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Mochica: Grammatical topics and external relations

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Citation
Eloranta-Barrera Virhuez, R. S. (2020, May 12). *Mochica: Grammatical topics and external relations*. *LOT dissertation series*. LOT, Utrecht. Retrieved from https://hdl.handle.net/1887/87645

Version:	Publisher's Version
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Downloaded from:	https://hdl.handle.net/1887/87645

Note: To cite this publication please use the final published version (if applicable).

Cover Page

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Title: Mochica : grammatical topics and external relations
Issue Date: 2020-05-12

Chapter 8. The Mochica numeral classification system

The presence of numeral classifiers is unusual among Andean languages, but they are common among Amazonian languages. Among the so-called Andean languages, this feature is present on the eastern slopes in the extinct languages Cholón and Hibito. Mochica also presents numeral classifiers. Mochica has a peculiar numeral classifier system that has been previously analyzed by Middendorf (1892: 129-131), Torero (2002: 346-347), Hovdhaugen (2004: 26), Adelaar ([2004] 2007a: 342-343), and Salas (2008, 2011b, 2012b: 154-176). Interestingly, Mochica classifiers do not behave like the ones found in Amazonian languages. This chapter offers a reexamination of the Mochica numeral classifier system that intends to explain that it cannot be understood as a numeral classifier system *stricto sensu*, but rather as a numeral classifier system in transition towards a specific counting system.

8.1. Bender & Beller's account of numeral classification systems

In order to clarify the proposal that the Mochica numeral classification system is a system in transition from a numeral classifier system towards a specific counting system, it is relevant to present the cases of the languages studied by Bender & Beller (2005, 2006a, 2006b, 2007a, 2007b, 2011).

Among Micronesian languages, Bender & Beller (2007b: 824) identify at least four types of counting systems, namely 1) involving standard classifiers, 2) quantifiers, 3) power[134] classifiers and 4) classifiers that adopt both classifying and multiplying functions. Concerning standard classifiers, these authors explain that they simply classify the objects of reference while quantifiers introduce a new counting unit such as bunch or group.

[134] The term power classifier was suggested first by Benton (1968), who saw that power terms could be considered as a particular type of numeral classifiers.

Chuukese, for example, presents a hundred and one "real" classifiers and also has quantifiers which imply a category that comprises enumerable or measurable quanta. In Chuukese, quantifiers typically refer to portions of food and to other units of counting and measuring. Most of these units of counting and measuring are numerically imprecise, but five of them imply a specific value: *yáf*, for example, refers to ten coconuts (Bender & Beller 2007b: 823). Power classifiers do not classify, but multiply, indicating a precise value that acts like a factor for the numeral it is adjoined to. Power classifiers, present in Micronesian languages, replace other classifiers and "indicate the new counting unit independently of the object concerned" (Bender & Beller 2007b: 824). They are "classifiers with a fixed numerical value" (Bender & Beller 2006a: 388). Woleaian exhibits power classifiers (*-ig, -biugiuw*) in counting animates *se-ig* 'one-ten' '10'; *se-ig me riuwe-mal* 'one-ten and two animate' '12'; *riuwe-ig* 'two ten' '20'; *se-biugiuw* 'one hundred' '100' (Bender and Beller 2011: 585). In this very specific case *–ig* 'ten' and *–biugiuw* 'hundred' determine the counting unit.

There exists also a kind of classifier that adopts both a classifying and a multiplying function. These classifiers provide a precise value and are restricted to certain objects indicating, for example, "tens of coconuts". This type of classifier can be exemplified with the case of Tongan. The Tongan general number system is founded on base ten (Bender & Beller 2007a: 213), but several objects are counted using diverging systems with at least partly specific terms for certain numbers. Among these objects are pieces of sugar cane thatch (*au*), coconuts (*niu*), pieces of yam for planting (*konga ʻufi* or *pulopula*), whole yam (*ʻufi*), and fish (*ika*).

The counting of these objects follows specific patterns that share one feature: counting proceeds in pairs and scores. For all objects, the pair is the smallest

unit: *nga'ahoa* for sugar cane thatch, yam and fish, and *taua'i* for coconuts. Counting of sugar cane thatch proceeds in tens of pairs (*tetula*), hundreds and thousands of pairs while coconuts, yam and fish from 20 onwards are counted in scores. The term for one score for coconuts is *tekau*, occasionally also for yam (Bender & Beller 2007a: 219).

After inspecting the role of numeral classifiers for specific counting systems in Polynesian and Micronesian languages and attempting to trace the origin of specific counting systems in those languages (2006a: 399-401; 2006b: 41-42), Bender & Beller come to the conclusion that a number system can be extended in two dimensions: classifiers can be added "in breadth" in order to differentiate ways of counting for different objects, and classifiers can also be added "in length" that is, at the end of a power series in order to extend the counting range (2006a: 397).

For instance, in Tongan, several objects were counted using diverging systems with at least partly specific terms for certain numbers. These objects are natural products used for subsistence: pieces of sugar cane thatch, pieces of yam for planting, whole yam, fish, coconuts, and one type of pandanus leaves (Bender and Beller 2005: 216). Coconuts, yam and fish from twenty onwards are counted in scores. The term for 'one score' depends on the counted object. For the counting of coconuts and yam, a further term refers to "tens of scores" (*tefua* for coconuts and *tefulu* for yam). The first extension results in a large number of classifiers, and high numerals are the result of the second extension. The combination of the two extensions offers a third variant which constitutes a specific counting system that makes possible an acceleration of counting.[135]

[135] Whereas in Bender & Beller (2006a: 399-401; 2006b: 41-42) only two variants of extensions are mentioned, in Bender & Beller (2011: 588) the authors speak of a third variant of extension: *density*. Other than just mentioning that it is a third variant of

As stated by Bender & Beller (2007b: 821), specific counting systems are characterized by a combination of two features: their bases are larger counting units (multiplication function) and they apply to certain objects only (object specificity).

Bender & Beller (2006b; 2006a; 2007a: 825) propose that the reason for applying specific counting systems in Polynesian and Micronesian languages was to extend the original number system to large numbers and resulted from cultural adaptations. Another important remark by Bender & Beller (2006b: 42) needs to be mentioned: it seems that evidence of the surveyed Polynesian and Micronesian languages suggests that the appearance of specific counting systems would have developed for a reason. However, since this is impossible to confirm, the option of the development from a numeral classifier system is plausible as well.

8.2. Analysis of the Mochica numeral classification system

8.2.1. General description

Mochica has a decimal system with two forms of numerals, namely the free forms that are used to enumerate and calculate, as in abstract counting, and a set of bound forms that are used in combination with numeral classifiers. See Table 23.

extension, the idea remains the same: it gives rise to a specific counting system that enables acceleration of counting.

Table 23. Free and bound numerals in Mochica

	Ten-based numerals Carrera (1644: 181)	**Bound forms Carrera (1644: 185)**
'one'	<o**n**æc>	<**n**a>
'two'	<at**p**ut>	<**p**ac>
'three'	<**ço**pæt>	<çoc>
'four'	<**no**pæt>	<**no**c>
'five'	<exllmætzh>	-
'six'	<tzhaxlltzha>	-
'seven'	<ñite>	-
'eight'	<langæss>	-
'nine'	<tap>	-
'ten'	<çiæcu̧>	-

The following examples show the use of these free (242) and bound forms (243):

(242) <onæc ñaiñ> (Carrera 1644: 103)

onæc ñaiñ

one hen

'one hen'

(243) <çoc pong cu̧elû> (Carrera 1644: 186)

çoc	pong	cu̧elû
three.BOUND	NUM.CLF.ten	hawk

'thirty hawks'

In relation to the numerals, first, one has to consider the possibility for fossilized numeral classifiers which can be discovered in the free form numerals of Mochica. The Mochica numeral <onæc> 'one' may have been a lexicalized item <-Vc> (segmentable as <on-æc>). Taking into account the

following other numerals <a(t)put> '2', <çopæt> '3' and <nopæt> '4', one discovers another potential ending <-pæt>.[136] The word for 'tree' in Mochica is <nepæt>, which is a plausible etymology of this potential classifier. These numerals '1' to '4' are free forms — in contrast to their coexisting Mochica bound forms that are attached to numeral classifiers. As stated above, these free forms are used for citing or reckoning.

In languages that have classifiers it is common to find numerals recorded with extra morphology (for an example from Hibito and Cholón, see Eloranta (2017)). One piece of evidence for this conclusion is that, cross-linguistically, general classifiers tend to be attached to the citation form of numerals, probably because speakers tend not to count in abstract terms, but rather conceptualizing numbers as reckoned items or objects. Therefore, one can suggest that the elements <-æc> and <-pæt> were likely a nominal element such as a noun classifier or a lost numeral classifier that remains fossilized in the numerals[137].

Mochica has a set of attested morphemes, called "ways of counting" by Carrera (1644: 181-188), that are used to count in pairs, <luc> and <felæp>; in tens, <pong>, <ssop>, <cɥo(quixll)> and <cæss>; in hundreds, <palæc> and <chiæng>; in thousands, <cunô>; and two mensural classifiers <col> and <ñofæn>. Classifier <xa>[138] is used for counting times. Table 24 presents all

[136] The variation of <u>, <æ> and <i> is very common in the Mochica colonial representations.

[137] Numeral classifiers occur in numerical or quantifying expressions and noun classifiers occur independently of other modifiers in a noun phrase (Aikhenvald 2000: 90).

[138] Hovdhaugen (2004: 26) considers <xa> an ordinal and a frequentative suffix. Salas (2011b) calls this element both quantifier and operator.

numeral classifiers, including the nominal class classified, the gloss and an example from Carrera (1644).

Table 24. Mochica numeral classifiers

classifier	Nominal class according to Carrera (1644)	gloss	example (Carrera 1644)
<pong>	to count men, horses, goats, canes and everything else that is not money or fruits	NUM.CLF: ten, animates, animal, human, erect object (trees, canes)	na pong cabra[139] na-pong-cabra one-NUM.CLF: ten animal-cabra 'ten goats'
<ssop>	to count money, coins and days	NUM.CLF: ten, money, coins, units of time, days	na ssop xllal na-ssop-xllal one-NUM.CLF: ten money-silver 'ten reales' (Spanish silver coins)
<cɥo>	to count fruits, corn ears and other things in groups of ten	NUM.CLF: ten, fruits, corn ears, other things	na cɥo quixll na-cɥo -quixll one-NUM.CLF: ten-fruit 'ten [corn ears]'
<cæss>	ten days	NUM.CLF: ten, days	na cæss na-cæss one-NUMCLF: ten-day 'ten days'

[139] Hispanicism for 'goat'.

classifier	Nominal class according to Carrera (1644)	gloss	example (Carrera 1644)
<palæc[140]>	hundred	NUM.CLF: hundred	na palæc na-palæc one-NUM.CLF: 'hundred, 100'
<chiæng>	to say hundred and count fruits, etc	NUM.CLF: hundred, fruits	na chæng [sic] na-chiæng one-NUM.CLF: hundred-fruit 'hundred (fruits)'
<cunô[141]>	1000	NUM.CLF: thousand	na cunô na-cunô one-NUM.CLF: thousand 'thousand, 1000'
<luc>	pair of plates, or food *mates*[142], pair of *pepinos*[143] and other things like fruit	NUM.CLF: pairs of fruits, plates, not so deep container for (solid?) food	naluc na-luc one- NUM.CLF: pair 'one pair'

[140] Cerrón-Palomino (personal communication, January 14, 2020) suggests that <palæc> originated in the Quechuan term *pachaq* for '100'.

[141] Cerrón-Palomino (personal communication, January 14, 2020) suggests that <cunô> originated in the Quechuan term *huno* for '1000000', the highest number used in Quechua.

[142] A *mate* is a gourd container resembling a plate, see Figure 10.

[143] *Pepino* is known in English as "sweeet pepino". It denotes the *Solanum muricatum* which is a round-shaped juicy fruit.

classifier	Nominal class according to Carrera (1644)	gloss	example (Carrera 1644)
<felæp>	pair of *potos*[144], birds	NUM.CLF: deep concave container, (for liquids?)	nafelæp na-felæp one-NUM.CLF: pair 'one pair'
<col>	horse	NUM.CLF: measurement unit, quantity, load, measure of uncountable objects of a possible solid consistency	na col mang na-col-mang one- NUM.CLF: load that a horse can carry -corn 'one horse of corn'
<ñofæñ>	*estado*[145]	NUM.CLF: measure unit, quantity, to measure uncountable objects of possible liquid consistency	pac ñofæñ là pac-ñofæñ-là two- NUM.CLF: measure-water 'two *estados* of water'
<xa> <xia>	time	NUM.CLF: to count times	pac xia ixll aio pac-xia-ixll-aio two-NUM.CLF: time-sin-DET 'two times (that) sin'

Source: Carrera (1644: 181-188)

After presenting all the Mochica numeral classifiers in Table 24, my intention is to explain, in 8.3.1.; 8.3.2.; 8.3.3.; 8.3.4. and 8.3.5. how these classifiers can be grouped according to their behavior.

[144] *Poto*, from Quechuan *putu* 'vessel' is a common use Peruvianism denoting a vessel often used to drink an alcoholic beverage called *chicha*.

[145] An *estado* was a longitudinal measure equivalent to two *varas*.

8.3. Mochica numeral classifiers

8.3.1. Counting in pairs

Mochica has two pair-counting[146] classifiers, namely <felæp> to count birds and *potos* or drinking vessels (see Figure 11), and <luc> for plates or *mates* of food, *pepino*s and fruits or crops (see Figure 12). The difference between the containers counted by these two pair classifiers relies on their depth and the consistence of their contents (Eloranta 2012): a *poto* can contain liquids, while a *mate* can contain dry food. The origin of these two classifiers can be traced back to a verbal —and not a nominal— root, namely the positional verbs 'to sit' <fel-> and 'to stand' <loc->, reflecting somehow the state of the objects being held in the vessels. The bound numeral is prefixed to the pair classifier in question: *na-felæp* or *na-luc* 'one pair'.

[146] Some Micronesian languages such as Kiribati, Marshallese or Puluwatese appear to have systems of pair counting (Bender & Beller 2006b: 391). Fish, breadfruit and coconuts may be counted in pairs in Puluwatese (Elbert 1974: 111, cited in Bender & Beller 2006b: 391). See Pache (2018: 275) for a reference to other South American languages with possible systems of pair counting.

Figure 11. *Poto* vessel, deep (Photo by Rita Eloranta)

Figure 12. *Mate* plate (Photo by Rita Eloranta)

Figure 13. Comparison of the shape and depth between a *poto* and a *mate* (Photo by Rita Eloranta)

Figures 11, 12 and 13 visually highlight the perceptual and functional difference between the two containers: a *poto* is deeper with higher sides, suitable for containing liquids, while a *mate* is shallower with shorter sides, better suited for holding solids. In relation to <luc>, Salas (2012b: 158) suggests an etymology in *loc* 'foot', but such an analysis does not fit with the postural/stative dichotomy that a sit/stand etymology does. Even though such a way of pair counting existed in Mochica, not all objects were counted in pairs. Example (244) clearly demonstrates it. The free form is used and not the bound form as in the pair classifier examples above.

(244) aput mellu (Middendorf 1892:188)

aput mellu

two egg

'two eggs'

8.3.2. Counting in tens

The attested classifiers for tens are <pong>, <ssop>, <cɥo(quixll)> and <cæss>. The classifier for ten <pong> has a clear nominal etymology in the Mochica word <pong> 'stone'. Mochica <pong> means mainly 'stone' or 'rock' but it also referred to ancestors and adoration or cult-places[147] (Calancha 1639: 535). According to Carrera (1644: 183), <pong> is used to count people, horses, goats, canes and everything else which is not coins or fruits. The classifier for tens <ssop> finds its etymology in the word <ssop> 'rope, cord' (Middendorf 1892: 68), and is used to count coins and days (Carrera 1644: 183). According to attested examples in the religious texts included in the grammatical description of Carrera (1644), this classifier is also used to count abstract concepts from the Catholic tradition such as commandments, sacraments, words, etc. See example (245):

(245)

<Nassoplecɥof mo Diosissap> (Carrera, 1644: 164)

Na-	ssop	lecɥ-	o-	f	mo	Dios-	i
one.BOUND-	NUM.CLF.ten	main	-REL1-	COP	DET.PROX	God-	OBL

ssap

word

'Ten are (these) God's commandments.'

The form <cɥoquixll> has so far been considered a classifier (Adelaar [2004] 2007a: 343; Hovdhaugen 2004: 26; Salas 2012b: 170) to count tens of fruits,

[147] "Adoraron tanbien los Pacas mayos i Yungas a unas piedras a quien asta oy llaman Alecpong, que quiere decir, deidad en piedra…"

ears of corn and other things (Carrera 1644: 186). Nevertheless, by inspecting the examples of the grammar (Carrera 1644: 186), the attested form appears to be only <cɥo> like in (246):

(246) <na cɥo quixll> (Carrera 1644: 186)

na-	cɥo	quixll
one.BOUND-	ten	fruit

'ten fruits'

The classifier for tens <cæss> seems to be a fixed expression meaning 'ten days'. In the attested example (Carrera 1644: 186), it shows only that it serves to count days in groups of tens. The classifiers to count in tens can be analyzed as a subsystem, where <pong> can probably be a sort of general classifier which serves to count specific items and "everything else which is not coins or fruits" (Carrera 1644: 183). Coins are counted by means of <ssop> and fruits by means of the classifier <cɥo>. This way one can assume that there is an existing dichotomy of complementary distribution between <ssop> and <cɥo>.

8.3.3. Counting in hundreds and thousand(s)

Besides the system of classifiers to count in tens, Mochica also presents classifiers that are used to count in hundreds. The terms for counting hundreds of items are: <palæc> (Carrera 1644: 184) and <chiæng> (Carrera 1644: 186). Regarding <palæc> there is no mention of the items that can be counted by means of this classifier, but the other form attested to count in hundreds <chiæng> is recorded with the information about the items that can be counted: fruits. It seems plausible that these two classifiers could have been

part of a subsystem, as well, where there would be complementary distribution also observable in the dichotomy shown between classifiers for counting tens.

No single Mochica scholar considers <cunô> as a classifier for counting thousands. There is no mention of items counted with <cunô>. Presumably there was another term to count thousands, thus counting all items that could not be counted with <cunô>. This would be consistent with a pattern of complementary distribution dichotomy observed in the subsystems of the classifiers for tens and hundreds. It can be argued that <cunô> is not a numeral classifier and that assuming so is speculative, but the evidence recorded in Carrera's grammar shows this item presented in combination with the bound form of the numeral prefixed to it. This corresponds perfectly to the way numeral classifiers are treated. I propose that <cunô> shall be considered a numeral classifier for counting thousands. See example (247).

(247) na cunô (Carrera 1644: 186)

na-	cunô
one.BOUND	thousand
'one thousand	1000'

8.3.4. Counting times

The term <xa> is not registered as "ways of counting" by Carrera (1644), which means that it is not obvious that we are facing another case of a numeral classifier. Salas (2011b) names this lexeme "operator" or "quantifier" and does not include it in his list of Mochica numeral classifiers nor does any other Mochica researcher. Salas (2011b) clarifies the panorama in relation to this lexeme, identifying its variants <xa> and <xia> contrasting his analysis against Hovdhaugen's assumption (Hovdhaugen 2004: 26) that considers

these two forms two different suffixes: <xa> an ordinal suffix and <xia> a frequentative suffix.

In what follows, I will try to justify why <xa> can be seen as a numeral classifier. First, by examining example (248) we can observe that <xa> / <xia> is used in combination with <pac> 'two' (bound form numeral). We can see that the structure in (248) corresponds perfectly to a numeral classifier phrase. Classifier <xa> / <xia> is present in contexts for counting times and in the interrogative phrases for asking 'how many?'.

(248) <pac xia ixll aio> (Carrera 1644: 237)

pac	xia	ixll	aio
two.BOUND	time	sin	DET.DIST

'two times (that) sin', 'sinned the same sin twice'

A numeral classifier phrase is not the only instance where a numeral classifier can appear. A numeral classifier also appears in interrogative quantifier phrases where 'how many' is a quantifier. Akatek (Mayan) offers an example of 'how many' in combination with a numeral classifier.

(249) jay-k'on-ne no'no' yuul konob (Zavala 2000: 118)

jay-	k'on-	ne	no'	no'	yuul	konob
how.many-	NUM.CLF-	only	NUM.CLF:	animal	in	town

'How many animals are there in town?'

Tzotzil (250) provides a similar example[148]:

[148] Thanks to Igor Vinogradov for the illustrating examples of Tzotzil (Vinogradov, personal communication, January 27, 2018).

(250) jayvo' yol ta sk'an

jay=	vo'	y-	ol	ta
how.many=	CLF:person	3SG.POSS-	child	IPFV

s-	k'an
3SG.ERG-	want

'How many children does [she] want?'

One Mochica attested example showing an interrogative quantifier phrase where 'how many' is present can be observed in (251).

(251) <Æf xiass?> (Carrera 1644: 167)

Æf-	xia-	ss
how.many-	NUM.CLF-	REL

'How many times?'

8.3.5. Mensural classifiers

According to the present analysis, mensural classifiers are also attested in Mochica (Carrera 1644: 186). Mensural classifiers "*create* a unit of measure" (Nomoto 2013: 8; Dalrymple & Mofu 2012: 253). In classifier languages (as in non-classifier languages, as well), numerals cannot directly modify mass nouns like 'water' or 'air' (Nomoto 2013: 8). A mensural classifier "acts as a massifier, **individuating** portions of the denotation of the noun" (emphasis in original) (Dalrymple & Mofu 2012: 253).

The Mochica mensural classifiers[149] attested are <ñofæn> meaning 'man' and <col> translated as 'horse' but meaning 'llama'. The term <ñofæn> is

[149] Salas (2008: 149) refers to these items as quantifiers.

translated as *'estado'* (Carrera 1644: 186). One *'estado'* or *'state'* corresponds to the height of a man, about seven feet, and was used previously to measure depth and height. The term <col> (Carrera 1644: 186) refers to the amount of load a llama can carry. In the example provided in Carrera (1644) the load consists of maize. Once again, one can establish a liquid/solid opposition as the defining semantic property for classifying objects to be categorized/measured as seen in the case of the pair counting classifiers <felæp> and <luc> in 8.3.1.

8.4. Conclusions: Between a numeral classifier and a special counting system

As we have seen, specific counting systems are characterized by a combination of two features. Their basis are larger counting units (multiplication function) and they apply to certain objects only (object specificity) (Bender & Beller 2007b: 821). The Mochica system includes some morphemes that cannot be seen as typical numeral classifiers. They share some features comparable to those in the languages studied by Bender & Beller (2005, 2006a, 2006b, 2007a, 2007b).

The Mochica classifiers used to count tens, hundreds and thousands clearly exhibit the multiplication feature. Because of this feature, they could either be understood as "power classifiers"[150] or as classifiers belonging to a specific counting system. Nevertheless, as seen before, the function of object specificity is essential to define a specific counting system classifier.

In spite of the fact that Mochica classifiers share some features comparable to the ones present in the languages studied by Bender & Beller (2006a, 2006b,

[150] As we have observed, power classifiers do not classify, they multiply, indicating a precise value that acts as a factor to the numeral adjointed to.

2007a, 2007b), they retain their very own peculiar characteristics and this is the main reason why, according to the present analysis, the Mochica system can be considered neither a numeral classifier system in a strict sense nor a specific counting system.

Mochica numeral classifiers for pairs also appear to be adjustable to a specific counting system similar to the ones present in Austronesian languages. Nevertheless, the object specificity in the Mochica system is not fully one object-specific; the units classify and group sets of objects the way a numeral classifier in a strict sense would do.

Evidence from the surveyed Polynesian and Micronesian languages (Bender & Beller 2006a, 2006b, 2007a, 2007b) does not only support the hypothesis that the emergence of specific counting systems would have been developed on purpose, but it seems equally plausible that it developed from a numeral classifier system. Following this, and because one cannot fully consider the Mochica system as a specific counting system, my suggestion is that the Mochica system attested in the grammar of 1644 might be at a transition phase, from a semantic properties-based numeral classifier system to a system that enables more efficient counting i.e. a specific counting system. This way based on the analysis by Bender & Beller (2006a, 2006b), one can attempt to clarify the possible path of grammaticalization the Mochica system could have undergone.

Moreover, according to Bender & Beller (2005, 2006a, 2006b, 2007a, 2007b, 2017), socio-economical reasons motivate the interest and use of large numerals in specific societies. In the case of Mochica numerals, one can say that the interest in large numbers could have been motivated by such reasons.

In this sense and considering the greatness and power of the Sicán Empire, there is no doubt that a system with classifiers was relevant because of the fact that such a system could have helped to accelerate counting.