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## Re-evaluating the ‘numeral classifier’ system in Mochica

**ABSTRACT:** Mochica, an extinct language of northern Peru, possesses an areally uncommon class of morphemes that have been variously termed quantifiers, numeral classifiers and alternative numerals. In this paper I reanalyse these terms as a special counting system for counting pairs, tens or hundreds of particular items, that exists alongside a standard, decimal numeral system. This compound system is compared with the similar special counting systems attested in Oceanic languages, which have also developed in parallel with extensive decimal counting systems to enable more efficient counting of culturally salient items, thereby also reducing cognitive load.

**KEYWORDS:** Mochica; Andean languages; Numeral classification; Special counting systems.

**RESUMEN:** Mochica, un idioma extinto del norte de Perú, posee una clase de morfemas poco común geográficamente, que han sido llamados tanto cuantificadores, clasificadores numerales como numerales alternativos. En este artículo, ofrezco un nuevo análisis de estos términos como un sistema especial de enumeración que existe al lado de un sistema de enumeración decimal. Este sistema compuesto es comparado con similares sistemas especiales de enumeración de varios idiomas oceánicos que se han desarrollado en paralelo a sistemas decimales extensivos para facilitar el cálculo más eficiente de objetos con una prominencia cultural elevada, así reduciendo también la carga cognitiva.

**PALABRAS LLAVES:** Mochica; Idiomas andinos; Clasificación numeral; Sistemas especiales de enumeración.

### 1. Introduction

Human beings classify consciously, unconsciously, and even subconsciously (Senft 2014). At the neural level, input to the receptor organs is filtered, some is eliminated and the remaining relevant information is assembled in to coherent patterns (“classified”) before being represented to consciousness (Koestler 1983: 201). At the semantic level, a second stage of classification takes place, allowing us to communicate about the received input. Once we begin to communicate through speech and/or gesture we classify again, based on how we use our language to refer to the perceived world. The linguistic devices used for such classifications and the distinctions they draw differ cross-linguistically, although areal and genetic patterns can be discerned.

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Nominal classification is one such cross-linguistic device for carving up the world according to a variety of inherent and non-inherent characteristics shared by certain referents, usually objects, human beings and other animates, or other concepts that can be represented by the grammatical category 'noun'. The linguistic categorisation of nominals is attested in most languages of the world, although the extent of these classificatory systems, as well as their morphosyntactic representation and distribution, can vary considerably from one language or language family to the next (see, notably, Aikhenvald (2000) and Grinevald (2000) for typological overviews of classification systems).

Mochica, a now extinct language of the northern Peruvian coast, possesses morphemes that have been variously termed quantifiers, classifiers and alternative numerals (Hovdhaugen 2004; Middendorf 1892). In the context of the Andean linguistic situation, the presence of these morphemes is somewhat unusual. Extensive and complex systems of nominal classification can be found across Amazonia, but in the Andes they are only found on the eastern slopes, which border the Amazon area. However, the function of these 'classifiers' in Mochica does not mirror that found in many Amazonian languages. In this paper I offer a new analysis of these morphemes, proposing that they functioned rather as a special counting system for counting pairs, tens or hundreds of certain, semantically linked and culturally salient, items.

The rest of this paper is structured as follows: Section 2 offers background on Mochica, its typological characteristics and data sources, as well as background to nominal classification in the Andean context. Section 3 provides an overview of the two counting systems in Mochica, including my new interpretation of what have previously been termed quantifiers, classifiers and alternative numerals. Section 4 offers a typological comparison with several Austronesian languages that also possess special counting systems. I discuss the implications of the findings in Section 5 and conclude the paper in Section 6.

## **2. Background**

### **2.1. Mochica - areal and genetic remarks**

The Mochica language was spoken on the northern Peruvian coast, from modern-day Chócope in the south to Mórrope and Motupe in the north (see Figure 1), as well as in a number of inland villages by an unknown number of speakers (Hovdhaugen, 2004: 6). The language began dying out, under pressure from Spanish and Quechua, in the nineteenth century and was extinct by 1920, although certain words and phrases continued to be used in some families until the 1960s (*idem.*).



Figure 1: The Mochica area (in blue; from Cerrón-Palomino 1995: 34)

From Figure 1 we can also identify the coastal languages with which Mochica was in contact or neighbored in the 17<sup>th</sup> century. Not pictured, but known to have been spoken in adjacent inland areas at the time of contact were Kulyi (directly to the east of Trujillo), Yúnqay (both Peripheral Quechuan languages, to the north east of the Mochica area), and Quechua, as well Cholón and Híbito (Cholónan languages spoken further east than Kulyi) (Kaufman 2007: 84).

No convincing genetic classification has yet to be posited for Mochica, thus the language is still generally considered to be an isolate. The principal unsuccessful external relations that have been proposed to date are (i) Maya and Uru-Chipaya (Stark 1972), (ii) the Paezan branch of Chibchan-Paezan, together with Allentiac (Huarpe), Atacama, Betoí, Itonama, Jirajira, Mura, Nuclear Paezan, Timucua and Warrau (Greenberg 1987), and (iii) Quingnam (Hovdhaugen 2004). The recent discovery of what has been assumed to be a list of basic numbers for Quingnam seems to discredit the third link (Quilter et al. 2010). It is quite possible, of course, that Mochica was related to other, also extinct languages for which there is little or no surviving documentation.

## 2.2. Typological characteristics

Despite also being a predominantly synthetic, suffixing language, structurally Mochica displays notable differences from Aymara, Mapudungan and Quechua, the three principal prehispanic languages of the Inca sphere in the Andes. Its areally unusual typological features include an “exotic” sound system<sup>2</sup> (Adelaar with Muysken 2004: 321), the recurrent use of passive constructions, obligatory marking of non-possessed nominal and multiple verbs meaning ‘to be’. Furthermore, it possessed relatively free constituent order, while displaying a preference for AVO in transitive active clauses and VS in intransitive clauses. Morphologically speaking, Mochica also possessed obligatory two-stemmed nouns (possessed and non-possessed), an agentive case suffix *-n*, as well as a system of ‘classifiers’, the subject of this paper.

It is worth noting at this point that some confusion and disagreement surrounds both the name of the language as well as the name and identity of the people who spoke it. The language has been variously termed Yunga, after the Quechua word for low altitude areas with a temperate climate as well as the people who inhabit them (e.g. de la Carrera 1880; Stark 1972), as well as both Muchik and Chimu (Middendorf 1892), with reference to the Chimú or Chimor kingdom of the region that was subjugated by the Incas around 1470 (Adelaar with Muysken 2004: 320). Despite this variation, we can be reasonably certain that all of these scholars were referring to the same language, namely the Mochica that constitutes the subject of this paper. It is certainly not evident, however, that the Moche (sometimes also termed Mochica, see Benson 1972), an indigenous culture residing to the south of Trujillo, spoke Mochica, nor should the town of Moche be automatically associated with the near-eponymous language.

## 2.3. Data sources

Our knowledge of the grammar and phonology of Mochica is somewhat limited since only two reference works based on the language whilst it was still living have survived, and neither can be deemed to be comprehensive (Hovdhaugen 2004: 6).<sup>3</sup> From the colonial period there is one grammar (de la Carrera 1880 [1644]), one set of religious texts (Oré 1607) and brief information about a Spanish-Mochica-Quechua catechism (Hovdhaugen 1992: 113). De la Carrera’s grammar draws on his status as a native speaker of the language (although his parents were Spanish) and is based on the variety around Eten, where he lived and worked as a priest. The grammar includes a variety of religious texts and formulas as well as some non-religious dialogues and sentences (Hovdhaugen 2004: 7). Oré’s collection of religious texts is extensive and

<sup>2</sup> “Exotic” is perhaps a little dramatic: essentially Mochica possessed a six-vowel system, the standard /a e i o u/ plus a sixth vowel that de la Carrera writes as /æ/. The interpretations of this sixth vowel vary. Salas (2002) analyses it as a diphthong, Hovdhaugen (2004: 10) claims it could be a reduced, central vowel [ə] although I tend towards the high central vowel [ɨ]. The phonetic details of the language are not central to the topic, however, so I have retained the original orthography in all examples.

<sup>3</sup> Hovdhaugen reports that two other grammars of Mochica were produced, but “apparently these grammars were unknown to Carrera (if they ever existed!) because he wrote that nobody could deprive him of the glory of being the first to write a grammar of Mochica” (Hovdhaugen 1992: 113).

based on work with informants of the language, although it is presumed that he also spoke the language to a certain extent. From the post-colonial period, the earliest – and last work based on the language whilst it was still living – is that of Middendorf (1892). This grammar is based on that of de la Carrera but expands and extends the analyses and data provided in the earlier work, despite the (assumed) increased paucity of natural language data available at that time.

In the 21<sup>st</sup> century, a new grammar (Hovdhaugen 2004) and an etymological dictionary (Salas García 2012) have emerged. Nonetheless it is important to bear in mind when reading any of these sources, as well as the present paper, that analyses are necessarily limited to the data available in the three earliest sources just mentioned.

## 2.4. Nominal classification

As indicated in Section 1, human beings classify and categorise naturally and necessarily, therefore it should come as no surprise that the linguistic categorisation of nominals is attested in most languages of the world. The extent of these classificatory systems, as well as their morphosyntactic representation and distribution, can vary widely from one language or language family to the next (Seifart 2010; Aikhenvald 2000; Grinevald 2000), although common semantic divisions, based on cognitively salient characteristics such as shape, size and density, can be identified cross-linguistically.

Nominal classification is probably best visualised as a continuum, since it comprises a variety of lexical and morphosyntactic devices. At the lexical end of the continuum, the classification of nominal referents is encoded in independent items, as in the English ‘gaggle of geese’ or ‘slice of bread’ (Grinevald 2000: 58). At the grammatical end lie systems exemplified by Bantu noun classes or Romance-type gender agreement, such as the Portuguese *o menino-o bonit-o* lit. ‘the.MASC boy.MASC beautiful.MASC’ (Aikhenvald 2000: 2). Classifiers fall at an intermediary point in-between these two extremes, being neither fully grammaticalised in most instances, nor fully lexically independent. Nominal classification is of particular interest to scholars in various disciplines, such as linguistics, anthropology, psychology and cognitive science, since it provides a window into the worldview of a particular group of speakers which may, in turn, have far-reaching implications for our understanding of human cognition (Aikhenvald 2000: 13).

### 2.4.1. Numeral classification

Numeral classification is generally treated as a sub-type of nominal classification and commonly defined as comprising “[...] special morphemes which only appear next to a numeral, or a quantifier. They may categorise the referent of a noun in terms of its animacy, shape and other inherent properties” (Aikhenvald 2000: 2). Yet in spite of this all-encompassing definition, numeral classifiers vary in terms of their structure, dependency and obligatoriness. In examples (1a-e), all reproduced from Aikhenvald (2000), we can observe a numeral classifier functioning variously as an independent morpheme preceding the nominal referent (1a), an independent morpheme following that referent (1b), an affix – here a suffix (1c), a repeater (1d), and fused to the numeral (1e). There is also evidence that numeral classifiers can attach to the head noun of a noun phrase, notably in Kegboid languages such as Kana, although this structure is very rare.

- (1a) Uzbek (Turkic)  
*bir*            *nafar*            *âdam*  
 one            CL:HUMAN            person<sup>4</sup>  
 ‘one person’
- (1b) Korean (Koreanic)  
*makkel*        *han*            *mal*  
 rice.wine     one            MENS.NUM.CL:rice.wine  
 ‘one measure of rice wine’
- (1c) Yucuna (North Arawak)  
*pajluhua-na*            *yahui*  
 one-CL:ANIM            dog  
 ‘one dog’
- (1d) Thai (Tai-Kadai)  
*prathêet*        *sâam*            *prathêet*  
 land            three            CL:LAND  
 ‘three countries’
- (1e) Telugu (Dravidian)  
*iddaru*  
 two.CL:human  
 ‘two [people]’

Furthermore, some typologies sub-divide numeral classifiers into two categories: mensural and sortal. Mensural classifiers are defined as measuring units of countable and mass nouns, depending on the “quantity, or measure, of an entity, and its physical properties [...]” (Aikhenvald 2000: 115), while sortal classifiers are deemed to categorise nouns in terms of inherent properties such as animacy, shape and consistency. The examples above, with the notable exception of (1b), constitute sortal classifiers according to Aikhenvald’s definition, although it should be underlined that the distribution and behaviour of these two types can be hard to differentiate, as in examples (1b) and (1d). Since this distinction is visible but not central to the Mochica case, I will not discuss this issue further.

#### 2.4.2. Nominal classification and the Andean situation

Mochica is unusual for an Andean language in possessing a system of numeral classification. Indeed, numeral classifiers are far less pervasive in the Andes than in Amazonia, where extensive and complex systems of nominal classification - including numeral classification - such as those found in Palikur (North Arawakan; Aikhenvald & Green 1998) and Tuyuca (East Tucanoan; Barnes 1990) are not unusual. No Andean language *sensu strictu* possesses a system of numeral classifiers, although some languages

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<sup>4</sup> The following abbreviations are used in this paper: ANIM animate, BEN beneficiary, BND bound, CL classifier, COP copula, DET determiner, GEN genitive, HUMAN human, IND independent, LAND land, LINK linker, MENS mensural, NEG negator, NUM numeral, PL plural, REL relativiser.

spoken on the eastern slopes do, namely Chimila and Tsafiki (Barbacoan), Cholón (Cholónan), other East Tucanoan languages, and a number of isolates located in Bolivia, Colombia, Ecuador and Peru. One other coastal language, Cuna (Chibchan), also displays a numeral classifier system but this is rare west of the Andes. Examples of numeral classification can be found in (2a) and (2b), while a more unusual example of multiple nominal classification that merits inclusion for its unusual ‘stacking’ of classifiers is presented in (2c). Classifiers are highlighted in boldface.

## (2a) Chimila (Barbacoan)

*ti* - *mu<sup>h</sup>na*

CL-two [long things]

‘two pencils, bananas, etc’

(Adelaar with Muysken 2004: 79)

## (2b) Cuna (Chibchan)

*mači-mala* ***wala-pik<sup>va</sup>*** *pe* *nikka*

son-PL CL-how many you have

‘How many children do you have?’

(Adelaar with Muysken 2004: 66)

## (2c) Harakmbut (isolate, Peru)

*wa-pa-pi-ki-ti-pi*

N-CL:rod-CL:stick-CL:head-CL:extension-CL:stick

‘shin’

(Adelaar with Muysken 2004: 460)

Nominal classification could thus be considered an areal feature of Amazonian languages, if not a genetic one, but certainly not a diagnostic for Andean languages, where its presence is much rarer. Since Andean languages display a marked lack of nominal classification, the case of Mochica is even more intriguing.

### 3. Counting and classification in Mochica

Before discussing the unusual ‘classifier’ system I posit to have been present in Mochica, it is first necessary to understand how basic counting functioned in the language, since the two systems are interlinked.

#### 3.1. Counting and basic numerals

Two types of numeral are attested in Mochica: independent forms and bound forms (see Table 1). The independent numerals constitute recital forms and have no formal dependence on other elements. The bound forms are found for the numbers one to four only and must co-occur with a [numeral] classifier. It is worth noting the similarity in the two sets of forms, whereby the first two letters (representing the first syllable in the independent forms) of each numeral in both sets are the same, although ‘one’ and ‘two’ display inversion, a common morpho-phonological process in Mochica.

**Table 1:** Bound and independent numerals in Mochica (Salas García 2008: 148)

Numeral	Independent form	Bound form
One	onæc	na
Two	a(t)put	pac
Three	çopæt	çoc
Four	nopæt	noc

Example (3) displays the usage of the independent numerals, here 'one' and 'three'.<sup>5</sup>

- (3) *Jompäko fe onäkna mo eskik, änta šain sopäto*  
 In truth COP one.IND DET Father, NEG but three.IND  
 'In truth the Father is just one, not three.' (Middendorf 1892: 180)

In (4) we can observe an example of a simple bound form, while in (5) both bound and independent forms are present.

- (4) *çoc-pong cyelû*  
 three.BND-ten hawk  
 'thirty hawks' (de la Carrera 1880:186)

- (5) *çoc-palæc allo nopæt*  
 three.BND-hundred LINK four.IND  
 '304' (de la Carrera 1880:184)

However, for days, months and years, the abbreviated versions of the standard cardinal numerals are used, as in (6).

- (6) *na käss*  
 one.BND day  
 'one day' (de la Carrera 1880: 87)

In the list in (7) we find the recital forms of the independent numerals from 1-10, as well as the multiples 20, 30 and 100. From 10 upwards, the objects that are being counted determine the form of the number ten to be used (see Section 3.2). This phenomenon is also reflected in the multiples of ten.

- (7) 1 onæc                      6 tzhaxlltza                      20 pac pong, pac ssop  
 2 atput                      7 ñite                              30 çoc pong, çoc ssop  
 3 çopæt                      8 langæss                      100 (na) palæc  
 4 nopæt                      9 tap                              1000 (na) kuno  
 5 exllmætzh                      10 çiaecu                      (Hovdhaugen 2004: 26)

<sup>5</sup> Note that the translations in the examples have all been carried out from Spanish for de la Carrera and German for Middendorf by the author.



### 3.2. Numeral classification – or is it?

In the existing literature, it is stated that Mochica possessed a restricted system of numeral classification, morphemes that are also referred to by Hovdhaugen (2004: 26) as both quantifiers and numerals, in the same section of his grammar, no less! The apparent confusion surrounding these terms - and associated analyses - supports the notion that their grammatical status remains unclear (see also Salas García 2011). As exemplified in Table 2, numeral classifiers in Mochica were associated with counting certain objects in pairs, tens or hundreds, using morphemes that differed from the corresponding cardinal number – 2, 10 and 100 respectively – that were presented in Section 3.1.

**Table 2:** ‘Classifiers’ and their referents in Mochica

Quantity	Classifier	Objects to be counted	Cardinal number
Pairs	felæp	Birds, jugs, etc.	aput, pac ‘two’
	luc	Plates/mates of food, drinking vessels, cucumbers, fruit/crops	
Tens	cæss	Days (fossilised)	çiæcų ‘ten’
	cyoquixell <sup>6</sup>	Fruits, ears of corn	
	pong	People, animals, large objects	
	ssop	Fruit, money, time units	
Hundreds	chiæng	Fruit/crops	palæc ‘100’
	palæc	People, animals, large objects (doubtful)	

It is difficult to posit clearly defined semantic characteristics, such as shape, dimension or size, for the referents (i.e. objects) of these so-called classifiers. Salas García (2012: 154) states, however, that Mochica classifies entities according to the eight semantic categories put forward by Allan (2001): material/essence, function, form, consistency, size, localisation, order and quantity (see Figure 2).

<sup>6</sup> As an anonymous reviewer pointed out, this term is also found attested as *cyo quixll* (de la Carrera 1880: 86) and *cyoquixll* (Salas 2011: 20) although for the purposes of this article the orthographic differences are not considered so important.

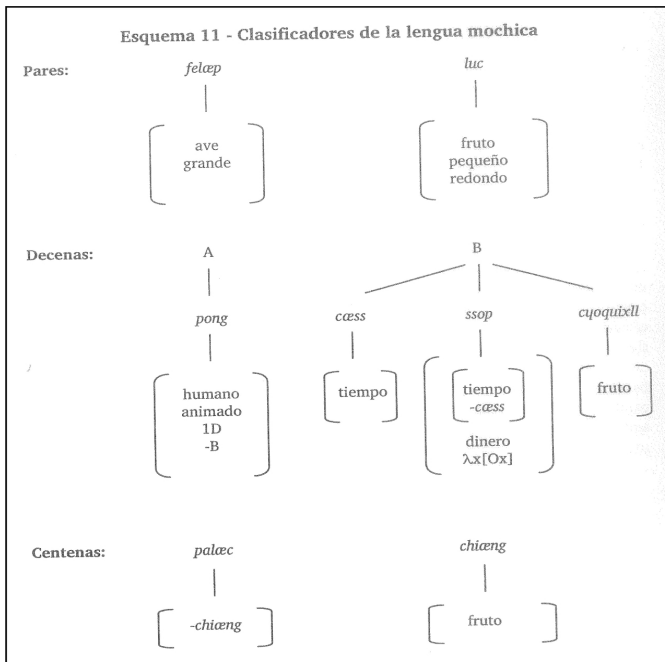


Figure 2: Semantic properties of classifiers in Mochica (Salas García 2004: 154)

Historically some of these classifiers may have encoded inherent properties of their referents, such as the round shape inherent to some of the referents of *luc*, notably plates and fruits. There are two main problems with this analysis, however. First, there is insufficient linguistic data to support such a neat, fine-grained classification, and second, the existing evidence places greater emphasis on the number of objects in question, rather than object specificity alone. It would appear that this eight-fold analysis is more suited to what we consider to be more typically Amazonian classifier systems, such as that found in Bora, see (8), which possess a series of classifiers based on shape, quality and/or measures (Adelaar with Muysken 2004: 66).

(8) Bora (isolate)

*uime-ʔé-kpayááuu*

tree-CL:tree-bent.over

'a bent over tree'

(Adelaar with Muysken 2004: 451)

Clearly the Mochica classifiers are behaving differently to their eastern slopes counterparts. Since the primary function of these morphemes is to enumerate certain items, I propose that they display a greater similarity to the specific counting systems found in Polynesia and Micronesia (e.g. Bender & Beller 2006, 2007) than to other classification systems found in South America. Special counting systems are characterised by the combination of two features: (i) they are based on larger counting units (their *multiplication function*), and (ii) apply to certain objects only (*object specificity*). In the next section I will provide a more detailed presentation of the classifiers for each unit (pair, ten, hundred).

### 3.2.1. Counting in pairs

In order to count pairs of certain items, Mochica possessed two different classifiers: *felæp* for birds, jugs, etc., and *luc* for plates or mates (a type of cup) of food, drinking vessels, cucumbers and fruit/crops. The bound numeral prefixes to the classifier to enumerate the pairs, as in (9).

- (9) *pak-feläp*      *fellu*  
two.BND-pair duck  
'two pairs of ducks' (Middendorf 1892: 129)

Not all occurrences of two objects were counted in pairs (or tens or hundreds), as can be observed in example (10), where the independent numeral *aput* 'two' is used to enumerate the eggs.

- (10) *aput*              *mellu*  
two.IND              egg  
'two eggs' (Middendorf 1892:188)

Salas García (2012: 158-160) states that *luc* comes from the noun *loc* 'foot' (an object that appears naturally as one of a pair) and *felæp*, possibly, from *fel* 'to sit' combined with the passive morpheme *-æp*, although the latter etymology is hard to reconcile with a pair-like reading. As I will discuss in Section 5, the objects enumerated using the classifiers as opposed to the independent numerals likely possessed some kind of heightened cultural salience and are also more likely to appear in pairs.

### 3.2.2. Counting in tens

There were two main terms for 'ten' that can be utilized to count units of ten items: (i) *pong* 'people, animals, large objects', as in (11), and (ii) *ssop* 'fruit, money, time units', see (12-13). As the examples demonstrate, the bound numeral can appear prefixed to the ten-counter (11-12), or not (13).

- (11) *na-pon*<sup>7</sup>              *eis-än,*              *nopät*      *ñofän,*      *tsaitsa*      *mecherräk*  
one.BND-ten.PONG      child-PL,              four.IND      man,              six.IND      woman  
'[she had] ten children, four boys and six girls' (Middendorf 1892: 189)

- (12) *na-ssop*              *lecy-o-f,*              *Dios i*              *ssop*  
one.BND-ten.SSOP      main-REL-COP      God-GEN              word  
'ten are God's commandments' (de la Carrera 1880: 160)

- (13) *Langäss*      *ssop*              *patkonär-nik*  
eight.IND      ten.SSOP              piece-GEN  
'For 80 pieces [of money]' (Middendorf 1892: 131)

<sup>7</sup> Orthographies vary between authors, so Middendorf's *pon* here is equivalent to Carrera's *pong*. It is easy to imagine how an alveolar nasal could be confounded with a velar nasal, thereby leading to different orthographic representations.

It is also possible to identify a nominal etymology for the ten-counters, etymologies that reflect the more prototypical shape classification categories of long, flat and round. Middendorf (1892: 68) offers support for a specific counting reading when he informs us that these 'numeral classifiers' were originally full nouns meaning 'stone' (*pong*) and 'rope, cord' (*ssop*) that over the course of time have grammaticalised to become lexically dependent suffixes. For example, *ssop* 'rope, cord' was utilised to count money, whereby the coins or bills being enumerated had a hole in the middle of them were so threaded onto a string; similarly, it was used for counting fruit which was tied up in bundles, as well as for counting days by marking them with knots [on a string] (Middendorf 1892: 68). This practice is reminiscent of the *khipu*, a common cultural counting device in the Inca sphere (see, e.g., Urton 1997). Its grammaticalization from a noun for 'rope' into a numeral classifier for longish objects is typologically fairly straightforward (see also Pache 2016 for a discussion of the grammaticalization of plant-part terms for 'stick', 'leaf', and 'seed' to classifying elements referring to shape in several Chibchan languages).

It is quite possible that 'stone' also came to be used as a means of counting. A stone may have been put aside or dropped into a pocket of the person counting each time a multiple of ten was reached for, in this instance, fruit or money. Indeed, this system is reminiscent of the 'yan tan tethera' counting system developed by shepherds across the UK up until the early twentieth century, and which can still be found in some regions.<sup>8</sup> In this system, "it is said that the shepherds, on reaching 20, would transfer a pebble or marble from one pocket to another, so as to keep a tally of the number of scores" (Ralph 2007). In societies that herded animals and traded objects, two of the few ways in which Yorkshire and the Andes are linked, it is easy to imagine how simple but reliable counting systems such as these could have developed.

In addition to *pong* and *ssop*, Mochica also possessed a term for counting some fruits, especially corn cobs, namely *chokij* (14).

(14) pak	chokij	mang	
two.BND	ten.CHOKIJ	corn	
'twenty corn cobs'			(Middendorf 1892: 130)

It is possible that *chokij* has an etymology in *tšok* 'mate, squash' which would make sense, insofar as it is common for the prototypical referent of a category to become its numeral classifier (see Salas García, 2012: 171).

### 3.2.3. Counting in hundreds

The two terms for counting hundreds of items are: (i) *palæc*, for people, animals, and large objects (although this last category is somewhat doubtful), and (ii) *chiæng* for fruit and crops, as indicated in (15) and (16) respectively.

<sup>8</sup> Yan, tan and tethera are the first three cardinal numbers in this counting system, which is vigesimal in nature and possesses the slightly unusual feature whereby adjacent numerals tend to rhyme (viz. yan 'one' and tan 'two').



- (17) *mwata*      *yangga-yaworo*      *na*      *yangga-to*  
 snake      CL-ten      and      CL-three  
 'thirteen snakes'      (Anderson & Ross 2002: 328)

The second type of classifiers function as multipliers, as in the Tongan example in (18).

- (18) *kau*      *ika*      'e      *ua*  
 score      fish      num.particle      2  
 'two scores of fish' (= 40 fish)      (Bender & Beller 2007: 222)

Type three classifiers function as both a classifier and multiplier, such as in Arosi (19), a language spoken by 3000-4000 people on the island western part of the island of Makira (formerly San Cristobal) in the Solomon Islands (Melanesia). The classifier is not simply a multiplier, as in (17), but it also refers to a class of objects, rather than just one (type).

- (19) *rua*      *abe*  
 two      ten.dogs'.teeth  
 'twenty dogs' teeth'      (Lynch & Horoi 2002: 565)

The type of classifier that we find in Mochica corresponds to the second type presented here, namely in (18), as the classifiers only multiply the bound form – an independent nominal referent is still required, unlike in Arosi, for example. In the next section I will discuss the possible reasons for the development of such a binary counting system in Mochica.

## 5. Discussion

It is clear from the preceding sections that what have been variously termed numeral classifiers, numerals and quantifiers in Mochica are in fact morphemes that count a specific number (2, 10 or 100) of different types of objects, rather than referring to other inherent properties of these objects, such as shape or animacy. More specifically this system facilitates enumeration, since counting large numbers in pairs, tens or hundreds renders the process more efficient, by reducing the cognitive load. It seems more appropriate, therefore, to refer to these morphemes as specific counting systems for objects that must have held some kind of cultural salience for Mochica speakers, possibly relating to trade or ritual and their abundance within the society. The notion of cultural salience is reinforced by the fact that these special counting systems refer only to particular items or types of items; they cannot be used in conjunction with simply any nominal referent. It is worth noting, however, that since the available data for the language are reasonably limited, this analysis cannot, unfortunately, be considered complete or comprehensive.

While the function of the specific counting system morphemes of Mochica clearly differs from the classifiers found in other Andean languages such as Cuna and Bora (see Sections 2 and 3.2), the grammaticalisation process that brought about the two systems displays considerable similarities. It is widely accepted that nominal classifiers, including numeral classifiers, constitute dependent and often lexically empty morphemes that at previous stages in a language's history belonged to an open class of lexical items – frequently nouns – with their own semantics (Aikhenvald 2000: 353). The interesting development in Mochica is that the nouns in question have evolved into a means of counting the referent they once stood for rather than indicating a more generic property relating to size or shape that applies equally to similar objects. Such a system may also have developed as a means of developing or reinforcing social identity, since it differentiates Mochica speakers from other major languages in the region.

It should be noted at this juncture that special counting systems are not specific only to Mochica, having already been identified in over thirty Austronesian languages of Oceania. No two of these systems are identical, but we can find languages that possess at least five specific means of enumerating certain objects, all of which are deemed to have considerable cultural significance (see Bender & Beller 2007). Not only are the nominal referents that are counted using a specific system of interest, but also the multiple associated with them, namely two, four, ten, 40 or 100. The recurrent use of two, ten and hundred in both Mochica and these Oceanic languages is likely driven by the base ten counting system present in the languages which, in turn, may rest on more fundamental cognitive biases and shared physical attributes.

Having identified that the Mochica counting systems are by no means a linguistic or evolutionary anomaly, but being obliged to rule out areal or genetic relatedness with other languages where this feature occurs, the question we should now pose is: What conditions or traits associated with this language and the culture of its speech communities enabled, or drove, it to develop special counting systems? In Austronesia, at least, numeral classifiers and specific counting systems are more likely to be present in languages spoken by groups with social stratification (Jordan 2011). If this were to be the case also in Mochica, which could only be identified through more detailed anthropological studies (if indeed the data are available, which is sadly unlikely), then the results would certainly shed more light on the co-evolution of counting and classification (through language) and culture.

## 6. Conclusions

The data on numeral classification available to the scholar of Mochica, some of which has been presented in this paper, offers a snapshot of a specific counting system for objects that presumably had high cultural salience. The co-occurrence of standard numerals with bound, semantically restricted forms suggests that the two systems were well entrenched in the language and co-existed for communicative needs. Cross-linguistic similarities in the specific counting nature of the classifiers with certain Oceanic languages provides linguistic and cultural context for the development and use of special counting systems, which may be applied (to a limited extent) to the Mochica case. Such systems clearly facilitate more efficient counting, which is especially useful in trade and exchange situations although their presence in an Andean language remains an areal anomaly.

Further research is both necessary and on-going. Of high priority is the search for more, hitherto undiscovered documentation which, courtesy of de la Carrera, we know was produced but it is unclear whether it has survived. More documentation would provide more examples, hopefully from different time periods, thus allowing clearer conclusions to be drawn, about both numeral classification and other morpho-syntactic features. Nonetheless, it seems appropriate to end with the following quote, referring to the evolution of pre-Sumerian record-keeping systems in the Middle East:<sup>10</sup>

The extraordinary invention of abstract numerals amounted to a revolution in accounting and communication, since it provided, for the first time, a reckoning system **applicable to any and every item under the sun**. Each numeral stood for the concept of oneness, twoness, threeness, and so on, abstracted from the item counted. [...] This put an end to the **cumbersome system** necessitating particular symbols for **counting different goods** (Schmandt-Besserat 1991:39, in Urton 1997: 32, my emphasis).

I have proposed the reverse for Mochica (following Bender & Beller 2007) that, in fact, multiple counting systems can facilitate more and easier counting, since the higher multiplier reduces the cognitive load required to count large amounts of certain items.

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<sup>10</sup> There were two types of clay tokens in this system for keeping track of items: plain and complex. Plain tokens were replaced by impressed markings (for tallies, keeping track) and complex tokens by pictographic signs made with a stylus, which came to represent abstract number, namely as a one-to-one correspondence.



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