(In search of) regular morphology and regular meaning in Kwapa verbal number marking[1]

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Introduction

Yuman languages have complex verbal number marking (ex., plurality). Langdon (1992) has described number marking in Yuman as "maddeningly irregular and complex" and "impossible to predict" (406-407). The issue is that the morphological inventory of number comprises numerous exponents. Furthermore, one exponent can be associated with different number interpretations just as one number interpretation can be associated with different exponents.

Kwapa (Cocopah) is a Yuman language spoken in Southwest Arizona and Northwest Mexico. Number is most productively marked on the verb in Kwapa (and Yuman languages) with very few nouns having plural forms, most of which are human. For example, in Kwapa, some forms (1) can be associated with either plural (A) objects, (B) subjects, or (C) both.

(1) p-**ɲmuxá**:**js**
1/3-**like.DPL**
(A) 'I like them,' or (B) 'we like him' or (C) 'we like them' (Crawford 1989: pg. 187)

Moreover, some types of number, such as subject plurals, can have many different forms associated with it, such as (2) ablaut, (3) *–s*, (4) *–p*, (5) *–tʃ–*, (6) *–ʈ–*, and (7) a combination.

(2) ráp 'be hurt' → r**á**:p
(3) nák 'kill' → nák**s**
(4) ƛwí: 'be like → ƛw**íp**
(5) ʃmáj 'lose' → ʃ**tʃ**m**á**:j
(6) ʈuʔáp 'turn upside down' → ʈ**ʈʔá**:p
(7) ʃkuwár 'doubt, disbelieve' → ʃ**tʃ**k^{w}**á**:r**p**

As can be seen, there isn't a one-to-one mapping for exponents and number interpretation, which contributes to their complexity.

Kwapa's number system is under-described, mostly found in:

- A grammar (Crawford 1966)
- A dictionary (Crawford 1989)
- A collection of texts (Crawford 1983)

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However, these documents are in tension and limited in their discussion of number. In Crawford's 1966 grammar, he dedicates a few pages to describing number, mostly the types of number marking and exponents associated with number in general, but arrives at very little in terms of definitive findings. He describes a paradigm comprising of the following categories:

- **Collective subject**: more than one actor
- **Distributive subject**: more than one actor performing singular or plural action or one performing a plural action
- **Distributive object**: one or more performing a singular or plural action on plural objects, either once or repetitively or continuously
- **Stative subject**: a state with a plural subject or a repetitive or continuous state for a singular or plural subject
- **Impersonal subject**: a plural inanimate action performing a singular or plural action (pp. 70)

To get a sense of the nature of plural action, it helps to examine some minimal pairs in Kwapa.

(8) (a) xám 'I **hit**' (b) **s**xam 'I **beat**'
(9) (a) ʂʔáw 'I bear **a child**' (b) ʂ**tʃá**:w 'I bear **children'**
(10) (a) ʃʈíp 'I **shoot**' (b) ʃʈ**í**:p**s** 'I **shoot a lot**' (Crawford, 1966: pg. 71-72)

Contrast these descriptions with Crawford 1989, which is a dictionary he published later. In the dictionary, he uses very different categories to describe the number paradigm:

- **Subject plural**: more than one actor
- **Dual**: exactly two actors
- **Paucal**: a few actors
- **Multiple**: several actors (a greater plural of sorts)
- **Distributive plural**: either plural object or actor(s) performing repetitive, habitual, or continuous action (pp. 4)

As can be seen above, most of these categories don't reconcile with Crawford 1966. As the dictionary is newer, we rely more on those descriptions.

The last major descriptive work on Kwapa is Crawford 1983, a collection of Kwapa texts. While not glossed, this volume provides the greatest source of publicly available documentation of the language in use.

Our research questions are:

(1) Are there morphological patterns in the Kwapa number system?
(2) Are there semantic patterns in the Kwapa number system?

We use these three sources to present preliminary findings to describe Kwapa number morphology and meaning, sorting through conflicting descriptions, finding novel regularities in form and meaning, and describing how they are used in texts, but also showing the ways in which their interpretations are even more complicated than previously described.

Morphological Patterns

The grammar has limited data on number forms ($N = 56$). The dictionary has many more number forms ($N = 622$) and thus, we collected all forms marked for number in the dictionary. However, the dictionary doesn't provide entries for the different types of number for every verb. Verbs have one, two, or at most three categories for number recorded, so there are great asymmetries in the paradigms. The distribution of the number categories in the dictionary is as follows:

- Subject plural: 197
- Dual: 1
- Paucal: 41
- Multiple: 46
- Distributive plural: 337

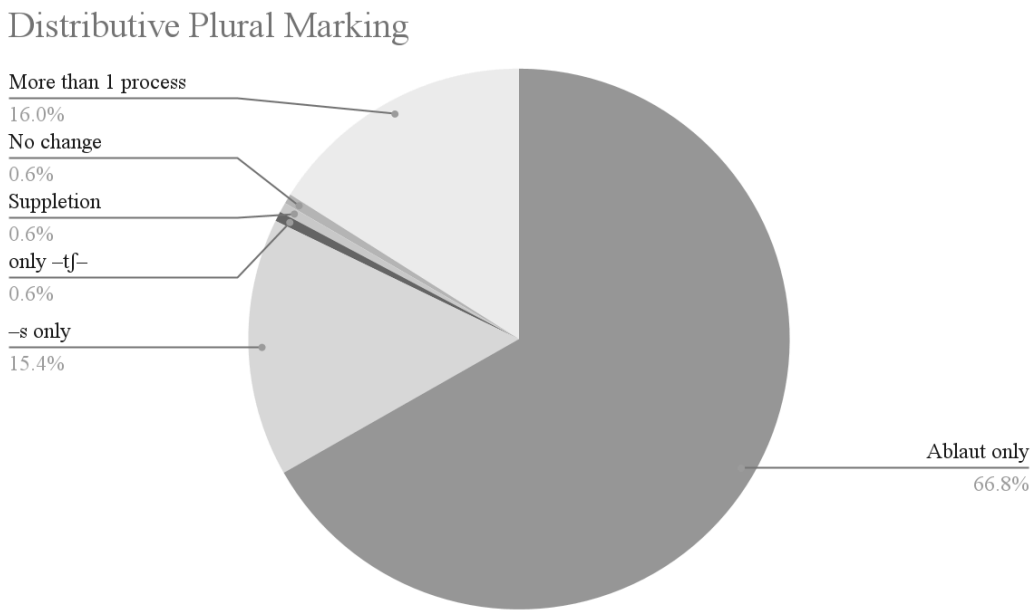
As seen, distributive plurals are the most frequently recorded in the dictionary. Duals, on the other hand, are not likely a true number category in the language as seen in their frequency.

We coded the different exponents for the different categories. From this, we see some commonalities with number marking. We will start with the most frequent form in the dictionary, and also the simplest form morphologically, the distributive plural.

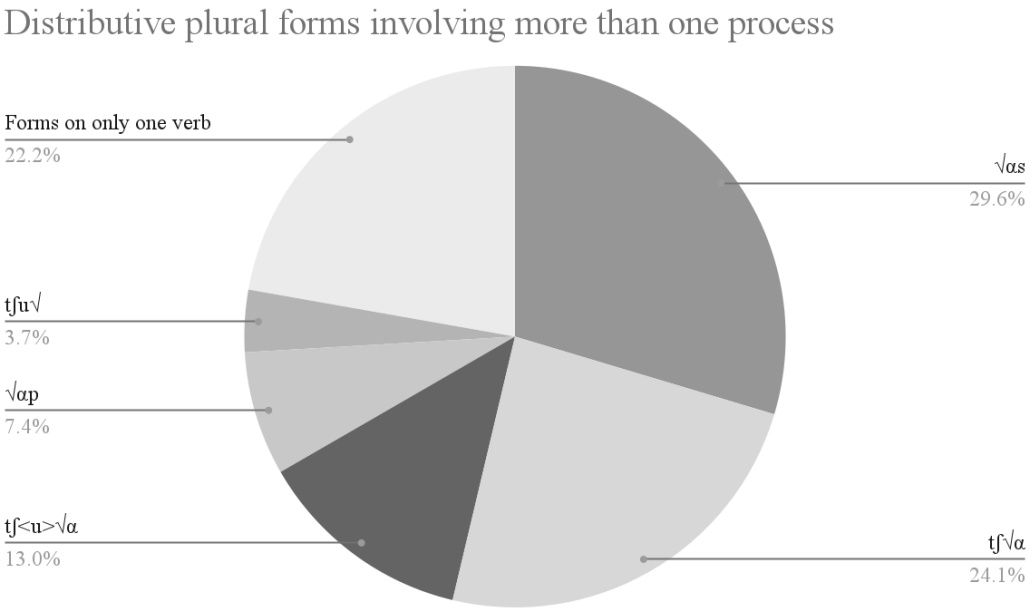
Distributive Plural Marking

There are 11 different exponent types which are used for forming distributive plurals, either with or without other exponents.

Nevertheless, 225 distributive plurals (66.8%) involve only ablaut, indicating some regularity.



The remaining markers of distributive plural mostly comprise *–s* and those involving more than one process. As for verbs whose distributive plural forms involve more than one process, many of those are a combination of ablaut and *–s* or *–tʃ–* and ablaut (as indicated by √α in the chart).[2]



The *–tʃ–* is a minority distributive plural form in Kwapa. This differs from many other Yuman languages, which commonly have a *–tʃ–* infix for their pluractionals (Powell 2023, 2024).

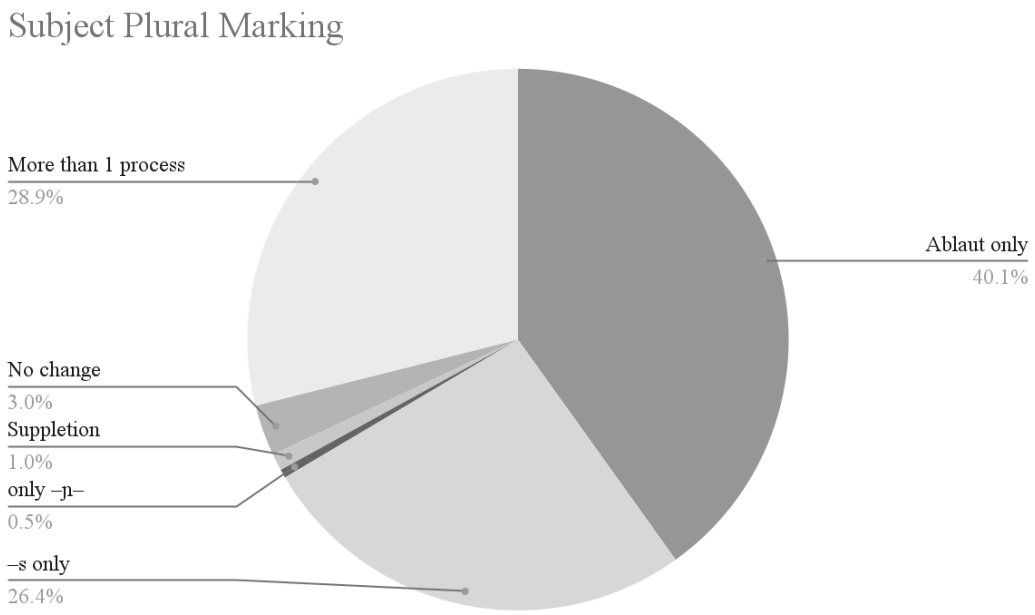
[2] The forms found on only one verb are provided in the Appendix for each number category.

However, like other Yuman languages, it generally inserts before the onset closest to the stressed vowel (examples 5, 7) for 96% of the verbs which take that form, and assimilates to *–t–* when preceded by other stops (example 6).

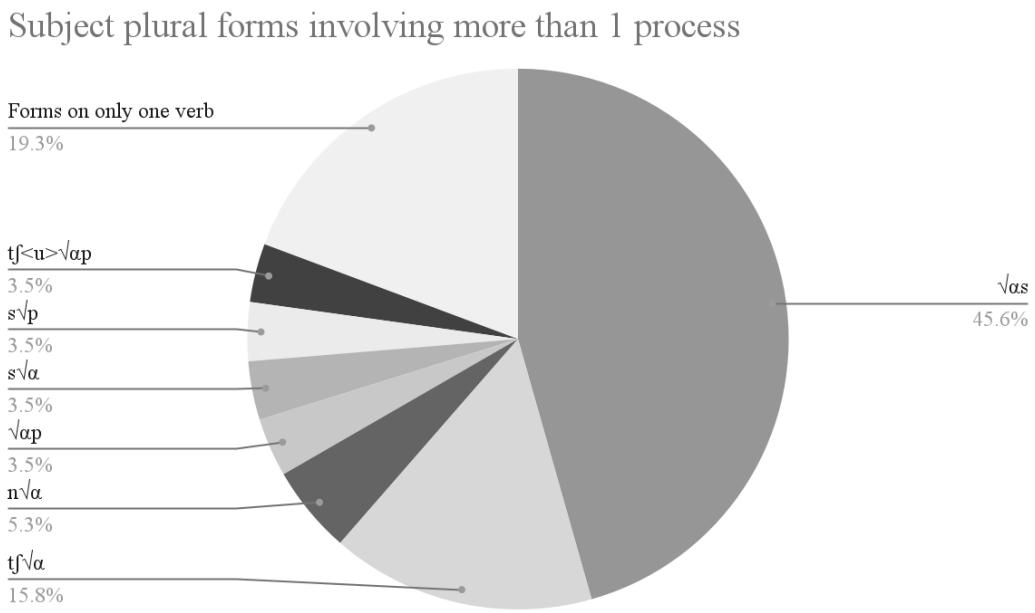
Moreover, 65.38% (51 of 78 verbs) of verbs which take an *–s* end in a vowel.

Subject Plural Marking

Subject plural marking is complicated, but not as much as has been stated in the literature. There are 10 different exponent types which are used for forming subject plurals, either with or without other exponents. In general, there are three main processes, ablaut only, *–s* only, and forms that include more than one process.



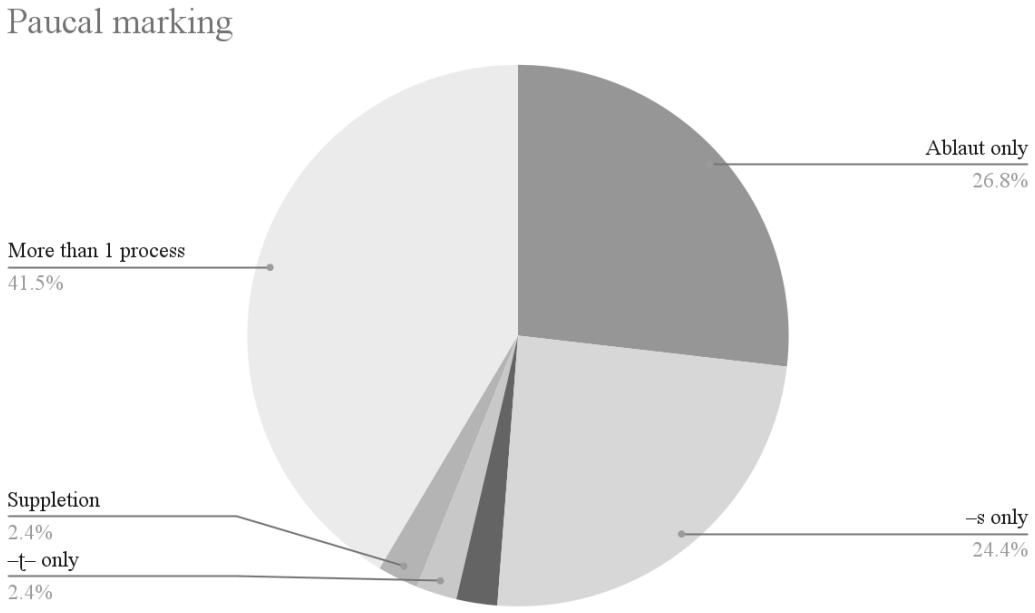
Even when we look at cases that involve more than 1 process, nearly half of those involve both ablaut and *–s*, and a smaller portion involving *–tʃ–* and ablaut.



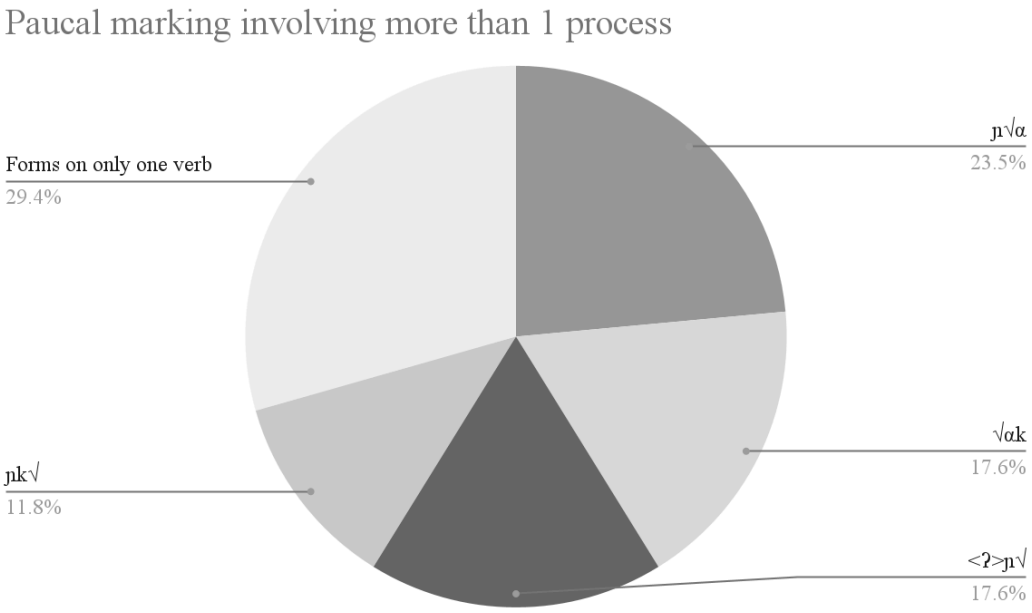
51.85% (42 of 81 verbs) of *–s* forms end in a vowel, a decrease from distributive plurals.

Paucal Marking

There are 9 different forms that correspond with paucal marking. The largest category are forms which involve more than one process, a marked difference from subject plural and distributive plural. The other two major categories are ablaut only and *–s* only.

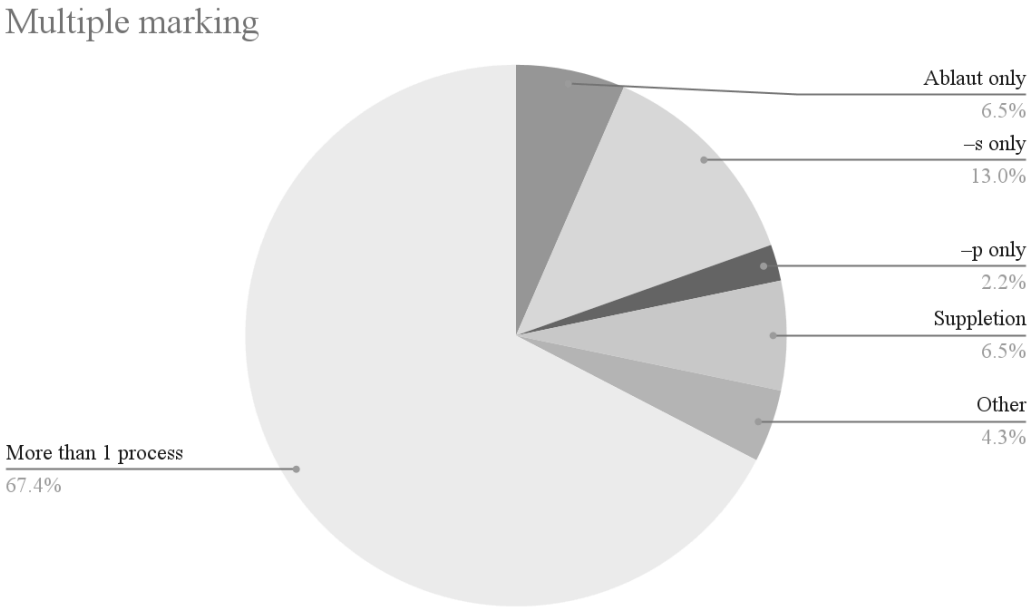


When examining those forms which involve more than one process, there isn't a clear preferred pattern.

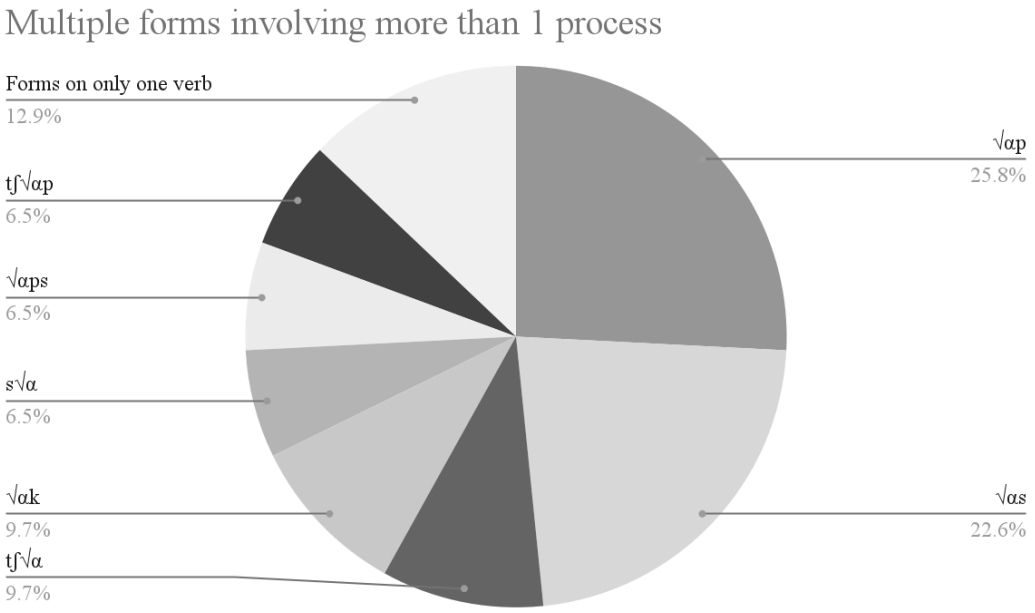


Multiple Marking

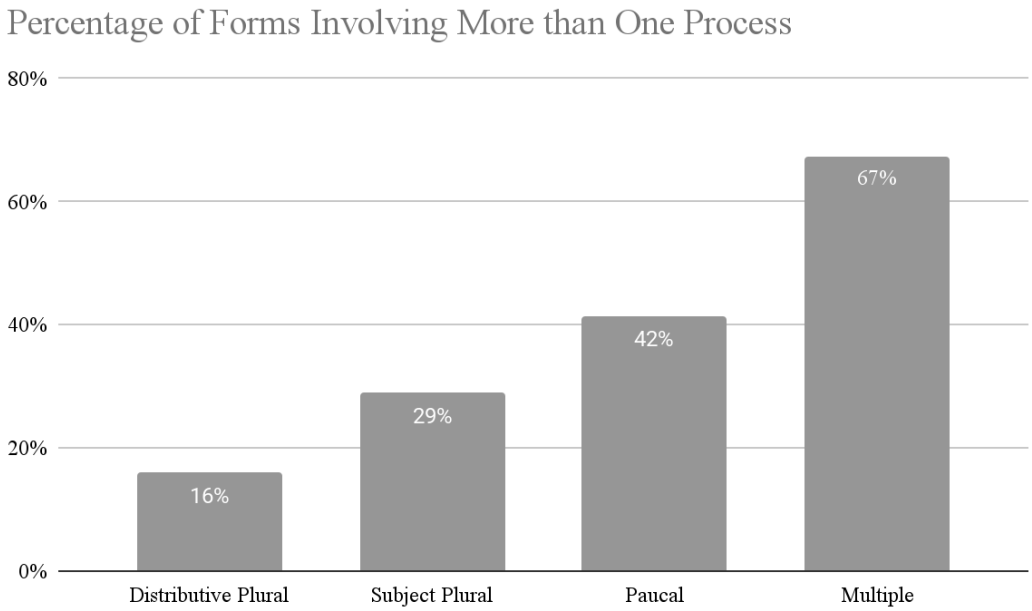
There are 11 different forms that correspond with multiples. By far, the largest strategy for forming multiples involve more than one process, showing this is the most morphologically complicated number category in the language.



When examining the methods that involve more than one process, the most common strategies involve ablaut and *–p* and ablaut and *–s*.



As can be seen in the data, we can see the relative morphological complexity across the different categories of number, with distributive plural being the simplest and multiples being the most complex.



In sum, the most regular and morphologically simplest form is the distributive plural, followed by subject plural, paucal, and multiple marking. Even though the system is very complicated, there are patterns associated with most of the number categories, especially the most common ones in the dictionary.

Semantic Patterns

We examined how number marking was used in texts. We chose a handful of verbs and collected all the tokens from the volume, including some transitive and intransitive verbs:

- ‘cut’
- ‘kill’
- ‘finish’
- ‘sleep’
- ‘jump’

We analyzed their morphology and interpretation in context. For this, we relied on the morphological marking of nouns and verbs in Kwapa as well as the pluralization in the English translation and any accompanying notes. We used the grammar and dictionary to gloss examples.

Paucal vs. Dual vs. Greater Plurals

We see that there are cases of paucal (PA), which tend to indicate ‘few’ actors.

(11) maːm **ʃumáːs**
just **sleep.PA**
'Now they slept' (Crawford, 1983: p. 290-291)

We also see that when there are only two actors, the paucal form is still used, providing further evidence that duals can be folded into paucals more generally in the paradigm.

(12) maːm ʂuː-tʃ **ʃumáːs** **ʂaːjáːw**
just DEM-NOM **sleep.PA** **be.located.there.PA**
'Now those (i. e., **Jose and his wife**) were **asleep** there.' (Crawford, 1983: pg. 330-331)

(13) ʔapaː piːs kajúx m-ʔíː-m **ʃmaːs** **pajáː**
hey money what.might.be 2-say-SS **sleep.PA** **lay.PA**
'Hey, how much money would you want for us to **sleep (together)**?' (Crawford, 1983: pg. 430-431)

The distributive plural (DPL) is used with large cardinalities, affecting the number of the subject.

(14) mtʃswám-xaŋ **ʃtʃumáːp**
all.the.people-be.very.much.so **sleep.DPL**
'**They all** slept.' (Crawford, 1983: p. 26-27)

Animacy of Arguments

Langdon (1992) remarked that verbal number marking in Yuman isn't morphological number agreement and appears optional. This is to say, just because there is no number marking on the verb does not indicate that there isn't a plural interpretation.

In the case of Kwapa, it appears that there is some optionality, but it may have to do with the animacy or cardinality of the arguments. For instance, we can see that there is often a lack of number marking on unspecific or inanimate plurals:

(15) nmiː **ŋawíː** **nak** maːm
be.brave **thing** **kill.SG** now
'I was brave (i.e., warlike) and killed **things** now' (Crawford, 1983: p. 66-67)

(16) paj ŋa-**nák**-x **pajáː**-m **wíː**-pi-tʃ
here 3/1-**kill.SG**-IRR **lay.PA**-DS **rock**-DEM-NOM
'They would kill me here, the **rocks** (would)' (Crawford, 1983: p. 466-467)

When the animacy is higher, then we tend to see more subject plural (SPL) marking:

(17) pujaːk-ʂ maː-**náks**-x-tʃ ʔujúʂ
be.located.there.PA-NOM? 3/2-**kill.SPL**-IRR-NOM be.SPL
'But **they** will (want to) kill you.' (Crawford, 1983: p. 360-361)

When an animate object is plural, and especially when it has a high cardinality, we see the verb marked for distributive plural, even when the object itself is unmarked for number.

(18) mapú-tʃ **tʃapáj** pm-**na**:**k** [...]
2-NOM **person.SG** 2/3-**kill.DPL**
'You killed **a lot of people** [...]' (pg. 204)

Similarly, with a verb like 'finish,' even when the object is plural in the translation, some verbs remain unmarked, unless the object has a particularly high cardinality.

(19) ɲa:p ɲa:-nák-k tʃapaj p-**ɲuwaʈ**-xa
1.ACC 3/1-kill.SG-SS person 3/3-**finish.SG**-IRR
'If he kills me, he will **finish off the people**'

(20) p-**ɲtʃuwá**:**ʈ** [...]
3/3-**finish.DPL** [...]
'He **finished them all** [...]' (Crawford: pg. 14-15)

Singular vs. Plural Action

Finally, with an unergative verb, we see that the distributive plural has a clear pluractional meaning, as seen below.

(21) [...] xuʈúp [...]
3.jump.SG
'[...] He (the horse) **jumped** [...]' (Crawford, 1983: pg. 92-93)

(22) [...] xuʈú:p ʈkísk-ʈkísk [...]
3.jump.DPL jump-RED
'(the horse) **bucked** and, jumping up and down' (Crawford, 1983: pg. 418-419)

It is ambiguous when some intransitives marked for DPL feature a pluractional interpretation or when the interpretation affects the number of actors (see 14). What these examples show is that these are two sides of the same coin – plural events, whether by plural actors or by plural actions.

Different Kinds of Pluractionality

For some verb forms called distributive plural, they feature a plurality of events but without any plural effect on the object. Such is the case for *ʔuka:ʈ* 'cut.'

(23) **ɲ-u**:**ká**:**ʈ-k** ma:-m ɲm-k^{w}i:s-k
2/1-cut.DPL-SS 2-ALL 2/1-slice.DPL-SS
'You are to **cut me up now and slice me** [...]' (Crawford, 1983: p. 352-353)

Contrast that with another form, *ʧu:kaʈ*, which is listed as a separate singular verb, also glossed as 'cut' in the dictionary. This form has the same root (kaʈ), but with a different kind of pluractional (*–ʧ–*), which is more distributive, even though it is unmarked in the dictionary.

(24) ɲawí: tʃʔa:m ʔaɲá:ƛ **tʃu:káʈ**
something arrowweed mesquite.tree **3/3.cut.SG**
'He **cut the arrowweeds and mesquite trees**' (Crawford, 1983: p. 414-415)

Thus, what has been identified as allomorphy of the distributive plural, namely ablaut and *–tʃ–*, may be different morphemes indicating different kinds of pluractionality.

In sum, we see that number marking seems to be sensitive to not only the cardinality and animacy of the arguments. Our results also cast doubt on the presence of a dual in the system. Finally, we show cases where distributed plural effects the number interpretation of the actors and the event. It shows that while there are some patterns in the data, there are also added complexities that previous descriptions did not address.

Conclusion

Kwapa's number system is complicated. While there is considerable complexity in its morphological marking, there are some patterns associated with number categories, especially for distributive plural and subject plural, where ablaut plays the largest role. We also see some of the conditioning environments for some of the other exponents.

The meaning behind the different number categories is also complicated and this paper describes some of the uses of number previously unaddressed. For example, we see that the presence of number exponents seem to be sensitive to animacy and cardinality and that duals are probably not a systematic category in the language.

Kwapa fits into a developing literature in Yuman (e.g., Henderson 2024; Powell 2023, 2024) showing that despite surface appearances, there is some regularity in the number system than previously recognized, while also clarifying the previous disparate descriptions, and complexifying our understanding of how number works in Yuman.

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Appendix

Single-token distributive plural forms involving more than one process:

- s√α
- s√αs
- ʧ√αp
- ʧ√s
- u√α
- n√α
- ʉ̶√α
- m̶√α
- ʧ̶ʉ̶√αp
- ʔ̶ʧ√α
- ʔ̶sʉ̶√α
- ʔ̶sʉ̶√

Single-token subject plural forms involving more than one process:

- ʧu√
- s√ps
- ɲ√αs
- ʧ√s
- u√α
- ʉ̶√α
- ʧ̲ʉ̶√α
- ɲkʉ̶√
- ɲk√
- ą̶ɲ√
- ʔ̶ɲ√

Single-token paucal forms involving more than one process:

- √αp
- √ps
- ɲ√αk̶
- s√ps
- √αs

Single-token multiple forms involving more than one process:

- ʧ√α
- ʉ̶√αk
- s√p
- ʔ̶ɲ√s