PALIKÚR NUMERALS
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1. Introduction. This article contains a description of the rich numerical terminology of Palikúr, a morphologically complex Maipuran Arawakan language of northern Brazil.1 My data base is a large collection of texts and some elicited material obtained during twelve years of living in the Palikúr village of Kumiene, and another eighteen years of sporadic contact with Palikúr visitors in Belém, Pará, Brazil.2 The affixes on Palikúr numerical terms make explicit many mathematical relationships that speakers of other languages may only assume or may not even be aware of. These affixes reveal mathematical concepts that are part of the everyday thought processes of people outside the influence of modern life, disproving once again the idea of ‘primitive’ minds unable to think abstractly or analytically, and providing a reference outside our own culture by which we can measure our own mathematical ideas. On the one hand, Palikúr numerical terms confirm the existence of many of our own mathematical concepts in the language of an unsophisticated society of jungle-dwellers. On the other hand, there are unusual differences, such as a special emphasis on the number seven. Most important, the Palikúr terms demonstrate the intricate relationship between linguistics and mathematics, which suggests a new framework on which to base the categorization of numeral classifiers.

In the Palikúr language most numerals from ‘one’ to ‘one hundred’ exhibit a variety of classifiers, gender agreement markers, arithmetical suffixes, modifiers, and syntactical affixes.3 In this article I discuss all these affixes. I

1 Palikúr is spoken by a group of little over a thousand indigenous people living in the far north of Brazil near the Atlantic coast and also in French Guiana. They live on scattered ‘islands’ of jungle in the flooded grasslands of the state of Amapá.
2 Research for this paper was done under the auspices of the Summer Institute of Linguistics in contractual cooperation with the Museu Nacional and the Fundação Nacional do Índio (National Indian Foundation). I would like to express my deep appreciation to my Palikúr friends, João Felício, Paulo Orlando, Leon, Afonso, Nilo, Raimunda, Susana, Daví, Moisés, Ivanildo, Elvira, and others for providing the texts on which this study was based and for their patient answers to my many questions. I owe much to all my colleagues of the Summer Institute of Linguistics for technical and logistical help in Brazil. Special thanks are due to R. M. W. Dixon and Alexandra Aikhenvald, as well as to SIL linguists, Arthur and Cheryl Jensen, Isaac Costa de Souza, and Carl Harrison, for their theoretical orientation and valuable comments and suggestions. Any errors are mine.
3 Abbreviations used in morphological analyses are the following: ABSTR = abstract; ANIM = animate; AUG = augmentative; BASK = basketed set; CAUS = causitive; CL = class;
first present the basic structure of the Palikúr numerical system (2), and then analyze the twenty unique numeral classifiers which are obligatorily attached to the root of the numerals (3). (See Appendix for a listing of numerals 1-10 with all of the classifiers.) The classifiers fall into five major semantic categories dealing with whole units, sets, fractions, abstractions, and series—all mathematical concepts. Within these categories, there are more mathematical ideas. For example, units which are inanimate are classified according to their geometrical form. The forms, in turn, are based on an intriguing view of the four Palikúr dimensions: length, width, depth, and perimeter (see Table 3). After looking at the classifiers, I explain gender agreement, which, on numerals, occurs only with reference to animate units (4). I then describe the ten unique ways in which the numerals are inflected to express mathematical concepts such as numerical order, addition, subtraction, numerical limits, multiplication, totality, and various kinds of sets (5). This is followed by examples of the numerical terms in their syntactic functions as adjectives, adverbs, pronouns, verbs, and nouns, noting a few of their more common inflections (6). I close with a display of the relative order of the numeral affixes (7).

2. The structure of the Palikúr numerical system. The Palikúr numerical system is basically decimal. The term for numeral ten is madikauku (madik-auku), which means ‘end [of]-hands’. The numeral twenty is pina madikwa, ‘two tens’, and the numeral forty is paxnika madikwa, ‘four tens’. The term for ‘tens’ is madik-wa (end-EMPH). As is common in decimal systems, the numeral five, pohouku, is a compound word made up of paha ‘one’ and u-waku ‘our-hand’.

CLUS = cluster; COMPL = completive action; CONT = continuous action; CYL = cylindrical; DIM = diminutive; DUR = durative state; EMPH = emphasis; EXCL = exclusive; EXTEN = extended; F = feminine; FLATD = flat-and-deep; FOLI = foliform; GRUP = group; IC = inchoative action; IMP = imperative; INSTR = instrument; INTERROG = interrogative; IRREG = irregular; LIM = limited; M = masculine; MULT = multiplication; N = neuter; NEG = negative; NOM = nominalizer; PASS = passive; PL = plural; REFLX = reflexive; REL = relational; REM = remainder; RND = round/square; SEQ = sequential; SER = series; SIM = simultaneous; SG = singular; ST = stative; TIE = tied set; TOTAL = totality; UN = unitary action; VRB = verbalizer; WRAP = wrapped set; VCL: = verbal class.
The most unusual feature is that the numerals eight and nine are based on the term for numeral seven, *nteunenker*. For example, the numeral eight is *nteunenker a-kak pahat arauna*, ‘seven and one more added’. ‘setary’* 

Table 1 gives enough samples of Palikūr numerals to show the basic structure of the system. The words used to form numerical phrases are ‘with’ *a-kak* (3N-with), ‘more’ *akiu*, and ‘added’ *ar-auna* (3N-addition). The last word is used only in numerical phrases.

**TABLE 1**

Structure Of The Palikūr Numerical System

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td><em>paha-t</em></td>
<td>‘1-CL:ABSTR’</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td><em>pi-ta-na</em></td>
<td>‘2-CL:ABSTR-2’</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td><em>mpana</em></td>
<td></td>
</tr>
<tr>
<td><strong>4</strong></td>
<td><em>paxnika</em></td>
<td></td>
</tr>
<tr>
<td><strong>5</strong></td>
<td><em>poho-uku</em></td>
<td>‘1-hand’</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td><em>pugunkuna</em></td>
<td>60</td>
</tr>
<tr>
<td><strong>7</strong></td>
<td><em>nteunenker</em></td>
<td>70</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td><em>nteunenker 7 + 1</em></td>
<td>a-kak paha-t ar-auna</td>
</tr>
<tr>
<td><strong>9</strong></td>
<td><em>nteunenker 7 + 2</em></td>
<td>a-kak pi-ta-na ar-auna</td>
</tr>
<tr>
<td><strong>10</strong></td>
<td><em>madik-auku</em></td>
<td>‘end [of]-hands’</td>
</tr>
<tr>
<td><strong>11</strong></td>
<td><em>madikauku 10 + 1</em></td>
<td>a-kak paha-t ar-auna</td>
</tr>
<tr>
<td><strong>19</strong></td>
<td><em>madikauku 10 + 7 + 1</em></td>
<td>a-kak nteunenker ar-auna a-kak pi-ta-na ar-auna akiu</td>
</tr>
<tr>
<td><strong>20</strong></td>
<td><em>p-i-na madikwa</em></td>
<td>‘2-CL:SER-2 tens’</td>
</tr>
<tr>
<td><strong>25</strong></td>
<td><em>p-i-na madikwa</em></td>
<td>‘2 tens + 5’ a-kak pohouku ar-auna</td>
</tr>
<tr>
<td><strong>30</strong></td>
<td><em>mpana madikwa</em></td>
<td>‘3 tens’</td>
</tr>
<tr>
<td><strong>40</strong></td>
<td><em>paxnika madikwa</em></td>
<td>‘4 tens’</td>
</tr>
<tr>
<td><strong>50</strong></td>
<td><em>pohouku madikwa</em></td>
<td>‘5 tens’</td>
</tr>
<tr>
<td></td>
<td><em>pugunkuna madikwa</em></td>
<td>‘6 tens’</td>
</tr>
<tr>
<td></td>
<td><em>nteunenker madikwa</em></td>
<td>‘7 tens’</td>
</tr>
<tr>
<td><strong>80</strong></td>
<td><em>nteunenker madikwa 7 tens + 10</em></td>
<td>a-kak madikauku ar-auna</td>
</tr>
<tr>
<td><strong>90</strong></td>
<td><em>nteunenker madikwa 7 tens + 20</em></td>
<td>a-kak p-i-na madikwa ar-auna</td>
</tr>
<tr>
<td><strong>100</strong></td>
<td><em>madikauku madikwa</em></td>
<td>‘10 tens’</td>
</tr>
<tr>
<td><strong>101</strong></td>
<td><em>madikauku madikwa 10 tens + 1</em></td>
<td>a-kak paha-t ar-auna</td>
</tr>
<tr>
<td><strong>199</strong></td>
<td><em>madikauku madikwa</em></td>
<td>‘10 tens+7 tens+2 tens+7+2’ a-kak p-i-na madikwa a-kak nteunenker madikwa ar-auna a-kak nteunenker a-kak pi-ta-na ar-auna akiu</td>
</tr>
</tbody>
</table>
When counting abstractly, without a particular object in view, the classifier -t is added to the root of the numerals one and two. The term for numeral one is paha-t (one-CL:ABSTR). This classifier indicates that what is being counted is an abstract idea but it also could indicate a cylindrical shape. In the case of counting without a specific object in mind, it is impossible to know if the classifier -t refers to the abstract idea of numbers or if it refers to fingers (which are cylindrical).

Only in the case of the terms for numeral two (pi...na) do the classifiers occur in the middle of the root. Thus, the term for numeral two used in Table 1 is pi-ta-na (two-CL:ABSTR-two). For morphophonemic reasons, the form of the classifier when it is infixed into the root is usually different from the form it has as a suffix.4

The classifier that indicates a series of things, -i, is used to count groups of ‘tens’. Thus the numeral twenty, ‘two tens’, is p-i-na madikwa (two-CL:SER-two tens).

For numerals higher than ninety-nine, numerical terms from the trade language are used a great deal more than those of Palikúr. This language, a French creole dialect, is the trade language used by the Palikúr men to speak with other indigenous people in the area as well as with the people of French Guiana. Among themselves the Palikúr speak their mother tongue exclusively. They use borrowed terms only for elements introduced from the outside culture. Sometimes, for higher numbers used when counting money, they combine both languages. For example, to say ‘three hundred’ they say mpama-put sah. The term for ‘hundred’, sah, is borrowed from the creole dialect; the term for ‘three’, mpama (or mpama word-medially) is Palikúr, with the addition of the Palikúr morpheme -put which refers to multiplication (three-times sah). See example (35).

It would be most interesting to know the history of the development of the Palikúr system. The existence of the numerals four, six, and seven is a mystery. In Proto-Arawak it is possible only to reconstruct roots of three numerals: ‘one’ is more or less *pa or *ha; ‘two’ is something like *pi or *bi; ‘three’ is something like *mapa or *mada (Payne, 1991). The Palikúr language follows this pattern. Where then did the other numerals come from? And why are their roots made up of four syllables, a very rare phenomenon in

4 Throughout the language, the phonological form of a morpheme in word-medial position usually differs a great deal from its form in word-initial or word-final position.
Palikúr? In some other Arawak languages, the terms for ‘four’ are derived from a verb (Aikhenvald, to appear). But there is no known etymology for the numerals four, six, and seven in the Palikúr language. There is also no known similarity to any other language presently spoken in the area.

Specific one-word terms for the numerals six and seven appear to be very rare among Brazilian indigenous languages. Usually, in decimal and vigesimal systems, numerals higher than five are made up of a phrase like ‘five plus one’ and ‘five plus two’. If a language does have specific words for six and seven, as the Quechua language of Peru does, it also has specific words for eight and nine. Perhaps in the past the Palikúr language had specific words for eight and nine but, through disuse, they were forgotten. Another possibility is that the idea of a decimal system was borrowed from the trade language, and before that the people used only seven numerals.

There are a few indications that the numeral seven has some importance in the Palikúr culture. For example, until the 1970s, the Palikúr fashioned a kind of combination invitation-and-calendar called imti ‘cords’ to count days. As far as I know, the imti never had more than seven cords. Each cord had a decoration at the end of it made of cotton and the wing covers of certain iridescent beetles. Among other things, the imti was distributed by one clan to members of the other clans, inviting them to come to a special ceremony to mourn and ‘forget’ members who had died during the year. A person who accepted an invitation took off one decoration each day. When he came to the last one, he knew it was time to attend the ceremony.

Figure 1. Palikúr invitation known as an ‘imti’.
Another indication of the importance of the numeral seven is the existence of a Palikúr term for a series of seven days. The term is *paka*. They count this series of seven in the same way they count series of tens, that is, by using numerals with the classifier *-i* which indicates a series. At the present time the word is used to refer to weeks and is also used as the name for the first day of the week, Sunday. ‘One week’ is *paha-i paka* (one-CL:SER week). Terms for the other days of the week are borrowed from the trade language, but this term appears to be indigenous.\(^5\) It may have to do with a period of seven ‘dry days’ between the ‘first rain’ and the ‘second rain’ which is an important annual event on the Palikúr calendar.\(^6\)

3. The numeral classifiers. There are twenty unique classifiers in Palikúr which occur only on the root of cardinal and ordinal numerals. They do not occur with any other type of words, except for one interrogative word concerning quantity.\(^7\) In this section I set forth a new way of categorizing the semantic parameters of these classifiers that I found to be efficient for Palikúr. I then describe the classifiers themselves in more detail, noting that several of those having to do with geometric forms are based on a fourth dimension.

3.1. General overview of semantic categories. When Keith Allan (1977) studied more than fifty ‘classifying languages’ in Africa, Asia, Australia, North America, and Mexico he encountered classifiers on numerals, nouns, intra-locatives and verbs. He noted ‘remarkable similarities’ between them and identified seven major categories which described the semantic bases of all the classifiers he examined. These are: 1) material, i.e. animate, inanimate, and abstract; 2) shape, such as round, flat, and long, etc.; 3) consistency, i.e. flexible, hard, and indiscrete; 4) size, i.e. large, medium, small; 5) location, such as village, field, country; 6) arrangement, such as

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\(^5\) The word *paka* has no resemblance to the term for ‘Sunday’ in the trade language, which is is *djimáx*.

\(^6\) It might seem that the period of seven days could be related to the phases of the moon, but that is doubtful. To the Palikúr, the phases of the moon are related to the level of water in the river, not to the moon’s physical appearance. None of the ‘phases’ lasts seven days; some last more and some less.

\(^7\) H. Green (1979) describes six interrogative terms in Palikúr concerning quantity: *aisau* ‘how much’, *aisau akebi / gikebykis* ‘how many’, *aisau (hamukri) gau* ‘how much age’, *aisau aripoi* ‘how much time’, *aisauput* ‘how many times’, *aisaumuk* ‘how much does it cost’. In three other constructions, *aisau* means ‘when’.
position, bunches (like a pair or herd), and objects in a row; 7) quanta, i.e.
plural, collections, measurements of dimension, volume (like basketfuls),
partitives, and cycles of time. He also spoke of 8) a ‘general’ category that
includes items that do not fit into any other class, and 9) classes that refer to
one specific item, like ‘house’. Palikúr numerical terms have classifiers with
semantic parameters in all of these categories, except for consistency, size,
and location.⁸

My study of the Palikúr system led me to realize that, for classifiers on
numerals, the categories identified by Allan could be ordered in a logical way
that would reduce overlap and clarify some concepts, especially in the areas
of ‘arrangement’ and ‘quanta’. I found that the semantic categories of Palikúr
could be conveniently organized according to mathematical concepts, that is,
in terms of tangible ‘whole units’, ‘sets’, and ‘fractions’, as well as intangible
‘units’ and ‘sets’ (called ‘abstractions’ and ‘series’). In this way the twenty
numerical classifiers of the Palikúr language can be summarized as indicated
in Table 2.

When the semantic parameters of numeral classifiers are categorized
according to mathematical concepts, the category of ‘sets’ includes the
parameters in Allen’s category of ‘arrangement’ and also the parameters of

⁸ Palikúr numerals have suffixes indicating size and quantity (plural) but they are modifiers, not
classifiers, since they may refer to any noun and they occur on many other parts of speech.
TABLE 2
Semantic Categories Of The Numeral Classifiers

<table>
<thead>
<tr>
<th>TANGIBLE UNITS</th>
<th>TANGIBLE SETS</th>
<th>FRACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>animate</td>
<td>inherently unconnected</td>
<td>side</td>
</tr>
<tr>
<td>inanimate:</td>
<td>inherently connected (cluster)</td>
<td></td>
</tr>
<tr>
<td>irregular</td>
<td>non-inherently connected:</td>
<td>part</td>
</tr>
<tr>
<td>round</td>
<td>by a tie</td>
<td></td>
</tr>
<tr>
<td>round + long (cylindrical)</td>
<td>by a wrapping</td>
<td></td>
</tr>
<tr>
<td>flat</td>
<td>flat + deep (concave)</td>
<td></td>
</tr>
<tr>
<td>extended</td>
<td>extended + perimeter</td>
<td></td>
</tr>
<tr>
<td>plant and body parts:</td>
<td>stem/trunk (foliform)</td>
<td></td>
</tr>
<tr>
<td>hand</td>
<td>mouth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>INTANGIBLE UNITS</td>
<td></td>
</tr>
<tr>
<td>abstractions</td>
<td>INTANGIBLE SETS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>series connected in time</td>
<td></td>
</tr>
<tr>
<td></td>
<td>by repetition</td>
<td></td>
</tr>
</tbody>
</table>

‘plural’, ‘collections’, and ‘basketful’ which he categorized as ‘quanta’. They all fit into the category of ‘sets’ because all refer to collections, not quantities or measurements. No Palikúr classifier is a quantifier. All are qualifiers. In the case of ‘sets’, the classifiers reveal the way the units within the collections are joined together. There remains only one parameter in Allen’s ‘quanta’ category that doesn’t fit into ‘sets’. It refers to ‘partitives’, which I call ‘fractions’.

In his discussion of the category of ‘quanta’, Allen mentions ‘cyclic time expressions’. In Palikúr the classifier used with ‘time’ words, like ‘day’ and ‘night’ is also used with any series of repeated actions, events, or numbers. They are not necessarily ‘cycles’. For that reason, I call them ‘series’.

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9 Adams and Conklin (1973:2) point out that ‘few analyses have recognized that quantification phrases [measurements, like ‘one liter of honey’] and qualification phrases [like ‘a slice of bread’ which is not a measurement, but describes the shape of the bread] are based on differing sets of semantic primes and have radically differing relationships with the head nouns of the phrases.’
‘Abstractions’ and ‘series’ are separate from the other classifiers and related to one another, not only because they are intangible, but for reasons of distribution and internal structure that will be discussed later. Since the classifiers occur on numerals, it is natural and appropriate that semantic categories fit into a basically mathematical framework.

3.1.1. Units. In Palikúr when a numeral higher than ‘one’ refers to a tangible or intangible unit, it is usually followed by a term which means ‘units’. When referring to inanimate objects or abstract ideas, the term is a-kebyi (3N-units) which means ‘neuter-units’. For example, ‘three houses’ is mpana a-kebyi pait (three 3N-units house). When the term for ‘units’ is used with animate beings, and often with plants, it is inflected by other pronominal affixes that agree with the noun in person, gender, and number. For example, ‘four children (girls)’ is paxnika gu-kebyi-kis bakimn-ai (four 3F-units-PL child-PL), i. e. ‘four female units of children’. ‘Two of us’ is pi-ya-na u-kebyi (two-CL:ANIM-two 1PL-units), i. e. ‘two units of us’. The numeral classifier doesn’t change with the use of this term; it still classifies the object being counted. The term -kebyi does not occur with sets, fractions, or series; it occurs only with units.

When a numeral refers to a tangible unit, the classifier always indicates whether the unit is animate or inanimate. With animate units, the numeral one has the classifier -p (‘animate’) and also agrees in gender. For example, ‘one (male) shaman’ is paha-p-ri iham-ri (one-CL:ANIM-M shaman-M) and ‘one (female) shaman’ is paha-p-ru iham-ru (one-CL:ANIM-F shaman-F).

With inanimate units there is no specific ‘inanimate’ classifier; instead the classifiers indicate the geometric shape of the unit. These shapes are: irregular, round/square, round-and-long (cylindrical), flat, flat-and-deep (concave), extended, and extended-including-perimeter (high/deep/broad). Numerals referring to inanimate units do not show gender. An example is ‘one paper’ paha-k kagta (one-CL:FLAT paper).

There are three classifiers that refer to items that seem to fall somewhere between being animate and inanimate. One indicates plants of all kinds; two indicate specific body parts: hands/handfuls and mouthfuls. All three classifiers are derivations of the nouns to which they refer. The classifier for plants is derived from the term meaning ‘trunk or stem’. The others are

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10 In this article, the term ‘object’ does not refer to a syntactic function, unless it is specifically called a ‘direct object’.
derived from the words for ‘hand’ and ‘mouth’. For example, ‘his two hands’ is *pi-wok-na gi-wak* (two-CL:HAND-two his-hand).

### 3.1.2. Sets.

On numerals referring to sets of tangible units, the classifiers indicate the manner in which the elements are joined to one another. There is a classifier for a set of entities that are inherently separate, i.e. not physically joined in any way (like a herd of pigs). For example, ‘a group of people’ is *paha-bru hiyeg* (one-CL:GRUP person). There is another classifier for a set of elements that are inherently joined together (like a stalk of bananas). There are others that indicate sets that are joined in other ways, i.e. by being tied together, by being wrapped up together (like a package), and by being ‘basket-ed’ together in a basket. For example, ‘five baskets of manioc roots’ is *pohoku-psi kaneg* (five-CL:BASK manioc_root). A basketful is treated as a set because it is not used as a measurement of volume or weight. Measurements of volume are nouns that are classified according to the shape of the container. For example, ‘one liter of honey’ is *paha-t lit ahayak a-nunu* (one-CL:CYL liter bee its-honey), because liters are measured by bottles, which are cylindrical. If the container were a large (19-liter) square kerosene can, which is often used nowadays to measure manioc flour, the classifier would be the one used for round or square objects, i.e. *paho-u bom kuwak* (one-CL:RND can manioc-flour). The different kinds of baskets are all considered by the Palikúr to be of irregular shape and are referred to by the use of the use of the classifier for irregularly-shaped items. For example, ‘one [back-pack] basket’ is *paha-a wasipna* (one-CL:IRREG basket). So the ‘basket’ classifier does not indicate a ‘basket’ shape or measurement but rather the manner in which the items in the set are joined together. See other measurements in examples (08) to (16).

### 3.1.3. Fractions.

On numerals referring to fractions, the classifiers refer to the parts into which a tangible object could be divided. One classifier indicates the sides of an object. (All objects have at least two sides.) The other has to do with a part removed from a whole. For example, ‘one side of the island’ is *paha-bak keurihgi* (one-CL:SIDE island) and ‘one part of the island’ is *paha-uhri keurihgi* (one-CL:PART island).

### 3.1.4. Intangible units: abstractions.

For abstractions, there is only one classifier. It refers to all intangible things like ‘sickness’, ‘job’, ‘custom’ and any specific action. Since these items occur with the term for ‘units’, *akebyi*, it is probably correct to think of the classifier as indicating ‘intangible units’. An
example is the phrase ‘two words’, which is *pi-ta-na a-kebyi yuwit* (two-
ABSTR-two 3N-units word).

### 3.1.5. Intangible sets: series.

For series, there is also only one classifier. It mainly refers to time, such as day or night, but also to breathing and other regularly repeated events or actions. For example, ‘one breath’ is *paha-i kahikanau* (one-CL:SER breath). (See example (05), as well. Numerical terms with this classifier are often inflected in different ways than others are. See examples (06) and (07) for a few of these. One of these unique inflections, *-put*, indicates repetition of actions or of any other items in the abstract class. It also refers to types of things. See examples (33) to (35) and (44) to (46). Besides this, the classifier for ‘series’ also refers to a set of seven days or a set of ten numerals. Therefore it could be called a classifier of ‘intangible sets’, sets which are connected by repetition.

### 3.2. Description of the classifiers in each category.

I will now describe each classifier in more detail. See Table 4 for a list of examples of all classifiers.

#### 3.2.1. Tangible units: animate entities.

To indicate an animate entity, the classifier is *-p* on the numeral one and *-ya* on the numeral two. The numeral one is *paha-p-ri* (one-CL:ANIM-M) or *paha-p-ru* (one-CL:ANIM-F). The numeral two is *pi-ya-na* (two-CL:ANIM-two). Numerals higher than two have no classifiers when they refer to animate creatures. The numeral one always agrees with the animate noun in gender (see section 4.) Animate beings include people, spirits, animals, fish, birds, snakes, turtles, and insects. For example, ‘one caterpillar’ is *pahapru iiei*. In accordance with their myths, the Palikúr also consider the moon, sun, and stars to be animate. The phrase *piyana kaig* ‘two moons’ also means ‘two months’.

#### 3.2.2. Tangible units: Inanimate objects.

When inanimate objects (except for plants and some body parts) are being counted, the classifier on the numeral indicates the objects’ geometric form. Seven forms are distinguished. They fit into a logical and elegant pattern, which is shown in Table 3. The terms that Palikúr speakers use to describe these forms involve the concept of a fourth physical dimension in addition to length (l), width (w), and depth (d). I call this dimension the perimeter (p). The term ‘perimeter’ refers to the outer boundary or periphery of a figure. It denotes the whole of that boundary, not the length of it.

The well-known mathematician, James Singer (1993), came very close to describing the Palikúr ‘fourth dimension’ when he stated, “Any point in the
The physical universe can be located by reference to three given axes; the physical universe is said, therefore, to be three-dimensional. The same space, however, becomes four-dimensional if it is regarded as made up not of points but of an infinity of spheres, because then four references must be given to determine or locate each individual sphere: the three coordinates of its center point and the length of its radius [italics mine]. Similarly a ‘three-dimensional’ space that can be drawn on a flat piece of paper can be imagined, the space consisting of all the circles that can be drawn on a plane surface. In this case the three dimensions consist of the coordinates of the center of a circle and its radius. The use of geometrical concepts involving more than three dimensions has had a number of important applications in the physical sciences, particularly in the development of the theory of relativity.”

The Palikúr ‘fourth dimension’ it must be kept in mind that all the points at the “coordinate of the radius” are what make up the perimeter of an object. Clearly, this type of a ‘fourth dimension’ is not a new concept. It is studied in Euclidian geometry as various types of curves, and is recognized as being of extreme mathematical importance. In the Palikúr language the perimeter is so inextricably involved with the other three dimensions that it is treated as a fourth dimension. All four references must be considered in order to determine the geometrical class to which a physical object belongs.

The Palikúr language is replete with terms for dimensions and geometrical forms. I discuss here only those that are related to the numeral classifiers. Several terms that native speakers use to describe shapes have the root huwi-, which basically means ‘round’ but is also used to refer to square items. The word huwi-patip ‘round-EQUAL’ means ‘round with all sides equal’. Geometers would call a round perimeter a set of points or a curve with only one center point, or ‘focus’, and one radius. The term huwipatip is used to describe a sphere or cube, a circular object, or a painted design that is round or square. The depth or solidity of the form is not an important component of the meaning of the term, but the single radius or equal perimeter is.

Singer was probably referring in his last sentence to the idea that the fourth dimension is that of time. The Palikúr language classifies expressions of time as being a series of repetitions without physical dimensions.

To specify the idea of ‘square’ one can say, huwipatip ka-tusi-bet (round having-corner-VCL:MULTIPLE_PARTS) (round with corners), but the term huwipatip is freely used to describe both round and square objects.
Another word, *huwi-bakup* ‘round-UNEQUAL’, describes a ‘round (or square) form whose sides are not of equal length’. It refers to an oval or rectangular shape. Geometers would describe this as a curve with two foci and two radii. A third word, *huwi-gakup*, indicates a shape that is ‘round (or square) whose perimeter is in focus’, for example, a ring, a wheel, a circle of people, a room or a corral. These examples indicate that the root *huwi* refers to a geometrical form we can call ‘saliently three-dimensional’. However, in this case, the three dimensions are not what we commonly call length, width, and depth. Depth is not taken into account. What is taken into account is length, width, and perimeter. The importance of perimeter as a dimension will become clear as the other dimensions are examined.

Another basic geometrical form in Palikūr is called *saba-bo-ye* (flat-VCL:FLAT-DUR.M) ‘flat’. The morpheme *-bo* is a verbal classifier\(^\text{x}\) which also occurs on adjectives and refers to a flat shape. The morpheme *-ye*, which indicates a durable state, occurs on most adjectives. The term is used to describe a leaf or piece of paper. This geometrical form is saliently two-dimensional. Only the surface, with its two dimensions of length and width, is taken into account. The perimeter is not considered.

Another important term refers to a saliently one-dimensional form. This term is *tara-n-ad* (extend-CONT-AUG) ‘extended’. It is used to describe things that are extended or linear, without thinking of the breadth or the extremities, like a river, a path, a cord or a row of things. Although for convenience we call this one dimension ‘length’, the concept of ‘extended’ does not include a beginning and ending point that the term ‘long’\(^\text{y}\) implies, and it can refer to height, depth, or breadth as well as length.

These four primary geometrical forms on which Palikūr classifiers are based can be summarized as follows: The first and second forms are both saliently three-dimensional (length + width + perimeter), the only difference being the equality of the perimeter. For example a speaker of Palikūr describes an egg as being *huwi-bakup*, ‘round-unequal’ and an orange as being *huwi-patip* ‘round-equal’. The classifiers (on the numeral one) that refer

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\(^{\text{x}}\) Besides the system of numeral classifiers, the Palikūr language has a system of verbal classifiers and a system of intra-locative classifiers, all with different markers and different semantic classes.

\(^{\text{y}}\) The word ‘long’ in Palikūr is *ki-yabwi-ye* (having-length-DUR). Objects of several shape classes can be described as being *kiyabwiye*, for example, arrows (cylindrical), boards (flat), canoes (concave), and rivers (extended).
to these forms are -a and -u, respectively. I label the first class ‘irregular’ because the classifier is used on numerals that refer not only to oval-shaped (huwibakup) items but to all items with dimensions that do not fit in any of the other classes. That is, the classifier does not only indicate forms with two radii, like that of an egg; it also includes forms that have perimeters produced by many foci and radii, like those of a cloud or a house. Besides these two forms, there are two others of different dimensions. The third form is sababoye ‘flat’, a form that is saliently two-dimensional (length + width). The classifier that refers to this form is -k. The fourth form is taranad ‘extended’, a form that is saliently one-dimensional (length). The classifier that refers to this form is -tra. It is the only classifier that appears phonologically related to the adjective that describes the form.

Classifiers exist for three more geometric forms that are related to these three dimensions. The difference is that the idea of a further dimension is added to each of them. Native terms for two of these shapes are made up of the root that refers to three-dimensional and two-dimensional forms with the addition of the morpheme -min, as in sababo-min ‘flat-min’. This morpheme -min is not easy to explain. It occurs on many roots with the idea of an added secondary dimension which may be either physical or abstract. The meaning of the basic root is amplified with the sense of ‘something more’ or ‘something beyond’. For want of a better term, it is labeled ‘SUPRA’.

15 For example, the verb ‘think’ is formed by adding -min to the verb ipeg ‘look’; the phrase ‘I’m thinking’ is literally ‘I’m looking-min in my thoughts’: Nah ipeg-min-ne nu-hiyakemni (I look-SUPRA-CONT my thoughts). A habitual liar is described as having a ‘long-min tongue’: ki-yabu-min gi-nen (having-length-SUPRA his-tongue). When -min is added to the postposition ‘on’ a-pit (1N-on), the resulting term a-pit-min refers to being higher than or surpassing other things. It is used to speak of birds flying ‘over’ the trees but also to describe people in positions of leadership, the winners of a battle, or God himself. Also when a deceased person is being spoken about, -min is always added to his name; ‘the deceased Paul’ is Pol-min (Paul-SUPRA). Examples of the use of -min in this paper are (05), (34), (65), (66), and (78).
TABLE 3
The Geometric Classes Of The Paliküur Numeral System
based on four dimensions of length (l), width (w), perimeter (p), depth (d)

<table>
<thead>
<tr>
<th>Class</th>
<th>Definition</th>
<th>Examples</th>
<th>Classifier(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3 unequal dimensions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>huwibakup (l + w + p)</td>
<td>‘oval/retangular/irregular’</td>
<td>Egg, house</td>
<td>-a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3 equal dimensions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>huwipatip (l + w + p)</td>
<td>‘round/square’</td>
<td>Orange, box, circle</td>
<td>-u</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2 dimensions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sababoye (l + w)</td>
<td>‘flat’</td>
<td>Sleeping mat, board</td>
<td>-k</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1 dimension</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>taranad (l)</td>
<td>‘extended’</td>
<td>String, river</td>
<td>-tra</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>the morpheme -min is used to describe different shapes, it indicates an additional secondary dimension that I call ‘depth,’ though it includes what English-speakers might refer to as being ‘length’ in some situations. Thus, the terms huwi-b-min (round-unequal-SUPRA) and huwi-pti-min (round-equal-SUPRA) are used to describe a form that is ‘primarily round and secondarily...</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
deep/long,’ that is, a cylindrical object such as an arrow or a tree-branch\textsuperscript{16}; the term saba-bo-min (flat-VCL:FLAT-SUPRA) is used to describe things that are ‘primarily flat and secondarily deep’, that is, a concave object such as a canoe or a bowl\textsuperscript{17}.

The last classifier is associated with elements that are extended, but they have a perimeter of some kind. There are two Palikúr words that describe this form, both ending with the suffix -ad (AUGMENTATIVE) or its allomorphs. These terms are mih-ad (deep-AUG) ‘deep’ and imu-wad (high-AUG) ‘high/tall’. The numeral classifier that has to do with these forms is the same that is used to refer to items described as huwi-gakup (‘round or square whose perimeter is in focus’). We could say that all three of these terms indicate a shape that is ‘primarily extensive and secondarily with the perimeter or extremities included’. This classifier is used with items such as a high building, a hole, a room or a field (when attention is on its breadth or boundaries).

Here are some examples of the difference between the two ‘one-dimensional’ classes. A rope used to take water out of a well is taranad ‘extended’ while the well is mihad ‘deep’ or ‘extended with a perimeter’. The word yar, ‘fence’, is classified as being taranad ‘extended’ by the speaker who is thinking of a barrier, without attention to its limits, and as being huwigakup ‘circular’ or ‘extended with a perimeter’ by the speaker who is thinking of a corral.

These three forms can be summarized as follows. A cylindrical object such as a banana is huwipti-min ‘beyond round’. ‘Round’ is length + width + perimeter. ‘Beyond round’ is length + width + perimeter + depth, that is, it is saliently three-dimensional with an additional dimension of depth. The classifier that refers to this form is -t. The second geometrical form, used to describe concave objects like bowls or canoes, is sababo-min ‘beyond flat’. It is a form that is saliently two-dimensional with an additional dimension of depth (length + width + depth). The classifier that refers to this shape is -mku. The final form is saliently one-dimensional with an additional dimension of a perimeter (length + perimeter). Three terms are used to describe this form: a wound is mih-ad ‘deep’, a tall pile of sand is imu-wad ‘high’, a room is

\textsuperscript{16} Some younger Palikúr speakers refer to the cylindrical shape as ki-yabu-min (having-length-SUPRA), i.e. ‘primarily long and secondarily round’.

\textsuperscript{17} Some younger Palikúr speakers refer to the concave shape as dudu-rik (dented-in).
huwi-gakup ‘having a perimeter all around’. The numeral classifier that indicates this form is -iku.

In the following paragraphs, the numeral classifiers are described in detail along with examples of inanimate units that generally occur with them. Each noun is followed by its gender in parentheses. See Tables 4 and 5 for examples of numerals used with some of these nouns.

For items considered to be of ‘irregular’ shape, the numeral classifier is -a on the numeral one and -sa on the numeral two. The numeral one is paha-a. The numeral two is pi-sa-ya. The terms for numerals higher than two do not occur with a classifier. Examples of nouns that occur with this classifier are: pait ‘house’ (n), pait-weh-pu (house-wide_range-PL) ‘village’ (n), antiyan ‘egg’ (n), epti ‘bench’ (n), iteuti ‘skull’ (n), ukuhne ‘cloud’ (n), tiket a-mei ‘fire 3N-spark’ (n), etc. It also refers to generalities like ‘a thing’, arikna, ‘a container’, atiy, ‘a light’, abukri, i.e. a physical thing that provides light, and even ‘a voice’, i-kupi-mna-t (literally ‘throat-sound’).

For items that are huwi-patip (round/square-equal), the numeral classifier is -u on the numeral one and -so in the numeral two. The terms for numerals higher than two do not occur with a classifier. The numeral one is paha-u. The numeral two is pi-so-ya. Examples of spherical or square objects are: uwas ‘orange’ (f), apuk ‘avocado’ (f), kapunma ‘passion fruit’ (f), papai ‘papaya’ (f), tukugu ‘gourd’ (f), tumauri ‘calabash fruit’ (f), tip ‘stone’ (f), wau ‘rattle’ (f), bul ‘ball’ (f), gol ‘goal-posts’ (f), kiyes ‘box’ (f), malet ‘suitcase’ (f), i.e. a physical thing that provides light, and even ‘a voice’, i-kupi-mna-t (literally ‘throat-sound’).

For cylindrical items, that is, those that are huwi-b-min (round-unequal-SUPRA) or huwi-pti-min (round-equal-SUPRA), the numeral classifier is -t. The numeral one is paha-t. The numeral two is pi-ta-na. The numerals higher than two do not occur with a classifier. Some objects classified as being cylindrical are: gil-wak 3M-finger’ (n), gil-semmu ‘[strand of] 3M-hair’ (n), gil-ib

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18 The classifiers for round/square objects (of equal proportions) and irregular objects (of unequal proportions) are morphologically closer than the others. Numerals one and two with the former are pahaa and pisaya, with the latter they are pahou and pisoya. One wonders if these were the original two categories.
'3M-tail' (n), gi-pita ‘3M-bone’ (n), a-tauni ‘3N-branch’ (n), alimet ‘match’ (n), aig ‘cigarette’ (n), karunri ‘lance’ (n), matap ‘manioc squeezer’ (n), enne-tet (design-INSTR) ‘pencil’ (n), kakus ‘needle’ (f), ugiyo a-kig (drill 3N-point) ‘drill bit’ (f), pudubdu ‘nail’ (f), pilatno ‘banana’ (f), maik ‘ear of corn’ (f), sipapa ‘reed’ (f), ah ‘stick/wood’ (f), butet ‘bottle’ (f), aragbus ‘shotgun’ (f), kattax ‘shotgun shell’ (f), etc.

For flat items, described as saba-bo-ye (flat-VCL:FLAT-DUR), the numeral classifier is -k. On numerals higher than two only the classifier -bu occurs. This obviously comes from the verbal classifier -bo which also refers to flatness. It has now become firmly established as an obligatory numeral classifier. The numeral one is paha-k. The numeral two is pi-ka-na. The numeral three is mpana-bu. Some nouns classified as flat are: parak ‘board’ (f), puwait ‘paddle’ (f), ax-tet (eat-INSTR) ‘table’ (f), miruk ‘plate’ (n), kuyeg ‘spoon’ (n), kagta ‘paper or book’ (n), sipapa ‘sleeping mat’ (n), gi-wak ‘3M-hand’ (n), gi-sipri ‘3M-feather’ (n), gi-hanpi ‘3M-wing’ (n), awagi ‘fan’ (n), kamos ‘cloth’ (n), ahap ‘patch’ (n), aka-butik-ti ‘belt’ (n)¹⁹, pudig ‘hammock’ (n), han ‘manioc sifter’ (n), awebru ‘manioc pancakes’ (n), waru ‘mirror’ (n), was ‘field’ (n), kasapat ‘sandal’ (n), etc.

For flat-and-deep items, described as saba-bo-min (flat-VCL:FLAT-SUPRA), the numeral classifier is -mku. It occurs on all the numerals referring to objects of this shape. The numeral one is paha-mku. The numeral two is pi-muk-na. Items that occur with this classifier are deeply concave: tumauri ‘calabash bowl’ (f), umuh ‘canoe’ (f), nawiy ‘boat’ (f), kutinna ‘ship’ (f), kud ‘basin (made of the curved bract of the inajá palm tree)’ (f), besin ‘metal basin’ (f), etc.²⁰ This classifier also occurs with certain objects that are not concave, such as iwan ‘knife’ (f), kastipag ‘machete’ (f), kirikri ‘saw’ (f), iphigi ‘razor blade’ (f), akawakti ‘ring’ (f), ideptet ‘scissors’ (f), kirehka ‘coin’ (f), etc. It seems that the sababo-min (flat-SUPRA) class has now been

¹⁹ aka-butik-ti is a compound word that means ‘with-waist-ABSOLUTE. To avoid confusion, I will not segment other compound words. For the same reason, I also will not segment words with the discontinuous morpheme, i...ti (ABSOLUTE), which is used on inalienably possessed nouns when the owner is not known.

²⁰ The nouns ‘plate’ and ‘spoon’ do not occur with this classifier because the original eating utensils that served as plates and spoons were not made of metal and, being only mildly concave objects, they were classed as being ‘flat’.
amplified to include objects that are ‘primarily flat and secondarily metallic’. This classifier also occurs on the interrogative word which means ‘how much does it cost?’, aisau-muk (quantity-CL:FLATD). The morpheme -muk is probably used because of the association with coins or gold.

For extended items, described as tara-n-ad (extend-CONT-AUG), the classifier is -tra. It occurs on all the numerals referring to objects of this dimension. The numeral one is paha-tra. The numeral two is pi-tahr-a. ‘Extended’ nouns are: warik ‘river’ (f), pareuni ‘stream’ (f), ahin ‘path’ (n), kawauta ‘corda’ (n), imedrit a-rim ‘bow 3N-string’ (n), akarti ‘string’ (n), iyuti ‘headdress’ (made of tiny feathers woven into a long string) (n), yar ‘fence (thinking of its extension)’ (n), etc. The ‘extended’ classifier is used with any noun that refers to things in a row, including people. For example, ‘a parade of people’ is hiyeg paha-tra-min-ne (people one-CL:EXTEN-SUPRA-CONT). It is common to speak of rows of plants. For example:

(01) n-amutra pi-tahr-a  gu-kebyi-kis  a-dahan   paxka-pti-t
   1SG-plant two-CL:EXTEN-two  3F-units-PL    3N-by four-CL:FOLI-SET
   ‘My plants [are] two (extensive) units by sets of four (plants)’
   (i. e. My plants are in two rows of four each.)

For items that are ‘extended with perimeter’, the classifier is -iku. It occurs on all the numerals. It appears to be related to the intra-locative classifier -iku which means ‘within spatial limits’. The extension can refer to height, or depth, or breadth. I label the class ‘high’. The numeral one is paha-iku. The numeral two is pi-rik-na. Items classified as deep, mih-ad (deep-AUG), are: miyokwiye ‘hole’ (n), unihpna ‘well’ (n), imeuti ‘grave’ (n), ahadru ‘root’ (f), busukne ‘wound’ (n), gi-biy ‘3M-mouth’ (n), gi-kig a-miyokni (3M-nose 3N-hole) ‘nosestril’ (n), etc. Examples of units classified as ‘high’, imu-wad (high-AUG), are: tiket ‘fire’ (f), apetetni ‘waterfall’ (f), pait imuw-ad-ne-ne (house high-AUG-CONT.M-CONT.M) ‘building’ (n). Examples of items classified as ‘with a perimeter’ huwi-gakup (round/square-perimeter), are: was ‘field’ (thinking of its perimeter) (n), amuri-pwi (plant-PL) ‘plantation’ (n), iwetrit ‘place’ (n), xam ‘room’ (n), lappot ‘doorway’ (n), bisik-ket (flee-place) ‘shelter’ (n), yar ‘fence’ (n), etc. The classifier for this shape occurs with any items that are high because they are piled up. For example, ‘a pile of sand’ is

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21 Could this be a move toward a category of ‘density’?
paha-iku kaih (one-CL:HIGH sand) and ‘a pile of books’ is paha-iku kagta (one-CL:HIGH book).

3.2.3. Tangible units: plants and body parts. The Palikúr picture a plant as being a trunk or stem with offshoots. The term used to describe all types of plants is ka-kat-ye (‘having-stalk-DUR’). I label the form ‘foliform’ to follow convention, although ‘stalked’ would probably be more correct. The numeral classifier for plants is -kti. It is obviously derived from the noun akati ‘trunk/stem’. The numeral one is paha-kti. The numeral two is pi-kat-na. This classifier occurs on all the numerals that refer to plants. It also is used with necklaces made of teeth, which are viewed as being offshoots of a stalk as plants are. Examples are: ah akat (wood trunk) ‘tree’ (f), pilatno akat ‘banana plant’ (f), uvas akat ‘orange tree’ (f), amutri ‘plant’ (f), ipuwiti ‘flower’ (f), akabdat ‘necklace (of teeth)’ (f), etc.

To refer to hands, the numeral classifier is -waku. It occurs only on numerals one and two. It is derived from the inalienably possessed noun ‘hand’, u-waku (our-hand). The numeral one is paha-uku. The numeral two is pi-wok-na. It is principally used as an adverb. For example:

(02) ig hawas-e kwak pi-wok-na gi-wak.
   he stir-COMPL manioc flour two-CL:HAND-two 3M-hand
   ‘He stirred the manioc flour [with] his two hands’

For mouth or mouthfuls, the numeral classifier is -biyu. It occurs on all the numerals. It is derived of the noun ‘mouth’, u-biy (our-mouth). The numeral one is paha-biyu. The numeral two is pi-biy-na. For example:

(03) ig higa paha-biyu
   he drink one-CL:MOUTH
   ‘He drank a mouthful’

3.2.4. Tangible sets. There are five classifiers that refer to sets of tangible units, either animate or inanimate. For a set of entities that is inherently unconnected, the numeral classifier is -bru. It occurs on all the numerals referring to unconnected sets. The numeral one is paha-bru. The numeral two is pi-bohr-a. This classifier is used when speaking of groups of individual items such as a crowd of people (hiyeg), a herd or band of animals (puwikne), a flock of birds (kuhipra), a swarm of bees (ahayak), a soccer

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22 On numerals higher than three, it is pronounced -pti, which is a spin-off from its allomorph on the numeral four. See Appendix.
team (arehwa-keputne ‘play-er’), etc. It is also used with a pair of shoes (kasapat) or any other small group of objects, such as a bunch of bananas (pilatno).

For a set of objects inherently connected, such as clusters, the numeral classifier is -tvi. It occurs on all the numerals that refer to this kind of set. The numeral one is paha-tvi. The numeral two is pi-tiu-na. This classifier is used to refer to groups of items that are firmly connected, such as a stalk of bananas or palm fruits, or a bead necklace, etc. Its use has been expanded to refer also to people connected by being in the same canoe together. See example (59).

For a set of items tied together (wanaka), the numeral classifier is -ki. (Some speakers say -kih.) It occurs on all the numerals. The numeral one is paha-ki. The numeral two is pi-ki-na. This classifier is used when speaking of bundles of items like arrows, leaves, or sugar cane. It also is used with a broom or a string of fish.

For a set of items wrapped up together (awastaka), the numeral classifier is -imku. The numeral one is paha-imku. This classifier refers to items that are wrapped together in leaves, paper, or cloth. The speaker may indicate the kind of wrapping that is being used. For example, ‘one bunch of rice joined by being wrapped in a bandana’ is paha-imku musweg dug (one-CL:WRAP bandana rice). It appears to be disappearing, since only the older people use it. It occurs only on the numeral one. The numeral two has the ‘irregular’ classifier, -sa.

For items joined by a basket (only large baskets), the numeral classifier is -ih or -psi. The classifier -psi occurs on all the numerals higher than one. The numeral one is paha-ih. The numeral two is pi-si-na. The numeral three is mpama-psi. For example, ‘one basketful of sweet potatoes’ is paha-ih kaig (one-CL:BASK sweet potato).

3.2.5. Fractions. To indicate ‘one side’ of an object, the numeral classifier is -bak on the numeral one and -bk on the numeral two. It occurs only on these two terms. The numeral one is paha-bak. The numeral two is pe-bk-ak.23 This classifier is used with all kinds of tangible units, because all

23 Some speakers pronounce this term as pekbak, which would mean the classifier is -kbak. It would be hard to explain phonologically the presence of the k before the bak, but then some of the other word-medial classifiers are also difficult to explain only on phono-
objects have at least two sides. For example, 'two sides of the paper' is *pe-bk-ak kagta* (two-CL:SIDE-RECIP paper). Example (04) is a bit more complicated:

(04) *ig biyak-e gi-wak paha-bak-yu....pe-bk-ak-te gi-kugku*

he lose-COMPL 3M-hand one-side-DUR....two-side-RECIP-TOTAL 3M-foot

‘He lost a hand on one side....[and] his feet on both sides’

To indicate a ‘part’ of an object, the numeral classifier is *-uhri*. It occurs only on the numeral one. The numeral one is *paha-uhri*. This classifier is used in relation to the parts of a region, city, or island. It is also used when speaking of pieces of meat or manioc bread. For example, ‘one piece of alligator meat’ is *paha-uhri pareine a-rih* (one-CL:PART alligator 3M-meat).

Any other numeral can represent ‘one part’ of a unit or group when it is followed by the word ‘from’, *ar-ai-tak* (3N-part of-from). For example, ‘three slices of bread’ is *mpana-bu ar-ai-tak bugut* (three-VCL:FLAT 3N-part of-from bread). For animate units, the word ‘from’ is *g-ai-tak-kis* (3M-part of-from-PL). The phrase ‘one of them’ (speaking of men) is *paha-p-ri g-ai-tak-kis* (one-CL:ANIM-M 3M-part of-from-PL).

Palikûr has other terms for fractions that are not related to numerals, but they show that the concept of fractions is not a strange notion to them. For example, ‘a portion’ is *abusku*; ‘a half’ is *abuskuh-wa* (portion-EMPH); ‘one third’ is *kabâ abuskuh-wa* (almost portion-EMPH) i. e. ‘almost a half’; and ‘one fourth’ is *abusku a-tusi* (portion 3N-corner) i. e. ‘a portion equal to one corner’.

3.2.6. Intangible units: abstractions. The numeral classifier that occurs on numerals referring to any abstract noun is *-t*. As was noted before, this classifier also indicates a cylindrical object. It is difficult to see any semantic relationship between the cylindrical shape and abstract ideas. The morpheme *-t* is probably homophonous. The nouns it refers to are the same ones that are classed as intangible sets; these nouns are never classed as tangible sets, as cylindrical objects are. Also, there are various differences of inflection between the numerals that refer to cylindrical items and those that refer to abstract nouns. Some suffixes that occur on numerals referring to abstract nouns are the same ones that occur on numerals referring to series. See grounds. (Historical and semantic factors also influence their form.) However, I feel *-bk* follows phonological rules better, and *pa...ak* is a very common discontinuous morpheme referring to reciprocity, which fits the idea of matching elements on both sides.
Examples of abstract nouns are: karait ‘sickness’ (n), annut ‘work’ (n), annipwit ‘job’ (n), abektei ‘example’ (n), inett ‘news’ (n), yuwit ‘word’ (n), apat ‘song’ (n), gi-haukan ‘3M-promise’ (n), ayap-ka ‘question’ (n), wasaim-ka ‘lie’ (n), hiyakemni-ki ‘idea, custom’ (n), taraksa-ki ‘error’ (n), ka-bai-ka (having-good-NOM) ‘blessing’ (n), m-bai-ka (without-good-NOM) ‘affliction’ (n), kumaduka-ki ‘law’ (n), igis-ka ‘riches’ (n), watiswa-ki ‘jump’ (n), etc.

3.2.7. Intangible sets: series. For the series class, the classifier is -i.

The numeral one is paha-i and the numeral two is p-i-na. The terms for numerals higher than two referring to series do not occur with a classifier. Nouns that have to do with a series are haukri ‘day’ (n), mtipka ‘night’ (n), paka ‘week’ (n), a-meremnit (3N-enlargement) ‘full moon’ (n), kahikanau ‘breath’ (n), mawok-we-kri (rain-wide_range-season) ‘rainy season’ (n), and madik-wa (end-EMPH) ‘tens’. The numeral one with the series classifier is also used as an adjective to describe any series of events. For example:

(05) paha-i-min-ne m-bai-ka
one-CL:SER-SUPRA-CONT without-good-NOM
‘a series of bad’ (i. e. a series of problems)

Numerals with the series classifier are often used as adverbs of time. In this case, they have inflections that do not occur on any other numeral, such as -e ‘completive action’, as in example (06) and -eupi ‘finality’ (07).

(06) paha-i-e in madik-e
one-CL:SER-COMPL it end-COMPL
‘All at once it ended’

(07) ini nu-peukan umeh-pe-n paha-i-eupi
this 1SG-thought kill-COMP-1SG one-CL:SER-FINALITY
‘I think this will kill me once and for all’

All the numeral classifiers are listed in Table 4 on the numerals one and two, with examples of nouns with which they often occur.

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24 Words that end with -ka or -ki are nominalized verbs and adjectives. All are common words.
TABLE 4
Examples of All Palikūr Numeral Classifiers

<table>
<thead>
<tr>
<th>TANGIBLE UNITS: ANIMATE</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>animate paha-\textit{p-ri} awaig</td>
<td>one-CL:ANIM-M boy</td>
<td>‘one boy’</td>
</tr>
<tr>
<td>masc. pi-\textit{ya-na} kaig</td>
<td>two-CL:ANIM-two moon</td>
<td>‘two months’</td>
</tr>
<tr>
<td>animate paha-\textit{p-ru} pak</td>
<td>one-CL:ANIM-F cow</td>
<td>‘one cow’</td>
</tr>
<tr>
<td>fem. pi-\textit{ya-na} pukupku</td>
<td>two-CL:ANIM-two owl</td>
<td>‘two owls’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TANGIBLE UNITS: INANIMATE</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>irregular paha-\textit{a} yamat</td>
<td>one-CL:IRREG basket</td>
<td>‘one basket’</td>
</tr>
<tr>
<td>pi-\textit{s-\textit{a}-ya} pait</td>
<td>two-CL:IRREG-two house</td>
<td>‘two houses’</td>
</tr>
<tr>
<td>round / paho-\textit{u} tip</td>
<td>one-CL:RND stone</td>
<td>‘one stone’</td>
</tr>
<tr>
<td>square pi-\textit{so-ya} kyes</td>
<td>two-CL:RND-two box</td>
<td>‘two boxes’</td>
</tr>
<tr>
<td>cylindrical paha-\textit{t} yakkot</td>
<td>one-CL:CYL arrow</td>
<td>‘one arrow’</td>
</tr>
<tr>
<td>pi-\textit{ta-na} aig</td>
<td>two-CL:CYL-two tobacco</td>
<td>‘two cigarettes’</td>
</tr>
<tr>
<td>flat paha-\textit{k} sipapa</td>
<td>one-CL:FLAT mat</td>
<td>‘one sleeping mat’</td>
</tr>
<tr>
<td>pi-\textit{ka-na} pudig</td>
<td>two-CL:FLAT-two hammock</td>
<td>‘two hammocks’</td>
</tr>
<tr>
<td>flat and paha-\textit{mku} kud</td>
<td>one-CL:FLATD basin</td>
<td>‘one basin’</td>
</tr>
<tr>
<td>deep pi-\textit{muk-na} iwan</td>
<td>two-CL:FLATD-two knife</td>
<td>‘two knives’</td>
</tr>
<tr>
<td>extended/</td>
<td>paha-\textit{tra} warik</td>
<td>one-CL:EXTEN river</td>
</tr>
<tr>
<td>in a row pi-\textit{tahr-na} a-rim</td>
<td>two-CL:EXTEN-two N-cord</td>
<td>‘two cords’</td>
</tr>
<tr>
<td>extended paha-\textit{iku} tiket</td>
<td>one-CL:HIGH fire</td>
<td>‘one fire’</td>
</tr>
<tr>
<td>/ perim. pi-\textit{rik-na} was</td>
<td>two-CL:HIGH-two field</td>
<td>‘two fields’</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TANGIBLE UNITS: PLANTS AND BODY PARTS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>trunk / paha-\textit{kti} pilatno</td>
<td>one-CL:FOLI banana</td>
<td>‘one banana plant’</td>
</tr>
<tr>
<td>foliform pi-\textit{k-\textit{at-na} ipuwiti</td>
<td>two-CL:FOLI-two flower</td>
<td>‘two flowers’</td>
</tr>
<tr>
<td>hand paha-\textit{uku} gi-wak</td>
<td>one-CL:HAND 3M-hand</td>
<td>‘one hand’</td>
</tr>
<tr>
<td>pi-\textit{wok-na} gu-wak</td>
<td>two-CL:HAND-two 3F-hand</td>
<td>‘two hands’</td>
</tr>
<tr>
<td>mouth</td>
<td>paha-biyu</td>
<td>one-CL:MOUTH</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td>pi-biy-na</td>
<td>two-CL:MOUTH-two</td>
</tr>
</tbody>
</table>

**TANGIBLE SETS**

<table>
<thead>
<tr>
<th>group</th>
<th>paha-bru upayan</th>
<th>one-CL:GRUP duck</th>
<th>‘one flock of ducks’</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pi-bolu a bot</td>
<td>two-CL:GRUP-two boot</td>
<td>‘two pair of boots’</td>
</tr>
<tr>
<td>cluster</td>
<td>paha-twi akabelat</td>
<td>one-CL:CLUS necklace</td>
<td>‘one necklace’</td>
</tr>
<tr>
<td></td>
<td>pi-tiu-na ah ariu</td>
<td>two-CL:CLUS-two fruit</td>
<td>‘2 clusters of fruit’</td>
</tr>
<tr>
<td>tied</td>
<td>paha-ki yakkot</td>
<td>one-CL:TIE arrow</td>
<td>‘1 bundle of arrows’</td>
</tr>
<tr>
<td></td>
<td>pi-ki-na im</td>
<td>two-CL:TIE-two fish</td>
<td>‘2 strings of fish’</td>
</tr>
<tr>
<td>wrapped</td>
<td>paha-imkku ipeiti</td>
<td>one-CL:WRAP medicine</td>
<td>‘1 pkg. of medicine’</td>
</tr>
<tr>
<td></td>
<td>pi-sa-ya kamis</td>
<td>two-CL:IRREG-two clothes</td>
<td>‘2 pkg. of clothes’</td>
</tr>
<tr>
<td>basketed</td>
<td>paha-ih kat maik</td>
<td>one-CL:BASK basket corn</td>
<td>‘1 basket of corn’</td>
</tr>
<tr>
<td></td>
<td>pi-si-na kat dug</td>
<td>two-CL:BASK-two basket rice</td>
<td>‘2 baskets of rice’</td>
</tr>
</tbody>
</table>

**FRACTIONS**

<table>
<thead>
<tr>
<th>part</th>
<th>paha-uhri keurihri</th>
<th>one-CL:PART island</th>
<th>‘1 part of the island’</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>paha-uhri a-rih</td>
<td>one-CL:PART 3N-meat</td>
<td>‘one piece of meat’</td>
</tr>
<tr>
<td></td>
<td>(‘Two’ does not occur.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>side</td>
<td>paha-bak warik</td>
<td>one-CL:SIDE river</td>
<td>‘1 side of the river’</td>
</tr>
<tr>
<td></td>
<td>pe-bk-ak gi-kugku</td>
<td>two-CL:SIDE 3M-foot</td>
<td>‘two sides of feet’</td>
</tr>
<tr>
<td></td>
<td>(i.e. the feet on both sides)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**INTANGIBLE UNITS**

<table>
<thead>
<tr>
<th>abstraction</th>
<th>paho-t karait</th>
<th>one-CL:ABSTR sickness</th>
<th>‘one sickness’</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pi-ta-na inetit</td>
<td>two-CL:ABSTR-two message</td>
<td>‘two messages’</td>
</tr>
</tbody>
</table>

**INTANGIBLE SETS**

<table>
<thead>
<tr>
<th>series</th>
<th>paha-1 kahikanau</th>
<th>one-CL:SER breath</th>
<th>‘one breath’</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>p-i-na haukri</td>
<td>two-CL:SER-two day</td>
<td>‘two days’</td>
</tr>
</tbody>
</table>

Table 5 presents a full paradigm of numerals referring to animate units, flat units, and a set of items in a basket. They occur with the nouns tino ‘woman’, puwait ‘paddle’, and kat im ‘basket of fish’. Morphemes that appear in the table are -gben (PLURAL), a-kak (3N-with) ‘with it’, gu-kak (3F-with) ‘with

3.3. The semantic value of the numeral classifiers. The numeral classifier is more than a simple agreement with certain nouns of a particular ‘noun class’. The speaker chooses the classifier that indicates a specific charac-

TABLE 5
Three Classifiers On Numerals 1-11 And 20 In Palikür

<table>
<thead>
<tr>
<th>ANIMATE UNIT</th>
<th>FLAT UNIT</th>
<th>SET IN BASKET</th>
</tr>
</thead>
<tbody>
<tr>
<td>tino ‘woman’</td>
<td>puwait ‘paddle’</td>
<td>kat im ‘basket of fish’</td>
</tr>
<tr>
<td>1 paha-p-ru tino</td>
<td>paha-k puwait</td>
<td>paha-ih kat im</td>
</tr>
<tr>
<td>2 pi-ya-na tino-gben</td>
<td>pi-ka-na puwait</td>
<td>pi-si-na kat im</td>
</tr>
<tr>
<td>3 mpana tino-gben</td>
<td>mpana-bu puwait</td>
<td>mpana-psi kat im</td>
</tr>
<tr>
<td>4 paxnika tino-gben</td>
<td>paxka-bu puwait</td>
<td>paxka-psi kat im</td>
</tr>
<tr>
<td>5 pohouku tino-gben</td>
<td>pohouku-bu puwait</td>
<td>pohouku-psi kat im</td>
</tr>
<tr>
<td>6 pugunkuna tino-gben</td>
<td>pugunkunma-bu puwait</td>
<td>pugunkunma-psi kat im</td>
</tr>
<tr>
<td>7 nteunenker tino-gben</td>
<td>nteunenker-bu puwait</td>
<td>nteunenker-si kat im</td>
</tr>
<tr>
<td>8 nteunenker tino-gben gu-kak paha-p-ru g-auna-kis</td>
<td>nteunenker-bu puwait a-kak paha-k ar-auna</td>
<td>nteunenker-si kat im a-kak paha-ih ar-auna</td>
</tr>
<tr>
<td>9 nteunenker tino-gben gu-kak-kis pi-ya-na g-auna-kis</td>
<td>nteunenker-bu puwait a-kak pi-ka-na ar-auna</td>
<td>nteunenker-si kat im a-kak pi-si-na ar-auna</td>
</tr>
<tr>
<td>10 madikauku tino-gben madikauku-bu puwait madikauku-psi kat im</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 madikauku tino-gben gu-kak-kis pi-ya-na g-auna-kis</td>
<td>madikauku-bu puwait a-kak pi-ka-na ar-auna</td>
<td>madikauku-psi kat im a-kak pi-si-na ar-auna</td>
</tr>
<tr>
<td>20 p-i-na madikwa tino-gben pi-na madikwa puwait pi-na madikwa kat im</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
teristic of the object he is speaking about. For that reason the classifier often defines the noun with which it occurs. For example, the numeral shows if the noun *ahehtet* ‘measure’ means ‘meter’, as in (08) or ‘kilogram’, as in (09).

(08) *paha-t aheh-tet kamis*

one-CL:CYL measure-INSTR cloth

‘one meter of cloth’

(cylindrical measure, or arm stretched from nose to fingers)

(09) *paho-u aheh-tet kamis*

one-CL:RND measure-INSTR cloth

‘one kilogram of remnants’

(round weight of scales)

The numeral also defines the word *iwakti*, which can mean either ‘hand’ or ‘finger’. In this case, the ‘irregular’ classifier is used to refer to a whole hand (10); the ‘cylindrical’ classifier refers to a finger (11), the ‘flat’ classifier refers to the palm of the hand (12), and the ‘group’ classifier refers to the four fingers as a set (13).

(10) *pi-wok-na iwakti OR pi-sa-ya iwakti*

two-CL:HAND-two hand/finger two-CL:IRREG-two hand/finger

‘two hands’

(11) *pi-ta-na iwakti*

two-CL:CYL-two hand/finger

‘two fingers’

(12) *pi-ka-na iwakti*

two-CL:FLAT-two hand/finger

‘two palms’

(13) *pi-bohr-a iwokti*    (width of 4 fingers: measure

two-CL:GRUP-two hand/finger used to measure curvature

‘two sets of fingers’ of canoe shell)

As is true of all words, the exact meaning of a numeral depends on the context in which it is being used. For example, the arm is used to measure the length of many different things. The term ‘one arm’, *pahat iwanti* (one-CL:CYL arm), can indicate a length of approximately 220 centimeters (7 feet) or about 170 centimeters (5 feet) or even of only 40 centimeters (17 inches). But the listener, knowing the situation, understands perfectly. It all depends on what object is being measured. When the speaker is measuring the length of his field with a pole, the term ‘arm’ refers to the height a man can reach with
his arm stretched above his head. In this case, ‘one arm’ means more than two meters (two yards). For example:

(14) nu-was-ra a-yabwi paxnika madikwa iwanti
    1SG-field-REL 3N-length four tens arm

‘The length of my field [is] forty ‘arms’ (40 x 220 cm=88 meters).

When a man speaks of the length of his canoe or house, the term ‘arm’ refers to his two arms stretched out from his sides. In this case, ‘one arm’ is less than two meters. For example:

(15) nu-pin pohouku iwanti a-yabwi a-kak mpana iwanti a-rik
    1SG-house five arm 3N-length 3N-with three arm 3N-within

‘My house [is] five arms long (5 x 170 cm=8.5 meters) and three arms wide (3 x 170 cm=5 meters’)

When the man speaks of the length of the long cylindrical manioc squeezer he is weaving, the term ‘arm’ refers to his forearm. In this case, ‘one arm’ means less than half a meter. For example:

(16) inin matap a-yabwi pi-ta-na iwanti a-kak pi-sa-ya iwokti
    this squeezer 3N-length 2-CL:CYL-2 arm 3N-with 2-CL:IRREG-2 hand

‘The length of this squeezer [is] two arms (2 x 40 cm=80 cm) and two hands (2 x 8 cm=16 cm’) (i. e. one meter)

4. Gender agreement. Only the cardinal numeral one and the ordinal numeral two agree in gender with the noun they refer to, and then only with animate nouns. In these cases gender agreement is obligatory. For example, ‘one girl’ is paha-p-ru himano (one-CL:ANIM-F girl); ‘two girls’ is pi-ya-na gu-kebyi-kis himano-pyo (two-CL:ANIM-two 3F-units-PL girl-PL.F); ‘three girls’ is mpana gu-kebyi-kis himano-pyo (three 3F-units-PL girl-PL.F).

Palikúr has a system of three genders: masculine, feminine, and neuter. Terms referring to people, spirits, animals, and fish of the male sex are of the masculine gender. When their sex is not known, the masculine gender is always used, except in the case of birds, turtles, and caterpillars. For example, ‘one boa constrictor’ is paha-p-ri datkar (one-CL:ANIM-M boa constrictor). Heavenly bodies, thunder, and lightning are also considered to be living male creatures. Therefore ‘one star’ is paha-p-ri warukma (one-CL:ANIM-M star).

Nouns of the feminine gender may refer to animate or inanimate objects. People, animals, and spirits of the female sex are of the feminine gender, as well as birds, turtles, and caterpillars whose sex is not known. The numeral
one agrees with them in gender. For example, ‘one bird’ is *paha-p-ru kahi'pra* (one-CL:ANIM-F bird). Plants and other phenomenon of nature such as fire, rivers, and rainbows are also of the feminine gender but they are not considered animate. Also, almost all round, square, or concave objects and all articles made of wood or metal are feminine. But the numerals do not agree in gender with them because they are not animate. For example, ‘one tree’ is *paha-kti ah* (one-CL:FOLI tree/wood).

All other nouns, including items of other shapes, abstract ideas, and actions, are of the neuter gender. Since they are inanimate, the numeral does not agree in gender. For example, ‘one road’ is *paha-tra ahin* (one-CL:EXTENDED path), and ‘one jump’ is *paha-t watis-ka* (one-CL:ABSTR jump-NOM).

Thus, opposition of gender is partially integrated with the system of numeral classifiers. But not completely. For example, the noun *pareuni* ‘stream’ is feminine because it is a phenomenon of nature. But, since its shape is extended, the numeral has the same classifier used with the extended item, ‘path’, *ahin*, which has neuter gender. These facts indicate that in this language, for animate units it is the gender that is important and not the shape (even when speaking of a very extended boa constrictor), and for inanimate units, the shape is more important than the gender (at least when dealing with numerals).

5. Unique numerical affixes. The numerals of the Palikúr language occur with ten unique affixes which refer to mathematical concepts. These have to do with numerical order, addition, subtraction, numerical limits, multiplication, totality, and various kinds of sets. These affixes occur on numerals referring to all nouns, both tangible and intangible.

5.1. Numerical order. The first kind of inflection, that of numerical order, is found in many languages. In Palikúr the ordinal numerals, except the term for ‘first’, occur with the same classifiers as the cardinal numerals. The term ‘first’ is not a numeral but an adjective: *pitat-yoe* (in front-DUR.M/N) or *pitat-yo* (in front-DUR.F). The rest of the ordinal numerals, ‘second’, ‘third’, etc., begin with one of the seven pronominal prefixes. They usually end with either a suffix that indicates gender (on the numeral two when counting animate

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25 The neuter gender, as well as the masculine and feminine, is marked on pronouns, postpositions, and demonstratives.
units, as in example (17) or one that normally occurs on nouns and indicates a
plural and shows possession.

(17) ig pitat-ye awaig gi-kak-kis gi-pe-p-ri, gi-mapnam
‘the first man, the second, and the third’

(18) gu-mapnam ka atak
3F-three NEG go
‘The third (woman) did not go’

(19) eg kowis euk a-pe-ki-n a-kak a-mapnam-ki-n
she already bring 3N-two-CL:TIE-REL 3N-with 3N-three-CL:TIE-REL
‘She already brought the second and the third (bundles of sugar cane).

(20) ig damuh a-bet a-pe-i-ni-pi-ye mtipka
he arrive 3N-in 3N-two-CL:SER-REL-ST-DUR night
‘He arrived the second night’

When the ordinal numeral occurs in a noun phrase, the common adjectival
suffixes -pi (STATIVE) and -ye (DURATIVE) are always added. Compare
the form of the following ordinal numeral when it functions as a pronoun with
its form when it functions as a quantifier.

(21) gi-mapnam-kis auna gi-mapnam-pi-ye awaig auna
M-three-PL speak M-three-ST-DUR.M man speak
‘The third spoke’ ‘The third man spoke’

Eg piyana gukamkayh tinogben. Amapnam(piye) aawayg. (Ck out -
piy in this paper.
The terms for ordinal numerals higher than ‘sixth’ can be expressed by the
phrase: ‘one (noun) making (the numeral)’. For example:

(22) paha-i haukri keh-pi-ye nteunehker a-kak pi-na ar-auna
one-CL:SER day make-ST-DUR seven 3N-with two-CL:SER-two 3N-addition
‘one day making seven with two in addition’ (i.e. the ninth day)
5.2 Addition. The other types of numerical inflection involve only the addition of a suffix. The suffix indicating addition is the morpheme -wa ('additional').

(23) nah iki pi-t paha-a-wa arikna
    I give you-to one-CL:IRREG-ADDITIONAL thing
    ‘I will give you one more thing’

(24) ig-kis manuk paha-uhri-wa keurihgi akiu
    he-PL cross one-CL:PART-ADDITIONAL island more
    ‘They crossed over [to] one more part of the island’

5.3. Subtraction. The suffix indicating subtraction is the morpheme -e ('remainder').

(25) usekw-e pehe-k-e parak
    remain-COMPL one-CL:FLAT-REM board
    ‘There remained one board (left over)’

(26) ku nah wiuh paha-t ah ar-iuntak paxnika a-kebyi usakwa mpamm-e
    if I take one-CL:CYL wood 3N-from four 3N-units remain three-REM
    ‘If I take one of the four sticks, three will be left’

5.4. Totality. Another suffix, -te ('total'), indicates the totality of a unit or group, as in examples (27)-(30), (04), (58), and (71).

(27) pilatno bus-ip paha-twi-te
    banana spoil-ST one-CL:CLUS-TOTAL
    ‘The stalk of bananas is completely spoiled’

(28) datkar daker-e takarak paha-p-nu-te
    boa swallow-COMPL chicken one-CL:ANIM-F-TOTAL
    ‘The boa swallowed the chicken whole’

(29) ig pituk-e antiyan nteunenker-te
    he break-COMPL egg seven-TOTAL
    ‘He broke all seven eggs’

(30) nah k-annipwi-ye paha-i-te haukri
    I had-work-DUR one-CL:SER-TOTAL day
    ‘I worked one whole day’

---

This morpheme is homophonous with the morpheme -wa (EMPHASIS) which can occur on almost any word.
5.5. Numerical limits. The suffix indicating numerical limits is the morpheme -o (‘limited’) or its allomorph -wo. It is usually followed by the morpheme -wa (emphasis), as in examples (31) and (32), but sometimes is not, as in examples (62) and (63).

(31) meuka k-an-yo paha-i-wo-wa a-dahan paha-k kamu-kri
turtle lay-DUR one-CL:SER-LIM-EMPH 3N-by one-CL:FLAT sun-season
‘The turtle lays eggs only once a year’

A idea of limitation is also sometimes a mathematical concept. In the following sentence the use of the ‘limited’ morpheme indicates semantically that ‘others have more and I have less’.

(32) nah pi-ka-nm-o-wa nu-kawih-ni
I two-CL:FLAT two-LIM-EMPH 1SG-clothes-REL
‘I [have] only two outfits’

5.6. Multiplication. The suffix indicating multiplication is the morpheme -put (‘multiplied’). This morpheme occurs only on numerals that refer to ‘series’ like p-i-ma-put (two-CL:SER-two-MULT) ‘two times’. It also occurs on the interrogative word which means ‘how many times?’, aisau-put (how_many-MULT). The morpheme occurs on all the numerals referring to series, except the numeral one. (Obviously, any numeral multiplied by one remains the same.) See examples (33), (34), and (63).

(33) ig hasih paxka-put
he sneeze four-MULT
‘He sneezed four times’

(34) nah isim-e ini kamis mpama-put a-tiunih a-pit-min akiu
I buy-COMPL this cloth three-MULT 3N-price 3N-over-SUPRA more
‘I bought this cloth for a price three times as much’

The Palikûr use these numerals to count money. Using the term sah ‘hundred’ borrowed from the creole dialect of French Guiana, they count like this:

---

27 The Palikûr use the word a-pit-min (it-over-SUPRA) ‘surpassing’ to express the concept of ‘more’ and the phrase warikap a-kebyi (below 3N-units) ‘lower amount’ for the concept of ‘less’. If, for example, I have one egg and my friend has three, then he has pi-sa-ya a-pit-min ‘two surpassing’ and I have pi-sa-ya warikap a-kebyi g-iu ‘two units lower than him’. But it is more common to say that he has three and I have ‘only one’ paha-a-wo-wa (one-CL:IRREG-LIM-EMPH).
In section 3.1.2, I described numerals used to count various kinds of sets like ‘two sets (groups) of people’ which is 
\textit{pi-bohr-a hiyeg} (two-CL:GRUP-two people). There are also two numeral suffixes that specify the number of elements that make up a set, such as the number of items in a group, as in examples (36-37), a cluster (59), or a row (01) and (69b). The first affix, \textit{-me} (‘pair’), occurs only on the numeral two. For example, a dove and its mate are \textit{pi-ya-n-me ugas} (two-CL:ANIM-two-PAIR dove). The other affix occurs on any numeral. It even occurs on the numeral two, when more than one set of pairs is being numbered. This morpheme is 
\textit{-t}, or its allomorphs \textit{-at} and \textit{-it} (‘set’). For example, people sitting in a canoe with two on each seat are \textit{pi-ya-n-m-at hiyeg} (two-CL:ANIM-two-PAIR-SET people) ‘two people in a set’. If the canoe has four seats, the people are described as in example (36):

\begin{itemize}
  \item \textit{paxka-bru gi-kebyi-kis a-dahan pi-ya-n-m-at}
  \begin{itemize}
    \item four-CL:GRUP 3M-units-PL 3N-of two-CL:ANIM-two-PAIR-SET
  \end{itemize}
  \begin{itemize}
    \item ‘four sets of two each’
  \end{itemize}
\end{itemize}

\begin{itemize}
  \item \textit{ig turuh akawakti pi-muk-na-m-at}
  \begin{itemize}
    \item he pierce ring two-CL:FLATD-two-PAIR-SET
  \end{itemize}
  \begin{itemize}
    \item ‘He carved out sets of two rings [from each nut]’
  \end{itemize}
\end{itemize}

This morpheme ‘set’ also occurs on the numeral one, forming a set of only one element—a profound mathematical abstraction. When this morpheme is affixed to the numeral one, we can translate it ‘each one’ or ‘one for each’. For example:

\begin{itemize}
  \item \textit{nah iki paha-p-ri-t im}
  \begin{itemize}
    \item I give one-CL:ANIM-M-SET fish
  \end{itemize}
  \begin{itemize}
    \item ‘I gave one fish to each (person)’
  \end{itemize}
\end{itemize}

\begin{itemize}
  \item \textit{ig-kis ax paho-u-it uwas}
  \begin{itemize}
    \item he-PL eat one-CL:RND-SET orange
  \end{itemize}
  \begin{itemize}
    \item ‘They ate one orange each’
  \end{itemize}
\end{itemize}

\begin{itemize}
  \item \textit{ig euk gi-mana-kis gi-t-kis paha-p-ri-t hiyeg}
  \begin{itemize}
    \item he bring 3M-food-PL 3M-to-PL one-CL:ANIM-M-SET people
  \end{itemize}
  \begin{itemize}
    \item ‘He brought food for each one’
  \end{itemize}
\end{itemize}
5.8. Sets of simultaneous events. States and events constitute another
type of set when they are simultaneous, as in example (41). This includes an
action performed at the same time by several actors as in examples (42) and
(60), or an action received at the same time by several patients (43). The
suffix indicating simultaneous action is -nam (‘simultaneous’).

(41) ig  mpa-nam  gi-kah-ri
he three-SIM 3M-illness-REL
‘He [has] three illnesses simultaneously’

(42) ig-kis  kah  pi-ya-nam
he-PL pull two-CL:ANIM-SIM
‘They both pulled simultaneously’

(43) ig takig-e ah  pi-ta-nam
he break-COMPL wood two-CL:CYL-SIM
‘He broke the two sticks simultaneously’

When speaking of intangible units that are simultaneous, in the case of the
numeral two the morpheme -put (‘multiplied’) is always added before the
morpheme -nam, as in examples (44) and (45). This also occurs when
speaking of types of tangible items (but not the items themselves), as in
example (46).

(44) eg  pi-put-nam  gu-hiyakem-ni
she two-MULT-SIM 3F-thoughts-REL
‘She [has] two simultaneous ways of thinking’ (i.e. She is two-faced.)

(45) ig k-annu  keh  pi-put-nam  annipwï
he has-ability do two-MULT-SIM work
‘He can do two jobs simultaneously’

(46) pi-put-nam  ax-ka  ai kitere  akak  suwiye
two-MULT-SIM eat-NOM here sweet and sour
‘[There are] two kinds of food here—sweet and sour’

5.9. Sets of sequential events. We can also speak of sets of sequential
events which take place ‘one by one’ or ‘two by two’. The suffix indicating
sequential action is the morpheme -empi (‘sequential’) or its allomorphs. This
suffix occurs only on numerals functioning as adverbs, as in example (47),
(48) and (68). A similar morpheme occurs on verbs to indicate that the subject
is moving along.
### TABLE 6
Examples of The Unique Inflections Of Palikûr Numerals

<table>
<thead>
<tr>
<th>Category</th>
<th>Inflection</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Numerical</strong></td>
<td>a-pes-ru</td>
<td>‘the second (orange)’</td>
</tr>
<tr>
<td><strong>Order</strong></td>
<td>gi-pep-ri</td>
<td>‘the second (man)’</td>
</tr>
<tr>
<td><strong>Addition</strong></td>
<td>pahou-wa uwas</td>
<td>‘one more orange’</td>
</tr>
<tr>
<td></td>
<td>piyanma-wa awaig</td>
<td>‘two more men’</td>
</tr>
<tr>
<td><strong>Subtraction</strong></td>
<td>pahou-re uwas</td>
<td>‘one remaining orange’</td>
</tr>
<tr>
<td>(remainder)</td>
<td>piyanm-e awaig</td>
<td>‘two remaining men’</td>
</tr>
<tr>
<td><strong>Totality</strong></td>
<td>pahou-te uwas</td>
<td>‘a whole orange’</td>
</tr>
<tr>
<td></td>
<td>piyanma-te awaig</td>
<td>‘all two (both)’</td>
</tr>
<tr>
<td><strong>Numerical</strong></td>
<td>pahou-wo-wa uwas</td>
<td>‘only one orange’</td>
</tr>
<tr>
<td><strong>Limitation</strong></td>
<td>piyanm-o-wa awaig</td>
<td>‘only two men’</td>
</tr>
<tr>
<td><strong>Multiplication</strong></td>
<td>Uwas atiunih pima-put akiu</td>
<td>‘The price of the orange is two times as much’</td>
</tr>
<tr>
<td></td>
<td>Ig padak uwas mpama-put</td>
<td>‘He tossed the orange three times’</td>
</tr>
<tr>
<td><strong>Units in a Set</strong></td>
<td>Ig pukuh uwas pisoya-m-at.</td>
<td>‘He counted the oranges in sets of two (2, 4, 6)’</td>
</tr>
<tr>
<td></td>
<td>Igkis bat piyan-m-at hiyeg</td>
<td>‘They are sitting in groups of two’</td>
</tr>
<tr>
<td><strong>Sets of Events</strong></td>
<td>Ig pidik uwas pisoya-nam.</td>
<td>‘He squeezed the two oranges simultaneously’</td>
</tr>
<tr>
<td>(simultaneous)</td>
<td>Igkis kah piya-nam.</td>
<td>‘The two pulled simultaneously’</td>
</tr>
<tr>
<td></td>
<td>Ig pi-put-nam g-annipwi.</td>
<td>‘He [has] two jobs’</td>
</tr>
<tr>
<td><strong>Sets of Events</strong></td>
<td>Uwas tuguhe pahou-rumpi.</td>
<td>‘The oranges fell one by one’</td>
</tr>
<tr>
<td>(sequential)</td>
<td>Egkis mpiya piyan-empì.</td>
<td>‘They passed by two by two’</td>
</tr>
</tbody>
</table>
Table 6 summarizes these nine unique inflections of Palikúr numerals. The suffixes appear in boldface with the numeral one that refers to round objects, paho-u (one-CL:RND), and the numeral two that refers to animate units, pi-ya-na (two-CL:ANIM-two). In cases where a suffix does not occur on the numeral one, the numeral two that refers to round objects is used: pi-so-ya (two-CL:RND-two). When a prefix is added to form ordinal numerals, the form of the root of numeral two, pi-so-ya, changes to pe-s (two-CL:RND) and the form of the root of the numeral two, pi-ya-na, changes to pe-p (two-CL:ANIM). The suffix concerning multiplication is shown with the numeral two that refers to a series, p-i-na (two-CL:SER-two).

6. Syntactic functions of the numerals. In Palikúr the numerals function not only as quantifying adjectives but also as adverbs, pronouns, verbs and nouns. In each function they occur with the suffixes appropriate for that function. Following is a description of the numerals in each function with an explanation of their external distribution and their internal structure.

6.1. Numerals as quantifying adjectives. As adjectives, the numerals occur in quantified and demonstrative noun phrases, and in descriptive clauses. The quantified noun phrase is the most common type of noun phrase in the language, because the numeral one serves as an indefinite article. In this type of phrase the quantifier always precedes the noun. For example:

(49) euk nu-t-hu paho-u goble nops-ad kipun a-kak un
    bring 1SG-to-1EXCL one-CL:RND glass size-AUM full 3N-with water
    ‘Bring me a big glass full of water’

(50) nah hiyá pi-ya-na gi-kebyi-kis yit gu-kamkai
    I see two-CL:ANIM-two 3M-units-PL deer 3F-offspring
    ‘I see two units of a deer’s offspring’ (i. e. ‘I see two fawns’)

(47) eg-kis pes pi-ya-ŋ-empí
    she-PL leave two-CL:ANIM-two-SEQUENTIALLY
    ‘They left two by two’

(48) ig kanum gi-u paha-i-impi
    he call 3M-name one-CL:SER-SEQUENTIALLY
    ‘He said his name one by one’
    (i. e. He spelled his name letter by letter.)
In general, the adjective precedes the noun, as can be seen in example (51) but when a quantifier or demonstrative occurs in a noun phrase, the other adjectives always follow the noun, as in (52).

(51) *ig ayá bareu-yo tino*

he.request pretty-DUR.F woman

‘He demanded a pretty woman’

(52) *ig-kis uté paha-p-ru tino bareu-yo*

he-PL find one-CL:ANIM-F woman pretty-DUR.F

‘They found one pretty woman’ (or ‘They found a pretty woman’)

When they function as adjectives, the numerals may be inflected with most of the numeral suffixes, that is, those referring to numerical order, addition, subtraction, totality, numerical limits, multiplication, and various kinds of sets, as was exemplified in Table 6. The numerals may also be inflected with affixes that occur in other parts of the language, such as *-pa* or *-ap* (‘vast’ which indicates a wide range of space or time), as in (53), *-ne* or *-n* (‘continuous’) (54) and (55), which signifies a continuous state or action,*-ad* (‘augmentative’) (54), *-ma* (‘negation’) (55), and many others.

(53) *paha-k-ap waxri ainte a-napi waik*

one-CL:FLAT-VAST land there 3N-under ground

‘[There is] a vast world under the ground’

(54) *ahegbet-ha-na-ba-i paxka-bu-n-ad yar-ad*

ready-VRB-POLITE-IMP-PL four-CL:FLAT-CONT-AUG fence-AUG

‘Prepare four big fences’

(55) *yuma paha-mku-ne-ma umuh*

none one-CL:FLATD-CONT-NEG canoe

‘not one canoe’

In demonstrative noun phrases, the numeral follows the noun, almost always bearing the suffix *-nene* or *nano* (‘continuous durative’) (56) and (57), but sometimes with *-kis* (‘plural’) (58).

(56) *ner-as bakim-nai mpana-nene gi-kehyi-kis*

that.M-PL child-PL three-CONT.DUR.M 3M-units-PL

‘those children being three’ (i.e. ‘those three children’)

(57) *no-ne-wa pi-sam-ru paha-p-ru-wat-nano*

that.F-SAME-EMPH your-sibling.F one-CL:ANIM-F-EMPH-CONT.DUR.F

‘that only younger-sister of yours’
In descriptive clauses, the numeral follows the noun, as in examples (59) and (60) although often the subject is repeated after it, as in example (61). It is sometimes inflected with the morpheme -ye (‘durative.M’) which occurs only on adjectives, as in example (62).

(59) **ig-kis pi-tiu-na-m-at**

he-PL two-CL:CLUS-two-PAIR-SET

‘They (the hunters) [were] in groups of two’

(i.e. two in one canoe and two in the other, the preferred way to hunt)

(60) **ig-kis mpan-nam gi-tiput**

he-PL three-SIM 3M-against

‘They [were] three attacking him simultaneously’

(61) **gi-sam-ri paha-p-o ig**

3M-sibling-M one-CL:ANIM-LIM he

‘His younger brother [is] alone’

(62) **ig ner kaibune ig paha-i-wot-ne-ye**

he that snake he one-CL:SER-LIM-CONT-DUR.M

‘That snake [is a] ‘one time only’ [kind]’ (i.e. poisonous)

6.2. **Numerals as adverbs.** As adverbs, numerals generally occur after the direct object of transitive verbs, as in example (63) or following the intransitive verb as in (33).

(63) **ig biuh-e gi-kamkaih p-i-ma-put a-kak ah**

he hit-COMPL 3M-child two-CL:SER-two-MULT 3N-with stick

‘He hit his son two times with a stick’

When numerals function as adverbs, they may be inflected with many of the same numeral suffixes that quantifying numerals do, that is, those referring to totality, numerical limits, multiple action and simultaneous events. In addition, they can occur with the suffix referring to sequential events, as in (68).

These numerals may also be inflected with many morphemes that occur in other parts of the language, such as -pa or -ap (‘vast’) (64), -min (‘beyond’) 28

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28 In noun phrases, -ye does not occur on numerals, unless they are on ordinal numerals.
(65) and (66), -ne (‘continuous’) (65) and (66), -pu (‘plural’) (67), and repetition of the first syllable, which indicates repeated action (68).

(64) was mutuh-ka paha-ik-ap
   field plant-PASS one-CL:HIGH/BROAD-VAST
   ‘The field is planted all over the vast breadth of it’

(65) paha-i-min-ne ig danuh-pa wo-t-hu
   one-CL:SER-SUPRA-CONT he arrive-VAST 1PL-to-1EXCL
   ‘From time to time he visits us’

(66) nah hiyá paha-p-ri hiyeg pi-ya-na-min
   I see one-CL:ANIM-M person two-CL:ANIM-two-SUPRA
   ‘I see a person doubled’ (double vision)

(67) usuh ai pi-ya-nma-pu
   we.EXCL here two-CL:ANIM-two-PL
   ‘We both [are] here together’

(68) eg pak-no apat pa-paha-i-mpi
   she sing-CONT.F song REPETITION-one-CL:SER-SEQ
   ‘She was singing songs one after the other’

6.3. Numerals as pronouns. A numeral often takes the place of a noun because, since the numeral shows the class of the noun, it is not difficult to know what the noun is. Consider the following monologue about pilatno ‘bananas’:

(69a) nah kadahan paha-kti pilatno
   I have one-CL:FOLI banana
   ‘I have one banana (plant)’

(69b) eg pi-ka-t-na-ma-t gu-hinani-u
   she two-CL:FOLI-two-PAIR-SET 3F-side-by
   ‘It [has] two (sprouts) beside it’

(69c) nah kwis matis-e paha-twi
   I already pick-COMPL one-CL:CLUS
   ‘I already picked one (stalk)’

(69d) ba pis muwaka ax paha-t? INTERROG you want eat one-CL:CYL
   ‘Do you want to eat one (banana)?’
(69e) **akah. nah iki pi-t paha-bru**

Here. I give you one-CL GRUP

‘Here. I’ll give you one (bunch)’

When serving as a pronoun, the numerals may be inflected with any of the numerical affixes (70), as well as the plural -**kis**, as in Table 7, and the negative -**ma**, as in (71).

(70) **Mahi gu-paxnika-n ka-kahri-ye**

Maria 3F-four-REL having-sickness-DUR.M

‘Mary’s fourth [child] is sick’

(71) **ig-kis ka umah pi-ya-n ma-te-ma**

he-PL NEG kill two-CL:ANIM-two-PAIR-TOTAL-NEG

‘They did not kill them both’

Numerals functioning as pronouns also occur with a suffix that often occurs on pronouns and, at times, on demonstratives and nouns. It is the morpheme -**me** (‘contrast’). This suffix is used to contrast two participants or events. For example:

(72) **mpana gi-kebyi-kis atak pi-ya-na me ka atak**

three 3M-units-PL go two-CL:ANIM-two-CONTRAST NEG go

‘Three are going; two, however, are not’

6.4. **Numerals as verbs.** Verbs are sometimes derived from numerals by the addition of the morpheme -**h** (‘verbalizer’). Examples (73) to (77) of verbs based on numerals exhibit the common verbal suffixes -**wa** (‘reflexive’) and -**e** (‘completive action’).

(73) **ig paha-p-ri-h-w-e**

he one-CL:ANIM-M -VRB-REFLX-COMPL

‘He one-ed himself’ (i.e. he withdrew, isolated himself)

(74) **eg-kis pi-ye-n-me-h-w-e**

she-PL two-CL:ANIM-two-PAIR-VRB-REFLX-COMPL

‘They two-ed themselves’ (i.e. they married)

(75) **ig kwis pahe-tre-h-e gihiyakem-ni**

he already one-CL:EXTEN-VRB-COMPL 3M-thoughts-REL

‘He already one-ed his mind’ (i.e. he decided, lined up his thoughts)
(76) \textit{eg-kis paha-dru-h-wa} \textit{ater}  
\textit{she-PL one-CL: GRUP-VRB-REFLX there}  
‘They one-ed themselves there’ (i.e. they met together)

(77) \textit{ig paha-dru-h} \textit{g-eukan-bet}  
\textit{he one-CL:GRUP-VRB 3M-belonging: MULTIPLE PARTS}  
‘He one-ed his belongings’ (i.e. he gathered them together)

\textbf{6.5. Numerals as nouns.} A few nouns are also derived from numerals by the addition of the suffix \textit{-ka} or \textit{-ki} (‘nominalizer’), as seen in (78) to (80).

(78) \textit{ig-kis keh paha-tra-min-ka} \textit{a-dahan parek-wiye}  
\textit{he-PL make one-CL:EXTEN-SUPRA-NOM 3N-for enter-IC}  
‘They formed a line in order to enter’

(79) \textit{ig-kis paha-dru-pu} \textit{aire a-bet paha-dru-h-ka}  
\textit{he-PL one-CL:GRUP-PL there 3N-in one-CL:GRUP-VRB-NOM}  
‘They [are] one-ed together over at the [chief’s] meeting’

(80) \textit{ig paha-p-ri ar-ait-tak ini paha-dru-h-wa-ki}  
\textit{he one-CL:ANIM 3N-part of-from this one-CL:GRUP-VRB-REFLX-NOM}  
‘He is a member of this [hunting] group’

\textbf{7. Relative order of the numeral affixes.} As has been seen, the basic stem of a Palikùr numeral is composed of a root plus a classifier. On the numeral one used with animate entities, a suffix is obligatorily added to the stem which indicates the gender of the entity. Other affixes are often added. The next in order are those unique to numerals which express mathematical concepts. Following these are modifying affixes that occur on other parts of speech as well and modify the noun or verb to which the numeral refers. No more than three modifiers occur on a numeral at one time. The order of the various affixes is illustrated in Table 7.

\begin{table}[h]
\centering
\caption{Relative Order Of The Numeral Affixes}
\begin{tabular}{lllll}
\hline
\textbf{ROOT} & \textbf{CLASS} & \textbf{GENDER} & \textbf{PAIR} & \textbf{MATH} & \textbf{MODIFIERS} \\
\hline
\textit{paha} & \textit{-p} & \textit{-ri} & \textit{-wa} & \textit{-ad} &  \\
\textit{one} & \textit{-CL:ANIM} & \textit{-M} & \textit{-ADD} & \textit{-AUM} &  \\
\end{tabular}
\end{table}

‘one more big male’
8. Conclusion. It is fitting that the Palikúr word *pukuh* ‘to count’ also means ‘to understand’. The study of the numerical system of the Palikúr language not only reveals how the people count but also how well they understand basic mathematical concepts. Many arithmetical relationships are expressed in the morphology of the numerical terms and thus are easier to perceive. The affixation of the numerals confirms linguistically that cultures outside of our own have many mathematical concepts similar to ours. It makes it clear that even in an illiterate society, where written numerical symbols were never thought of, systematic mathematical concepts may be well-developed. Obviously the people of this so-called ‘primitive’ culture are able to think both abstractly and analytically!

In the numerical system of this language, we can observe 1) the basic organization of all classifiers into units, sets, and fractions, 2) the idea of series, 3) well-defined geometrical categories based on four dimensions instead of three, with sub-categories established on the concept of -min ‘something more’, 4) unique numerical inflections that express basic arithmetical concepts like that of numerical order, addition, subtraction, multiplication, more and less, wholes and parts, and 5) extensive reference to various kinds of sets. This raises the question: could the study of mathematical
terms in indigenous languages lead to the discovery of some small but vital concept that would contribute to the science of mathematics in general?

Another question is whether mathematics will influence the way linguists categorize numerical classifiers. Much analysis and description of linguistic structure and semantics has already fruitfully been done along the lines of mathematical relationships. The Palikûr terms reaffirm the existence of an intricate relationship between language and mathematics, especially when it concerns numerals. The ease and precision with which the numeral classifiers can be categorized according to units, sets, and fractions suggests that this kind of ‘mathematical’ categorization may provide a useful framework for the description of classifiers in other languages as well. The discovery of the elegant arrangement of the geometrical classes was made possible only by considering the native speakers’ own descriptions of the forms they are based on. It indicates the importance of studying the indigenous terms for these classes. It also demonstrates the necessity of describing classes according to their primary and secondary dimensions, keeping in mind the possibility of the existence of a fourth dimension of ‘perimeter’.

The morphological structure of the Palikûr numerals supports the morphosyntactic typology of noun classification systems and classifiers proposed by Derbyshire and Payne (1990). It is apparent that nominal agreement systems (such as gender), modifying affixes (such as those indicating size or plurality), and affixes referring to mathematical concepts (such as addition, remainders, limitation, and totality) are not classifiers and should be treated separately. The numerical terms of Palikûr furnish a rare example of all these types of morphemes on the numerals of a single language.

I hope to address the semantic typology of the numeral classifiers in more detail in a future article that will compare the numeral classifiers of Palikûr with the verbal and intra-locative classifiers, as well as the concordial noun classification system and the demonstrative referents. The combination of so many systems of classifiers in one language, all with different markers and different semantic classes, is quite unusual and may be unique. It calls for further in-depth research and a separate report.
REFERENCES


