or overlong vowel in their stem syllable. Base forms with a short or a long stem vowel can carry a suffix **-ɪ**; base forms with an overlong stem vowel never do. This is in line with the more general pattern in Shilluk morphophonology, whereby the suffix **-ɪ** never combines with stems that have an overlong vowel. Table 43 also illustrates the fact that the inflected forms of plural nouns invariably carry the suffix **-ɪ**; accordingly, the stems of the inflected forms of plural nouns have either a short vowel or a long one, but not an overlong one. Overall, there are four patterns of quantity alternation in plural nouns: Fixed Short, Fixed Long, Short with Grade and Long with Grade.

Table 43. Patterns of alternation of vowel length in the stem, found among plural nouns.

	Fixed short (V)		**Fixed long (VV)**		**Short w. Grade (V~VVV)**	**Long w. Grade (VV~VVV)**
Base	ɲíŋ 'eyes'	ɟâm-ì 'things'	lēɛl 'pebbles'	lòok-ì 'words'	ɟʌ́ʌʌʈ̚ᵘ 'boats'	mɛ̆ɛɛlᵘ 'droughts'
Pertensive	ɲíŋ-í	ɟám-í	lēɛl-í	lòok-í	ɟʌ́ʈ-í	mɛ̀ɛl-í
Constr. st.	ɲíŋ̄-ī	ɟâm-ī	lēɛl-ì	lòok-ì	ɟʌ́ʈ̄-ī	mɛ̀ɛl-ì
Demonstr.	ɲíŋ-ì	ɟám-ì	lēɛl-ì	lòok-ì	ɟʌ́ʈ-ì	mɛ̀ɛl-ì

4.3 Floating quantity

In relation to singular nouns, we described how suffixes in the suffixed paradigms are matched to some extent in suffixless paradigms by floating quantity: a feature of quantity at the right edge of the noun, which is realized as greater duration on a following vocalic prefix. In suffixless singular nouns, floating quantity is found in all demonstratives (Section 3.3.1), and in the pertensive with singular possessor (Section 3.3.2). It is also found in the suffixless base form of nouns that have suffixed inflected forms (Section 3.6.2). In all of these cases, the phenomenon can be attributed to a lost suffix (cf. Andersen 1990). Moving on to plural nouns, the only form in the paradigm where floating quantity could possibly be found is the base form, because the inflected forms invariably carry the suffix **-ɪ**. In contrast, the base forms are

either suffixed or suffixless; the latter represent the environment in which floating quantity is possible. And it is indeed found there.

Floating quantity in the plural base form is illustrated in (32). The plural suffixless noun **lɔ̂t̪ᵘ** 'sticks' has floating quantity. In contrast, the plural noun **pᴧ̂t** 'spoons', does not. This can be established on the basis of the duration of the following cardinal marker **á-**: as heard in the embedded sound files, its duration is considerably greater following **lɔ̂t̪ᵘ** 'sticks' in (32a) than following **pᴧ̂t** 'spoons' in (32b). In contrast, when, the noun is followed by the indefinite relativizer **mɛ́/mɔ́**, there is no difference in quantity or tone. This is shown in (32c,d).

(32) a. **lɔ̂t̪ᵘ** **á-dʌ̀k**   b. **pᴧ̂t** **á-dʌ̀k**
         stick.P CRD-third   spoon.P CRD-third
         'three sticks'   'three spoons'

      c. **lɔ̂t̪ᵘ** **mɔ́** **bʌ̀r-ɔ̀**   d. **pᴧ̂t** **mɔ́** **bʌ̀r-ɔ̀**
         stick.P REL.P long-P   spoon.P REL.P long-P
         'long sticks'   'long spoons'

When floating quantity is found in the base form of plural nous, any following vocalic suffix serves as a docking site. In this respect, it is just like floating quantity in the demonstrative of suffixless singular nouns (Section 3.3.1), and unlike floating quantity in the pertensive with singular possessor of suffixless singular nouns, where the docking site is restricted to High-toned **á-** (Section 3.3.2). Additional examples with audio are presented in (33).

(33) a. **tɔ̂ŋᵘ** **á-dʌ̀k**   b. **wɔ̀ɔŋᵘ** **á-dʌ̀k**   c. **jᴧ́ʌʌt̪ᵘ** **á-dʌ̀k**
         spear:P CRD-third   grandmother:P CRD-third   boat:P CRD-third
         'three spears'   'three grandmothers'   'three boats'

In a set of 324 suffixless plurals, 70 items, or 22 percent, do not have floating quantity. That is, most suffixless plurals do have floating quantity. As for the suffixless plural nouns whose base form does not have floating quantity, a total of 60 out of these 72 items have either a High or a Mid tone, with the stem vowel being either short or long. These forms are illustrated in (34): there is no floating quantity here. This pattern is consistent, i.e., all suffixless plurals in the set of 324 nouns that carry a High tone or a Mid tone do not have floating quantity. Therefore we hypothesize that this generalization holds for the population of High- and Mid-toned suffixless plural nouns as a whole.

(34) a. **ríc** **á-dʌ̀k**   b. **lēk** **á-dʌ̀k**   c. **mᴧ́ʌn** **á-dʌ̀k**   d. **dōor** **á-dʌ̀k**
         fish.P CRD-third   teeth.P CRD-third   women CRD-third   wall.P CRD-third
         'Three fish.'   'Three teeth.'   'Three women.'   'Three walls.'

The twelve other suffixless plurals we know of that do not have floating quantity are the following: **cwɔ̂w** 'men', **cjʌ̂ʌŋ** 'days', **d̪òk** 'cows', **djêk** 'goats/ sheep', **pʌ̂t** 'spoons', **ɟìɪ** 'people', **câak** 'milk', **pʌ̂ʌt** 'bark (pl.)', **rûun** 'years', **pîi** 'water', **cjêt̪** 'excrement', and **ɟɔ̂k** 'men'.[35] While this list is almost certainly not exhaustive, it is clear that, beyond High- and Mid-toned forms, the lack of floating quantity is very rare in the base form of suffixless plurals. There are a few important things to note. First, none of the nouns that lack floating quantity have an overlong stem vowel, a hallmark of morphological marking. This supports the interpretation that the floating quantity is an instance of morphological marking. Second, a long stem vowel is characteristic of the lack of morphological marking, and almost all of these lack floating quantity. The only suffixless plural nouns with a long vowel that do display floating quantity are **wɔ̀ɔŋ**ᵘ 'grandmothers', and **ɔ̂ɔt**ᵘ 'houses'. Finally, several of above twelve nouns are suppletive relative to the corresponding singular, which is in line with the interpretation that they are morphologically unmarked. They are **cwɔ̂w** 'men', **d̪òk** 'cows', **ɟìɪ** 'people'. As for the plural nouns **pʌ̂ʌt** 'bark (pl.)', **pîi** 'water', **cjêt̪** 'excrement', they all have a corresponding singular that carries the **-ɔ** suffix, suggesting that they are morphologically unmarked in the plural. All of these characteristics are in line with the interpretation that the lack of floating quantity is characteristic of morphologically unmarked plurals, and that, equally, floating quantity is part of the morphological exponence of plural number.

4.4 Tone

4.4.1 Tone in base forms

The tonal specifications observed in suffixless plural base forms are illustrated in Table 44. The range of specifications is greatest when the vowel is short, where seven specifications are attested. In Section 5, we will argue that some plurals are morphologically derived from singulars, whereas other plurals are morphologically basic. In this perspective, the wider range of tonal specifications in stems with a short vowel than in stem with a long or an overlong vowel can be explained on the basis of the fact that short vowels are found both in morphologically unmarked forms and in morphologically

---

35 Regarding those nouns for which the plural number is not obvious from the translation, the fact that they are grammatically plural can be established straightforwardly on the basis of number agreement. For example, the 1st singular possessor suffix is High-toned when the possessor is grammatically plural, as opposed to Mid-toned when it is grammatically singular.

marked ones. In contrast, long vowels are found primarily in morphologically unmarked forms, and overlong vowels primarily in morphologically marked ones. On the basis of this heuristic, it can be inferred from the patterns in Table 44 that the High tone is found on morphologically unmarked forms, and the High Fall to Mid, High Fall and Low Rise on morphologically marked forms.

Table 44. Illustrations of the specifications for tone found in the base forms of suffixless plurals, by level of vowel length in the stem syllable.

	Short stem vowel	Long stem vowel	Overlong stem vowel
Low	**dòŋ**ᵘ 'baskets'	**wɔ̀ɔŋ**ᵘ 'grandmother (biol.)'	**gɔ̀ɔɔt**ᵘ 'corners'
Low Fall	**pîn**ᵘ 'cheeks'	**pʌ̂ʌt** 'bark (pl)'	**dʌ̂ʌʌk**ᵘ 'cooking pots'
Mid	**ṭɪ̄k** 'doors'	**lɛ̄ɛl** 'pebbles'	**rjɛ̄ɛɛw**ᵘ 'second ones'
High Fall	**wɪ́n**ᵘ 'birds'		**gjɛ́ɛɛl**ᵘ 'armbands'
High Fall to Mid	**gɔ̂ɪ̄**ᵘ 'honey badgers'		**jʌ̂ʌʌɪ̄**ᵘ 'boats'
High	**wór** 'songs'	**láac** 'urine'	
Low Rise	**lɜ̌ɲ**ᵘ 'cats'		**dǎaak**ᵘ 'herds'

The tonal specifications in suffixed plural base forms are illustrated in Table 45. The three specifications for tone on the stem syllable listed there, i.e., Low, Low Fall, and High Fall to Mid are each represented by dozens of cases. There are two other specification that are only attested in a handful of cases: one is High Fall, as in **ɟʌ́m-ɪ̀** 'things'; the other is Mid, as in **àwāl-ɪ̄** 'basket-shaped nets for trapping fish'.

Table 45. Illustrations of the specifications for tone found in the base forms of suffixed plurals, by level of vowel length in the stem syllable.

Stem tone, Suffix tone	Short stem vowel	Long stem vowel
Low-Low	**bùl-ì** 'drums'	**tùuk-ì** 'cooking stones'
Low Fall-Low	**ṭûlì** 'owls'	**kʌ̂ʌn-ì** 'palm trees (*Hyphaene thebaica*)'
High Fall to Mid-Mid	**púk̄-ɪ̄** 'clay pots'	**kʌ́ʌĪ-ɪ̄** 'compounds'

4.4.2 Tone in the inflected forms

As seen from Table 43, the inflected forms of plural nouns – pertensive, construct state and demonstrative – invariably carry the suffix **-ɪ**, irrespective of whether the base form is suffixed or not.[36] In some forms, the specification

---

36 We leave aside here the forms marked for a pronominal possessor, some of which involve a suffix as well. This marking was covered in Section 4.1.

for tone on the suffix **-ɪ** interacts with the specification for tone of the stem syllable, to the effect that these specifications are not independent. The direction of the conditioning effect can go in either direction. That is, in some cases the specification for tone of the stem determines the specification for tone on the suffix, and in others the conditioning relation is the way around. These interactions are described below. The presence of a suffix in the base form is irrelevant in this context. For example, the inflected forms of **kɅ́ʌl-ī** 'compounds' are identical in their specification for tone to those of **jɅ́ʌʌt̪ᵘ** 'boats': what matters is that both have a High Fall to Mid on the stem.

We first discuss the specification for tone in relation to plurals in which the specification for tone on the stem syllable remains the same between the base form and inflected forms, and then discuss paradigms where base forms and inflected forms diverge in terms of the tonal specification on the stem syllable. The specification for tone on the stem and on the suffix for plural nouns that have a Low, a Low Fall, and a Mid on the stem syllable in the base form is illustrated in Table 46. These three tonal specifications on the stem are reflected unchanged in the inflected forms. As for the specification for tone on the suffix **-ɪ**, it is invariably High-toned in the pertensive, i.e., **-í**, and in the demonstrative it is consistently Low-toned, **-ì**. The specification for tone of the **-ɪ** suffix in these two inflections is fixed. Finally, in the construct state the tonal specification on the suffix varies between Low and Mid, i.e., **-ī/-ì**. As illustrated by the forms in Table 46, nouns that have a Low, a Low Fall or a Mid on the stem all have the Low-toned **-ì** allomorph in the construct state. We will come back to this below.

Table 46. Illustrations of the specifications for tone found in the inflected forms of plural nouns that have a Low, Low Fall, Mid, and Low Rise tone on the stem in the base form.

	Low	Low Fall	Mid	Low Rise
Base	**lùmᵘ** 'grasses'	**gûlᵘ** 'joints'	**lēk** 'teeth'	**lɔ̌ɲᵘ** 'cats'
Pert.	**lùm-í**	**gûl-í**	**lēk-í**	**lɔ̀ɲ-í**
Constr. st.	**lùm-ì**	**gûl-ì**	**lēk-ì**	**lɔ̀ɲ-ì**
Dem	**lùm-ì**	**gûl-ì**	**lēk-ì**	**lɔ̀ɲ-ì**

Table 46 also illustrates the specification for tone on stem and on suffix for plural nouns that have a Low Rise. For these nouns, the tonal specification found on the stem syllable in the base form is not retained in the inflected forms. Rather, the High end target that is part of tonal configuration in the base form is absent in the inflected forms, just as it is in singular base forms

that have rising specifications for tone (cf. Sections 3.4.2 and 3.4.5). Hence, plural nouns that have a Low Rise on the stem in the base form have a Low on the stem in the inflected forms, as in **lɔ̀ɲ-í** 'cats:PRT'. As a result, we cannot tell from the specifications for tone in the inflected forms whether a plural noun has a Low or a Low Rise on the stem syllable in the base form. This can be seen from comparing the paradigms of **lùm**ᵘ 'grasses' vs. **lɔ̌ɲ**ᵘ 'cats'.

Finally, there are plural nouns that have a High, a High Fall, or a High Fall to Mid on the stem in the base form. The common characteristic of these nouns is that they have an initial high target on the stem syllable. As seen from Table 47, the stem carries a High tone in the pertensive and demonstrative, and a High Fall to Mid in the construct state, where it is followed by the Mid-toned allomorph **-ī**.[37] Note that these nouns are indistinguishable from one another in terms of the specifications for tone in the inflected forms. That is, one cannot tell from the inflected forms of these nouns whether the base form has a High, a High Fall, or a High Fall to Mid on the stem.

Table 47. Illustrations of the specifications for tone found in the inflected forms of plural nouns that have a High Fall, High Fall to Mid or High on the stem in the base form.

	High Fall	High Fall to Mid	High
Base	**wíɲ**ᵘ 'birds'	**gɔ́r̄**ᵘ 'honey badgers'	**ɲíŋ** 'eyes'
Pert.	**wíɲ-í**	**gɔ́r-í**	**ɲíŋ-í**
Constr. st.	**wíɲ-ī**	**gɔ́r̄-ī**	**ɲíŋ̄-ī**
Dem	**wíɲ-ì**	**gɔ́r-ì**	**ɲíŋ-ì**

In summary, the specification for tone on the suffix **-ɪ** is constant in the pertensive (**-í**) and in the demonstrative (**-ì**). In the construct state, the tone on the suffix alternates as a function of the tonal specification of the stem syllable. The tonal specification on the suffix in the construct state is Mid, i.e., **-ī**, for nouns that have a High, High Fall to Mid or High Fall in the base form (Table 47), but Low, i.e., **-ì**, in the case of nouns with different specifications

37 Most of the evidence from Shilluk morphology supports the interpretation that a Mid-toned suffix conditions a preceding High tone on the stem syllable to change into a High Fall to Mid. Note, for example, that the specifications for tone on suffixed plural include **CV̂C̄-V̄**, i.e., High Fall to Mid followed by Mid but not **CV́C-V̄**, i.e., High followed by Mid. While this generalisation holds in relation to the inflectional morphology, **CV́C-V̄** is in fact attested in the derivational morphology. The derivation of instrument nouns from transitive verbs regularly yields forms such **ŋíc- īı** 'symbol, marker' from {**ŋìc**} 'recognize' and **góooc-īı** 'machete' from {**gɔ̀ɔc**} 'hit'.

for tone on the stem syllable (Tables 46).

It is puzzling that Mid-toned stems such as **lēk** 'teeth' take the Low-toned suffix, i.e., **lēk-ì**, and not the Mid-toned one, i.e., *****lēk-ī**. The fact that High nouns, High Fall to Mid nouns and High Fall nouns take **-ī** rather than **-ì** in the construct state suggests that the distribution of the allomorphs of the construct state marker **-ì/-ī** is assimilatory in nature. Given that there is an allomorph that matches the specification of Mid-toned stems exactly, it is remarkable that the latter nonetheless combine with the Low-toned allomorph. Undoubtedly, the explanation for this state of affairs is diachronic.

Within the synchronic scope of this descriptive analysis, we limit ourselves to presenting the evidence for the specifications hypothesized in Tables 46 and 47. Illustration (35) presents examples, including embedded sound files, for the inflections of plural nouns with Low, Low Rise, and Low Fall. Note that, in the inflected forms, the nouns with Low and those with Low Rise are indistinguishable with respect to their specification for tone.

(35)
a. **lùmᵘ**
'grasses'

b. **lùm-í kùl**
grasses-PRT Kul
'Kul's grasses.'

c. **lùm-ì ŋèɛɛɲ-ɔ̀**
grasses-CS QUANT
'A mass of grasses.'

d. **lùm-ì**
grasses-CS:DEM
'These grasses.'

e. **lɔ̌ɲᵘ**
'cats'

f. **lɔ̀ɲ-í kùl**
cats-PRT Kul
'Kul's cats.'

g. **lɔ̀ɲ-ì ŋèɛɛɲ-ɔ̀**
cats-CS QUANT
'A mass of cats.'

h. **lɔ̀ɲ-ì**
cats-CS:DEM
'These cats.'

i. **gûlᵘ**
'joints'

j. **gûl-í kùl**
joints -PRT Kul
'Kul's joints.'

k. **gûl-ì ŋèɛɛɲ-ɔ̀**
joints -CS QUANT
'A mass of joints.'

l. **gûl-ì**
joints-CS:DEM
'These joints.'

There is syncretism between the construct state and the demonstrative inflections. Syncretism is even greater in the paradigms of suffixed plurals such as **lòok-ì** 'words'. Here base form, construct state and demonstrative are all identical, and only the pertensive form (**lòok-í**) is different.

The Mid-toned plural nouns are illustrated in (36). As noted in relation to Table 46, the construct state has the Low-toned allomorph of the suffix, rather than the Mid-toned one. The reader can ascertain this on the basis of the sound example in (36c,g,k). In these examples, the Mid tone on the noun stem conditions the highest pitch in the clause. Note that, in each case, the pitch drops from mid to low register after the stem syllable of the head noun, rather than after the construct-state marking suffix **-ì**.

(36) a **lēk**
         🔊 teeth
         'teeth'

b. **lēk-í   kùl**
    🔊 teeth-PRT Kul
    'Kul's teeth.'

c. **lēk-ì   ŋèɛɛɲ-ɔ̀**
    🔊 teeth-CS QUANT
    'A mass of teeth.'

d. **lēk-ì**
    🔊 teeth-CS:DEM
    'These teeth.'

e. **lēɛl**
    🔊 pebbles
    'pebbles'

f. **lēɛl-í   kùl**
    🔊 pebbles-PRT Kul
    'Kul's pebbles.'

g. **lēɛl-ì   ŋèɛɛɲ-ɔ̀**
    🔊 pebbles-CS QUANT
    'A mass of pebbles.'

h. **lēɛl-ì**
    🔊 pebbles-CS:DEM
    'These pebbles.'

i. **ŋjēeɲ**
    🔊 money.P
    'money'

j. **ŋjēeɲ-í   kùl**
    🔊 money.P-PRT Kul
    'Kul's money.'

k. **ŋjēeɲ-ì   ŋèɛɛɲ-ɔ̀**
    🔊 money.P-CS QUANT
    'A mass of money.'

l. **ŋjēeɲ-ì**
    🔊 money.P-CS:DEM
    'This money.'

Illustration (37) demonstrates the inflections found on plural nouns that have a High, High Fall, and High Fall to Mid in the base forms. Here the construct state suffix has a Mid tone. This is revealed by the sound examples in (37c,g,k), where one can hear the drop in pitch from mid to low register following the construct-state marker **-ī**.

(37) a. **ɲíŋ**
         🔊 'eyes'

b. **ɲíŋ-í   kùl**
    🔊 eyes-PRT Kul
    'Kul's eyes.'

c. **ɲíŋ̄-ī   ŋèɛɛɲ-ɔ̀**
    🔊 eyes-CS QUANT
    'A mass of eyes.'

d. **ɲíŋ-ì**
    🔊 eyes-CS:DEM
    'These eyes.'

e. **wíɲ^u**
    🔊 'birds'

f. **wíɲ-í   kùl**
    🔊 birds-PRT Kul
    'Kul's birds.'

g. **wíɲ̄-ī   ŋèɛɛɲ-ɔ̀**
    🔊 birds-CS QUANT
    'A mass of birds.'

h. **wíɲ-ì**
    🔊 birds-CS:DEM
    'These birds.'

i. **gɔ́r̄^u**
    🔊 'honey badgers'

j. **gɔ́r-í   kùl**
    🔊 h.badgers-PRT Kul
    'Kul's honey badgers.'

k. **gɔ́r̄-ī   ŋèɛɛɲ-ɔ̀**
    🔊 h.badgers-CS QUANT
    'A mass of honey badgers.'

l. **gɔ́r-ì**
    🔊 h.badgers-CS:DEM
    'These honey badgers.'

4.5 Exceptions

Table 48 presents the paradigms of five plural nouns where the inflectional marking goes beyond the patterns of exponence described in Sections 4.1 to 4.4. Before going into the morphonophonological phenomena, we note that the nouns **pîi** 'water' and **càak** 'milk' are both plurals, as determined on the basis of the pattern of agreement with modifiers. For example, they take the plural relativizer **mɔ́**, rather than the singular relativizer **mɛ́**. This is not surprising: in Shilluk as in other Nilotic languages, nouns referring to liquids are grammatically plural (cf. Zwarts 2007).

And yet, in spite of being grammatically plural, the paradigms of **càak** 'milk' and **pîi** display some features that are characteristic of singular nouns. The noun **càak** 'milk' is similar to singular nouns in that its inflected forms have increased vowel length, just as the inflected forms of suffixless singular nouns that have a long vowel in the base form (see Section 3.2, Table 8).

But, unlike a singular noun, there is no nasalisation in the demonstrative inflection.

Table 48. Illustrations of the specifications for tone found in the base forms of suffixed plurals, by level of vowel length in the stem syllable.

Base	càak 'milk'	pîi 'water'	rûun 'years'	cjʌ̂ʌŋ 'days'	ɟɔ̂k 'men'
Pertensive	cǎaak	píii	rúun-í	cjʌ́ʌŋ-í	ɟɔ̌ɔ
Pert. 1st sg.	caaak-áa	pík-áa	rúun-áa	cjʌ́ʌŋ-áa	ɟɔ̂k-áa
Construct state	càaak	pík̂	rúuñ-ī	cjʌ́ʌŋ̄-ī	ɟɔ̂k
Demonstrative	càaak	pík̀	rúun-ì	cjʌ́ʌŋ-ì	ɟɔ̂k

A different irregularity, shared by **pîi** 'water', **rûun** 'years' and **cjʌ̂ʌŋ** 'days', is that they have a Low Fall in the base form, and a High tonal component in the tonal specification of the inflected forms. This is reminiscent of singular nouns, especially the tonal alternation in the paradigm of the Low Fall (High) singular nouns (see Table 21).

The paradigms of **pîi** and **ɟɔ̂k** present an alternation in the inflected forms, between a closed syllable with a short vowel, which is found in most of the paradigm, and a form with an open syllable an overlong vowel in the pertensive (**píii**, **ɟɔ̌ɔ**). This alternation is again reminiscent of an exception in singulars, whereby the coda consonant is dropped (cf. Section 3.6.6).

Finally, all five of these exceptions belong to the set of plurals that do not have floating quantity, even though the specification for tone is neither High nor Mid. As noted in Section 4.3, we know of only twelve such nouns.

Aside from these exceptions in inflectional marking in plural paradigms, there are also some instances of suppletion. For example, the base form **ɟìɪ** 'people' does not form the basis of the corresponding inflected forms, as the latter are suppletive: the pertensive and construct state forms are **tjéeeŋ**, and the demonstrative is **tjéeeŋ̀**.

5 Number marking

Number marking in nouns is one of the topics in Shilluk grammar that has received the most attention (Westermann 1912; Gilley 1992, 2000; Storch 2005; Reid 2009; Remijsen, Miller-Naudé & Gilley 2015; Xu 2017). In this section, we present a descriptive analysis that builds on these earlier studies, and also on the analysis of nominal morphophonology in Sections 3 and 4. We

start out with addressing the central questions of regularity and productivity (Section 5.1). Then we present the tripartite analysis of number marking in Shilluk (Gilley 1992, Dimmendaal 2000), for which we have new evidence (Section 5.2).

5.1 Regularity and productivity

The question of regularity figures prominently in earlier work on number marking in Shilluk nouns (Westermann 1912; Gilley 1992, 2000; Storch 2005; Reid 2009; Remijsen, Miller-Naudé & Gilley 2015; Xu 2017). All these studies conclude that the morphophonological forms of corresponding singulars and plurals are not predictable on the basis of either one.

The study by Xu (2017) is particularly insightful in this context, as it quantifies the extent of regularity. Xu examined 428 nouns for which both singular and plural were available. She coded the differences between singular and plural forms for the 428 nouns, following the methodology set out in a study examining regularity in number marking in Dinka (Ladd, Remijsen & Manyang, 2009). In this approach, each singular-plural pair is coded for the set of morphophonological features that mark number. For example, the singular-plural pair **mâʌt̪ – mʌ́ʌʌt̪ᵘ** 'friend:s/:P' is coded for differing in terms of tone (Low Fall – High Fall) and vowel length (VV – VVV). The pair **gûur – gʌ́uurᵘ** 'Nile perch:S/:P' counts as an instance of the same pattern of exponence, but the pair **lêɛm – lěɛɛmᵘ** 'surgery knife:S/P' does not: while vowel length (VV – VVV) is shared with the above-mentioned pattern, the tonal marking is different (Low Fall – Low Rise). Floating quantity was not included in the coding scheme, because it was not yet discovered at the time of Xu's study.

The 428 singular-plural pairs include 247 pairs that represent native nouns that do not include a vocalic prefix, and which are therefore unambiguously monomorphemic. Just for these 247 monomorphemic native nouns, Xu reports a total of 146 different patterns of exponence in terms of which singulars and plurals may differ from one another. The eight most common patterns of exponence are listed in Table 49, which is drawn from Xu (2017:17). The most common pattern makes up 5.3% of the dataset. Put together, the eight most common patterns account for 26.7% (66 out of 247 cases). The remaining 138 patterns are each represented five times or less. Other studies also report a multitude of patterns of number marking (Westermann 1912, Gilley 2000, Storch 2005, Reid 2009).

Table 49. The eight most frequent patterns of number marking found in a set of 428 monomorphemic native Shilluk nouns. Adapted from Xu (2017:17, with transcription for floating quantity and sound examples added here).

Rank	Differences	Example (Sg – Pl)			No. of cases, %
1.	Tone (Low, Mid), Suffix (-ɔ, Ø), Length (VVV, VV)	🔊	🔊	**kòʋʋr-ɔ̀ – kōʋr** 'cotton:S/P'	5.3% (13)
2.	Tone (High, Low Fall)	🔊	🔊	**líɲ – lîɲ**ᵘ 'conflict:S/P'	4.5% (11)
3.	Tone (Low Fall, Low), Suffix (-ɔ, Ø)	🔊	🔊	**kwâaaj-ɔ̀ – kwàaaj**ᵘ 'ancestor:S/P'	4.0% (10)
4.	Tone (High Fall to Mid, High Fall), Suffix (-ɔ, Ø)	🔊	🔊	**lwɛ́ɛɛt-ɔ̄ – lwɛ́ɛɛt**ᵘ 'finger:S/P'	3.2% (8)
5.	Tone (Low Fall, Low Rise), Length (VV, VVV)	🔊	🔊	**lêɛm – lěɛɛm**ᵘ 'surgery knife:S/P'	2.8% (7)
6.	Tone (High, High Fall to Mid), Length (VV, VVV)	🔊	🔊	**jíit – jíɨiīt̶**ᵘ 'fisherman:S/P'	2.8% (7)
7.	Tone (Low Fall, Low), Suffix (-ɔ, Ø)	🔊	🔊	**ḓôŋ-ɔ̀ – ḓòŋ**ᵘ 'basket:S/P'	2.4% (6)
8.	Tone (Low Rise, Low), Suffix (Ø, -ɪ), Length (VVV, VV)	🔊	🔊	**kʌ̌ʌʌk**ᵘ **– kʌ̀ʌk-ɪ̀** 'harpoon:S/P'	2.0% (5)

While number marking is not generally regular (i.e., predictable), there are subregularities. For example, a High Fall to Mid on suffixless stems is only found in plural, and never in singulars.

Productivity has received less attention in earlier work. The fact is that many nouns appear in one level of number only, i.e., either as a singular or as a plural, but not both. Our lexicographic database includes 906 singular nouns, and 668 plural nouns. By implication, at least 238 singular nouns, i.e., more than a quarter of the grammatically singular nouns in our dataset, are either unspecified for number, or do not have a corresponding plural. Examples of these are presented in (38). The set of nouns that do not display a singular-plural distinction includes many plants and animals. With such nouns, the same form is used for both singular and plural referents. For example **ɲâʌʌl-ɔ́** 'python' can be used both with singular reference, as in **ɲâʌʌl-ɔ́ mɛ́ dwɔ́ɔŋ** 'a big python' or **ɲâʌʌl-ɔ́ á-kjèl** 'one python', and with plural reference, as in **ɲâʌʌl-ɔ́ mɔ́ dɔ̀ɔŋ-ɔ̀** 'big pythons' or **ɲâʌʌl-ɔ́ á-dʌ̀k** 'three pythons'.

(38)

🔊 **ájàaat-ɔ̀** 'bean.greens'	🔊 **pjɛ̄ɛt** 'lie'	🔊 **ɲʌ̂ʌʌl-ɔ́** 'python-s'	🔊 **úcɔ́ɔɔj̄-ɔ̄** 'watermelon-s'
🔊 **pɛ̂ɛṱ** 'rice plant'	🔊 **bwōooop-ɔ̄** 'butter-s'	🔊 **dɔ̀ɔɔt-ɔ̀** 'hard.soil-s'	🔊 **tàm** 'large.intestine'

It is worthwhile to note that the set of nouns that do not have both a singular and a plural includes many singular nouns that end in the suffix **-ɔ**. This goes to show that **-ɔ** is not necessarily a marker of singulative, i.e., marking individuation (singling out) from a set. There certainly are cases in which the suffix **-ɔ** can be interpreted as a singulative marker, whereby an entity is conceived of as plural, and the singular form represents an individuation from this plural entity. The pair **ʈjâaaŋ-ɔ́ – ʈjāaŋ** 'stalk(s)' illustrates this. At the same time, nouns that appear only in in the singular, such as **úcɔ́ɔɔj̄-ɔ̄** 'watermelon-s', show that this is not necessarily the case. In this context, it is also relevant that the infinitive nominalization of transitive verbs also carries this suffix, as in **càaam-ɔ̀** 'eating', which is derived from {càm} 'eat'. Here as well, there is no corresponding plural.

The lack of productivity is equally characteristic of nouns that are grammatically plural, and lack a corresponding singular. However, nouns of this sort are relatively rare; our lexicographic dataset includes nine cases. Some examples are presented in (39).

(39)

🔊 **ŋòoorᵘ** 'beans'	🔊 **gʌ̋ʌʌŋᵘ** 'hard.scales'	🔊 **rʉ́m̄-ī** 'thoughts'
🔊 **tīɪn** 'dregs'	🔊 **ɲìmᵘ** 'sesame'	🔊 **úɲàaacᵘ** 'gills'

In conclusion, number marking in Shilluk is not fully productive, nor is it regular. The lack of regularity is well established in earlier work. Regarding producitivity, a sizeable proportion of singular nouns do not have a plural to match, and there are also a small number of plural nouns that do not have corresponding singular. Regularity and productivity have been interpreted as defining characteristics of inflectional morphology (Haspelmath 1996:47). On the basis of these formal properties, we interpret number marking in Shilluk as derivational in nature.

The interpretation that number marking is not part of the inflectional morphology is supported by evidence from compounding. In compounds, inflections are marked on the rightmost constituent. This is shown in Table 50, where the base form **ɔ̄ɔt-jāaṱ** 'hospital' has the construct state **ɔ̄ɔt-jāaaṋ**.

In contrast, in the marking of number, both of the constituents are pluralized, yielding **ût-í-jéṇ** in relation to the same example.

Table 50. Illustration of the difference between the marking of construct state vs. number in Shilluk.

Singular, base	Singular, construct state	Plural, base
ɔ̄ɔt-jāaṯ	**ɔ̄ɔt-jāaaṇ à dwɔ́ɔŋ**	**ût-í-jéṇ**
'hospital (<house + plant)'	'the bigger hospital'	'hospitals (<houses-PRT-plants)'
ɟàal-nâam	**ɟàal-nɑ́aām à dwɔ́ɔŋ**	**ɟɔ̌ɔɔ-nɑ́m̄-ī**
'river expert (<man + river)'	'the older river expert'	'river experts (<men:PRT-river-P)'

5.2 The tripartite analysis: a problem and a solution

Gilley (1992) observes that many Shilluk nouns that are typically conceived of as plural carry the suffix **-ɔ** in the singular. This is illustrated in Table 51 by **tjèɛɛl-ɔ̀ – tjɛ̄ɛl** 'leg-S/:P'. Legs come in pairs; therefore, the plural can be considered to be unmarked in a semantic sense, and the singular to be marked. Crucially, the pattern of suffixation mirrors the semantics: the singular is also marked in a morphological sense, through the suffix **-ɔ**. Other concepts to which this applies include e.g. **lèeec-ɔ̀ – lɛ̄k** 'tooth-S/:P' and **bjêeel-ɔ́ – bjέl** 'grain-S/:P'. In such singular-plural pairs, number marking can be conceived of as singular marking, with morphological marking mirroring conceptual markedness. Conversely, many nouns whose referent is typically conceived of as a unit carry a suffix in the plural; **pʌʌm – pɑ́m̄-ī** 'wooden board(s)' in Table 51 illustrates this. Finally, Gilley distinguishes a third pattern, in which both singular and plural are marked (replacement marking). This pattern cannot be related to a difference in semantic markedness. Dimmendaal (2000) presents an account of 'tripartite' number marking as characteristic of Nilo-Saharan languages in general.

Table 51. Illustrations of the three patterns of number marking distinguished in Gilley (1992) and Dimmendaal (2000). The form on the left is the singular, and the form on the right is the plural.

Pattern	Example
Singular marking	**tjèɛɛl-ɔ̀** 'leg' **– tjɛ̄ɛl** 'leg(s)'
Plural marking	**pʌʌm – pɑ́m̄-ī** 'wooden board(s)'
Replacement marking	**bɔ̀ɔɔṯ-ɔ̀ – bòoṯ-ì** 'craftsman/men'

The tripartite analysis of number marking is attractive, as it suggests
an explanation for which member of a number pair is prone to be
morphologically marked. It also predicts that some patterns do not occur: a)
for a conceptually singular noun to display singular marking, and b) for a
conceptually plural noun to display plural marking. These predictions only
apply if a noun has both singular and plural forms. We noted above that there
are many singular nouns ending **-ɔ** refering to animals or plants, that do not
have a plural counterpart, e.g. **mɔ̀r-ɔ̀** 'red ants' and **úgɛ́ŋ-ɔ̄** 'morenga tree'.
Arguably, the tripartite analysis of number marking does not apply here,
because there is no pairing of singular and plural.

Leaving aside marked nouns that are singular only or plural only, the
tripartite analysis of number marking faces a more fundamental challenge in
relation to Shilluk: which singulars and plurals are morphologically marked?
Following Gilley (1992), we have presented the analysis using examples in
which morphological marking takes the shape of suffixation, both in singulars
and in plurals (cf. Table 51). But what about morphological marking beyond
suffixation? Consider the singular-plural pairs in (40). The concepts 'knife'
and 'chief' are typically conceived of as a unit (not as a collective or a mass),
hence the tripartite analysis predicts that the plural should be morphologically
marked. Given so, it may at first glance appear puzzling that the plural is
not suffixed. These patterns are not uncommon – as seen from Table 49, the
number marking pattern of 'knife' is actually third-most common pattern
reported in Xu (2017).

(40) 🔊 a. **pâaal-ɔ̀ – pàaalᵘ** 'knife-S/:P'   🔊 b. **ɟâaak̄-ɔ̄ – ɟáaakᵘ** 'chief-S/:P'

In this context, it is important to note that overlong vowel length in West
Nilotic languages has its diachronic origin in lost suffixes. This finding
goes back to Andersen (1990), who showed that overlong vowels in Dinka
correspond to suffixed stems with a long vowel in Päri, which does not have
three-level vowel length. For example, Dinka **cɟ̀iin** 'intestine', corresponds
to Päri **cíin-ò**. In Shilluk, stem syllables with an overlong vowel alternate in
inflection paradigm with both long and with short stem vowels (cf. Table 8).
Hence, an overlong vowel in the stem can be interpreted as the diachronic
result of a suffixed stem syllables with a short or a long vowel, i.e., CVVVC
< *CVC-V, *CVVC-V (Andersen 1990, Reid 2009). In relation to singular-
plural pairs such as those in (40), this means that **pàaalᵘ** knife:P' and **ɟáaakᵘ**
'chief:P' are both morphologically marked, and that, therefore, both **pâaal-ɔ̀ –
pàaalᵘ** and **ɟáaak̄-ɔ̄ – ɟáaakᵘ** should be interpreted as instances of replacement

marking within the tripartite analysis of number marking (cf. Table 51). The same goes for pairs like **twŏooŋ^μ – twòoŋ-ì** 'chisel:S/-P', where morphological marking in the singular is expressed through overlength.

There are other ways in which a suffixless base form can be morphologically marked in an unambiguous manner. For example, the High Fall to Mid unambiguously marks a nominal base form as plural: this specification is unattested in singular base forms. Hence **ŋér – ŋɛ́r̄^μ** 'white-eared kob:S/:P' is an instance of plural marking. The same goes for coda alternations with /t/, as in **pâal – pʌ̂t** 'spoon:S/:P'. Within Shilluk morphology as a whole, coda /l/ and /r/ within a lexical root can change to /t/ in morphological derivation, but a change in the opposite direction, i.e., from underlying /t/ to either /l/ or /r/, is unattested. Moreover, there equally are morphological processes whereby a -ATR root vowel becomes +ATR, but here again, a change in the opposite direction is unattested. Both of these are illustrated in the paradigm of the verb {tɛ̀ɛl} 'pull', which has the Object voice Past tense form **á-tɛ́ɛl**, whereas the Antipassive derivation has the Past tense form **á-tèeet**.[38]

However, there remain problematic cases, for which insights based on earlier work not offer an adequate interpretation. We argue that floating quantity is crucial to determine morphological markedness in these remaining cases. Consider the pairs in (41). Both the singular and the plural have a short vowel; the most obvious difference between them is the specification for tone: High in singular, Low Fall in plural. As seen from Table 49, this is the second most common pattern, according to Xu (2017). On the basis of their meanings, we would expect the plurals in (41) to be morphologically marked, but this is not obvious from the specification for tone, because High, Low Fall and Low tones are all commonly found on singular and on plural nouns alike.

---

38   We illustrate the phenomenon of morphological marking through the change from –ATR to +ATR on the basis of the verb morphology. This is justified, because the same morphophonological processes that are found in the morphology of nouns are found in the morphology of verbs. Illustration on the basis of verb morphology is particularly insightful because verb morphology makes clear that the process goes from –ATR to +ATR, rather than the way around, from +ATR to –ATR. In the base paradigm of a transitive verb, the stem vowel can be either –ATR or +ATR; but in the antipassive the stem vowel is invariably +ATR. In this way, the Object voice Past tense forms **á-tɛ́ɛl** 'PST-pull:OV' and **á-kɛ́el** 'PST-throw.a.spear:OV' have the corresponding the Antipassive Past tense forms **á-tèeet** 'PST-pull:ATP' and **á-kèeet** 'PST-throw.a.spear:ATP'. This process can be best understood as a change from –ATR in the base paradigm to +ATR in the Antipassive derivation. If the process were to go from +ATR in Antipassive to –ATR in transitive, there would be no way to tell which verbs change to –ATR and which ones do not.

(41) a. d̪ɔ́k – d̪ɔ̂kᵘ
           'mouth:S/:P'
      b. líɲ – lîɲᵘ
           'conflict:S/:P'
      c. cúl – cûlᵘ
           'penis:S/:P'
      d. píɲ – pìɲᵘ
           'ground:S/:P'

Similarly challenging are pairs like those in (42). Here again it is not obvious which level of number should be considered to be morphologically marked. Short and long stem vowels occur regularly in singulars and in plurals, and so do Low Fall and Low specifications for tone. A similar case, this one with the opposite pattern of vowel length alternation, is **wɔ́ŋ – wɔ̀ɔŋ** 'biological. grandmother:S/:P'.

(42) a. lôʊl – lùlᵘ
           'steep bank:S/:P'
      b. kîic – kìcᵘ
           'orphan:S/:P'
      c. pîɪl – pèlᵘ
           'grindstone:S/:P'
      d. mîɪŋ – mìŋᵘ
           'deaf.person:S/P'
      e. tûuŋ – tùŋᵘ
           'horn:S/:P'
      f. lûum – lùmᵘ
           'grass:S/:P'

Neither tone in (41) tone and vowel length in (42) offer an indication as to which level of number is morphologically unmarked. According to the tripartite analysis of number marking, at least one level should be marked. At face value, it appears as if, in addition to singular marking, plural marking and replacement marking, nouns like those in (41) and (42) display a fourth pattern, in which neither the singular nor the plural is marked. Neither Gilley (1992) in relation to Shilluk nor Dimmendaal (2000) in relation to the Nilo-Saharan languages as a whole have identified such a pattern, and it would be unattractive in an analytic sense: if **d̪ɔ́k** and **d̪ɔ̂kᵘ** were both unmarked, then neither is derived from the other, leaving the obvious similarity between the two unaccounted for. The crucial phonological parameter here is the newly discovered phenomenon of floating quantity (cf. Sections 3.3, 4.3).

In conclusion, floating quantity resolves the status of singular-plural pairs in which other parameters of morphophonological exponence fail to resolve which level of the pair is marked in a morphophonological sense. To the best of our knowledge, then, the tripartite analysis holds for Shilluk: there is singular marking, plural marking and replacement marking, as hypothesized in Gilley (1992), but no pairs in which both singular and plural are unmarked. In Section 5.1, we concluded that, on formal grounds, the morphological marking of number in Shilluk can be characterized best as derivational, rather than as inflectional.

6 Conclusion

In this chapter, we have presented a descriptive analysis of the inflectional paradigms of Shilluk nouns, and also of number marking. The inflectional paradigm includes marking for pertensive, construct state and demonstrative forms, with the pertensive additionally forming the basis for the pronominal possessed forms. These functions are marked by a combination of exponents, including tone, vowel length, suffixation, floating quantity, and nasalization. The marking of number is similar, involving tone, vowel length, suffixation, floating quantity, vowel quality/ATR, and a change to /t/ in the stem coda. But whereas morphological marking is fully productive and largely regular in relation to the marking of pertensive, construct state and demonstrative inflections, it is neither productive nor regular in relation to number marking. This is not to say that the inflectional paradigms of Shilluk nouns are without exceptions. The exceptions are there, and we have tried to describe them in detail. Nonetheless, for the majority of Shilluk nouns, both singular and plural, the inflected forms can be predicted on the basis of the base form. That is, the specifications for tone, vowel length and suffixation in a base form allow one to predict the pertensive, construct state and demonstrative forms for the majority of Shilluk nouns, both singular and plural. As seen from earlier studies, especially Xu (2017), this is not the case for number marking. Number marking and the inflectional paradigm also diverge in terms of productivity: for any nominal base form, be it singular or plural, there exist inflections, or in a very small number of cases, suppletions. In contrast, at least 25 percent of singular nouns do not have a corresponding plural form. This state of affairs supports an analysis whereby number marking is not interpreted as part of the inflectional paradigm.

Our descriptive analysis clarifies the nature of morphological marking in the noun system. We particularly highlight the role of floating quantity, which has not been distinguished in earlier studies on Shilluk nouns. Floating quantity is rarely found in singular base forms, but it is part of the phonological representation of over 80 percent of plural base forms. The discovery of this phenomenon enables us to maintain and corroborate the tripartite analysis of number marking for Shilluk proposed in Gilley (1992). With Gilley (1992), we hypothesize that all Shilluk singular-plural pairs that are not suppletive can be classified as instances of either singular marking (wih the plural being unmarked), plural marking (wih the singular being unmarked), or replacement marking (with both singular and plural marked).

Acknowledgements

Abbreviations

AD	Animate destination	IRR	Irrealis
APL	Associative plural	ITER	Iterative derivation
ATP	Antipassive	MAL	Male name derivation
AUX	Auxiliary	NT	No Tense
CND	Conditional subordinator	NEVP	Non-evidential derivation
CONJ	Conjunction	N	Nominative case
CRD	Cardinal marker	NOM	Nominalisation
CTG	Contingent	NOMP	Nominal predicate marker
CS	Construct state	OV	Object Voice
DEF	Definiteness	P	Plural
DEM	Demonstrative	PAT	Patient nominalisation
DIM	Diminuitive	PET	Centripetal
EXSP	Existential predicate marker	PR	Pronoun
F	Focus marker	PROH	Prohibition marker
FEM	Female name derivation	PST	Past
FUT	Future	PRT	Pertensive
HAB	Habitual marker	PRP	Preposition
IDP	Independent pronoun	QUANT	Quantifier
IMPF	Imperfective	REL	Relativizer
INF	Infinitive	S	Singular
INF.A	Agentive infinitive	VOC	Vocative
INC	Inclusive		

References

Andersen, Torben (1990). Vowel length in Western Nilotic languages. *Acta Linguistica Hafniensia* 22, 5–26.

Andersen, Torben (2002). Case inflection and nominal head marking in Dinka. *Journal of African Languages and Linguistics* 23, 1–30.

Baerman, Matthew (2012). Paradigmatic chaos in Nuer. *Language* 88(3), 467–494.

Creissels, Denis (2009). Construct forms of nouns in African languages. In Peter K. Austin, Oliver Bond, Monik Charette, David Nathan & Peter Sells (eds.) *Proceedings of Conference on Language Documentation and Linguistic Theory 2. London: SOAS.*

Dimmendaal, Gerrit J. (2000). Number marking and noun categorization in Nilo-Saharan languages. *Anthropological Linguistics* 42(2), 214–261.

Dimmendaal, Gerrit J. (to appear). A typological perspective on the

morphology of Nilo-Saharan languages. To appear in *Oxford Research Encyclopedia of Linguistics*.

Dixon, R.M.W. (2010). *Basic linguistic theory – volume 2 grammatical topics*. Oxford University Press.

Frank, Wright Jay (1999). Nuer noun morphology. MA diss. State University of New York at Buffalo.

Gilley, Leoma (1992). *An autosegmental approach to Shilluk phonology*. Dallas (TX): Summer Institute of Linguistics and The University of Texas at Arlington Publications in Linguistics 103.

Gilley, Leoma G. (2000). Singulars and plurals in Shilluk – a search for order. *Occasional Papers in the Study of Sudanese Languages* 8, 1–21.

Haspelmath, Martin (1996). Word-class changing inflection and morphological theory. In Geert Booij & Jaap van Marle (eds.) *Yearbook of morphology 1995.* Dordrecht: Kluwer, 43–66.

Hyman, Larry M. & Ernest R. Byarushengo (1984). A model of Haya tonology. In G.N Clements & J. Goldsmith (eds.) *Autosegmental studies in Bantu tone.* Dordrecht: Foris Publications, 53-104.

Klamer, Marian (2001). Phrasal emotion predicates in three languages of Eastern Indonesia. In Geert Booij & Jaap van Marle (eds.) *Yearbook of Morphology 2000.* Dordrecht: Kluwer, 97–122.

Ladd, D. Robert, Bert Remijsen & Caguor A. Manyang (2009). On the distinction between regular and irregular inflectional morphology: evidence from Dinka. *Language* 85(3), 659–670.

Martin, Amy (2018). The phonology, morphology and semantics of Shilluk cattle nouns. University of Edinburgh Hons dissertation.

McKendry, Inga (2013). *Tonal association, prominence and prosodic structure in South-eastern Nochixtlán Mixtec*. University of Edinburgh PhD dissertation.

Moravcsik, Edith (2003). A semantic analysis of associative plurals. *Studies in Language* 27(3), 469–503.

Pike, Kenneth L. (1948). *Tone languages: A technique for determining the number and type of pitch contrasts in a language, with studies in substitution and fusion.* Ann Arbor: Univ. of Michigan Press.

Reh, Mechthild (1996). *Anywa Language – Description and Internal Reconstructions.* Nilo-Saharan 11. Cologne: Rüdiger Köppe Verlag.

Reid, Tatiana (2009). Suprasegmentals in Shilluk nominal morphophonology. Undergraduate honours dissertation, University of Edinburgh.

Remijsen, Bert & Leoma Gilley (2008). Why are three-level vowel length systems rare? Insights from Dinka (Luanyjang dialect). *Journal of Phonetics*

36(2): 318–344.

Remijsen, Bert & Caguor A. Manyang (2009). Luanyjang Dinka. *Journal of the International Phonetic Association* 39(1), 113-124.

Remijsen, Bert & Otto G. Ayoker (2014). Contrastive tonal alignment in falling contours in Shilluk. *Phonology* 31(3), 435-462.

Remijsen, Bert, Cynthia L. Miller-Naudé & Leoma G. Gilley (2015). Stem-internal and affixal morphology in Shilluk. In Matthew Baerman (ed.) *The Oxford Handbook of Inflection*. Oxford University Press, 577–596.

Remijsen, Bert, Cynthia L. Miller-Naudé & Leoma G. Gilley (2016). The morphology of Shilluk transitive verbs. *Journal of African Languages and Lingusitics* 37, 201–245.

Remijsen, Bert (2018). Three-level vowel length and phantom quantity in Shilluk. Invited talk presented at the *Annual Meeting on Phonology, October 5–7, 2018,* University of California San Diego.

Remijsen, Bert, Otto G. Ayoker & Signe Jørgensen (2019). Ternary vowel length in Shilluk. *Phonology* 36(1).

Remijsen, Bert & Otto G. Ayoker (no date). *Collection of Shilluk narratives and songs*. Edinburgh DataShare. [online at https://datashare.is.ed.ac.uk/handle/10283/425]

Stirtz, Timothy (2011). *A grammar of Gaahmg*. Utrecht: Landelijke Onderzoeksschool Taalwetenschap.

Storch, Anne (2005). *The Noun Morphology of Western Nilotic*. Nilo-Saharan vol. 21. Cologne: Rüdiger Köppe Verlag.

van den Heuvel, Wilco (2006). *Biak – description of an Austronesian language of Papua*. LOT publication no. 138.

Welmers, William E. (1970). Igbo tonology. *Studies in African Linguistics* 1, 255–278.

Westermann, Diedrich (1912). *The Shilluk people – their language and folklore*. United Presbyterian Church of North America [1970 reprint edition by Negro Universities Press].

Xu, Tongling (2017). Number marking in Shilluk. Undergraduate honours dissertation, University of Edinburgh.

Zwarts, Joost (2007). Number in Endo-Marakwet. In Doris L. Payne & Mechthild. Reh (eds.) *Advances in Nilo-Saharan Linguistics – Proceedings of the 8th Nilo-Saharan Linguistics Colloquium, University of Hamburg, August 22–25, 2001*. Nilo-Saharan series volume 22. Köppe Verlag.