Mochica: Grammatical topics and external relations

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Chapter 3. Orthography and Phonology

The “letters” and “sounds” of Colonial Mochica

The only colonial record of Mochica providing explicit information about its pronunciation is Carrera's (1644) grammar. As an extinct language, Mochica faces the fate of probably never being completely understood. Particularly, the phonological system can only be pieced together based on impressionistic descriptions by Carrera (1644) for the Colonial Mochica, and by Middendorf (1892) and Brüning (1905-1924a, b) for republican time Mochica[72]. In this chapter, I analyze the existing interpretations of the Colonial Mochica sounds offered by different scholars and offer my own interpretation, as well. Since there are no remaining speakers of Mochica and because the first phonological description of this language is attested in a colonial grammar, it is necessary to adopt a philological approach, taking into account the tradition and common practices of the colonial missionaries who wrote grammars and dictionaries of indigenous languages.

3.1. Mochica orthography in the tradition of colonial grammatical descriptions of indigenous languages

Orthography is an important part of the grammatical descriptions produced during colonial time; very often the sounds of the language to be described are presented in the first introductory chapter or section of a colonial grammar. These sections on orthography include the first tentative descriptions of the sounds of the indigenous languages encountered by Spaniards. Phonological

[72] Lehmann (1929a); (1929b); ([1929g] 1931) presents the Mochica sounds through his own orthographic representation, but he does not offer any kind of description of the sounds themselves.

description during colonial time in Spanish colonies was prolific, covering both North and South American and Asian languages.

When missionaries assumed the task of describing a language that had different sounds than the ones present in Spanish (or other languages known to them), they struggled, but on most occasions, they succeeded with remarkable results. There was probably no unfamiliar sound that remained undescribed. This concern for obtaining a one-to-one correspondence between the Spanish sounds and the sounds of the languages described, led the grammarians to note that many Spanish sounds were not present in the indigenous languages and *vice versa*. Thus, claims that the described languages "lack letters" in their alphabet or that the Spanish alphabet "lacks a letter", are frequent in colonial descriptions[73]. For example, the voiced stops, [b], [d] and [g] and the voiceless labiodental fricative [f] are often said to be missing from described languages. To represent new sounds that could not be represented by means of Spanish orthography, the missionaries had to design new orthographic notations. They often relied on symbols/letters from Spanish or Latin.

According to Smith-Stark (2005: 12), early grammarians employed five strategies for representing new sounds:

a. they used familiar letters with a novel sound
b. they created special combinations of letters
c. they used modified forms of conventional letters
d. they invented completely new letters, and

[73] See the discussion of the extra vowel in Mochica in Carrera's (1644: n.p.).

e. they borrowed letters from another non-Latin based writing system (this is evident in cases of description of Japanese (Smith-Stark 2005: 12, fn. 17).

To interpret missionary descriptions of the Spanish tradition, it is fundamental to have background information about the orthography of Spanish during the corresponding period. It is relevant to mention that the production of linguistic materials by missionaries occurred during a very special period of linguistic transformation of the Spanish language. Therefore, in order to approach Carrera's orthography in an appropriate way, it is crucial to understand the Spanish orthographic practice of Carrera's time. This requires tracing back certain phonological changes that had been taking place and developed between the 16th and 17th centuries. Any attempt to interpret Carrera's orthography without a proper understanding of what was going on in Spanish remains in vain.

3.2. Correspondence of letters and sounds

Hovdhaugen (1992: 121) suggests that Carrera's grammar is a grammar with no tradition but, on the contrary, one can state that the symbols represented in the orthography used by Carrera (1644) follow a clear pattern and a specific tradition. In general, it is necessary to understand that the Mochica grammar constitutes a manifestation of a tradition of describing indigenous languages that was very well established in the colonial times. The spelling of indigenous languages is motivated by Spanish orthographic conventions for Spanish phonetic categories. Spanish has a clear phonemic writing system with an alphabetic character whose graphic system is framed in the Greco-Latin alphabets (Pujol 2001-2002: 194). This explains why the missionaries, when faced with the task of describing languages with sounds that could not be

found in the Spanish language, tried to represent them simply following the orthographic tradition of the Spanish language (Cerrón-Palomino 2006: 149).

Historiographic evidence from other indigenous languages attested during colonial time representing the high central unrounded vowel /ɨ/, supports the idea that Carrera's effort to represent this sound using the Latin ligature <æ>[74], was not isolated. Various indigenous languages that were described during colonial time have vowels with qualities distinct from the five standard vowels found in Spanish. For instance, Zoque has a sixth vowel, the high central unrounded vowel /ɨ/, which was represented with several symbols such as <æ>, <ę> and <œ> in colonial descriptions. The symbols <æ> and <ę> were familiar from the tradition of writing Latin, where both are derived from the sequence <ae> (Smith-Stark 2005: 20, fn 33). The same Latin diphthong or ligature was used to describe the high central unrounded vowel /ɨ/ in Otomí (Guerrero Galván 2007: 123).

As can be seen, this high central unrounded vowel proposed for Mochica as <æ>, is represented in Zoque and Otomí with the same Latin ligature <æ>; this is, of course, only a coincidence, but it illustrates the tendency among grammarians to turn to known symbols to represent an unfamiliar vowel. The Chinantec /ɨ/ was represented with <ui> (Smith-Stark 2005: 21). The Mapudungun /ɨ/ was represented with <ù> (Valdivia 1684: 1; Febrés 1765: 2). In the cases of Mochica, Zoque and Otomí, a known graphic symbol/letter <æ> is used, but the sound that it represents is new. In the case of Chinantec, the symbol <ui> seems to be a phonemic spelling of some sort, and for

[74] In Old English, this ligature <æ> was named *aesc* meaning 'ash-tree' (*æsc* in older spelling, pronounced /ˈæʃ/) after the name of the Anglo-Saxon rune æ (Baskervill, Grein, Groschopp & Harrison 1885: 11). It was used as a letter of the alphabet in Faroese and Icelandic (Bringhurst [1992] 2004: 288), Danish, Norwegian, Anglo-Saxon and Old Norse (Bringhurst ([1992] 2004: 301).

Mapudungun, Valdivia (1684) and Febrés (1765) use the backwards virgulilla <ù> to emphazise the fact that it is an unfamiliar sound.

Phonological reconstruction of an extinct language will always remain hypothetical. There have been several attempts to reconstruct the Mochica phonological system; the various interpretations are presented in Table 4. There is an overall consensus concerning most sounds in Mochica, but the problem arises when dealing with the "special sounds" of Mochica that Oré (1607) and Carrera (1644) tried to represent with special characters. Following Torero (2002: 300), it is relevant to mention that even though Oré's record of Mochica dates back to the beginning of the 17th century (1607), his orthography was probably still the one used during the late 16th century.

3.3. Mochica Vowel System

The vowel system of Mochica comprised six phonemic vowel qualities, with distinctive length contrasts. Carrera (1644 n.p.) states that he uses two diacritic marks to express vowel quantity: <´> for short vowels and <^> for long vowels. However, one cannot really find a systematic use of those symbols throughout his work. Nevertheless, Middendorf (1892: 48-49) supports the fact that length was a feature in the vowel system of Mochica attesting examples with short and long vowels. Length appears to be functional as a clear distinctive feature, as proven by Cerrón-Palomino (1995: 81-82), see also Adelaar ([2004] 2007a: 324). Cerrón-Palomino extracts minimal pairs from Middendorf's work to show that vowel length definitely distinguishes meaning. Middendorf uses the diacritic mark <¯> to express vowel length. Cases as <ñop-> 'to receive' / <ñōp-> 'to hope', 'to wait for' (Middendorf 1892: 89); <pok-> 'to enter' / <pōk-> 'to be named', 'to call' (Middendorf 1892: 89); and <rak> 'puma' (Middendorf 1892: 60) / <rāk> 'excrement' (Middendorf 1892: 62) are clear cases where vowel length is a distinctive

feature in Mochica. Regarding the Mochica vowels, Middendorf provides their different pronunciations depending on their contexts, comparing their sounds to German and English sounds in different realizations.

The symbol <i> deserves special attention because it does not only represent the close front unrounded vowel /i/ but phonologically seems to have had a glide's behavior, functioning as the voiced palatal approximant /j/. This was first proposed by Torero (1986: 531) and presented later on in Torero (1997: 119, 2002: 321). Hovdhaugen (2004: 10, 2005: 177) and Adelaar ([2004] 2007a: 322) adopt a similar approach. Moreover, Hovdhaugen identifies the contexts where <i> was most likely realized as an approximant and provides examples:

a) in onset position, word initially in pre-vocalic position, #_V, as in the case of <yanà> 'servant' (Carrera 1644: 144) written alternatively also as <iana> (Carrera 1644: 165). I consider this example given by Hovdhaugen problematic because it is a Quechua loan. Moreover, the assumed occurrence of this glide in onset position is limited to very few examples. After inspecting the whole *Arte*, I could only find the following attested forms with initial <i> or <y>: <iactum[75]> 'coarse', 'vulgar' (Carrera 1644: 145), <iam[76]> 'desire' (Carrera 1644: 157) and <iai[77]-> 'to end' (Carrera 1644: 174, 194).

[75] This form <iactum> (Carrera 1644: 145) alternates with another orthographic representation <yactæm> (Carrera 1644: 224).

[76] Salas' interpretation of this untranslated term attested in Carrera (1644: 157, 221, 225) is the adjective 'greedy' but according to my analysis it cannot always have a negative connotation, neither appears as adjective, but more like a noun probably meaning 'desire'.

[77] The attested form <iaiæp-> (Carrera 1644: 174, 194, 209, 226) alternates with <iayp-> (Carrera 1644: 210). Middendorf interpreted it as the verb 'to finish', 'to end' (1892: 87), and it is registered this way in Salas (2002: 14), as well. Nevertheless,

b) in coda position, V_#, like in the verb <ai-> (Carrera 1644: 148) suggested by Hovdhaugen. The search for more examples yielded only one more example: <pei> 'grass' (Carrera 1644: 22). Unfortunately, appearance in this position is limited to just these two examples.

c) in V_C context as in the case of <aid-> 'past participle of verb to do, i.e. done', reported by Hovdhaugen. Other examples that present <i> in this position are: <uiz> 'cultivation field' (Carrera 1644: 104), <eiñ> 'who' (Carrera 1644: 21), <eiz> 'child' (Carrera 1644: 144), <oiz[78]-> 'to smell' (Carrera 1644: 244), <uich-> 'to stretch' (Middendorf 1892: 90), <uid-> 'to swim' (Middendorf 1892: 90), <uij-> 'to give birth' (Middendorf 1892: 90), <uiñ> 'gourd container' (Middendorf 1892: 61), <uip-> 'to hide' (Middendorf 1892: 90), <uis> 'totora reef' (Middendorf 1892: 61), <ůiz> 'cloud'.

d) in V_V context, in this context I could find several examples, such as <aie> 'this way' (Carrera 1644: 124), <aio> '3SG' (Carrera 1644: 19), <aiung> '3SG.OBL', <aiin> 'there' (Carrera 1644: 125), <Chiclaiæp> 'Chiclayo' (Carrera 1644: 129), <aiapæc> (Carrera 1644: 243), <ajiçæc> 'workmanship', 'making', 'creature' (Carrera 1644: 24), etc.

When comparing Hovdhaugen's proposed contexts (a) and (b) with the ones illustrated in (c) and (d), one can observe that there exist very few examples

according to my analysis, one can segment <iaiæp-> into <iai-> and <-æp>, where the last segment is a Mochica middle voice suffix (MID).

[78] Middendorf (1892: 89) registers the verb 'to smell', 'to sniff out' as <ōj->. Salas (2002) does not register the verb 'to smell' in his Mochica dictionary, but he does register <oiz-> 'to smell' in Salas (2009: 80). After my analysis of Carrera's non-translated texts (1644: 244), I also consider that the colonial Mochica term for the verb 'to smell' is indeed <oiz->.

for the former two groups, while the two latter ones offer a few more attested forms. Contemplating all the contexts proposed by Hovdhaugen (2004, 2005), we cannot be sure about the pronunciation of <i> in all contexts, at least one cannot assume that non-nuclear <i> may always be interpreted as a consonant.

Besides the proposed glide behavior of <i>, Torero (2002: 306) reflects on the presence of the vowel <i> in regard to palatality, which he considers one salient characteristic of the Mochica phonology. According to his analysis, palatality may divide Mochica's consonant system in palatalized and non-palatalized consonants. Thus, the vowel <i> is considered a palatality indicator first by Torero (1986: 531, 1997: 107-108, 2002: 305-308). Hovdhaugen (2004: 11-12, 2005: 177-178) supports this analysis, and so does Adelaar ([2004] 2007a: 326). According to this analysis, the vowel <i> may have indicated the palatal nature of the adjacent consonant. This palatality marker is found before or after palatal consonants. The case of <ñaiñ> 'hen' is an example where the vowel <i> may represent the palatality of <ñ>. We will never know, however, whether this word was pronounced as a bisyllabic root [ɲa-iɲ] or monosyllabic as [ɲaɲ].

Additionally, reflecting on the probable glide behavior of <u> and its representation as <v>, Hovdhaugen (2004: 11, 2005: 177) considers two issues. First, initial <v> is only found in Spanish loans such as *viernes* 'Friday', *virgen* 'virgin' and *vino* 'wine', and one cannot be sure how this <v> was pronounced. Second, he observes that <u> is not found in nuclear position in none of the following contexts V_#, V_V or V_C. With respect to the appearance of <u> as <v>, Hovdhaugen observes an orthographic alternation of the absolute form of the term <uiz> meaning 'farm' or 'cultivating field' (Carrera 1644: 104), which appears attested as <vizquic> (Carrera 1644: 107), <ù, iz quic> (Carrera 1644: 126) and <û, iz quic> (Carrera 1644: 128), where

<-quic> is a derelational suffix that I gloss as DEREL throughout this dissertation and discuss in 6.3.1.1. This orthographic alternation noted by Hovdhaugen makes me reflect more on the way this word may have been pronounced. If the orthographic representation meant the need of separating the syllables into <û-iz-quic>, we could be facing a clear example of the monosyllabic tendency of the Mochica words (see syllable structure in 3.9.1.). Besides, this could also shed some light on the hypothesis of the non-existence of diphthongs in Mochica.

3.4. Previous proposals of interpretation on the Sixth Vowel

In addition to five typologically common vowels /a/, /e/, /i/, /o/, /u/, Mochica had the so-called "sixth vowel" represented by <æ> in Carrera (1644). Oré (1607) does not dedicate any particular symbol to the sixth vowel, alternating between <e>, <u>, <o> and even <a>. Carrera (1644: n.p.), when describing his rules of Mochica pronunciation, initially claims that the Spanish alphabet lacks one vowel that was available to Mochica speakers: "To speak and pronounce this language, our alphabet is lacking a vowel that the Indians have additionally; and for there to be distinction and knowledge of this letter and for it not to clash with ours [letters], I make use of a Latin diphthong, which is the following: æ."[79] It is important to point out that the used Latin ligature that originally represented the Latin diphthong <ae>, [ai], does not necessarily represent a diphthong in Mochica or other language that adopted it as a letter of their alphabetic inventory.

[79] "Para hablar, y pronunciar esta lengua, falta a nuestro abecedario vna vocal, que los Indios tienen demas, y para que aya distincion, y conocimiento desta letra, y no se encuentre con las nuestras, me valgo de vn diphtongo latino, que es el siguiente. æ" (Carrera 1644).

Following Stark (1968: 25), Cerrón-Palomino (1995: 76), Torero (1997: 107; 2002: 305) and Hovdhaugen (2004: 11, 2005: 174-175), I assume, that it is very difficult to be certain of the existence of diphthongs in Mochica. Besides, it seems clear that Carrera considered this vowel to be a simple vowel, not a diphthong. He explicitly says that he uses the Latin diphthong, that is, the symbol <æ> itself, to represent a vowel that does not exist in the Spanish inventory. Going back to the strategies proposed by Smith-Stark (2005: 12), one can remark that Carrera used a familiar letter for a novel sound. Carrera (1644) claims that it is very difficult to explain how to pronounce this vowel but still attempts to do so, stating that "[…] it starts as an E and ends as a U, so that it is two vowels in one […]". At the end of his explanation, he just adds that it would be better to consult the literate Natives because he had taught them the equivalence he had established between the symbol and the sound.

While Carrera (1644) describes the sixth vowel as only one vowel, Middendorf (1892: 49) distinguishes two variants of the sixth vowel: <ä> and <ů> and considers them two "impure diphthongs". In this respect, it is valid to note, that the Mochica language described by Carrera (1644) may have been pronounced differently from the Mochica described by Middendorf (1892). Middendorf mentions that both of the impure diphthongs are related to each other in the sense that the sounds of both <ä> and <ů> are similar "[…] start[ing] with a [ɛ], [ø], or [e] and end[ing] with an [u] […]." His description of the sound of <ä> specifies that the ending [u] is very soft and that in fast speech one cannot even hear it at all; one basically hears a sound similar to the German <ä> [ɛ] or <e> [e].

Moreover, he offers an explanation of the sounds corresponding to <ů>. He claims that the ending [u] is more dominant and then he explains that its sound is reminiscent of (a) the Swabian diphthong, of which the starting target is a

low front unrounded vowel and the end target a near high back rounded vowel /aʊ̯[80]/ and (b) the impure diphthongs present in Hamburger Platt (Middendorf 1892: 49). Since Hamburger Platt is a variety of Northern Low Saxon or Low German, it seems that Middendorf was referring to the diphthong /ɑʊ/, which starts as a low back unrounded vowel and ends as a near high back rounded vowel. In spite of Middendorf's efforts to compare these sounds with those of Germanic languages, such as Svabian and Northern Low Saxon, and assuming that it was a diphthong, he accepts that he never succeeded at pronouncing it correctly and therefore only provoked amusement among his listeners (Middendorf 1892: 49-50). This fact gives support to the hypothesis that it was most probably not a diphthong, but a single vowel with a very distinctive sound. If this sound had been a diphthong similar to those of Swabian or Low Saxon, his attempts at pronouncing it would have been more successful.

The occurrence of Middendorf's impure diphthong <ů> is limited to about 15 lexical items, as first noted by Torero (1997: 125; 2002: 327). Its distribution seems to be restricted to the initial syllable of the root as first noted by Stark (1968: 25) and confirmed by Torero (1997: 125; 2002: 327) and Adelaar ([2004] 2007a: 323). Yet, in contrast to the scarce occurrence of <ů>, the diphthong <ä> is more frequent, being found both in initial syllable and as the nucleus of final syllables CVC of polysyllabic roots. With regard to the distribution of <ů> and <ä>, Torero (1997: 125; 2002: 328) believes to have discovered, amongst Middendorf's attested forms, a minimal pair that would support the claim that the difference between the two impure diphthongs was functional, representing a contrastive feature, that is, distinguishing a difference in meaning.

[80] Middendorf (1892: 49) says that the sound is reminiscent of the pronunciation of <au> as pronounced by Svabians when saying the word "Gaul".

The minimal pair Torero establishes is <ûp> 'salt' / <äp> 'chili pepper' (Torero 2002: 328). It needs to be noted that Torero (2002: 326) uses the symbol <û> to represent Middendorf's <ů>. Nevertheless, when inspecting the sources, one can see that Middendorf (1892: 62) registers <up> 'salt' and <äp> 'chili pepper' (Middendorf 1892: 61). This means that Middendorf's attested form for 'salt' <up> appears originally without the impure diphthong's symbol <ů>. In spite of this, Adelaar ([2004] 2007a: 323) assumes Torero's minimal pair to be valid and, after consulting Schumacher de Peña (1991: 7, 27, respectively), provides his own minimal pair extracted from Lehmann[81] ([1929a]1937; 1929b): <ǽp> 'chili pepper' / <u̯ŭp> 'salt'. Lehmann's word for 'salt' does not include Middendorf's impure diphthong <ů>. Lehmann's orthography instead suggests that the sequence <u̯ŭ> in <u̯ŭp> may have represented a long /u/.

As can be observed, Torero's minimal pair offers no proof for establishing the distinction between the two impure diphthongs proposed by Middendorf. First, Middendorf does not utilize the symbol <ů> for representing 'salt'. Secondly, if this minimal pair was to demonstrate that the vowel sounds involved in the terms for 'salt' and 'chili pepper' are contrastive, the meanings of these two words are not so distant from each other. Third, there is a verb <ůp-> 'to thresh' attested by Middendorf that, according to my analysis, may constitute, with <äp> 'chili pepper', the searched minimal pair. Furthermore, a relevant minimal pair that represents the distinction between <æ> and <u>

[81] Lehmann ([1929a]1937; 1929b) utilized a "strongly differentiated phonetic transcription", which is detailed in Lehmann (1920), in the first volume of his work Zentral-Amerika (Schumacher 1991: 4; Dürr 1993: 175). He used several special diacritics. Schumacher (1991: 27) clarifies that Lehmann writes <u> instead of <ui>.

would be the one I establish between <pæp> 'thread' (Carrera 1644: 172) and <pup> 'wood', 'stick' (Carrera 1644: 102).

As seen at the beginning of this section, both Carrera (1644) and Middendorf (1892) attempt to describe the pronunciation of the Mochica sixth vowel. Interestingly, also in Brüning's legacy, one also finds another impressionistic description of this vowel's sound. Brüning (1905-1924a: n.p.) describes the sound of the sixth vowel of the Eten variety. The symbol he chooses to represent it with is the same as the one proposed by Middendorf, <ů>, and he describes the sound as "a special word of Mochic that almost sounds like <ui> but pronounced as if one would be burping[82]". This description probably explains why Salas (2002) represents Brüning's <ů> as [uʔi], adding a glotal stop, e.g., <kůts> ['ku ʔits] 'wind' (Salas 2002: 29). Yet, oddly he also interprets the same <ů> as a long /uː/, as in the case of <ůts> ['uːts] 'drizzle' (Salas 2004: 69).

All these vague articulatory descriptions have led to intense debate in the academic community as to the pronunciation of this vowel. Each author argues for a different phonetic realization of the vowel, based on different interpretations of the aforementioned descriptions. Mochica is an extinct language with no available sound recordings; this is one reason why all existing articulatory descriptions of the pronunciation of the sixth vowel are impressionistic and vague. This is also why the phonetic realization of <æ> cannot be fully reconstructed and will remain hypothetical.

Some Mochica scholars observe allomorphic variation affecting the vowel <æ>. While Stark (1968), Torero (2002) and Salas (2002) adopt this approach,

[82] "ů= un vocablo especial del mochic que casi suena como ui, pero pronunciándola como eructando" (Brüning 1905-1924a: n.p.).

Adelaar ([2004] 2007a) and Hovdhaugen (2004, 2005) consider the sixth vowel as a reduced variant of several vowels. In his turn, Cerrón-Palomino (1995: 75-84) describes it as a high-mid front rounded vowel, /ø/. Based on the information provided by Middendorf and Carrera, Stark (1968: 24-25) believes that allomorphic variation occurs in the Mochica sixth vowel. According to her analysis, there is a complementary distribution of Middendorf's impure diphthongs <ů> and <ä>. The sound represented with <ů> is present "in initial syllable preceding a bilabial nasal or alveolopalatal semivowel, or in the environment of a velar stop" (Stark 1968: 25), while <ä> occurs elsewhere. In conclusion to her analysis, this author proposes the sixth vowel to be a high-mid central rounded vowel [ɵ], (in her own words: mid-central rounded vowel) (Stark 1968: 24-25).

Torero (2002: 326) suggests that Carrera used <æ> to represent "at least two distinct phonemes and various sounds characteristic of Mochica that differed greatly from the Spanish vowels". This way, in addition to Middendorf's impure diphthongs <ů> and <ä>, Torero (2002: 326) contemplates two more sound manifestations of the sixth vowel, an allophone of /u/ represented in Carrera as <u> and the sound corresponding to Middendorf's "impure u", which, according to the German scholar, was pronounced short and close to [ö] or [a] (Middendorf 1892: 49). Notwithstanding, Torero's interpretation (2002: 323, 328) is that <æ> represented a high central unrounded vowel, /ʉ/. Salas (2002: 144-148) assumes that the sixth vowel was a diphthong with allophonic character with the starting target of a mid-central vowel or schwa and the end target of a near high back rounded vowel, /əʊ/.

Adelaar ([2004] 2007a: 323), considering that Middendorf's impure diphthong <ä> "occurred in endings presumably unstressed as well as in roots", posits the question whether it may have been the product of

neutralization of several full vowels, rather than an allophone of them. He observes that the Mochica morphophonemic rule of vowel loss in unstressed open syllables always affects <ä>, and postulates that the product of this neutralization may have been "a schwa type of vowel". Furthermore, Adelaar (personal communication, April 24, 2019) postulates that this schwa type of vowel would most probably be /ə/ when occurring as an epenthetic vowel and when representing a syllabic nucleus, it would be like the Dutch diphthong <ui>, /œy̯/, present, for example, in <huis>, meaning 'house'. Besides these interpretations of the impure diphthong <ä>, Adelaar proposes that the vowel represented as <uu> in Lehmann ([1929a]1937; 1929b) may have been a long /u/ like the one present in South African and some Flemish dialects, as in the word <boer>, i.e. /ʉː/.

In the same vein, Hovdhaugen (2004: 10, 2005: 174-175) considers this sixth vowel to be a reduced variant of the other vowels except <a>. He enumerates several characteristics of this vowel. He observes that (a) <æ> never has an accent mark, which he observes as a sign for vowel length or stress; (b) <æ> is the only vowel that regularly is subjected to elision; and (c) <æ> may have been used as a buffer vowel in order to avoid unacceptable consonant groups. He concludes that the sixth vowel "seems most likely to have been a short, maybe reduced central vowel [ə]".

3.4.1. Phonological behaviour of the sixth vowel

The phonetic realization of <æ> has little consequence for the understanding of the Mochica grammar. An endeavor leading to more insight is to investigate the phonological behaviour of <æ>. By doing so, one can actually better understand the nature of this sound. In what follows, morphophonological and

typological evidence that sheds light on the phonological nature of the vowel will be presented.

As has previously been observed (Cerrón-Palomino 1995; Torero 2002), Mochica exhibits complex vowel alternations. Although thought to be components of a harmonic process, these alternations have not been explained previously. Let us begin by inspecting the cases of the vowel alternations in (12), triggered by genitivization. These cases, among others, are presented in Cerrón-Palomino (1995: 144). In the case of the demonstrative pronoun <mo>, the addition of the oblique-genitive suffix <-ng> seems to affect the vowel in the root. The suffix <-(i)ô> is, according to my interpretation, a possessive nominalizer (POSS.NMLZ), which I present in 4.1.4.2.1. The vowels of the interrogative pronouns <ech> and <eiñ>, inflected in oblique-genitive also differ from the vowel in the original root.

(12)

<mo> 'this'	+	genitivization	<mung(ô)> 'this.GEN'
<tzhang> '2SG'	+	genitivization	<tzhæng(ô)> 'yours'
<ech> 'what'	+	genitivization	<ich(ô)> 'of what'
<eiñ> 'who'	+	genitivization	<iñ(o)> 'whose'

As can be noticed in the examples, the vowel in the root gets raised: the high-mid front unrounded vowel /e/ is raised to become the high front unrounded vowel /i/, and the high-mid back rounded vowel /o/ becomes the high back rounded vowel /u/. The low front unrounded vowel /a/ becomes <æ>, which can safely be assumed to be a central vowel. Height harmony is the clear resulting phenomenon produced by the process of genitivization. Figure 6 illustrates this process.

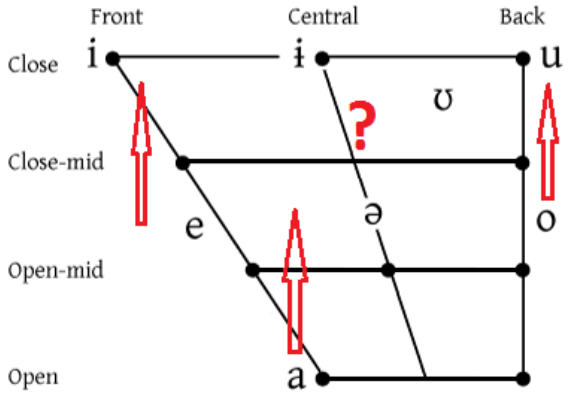

Figure 6. Representation of height harmony triggered by genitivization

The height specification of <æ> is revealed by another vowel alternation. The locative suffix <-æc> causes vowel raising, as shown in example (13). This case is also studied by Cerrón-Palomino (1995: 145), but so far no Mochica scholar has used this kind of information to establish the characteristics of <æ>.

(13)

<ssol>	'forehead'	+	<-æc> LOC >	<ssulæc>	'on the forehead'
<loc>	'foot'	+	<-æc> LOC >	<lucæc>	'on the foot'
<fon>	'nose'	+	<-æc> LOC >	<funæc>	'on the nose'

The added morpheme <-æc> must be able to raise the high-mid back rounded vowel /o/ to become the high back rounded vowel /u/. In this sense, it can be assumed to contain a [+high] feature, which spreads leftwards into the root. See Figure 7.

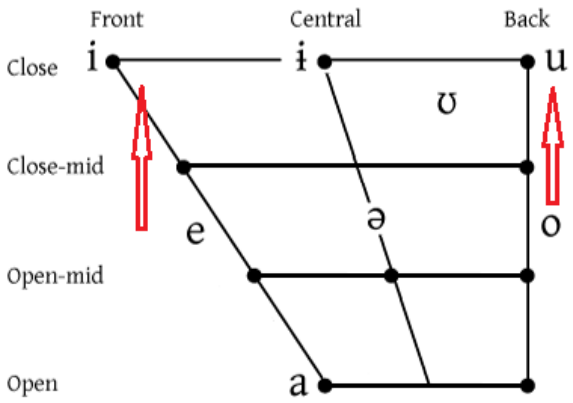

Figure 7. Representation of mid vowel raising (to [+ high]) in Mochica

Therefore, the best way to describe this vowel phonologically is as a central, high vowel, as shown in Figure 8.

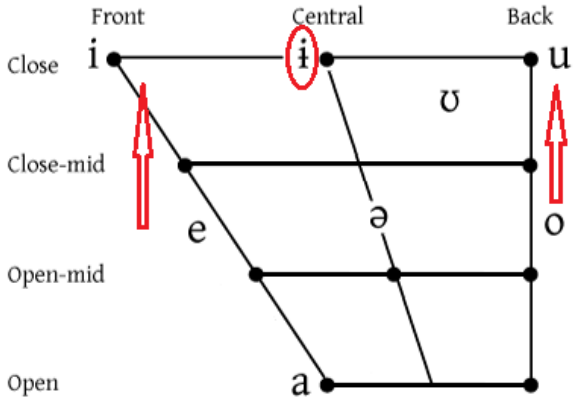

Figure 8. Representation of Mochica's sixth vowel as a central high vowel

The discussion about the sixth vowel has been so far mostly centered around its phonetic realization. In reality, the phonetic realization is secondary. The phonological behaviour of this vowel is more revealing about Mochica grammar. By looking at vowel harmony alternations in Mochica, one can

argue that the sixth vowel is a phonologically high and central vowel and one can hypothesize that it may have been /ɨ/. This would not be surprising typologically because /ɨ/ is found overwhelmingly in the languages of Peruvian Amazonian area, eastern Ecuador, and southern Colombia.

According to Aikhenvald (2012: 70), a typical Amazonian vowel system includes this vowel. It has been identified as a robust areal feature of the region. Mochica was spoken at the edge of this region. It is therefore not implausible that it also shared this areal feature. Based on this morphonological evidence and the typological criteria, I interpret the sixth vowel as a high and central vowel: /ɨ/. The South American Phonological Inventory Database (SAPhon) includes the Mochica inventory. Based on the analysis by Cerrón-Palomino (1995) and Torero (1997)[83], Michael et al. (2015) opt for the same vowel as I propose: /ɨ/. They justify this conclusion based on their evaluation of the description of the vowel quality in Torero and the "frequency of occurrence of this phoneme in languages of this area".

[83] Torero (1997) is presented in Torero (2002).

Table 4. Vocalic system of Colonial Mochica

Carrera 1644	Stark 1968	Cerrón-Palomino 1995	Torero 1997, 2002	Salas 2002	Hovdhaugen 2004, 2005	Adelaar [2004] 2007a	Eloranta 2013b	Michael et al. 2015
<a>	a, aː	a, aː	a	a	a	a, aː	a, aː	a, aː
<e>	e	e	e	e	e	e, eː	e, eː	e
<i>	i	i, iː	i	i	i	i, iː	i, iː	i, iː
<o>	o, oː	o, oː	o	o	o	o, oː	o, oː	o, oː
<u>	u, uː	u, uː	u	u	u	u, uː	u, uː	u, uː
<æ>	ɵ	ø	ʉ	ɘʊ	ɔ	ə, œ̂y	ɨ	ɨ

Table 4 summarizes what has been revealed so far about the different interpretations of the Mochica vocalic system and its sixth vowel, showing each interpretation according to the IPA system.

3.5. Mochica consonantal system

Considering the changes affecting the sibilants and palatals in Spanish, aids in interpreting Carrera's orthographic representations. Specifically, the devoicing and dissimilation of the sibilants and velarization of the old palatal fricatives are evident in the orthography. Unfortunately, Spanish orthography was in a chaotic state during the time when Mochica was described. This graphic situation actually stayed chaotic until 1713 when the *Real Academia Española* (Royal Spanish Academy) was created. After the creation of the Royal Spanish Academy, the *Diccionario de Autoridades* (Dictionary of Authority) appeared in 1726, along with the *Ortografía de la Real Academia* (Orthography of the Royal Academy) in 1741 (Rivas Zancarrón, in press). This makes the task of Mochica scholars challenging, as one must take into consideration that it is practically impossible to be sure about the orthography

taken to the other side of the Atlantic (Rivarola 2001: 20-21; Rivas Zancarrón, in press).

In what follows, I present specific changes relevant to the sibilants in the two coexisting varieties of Spanish between the mid 16th and 17th centuries. Those varieties correspond to the areas with or without distinction of /s/ and /θ/. Table 5 is created according to my interpretation of the philological studies of Spanish phonology (Lloyd ([1987] 1993: 521-547); Quilis ([1997] 2012: 56-57); Cano (2004: 833-848) and Alarcos Llorach (2012: 217-228)). Furthermore, in terms of Spanish variety, it is important to mention that I assume that the Spanish spoken by Oré (1607) and Carrera (1644) was most probably of the variety that tends not to distinguish /s/ and /θ/ (as in Andalucia and Hispano-America).

Table 5. Changes of Spanish sibilants and palatals during the mid 16th and mid 17th centuries

old orthographic symbol	**IPA symbols**			
	changes in areas of seseo (no distinction of /s/ and /θ/		changes in areas with distinction of /s/ and /θ/	
	mid 16th century	mid 17th century	mid 16th century	mid 17th century
<ç> / <z> (preceding e/i)	voiceless laminal dentalized alveolar sibilant /s̻/	voiceless alveolar sibilant /s/	voiceless laminal dentalized alveolar sibilant /s̻/	voiceless dental fricative /θ/
<s>, <ss> (initial position) <s> (intervocalic position)	voiceless apical alveolar sibilant fricative /s̺/		voiceless apical alveolar sibilant fricative /s̺/	voiceless apical alveolar sibilant fricative /s̺/
<x> <j>, <g> (preceding e, i)	voiceless palatal fricative /ʃ/, /ç/	voiceless velar fricative /x/	voiceless palatal fricative /ç/	voiceless velar fricative /x/

3.6. Difficulties with some Mochica sounds

The phonemic interpretation of some Colonial Mochica orthographic symbols differs greatly; this is the case of, first, the sibilants which were in a process of stabilization during the 16th and 17th centuries. The sibilants were represented by the symbols presented in Table 5: <ç> / <z>; <s>, <ss> and, second, the consonants represented by the innovations designed by Carrera (1644): the digraph <cu̱> and the trigraphs <tzh> and <xll>. Taking into account the orthographic symbols in Table 5, I will first present the interpretations regarding the Mochica consonants that are represented with the symbols: <ç> / <z>; <s>, <ss> and <x>.

3.6.1. The graph <x>

The orthographic symbol <x> corresponds to the fricative voiceless postalveolar fricative /ʃ/, which is proposed by every Mochica scholar, as can be seen in Table 6. Stark (1968: 15-16) does not offer a separate description and explanation for the grapheme <x> as she does for the other consonants. Nevertheless, Stark (1968: 24) analyzes the word <moix> and, following the Americanist phonetic notation, also known as the North American Phonetic Alphabet, interprets <x> as /š/, which stands for /ʃ/.

3.6.2. The pair <ç> / <z>

These orthographic symbols do not really create much confusion. Almost all authors coincide in interpreting the sound of these symbols as the voiceless alveolar fricative /s/ except for Stark (1968) and Hovdhaugen (2004, 2005). Stark (1968: 14) interprets these graphs as representing allophones of the voiceless postalveolar fricative /ʃ/. She states that the <ç> represented the voiceless alveolo-palatal fricative /ɕ/, and <z> the voiced alveolo-palatal fricative /ʑ/. This author bases her interpretation on the fact that these consonants "are usually preceded or followed by a vowel, plus high front glide". Along the same lines, because of the combination of this phoneme with the vowel /i/, Hovdhaugen (2004: 12, 2005: 178) assumes a probable postalveolar or palatal(ized) pronunciation and proposes to represent it as /sʲ/. Torero (1997: 110, 2002: 309) assumes that <ç> / <z> both correspond to what he identifies as a "fricativa predorsodental sorda" or the voiceless predorsodental fricative /s/.

3.6.3. The pair <s>, <ss>

The orthography provided by Oré (1607: 403-408) does not include <ss>; it only records <s>. Carrera offers the pair <s> / <ss> and with respect to how <ss> is pronounced, either in initial or final position, Carrera 1644 (n.p.) says "they [ss] have to be pronounced between them both, hurting on the last one as in ssonto, amoss."[84] In this respect, it is important to try to clarify the meaning of the verb "to hurt" in Carrera.

One needs to turn to Nebrija (1492), who provided the model of description for colonial grammarians to look for the meaning of 'to hurt'. Nebrija (1492: n.p.) states in his *Gramática castellana*, in the first book about *Orthographía* (Orthography), third chapter: "they were called vowels because they have voice by themselves without mixing with other letters, the others were called consonants because they cannot sound without **hurting**[85] the vowels". The explanation given by Carrera (1644), enlightened by the information by Nebrija (1492), leads to the hypothesis that <ss> sounded only when the second (last) <s> would affect the contiguous vowel. Apparently, Carrera did not intend to describe a strange sound at all. According to Table 5 and following the orthography of his time, this <ss> would represent the voiceless apical alveolar sibilant fricative /s̻/ or even the voiceless alveolar sibilant /s/.

Stark (1968: 13) has another, anachronistic interpretation and suggests that <s> and <ss> symbolize the Old Spanish opposition between the voiced laminal alveolar sibilant fricative /z̻/ and the voiceless laminal alveolar sibilant

[84] "Todas las dicciones que empeçaren, o acabaren cõ dos ss. se han de pronunciar entrãbasm hirie[n]do en la vltima como *ssonto, amoss.*" (Carrera 1644: n.p.).

[85] My own emphasis. Perona (2010: 28) mentions Nebrija's idea of "to hurt" exposed by Quilis.

fricative /s̪/. This opposition was present during the 13th and 14th centuries. During the 15th century, there was no such opposition, and both letters symbolized only /s̪/. During the 16th century, it was a voiceless apical alveolar sibilant fricative, /s̻/ in both areas with and without a distinction between /s/ and /θ/. In the 17th century, in the areas with a distinction between /s/ and /θ/ it remained /s̻/, but in the areas with *seseo* it became the voiceless alveolar fricative /s/, this latter one being the interpretation by Hovdhaugen (2004: 13, 2005: 178). Torero (2002: 309), Adelaar ([2004] 2007a: 329), and Eloranta (2013b) prefer to interpret <ss> as a voiceless apical alveolar sibilant, /s̻/.

Interestingly, some interpretations, such as those of Salas (2002) and Michael et al. (2015) suggest a voiceless retroflex sibilant fricative /ʂ/, probably following Cerrón-Palomino (1995: 103), who understands the use of "to hurt" as meaning to produce a strident sound. In general, in several colonial grammars describing new sounds, the verb "to hurt" represents more a place of articulation where the tongue touches some part of the mouth, either the palate or the teeth, etc. Carrera (1644) does not give any further information about it and because of this, I prefer to follow the idea that Carrera's description, using the word "hurt" only meant that the second <s> in the segment <ss> was the sound that affected the contiguous vowel.

3.7. Special combinations of letters

3.7.1. The digraph <cꝙ>

The digraph <cꝙ> is a clear case of an orthographic invention using a known graph in an innovative way. Carrera (1644: n.p.) explains that he uses an inverted <h> to emphasize the fact that the sound represented by <cꝙ> is different than the Spanish <ch>, which is the voiceless palato-alveolar affricate /t͡ʃ/. Carrera's weak description does not aid in the interpretation of

the sound, but with the information provided by Middendorf (1892: 51), one can assume that at least about two hundred years after Carrera's statement, the mentioned phoneme sounded "like <tj> in German".

According to Hovdhaugen (2004: 12, 2005: 179), this sound does not appear in a context preceding /i/, which leads him to conclude that it cannot be a palatalized affricate. Therefore, he proposes that it may be a voiceless retroflex sibilant affricate, /tʂ/. By contrast, Stark (1968: 11) suggests a voiceless palatalized alveolo-palatal /t̠ʲ/, as does Salas (2002). Torero (1997, 2002) comes to the conclusion that the sound may have been a palatalized velar stop and proposes /kʲ/. Eloranta (2013b) and Michael et al. (2015) propose a voiceless palatal stop /c/. A voiceless alveolo-palatal affricate /tɕ/ is proposed by Cerrón-Palomino (1995: 96). Adelaar ([2004] 2007a: 327, 329), following interpretations by Middendorf (1892), Torero (1986, 1997) and Cerrón-Palomino (1995), includes the following interpretations for the digraph <cu̯>: /kʲ/, /tʲ/ and /tᶜ/. Adelaar believes that this sound may have been more like /tʲ/ (Adelaar, personal communication, March 8, 2019).

3.7.2. The trigraph <tzh>

Carrera (1644 n.p.) states this trigraph represents a sound which is difficult to produce, and, giving examples such as <tzhang>, <tzhæich> and <tzhecan>, he says: "These [words] one pronounces starting with T, hurting on the Z and on the vowel, that comes after H, so that it does not say *cha* but *tzha*." Moreover, he also mentions the place of articulation of this consonant, by stating that the tongue touches the palate next to the teeth (I assume, in alveolo-dental position). The information by Middendorf (1892: 51) is revealing since he explains that this sound is similar to the German <z>, that is, /t͡s/. As Adelaar [2004] 2007a: 326) states, there is probably no reason not

to assume that <tzh> was the voiceless alveolar affricate /t͡s/. The same interpretation is offered by Stark (1968: 11), Cerrón-Palomino (1995: 89-92), Salas (2002), Eloranta (2013b), and Michael et al. (2015). Torero (2002: 311-312) assumes /t͡s/, but he considers /tʲ/, as well. Hovdhaugen (2004: 13, 2005: 179) believes that it is a palatalized voiceless alveolar affricate, /tsʲ/.

3.7.3. The trigraph <xll>

Carrera (1644: n.p.) attempts to describe how to pronounce the sound represented with the trigraph <xll>: "The X preceding consonant has to be pronounced hurting between both in a soft way, attaching the tongue to the palate, in such a manner that the sound of the first letter, the vowel, may come out through one side and the other of the mouth, like in xllon, xllaxll, xllipcon, xllecna." Stark (1968: 15) assumes this consonantal sound to be a voiceless palatalized alveolo-palatal fricative, or /ɕʲ/. Torero (2002: 322) describes the sound as a voiceless post-palatal lateral, /ʟ̝̊/ but its representation in his work appears as the phonetic symbol of a (post) alveolar palatalized click [!j]. This must clearly be a printing error. Hovdhaugen (2004: 13, 2005: 178-179) considers that this sound may have been a retroflex fricative /ʂ/. Cerrón-Palomino (1995: 109) calls it pre-palatal lateralized fricative but the symbol he uses to represent it, <ç̃ˡ>, appears to be a velar fricative in Cerrón-Palomino (1995: 123), /ɬ/ in IPA; the same interpretation is offered by Salas (2002), Eloranta (2013b) and Michael et al. (2015). Adelaar ([2004] 2007a: 329) suggests a palatalized lateral fricative, /ɬʲ/.

3.8. General agreement on some Mochica sound interpretations

With regard to the interpretations of the other consonants of the Mochica phonological system, there is common agreement on the presence of:

- Voiceless stops: the voiceless bilabial stop /p/, the voiceless alveolar stop /t/, and the voiceless velar stop /k/[86]. In addition, Hovdhaugen (2004: 13, 2005: 173) includes the voiceless retroflex stop /ʈ/ in the group of voiceless stops, as an interpretation of the sequence <tr>.
- The voiced alveolar stop /d/, excluding Stark (1968: 10), who proposes a voiced dental stop, /d̪/, and Hovdhaugen (2004: 12, 2005: 173), who proposes a voiced dental fricative, /ð/, as does Adelaar ([2004] 2007a: 329).
- Nasals: the voiced bilabial nasal /m/, the voiced alveolar nasal /n/, the voiced palatal nasal /ɲ/ and the voiced velar nasal /ŋ/. Torero (2002: 320, 322) is an exception, claiming that <ñ> represents a pre-palatal nasal for which he uses the symbol /nj/.
- A rhotic: the voiced alveolar trill /r/. Even though Hovdhaugen (2004: 13, 2005: 173) suspects that "it may as well have been a tap", he opts to propose the existence of just a trill. Stark (1968: 18) and Cerrón-Palomino (1995: 117-118) interpret <r> as the voiced alveolar flap /ɾ/ and <rr> as the voiced alveolar trill /r/.
- A voiceless labiodental fricative is proposed by Stark (1968: 12), Torero (2002: 316-317), Salas (2002), Hovdhaugen (2004: 12, 2005: 173) and Michael et al. (2015). Instead of a labiodental, a voiceless bilabial fricative /ɸ/ is assumed by Cerrón-Palomino (1995: 97-98), although it is also labeled as a biliabial, but represented as a labiodental /f/ (Cerrón-Palomino 1995: 123). Cerrón-Palomino (personal communication, March 13, 2019) confirms his

[86] In Carrera (1644) the voiceless velar stop is represented following the orthographic tradition of the Spanish language, that is, it is represented as <c> when followed by [a], [o], [u] and [æ], and as <qu> when followed by [e] or [i].

interpretation of <f> as /ɸ/, following two criteria: first, the Peruvian pronunciation of <f> and second, the way Spanish or Quechua loanwords with /w/ or /β/ have entered Mochica. Orthographically, they were represented with <f> or <v>. The same arguments are provided by Adelaar [2004] 2007a: 325), who proposes /f/ and /ɸ/. Eloranta (2013b), following Cerrón-Palomino and Adelaar, prefers the interpretation of the bilabial fricative /ɸ/.

- A glide: the voiced palatal approximant /j/.
- The fricative voiceless postalveolar fricative /ʃ/, which is proposed by all authors. Stark (1968: 15-16) does not offer a separate description and explanation for the grapheme <x> in the way she deals with the other consonants. Moreover, Stark (1968: 24) analyzes the word <moix> and interprets <x> as /š/, which is /ʃ/. For <x>, Stark (1968) offers two interpretations: /ç^{j}/ and /ʃ/.
- A voiceless palato-alveolar affricate, /t͡ʃ/, is proposed by everyone except for Stark (1968: 11), who proposes a "voiceless affricated alveolopatal stop" symbolized with /č/, which is the voiceless alveolo-palatal affricate, or /t͡ɕ/.
- Laterals: the voiced alveolar lateral approximant /l/ and the voiced palatal lateral approximant /ʎ/. Torero (2002: 318, 322) proposes /l/ and a "lateral cacuminal sorda", which I interpret as a retroflex lateral approximant, /ɭ/. In contrast to the voiced palatal lateral approximant proposed by the other Mochica scholars, Torero (2002: 318, 322) prefers to suggest a voiced pre-palatal lateral, /lj/.

In Table 6, I summarize the analysis of the phonological interpretations of Colonial Mochica prepared by various scholars.

Table 6. Phonological interpretations of Colonial Mochica

Carrera 1644	Stark 1968	Cerrón-Palomino 1995	Torero 2002	Salas 2002	Hovdhaugen 2004, 2005	Adelaar* [2004] 2007a	Eloranta 2013b	SAPhon 2015
<a>	a, aː	a, aː	a	a	a	a, aː	a, aː	a, aː
<e>	e	e	e	e	e	e, eː	e, eː	e
<i>	i	i, iː	i	i	i	i, iː	i, iː	i, iː
<o>	o, oː	o, oː	o	o	o	o, oː	o, oː	o, oː
<u>	u, uː	u, uː	u	u	u	u, uː	u, uː	u, uː
<æ>	ɵ	ø	ʉ	ɔʊ	ɔ	ə, œ͡y	ɨ	ɨ
<c/qu>	k	k	k	k	k	k	k	k
<ç/z>	ɕ / ʑ	s	s	s	sʲ	s	s	s
<ch>	t͡ɕ	t͡ʃ	t͡ʃ	t͡ʃ	t͡ʃ	t͡ʃ	t͡ʃ	t͡ʃ
<cɥ>	t̠ʲ	tɕ	kʲ	tʲ	tʂ	tʲ / tᵛ	c	c
<d>	d̠	d	d	d	ð	ð / θ	d	d
<f>	f	ɸ	f	f	f	f / ɸ	ɸ	f
<l>	l	l	l, l̩	l	l	l / ɬ	l	l
<ll>	ʎ	ʎ	lʲ	ʎ	ʎ	lʲ	ʎ	ʎ
<m>	m	m	m	m	m	m	m	m
<n>	n	n	n	n	n	n	n	n
<ñ>	ɲ	ɲ	ɲ	ɲ	ɲ	ɲ	ɲ	ɲ
<ng>	ŋ	ŋ	ŋ	ŋ	ŋ	ŋ	ŋ	ŋ
<p>	p	p	p	p	p	p	p	p
<r/rr>	ɾ/r	ɾ/r	r	r	r	ɾ/r	r	r
<s/ss>	z/s	ʂ	s̠	ʂ	s	s̠	s̠	ʂ
<t>	t	t	t	t	t	t	t	t
<tr>	-	-	-	-	ʈ	-	-	-
<tzh>	t͡s	t͡s	t͡s / tʲ	t͡s	tsʲ	tˢ / tˢ	t͡s	t͡s
<v>	u	u	u	u	u	u	u	u
<x>	ʃ	ʃ	ʃ	ʃ	ʃ	ʃ	ʃ	ʃ
<xll>	ɕʲ	ɬ	ʎ̊	ɬ	ʂ	ɬʲ	ɬ	ɬ
<y, j, i>	j	j	j	j	j	j	j	j

* Adelaar's column is based on Adelaar ([2004] 2007a: 321-329) but it also profited from Adelaar's revision and comments (Adelaar, personal communication, April 24, 2019).

I have standardized all interpretations using the symbols of the IPA. In the table, SAPhon (2015) corresponds to Michael et al. (2015) whose analysis is

based on the examination of the interpretations by Cerrón-Palomino (1995) and Torero (2002). Table 6 shows the Colonial Mochica sounds, interpreted on the basis of the information extracted from Carrera (1644).

3.9. Phonotactics and suprasegmental features

3.9.1. Syllable structure

Mochica has a (C)V(C) syllable structure and a tendency to have monosyllabic words. The language does not allow onset or coda consonant clusters while initial and medial syllabic consonant sequences do occur, as correctly first stated by Cerrón-Palomino (1995: 126-127) and followed by Hovdhaugen (2004: 15). It was first noted by Cerrón-Palomino (1995: 145-147), and formulated by Hovdhaugen (2004: 15), as well, that with regard to consonant sequences, a clear constraint prohibits the presence of /d/, (interpreted as /ð/ by Hovdhaugen, see Table 6.), as the second element in a consonant sequence. Considering, for instance, the past participle suffix <-do>, Cerrón-Palomino (1995: 145-146) (following Middendorf (1892: 141-142) and followed by Hovdhaugen (2004: 15)) states that an illicit consonant sequence in the case of a verb base ending in consonant and followed by /d/ would be avoided by the appearance (epenthesis) of an extra vowel. This vowel depends on the vowel of the root (Middendorf (1892: 141-142); Cerrón-Palomino (1995: 145); Hovdhaugen (2004: 15)). Other distributional constraints in Mochica were also first identified by Cerrón-Palomino (1995: 126) and followed by Hovdhaugen (2004: 15). The consonants <ng> /ŋ/ and <d> /d/ cannot occur word initially.

3.9.2. Stress

In relation to stress, the inconsistent use of the accent marks in all sources leads to various tentative interpretations. Stark (1968: 27) considers stress in Mochica unpredictable and therefore phonemic. She nevertheless assumes that it most often occured on the penultimate syllable. Cerrón-Palomino (1995: 133-138), after going over all Mochica material available, both from colonial and republican times (Oré 1607, Carrera 1644, Martínez Compañón 1783, Middendorf 1892, Brüning 1905-1924a, Brüning 1905-1924b and Lehmann 1929) concludes that the stress had a fixed, antepenultimate position. Hovdhaugen (2004:14) tries to interpret the use of accents by Carrera (1644) and determines that the stress fell on the vowel of the initial syllable. Cerrón-Palomino's antepenult and Stark's penult depart from assuming that the Mochica word had three syllables. I prefer to adopt Hovdhaugen's approach taking into consideration Mochica's preference for monosyllabic words which would explain that the accent may have always been on the root syllable.

3.9.3. Morphophonology

Cerrón-Palomino (1995: 139-150) identifies several morphonological processes, both vocalic and consonantal. This author concludes that nouns and verbs exhibit vowel alternations. Hovdhaugen (2004: 15-16) develops this topic very briefly. Cerrón-Palomino's seminal analysis of the Mochica morphophonological phenomena is the basis for my own analysis. In what follows, I adapt Cerrón-Palomino's analysis and add my own interpretation. Hereafter I will present the following processes: unstressed vowel syncope, vowel height harmony, epenthesis, apocope, and consonant alternation.

3.9.3.1. Vowel <æ> syncope

As Cerrón-Palomino (1995: 141) states, the process of genitivization or genitive inflection affects a root containing <æ> appears, causing syncopation. In (14) the examples clearly show how the root vowel gets elided after genitivization. Suffixes <ærr> / <ær> and <-e> are oblique-genitive suffixes. As stated in 3.4.1, the suffix <-(i)o> is a possessive nominalizer.

(14)

<mecherræc>	+	<-ær(ô)>	<mecherrcærr(ô)>	(Carrera 1644: 10-11)
			'the woman's'	
<ñofæn>	+	<-ær(ô)>	<ñofnær(ô)>	(Carrera 1644: 7)
			'the man's'	
<onæc>	+	<-ær(ô)>	<oncærr(ô)>	(Carrera 1644: 20)
			'the one's'	
<izçæc>	+	<-ær(ô)>	<izcær(ô)>	(Carrera 1644: 24)
			'everything's'	
<macɥæc>	+	<ær(ô)>	<macɥcær(ô)>	(Carrera 1644: 144)
			'the idol's'	
<ocæn>	+	<-e(io)>	<ocne(io)>	(Carrera 1644: 178)
			'the arm's'	
<motzhæn>	+	<-e(io)>	<motzhne(io)>	(Carrera 1644: 178)
			'the elbow's'	

Except for <mecherræc> all examples in (14) are bisyllabic words. Cerrón-Palomino (1995: 142) notices that not all words containing <æ> undergo apocopation when genitivized, see (15). According to Cerrón-Palomino's analysis, the constraint to the morphophonological rule of syncopation of vowel <æ> is determined by the context where it appears. Cerrón-Palomino suggests that the vowel does not get elided when more than one consonant

precede it. He gives the examples presented in (15) to support this constraint rule proposal (Cerrón-Palomino 1995: 142). In the following examples the vowel <æ> certainly does not collapse.

(15)

<focaltæc>	+	<-ær(ô)>	<focaltæcær(ô)>	(Carrera 1644: 178)
			'the shoulder's'	
<facatæc>	+	<-ær(ô)>	<facatæcær(ô)>	(Carrera 1644: 179)
			'the groin's'	
<ñotæn>	+	<-e(iô)>	<ñotæne(iô)>	(Carrera 1644: 177)
			'the eyebrow's'	
<chucæss>	+	<-e(iô)>	<chucæsse(io)>	(Carrera 1644: 179)
			'the knee's'	

Still, the proposed constraint rule gets violated in the following examples (16) presented in Cerrón-Palomino (1995: 142).

(16)

<fæpiçæc>	+	<-ær(ô)>	<fapizcær(ô)>	(Carrera 1644: 144)
			'the dream's'	
<catæn>	+	<-e(iô)>	<catne(iô)>	(Carrera 1644: 177)
			'the vagina's'	
<nossæn>	+	<-e(iô)>	<nossne(iô)>	(Carrera 1644: 177)
			'the knee's'	

Due to scarcity of examples, it is difficult to establish a reformulated rule that would complement Cerrón-Palomino's observation. Nevertheless, after examing the examples in (15) and (16), I conclude that the cluster, which would arise on syncope is illicit with regard to Mochica phonotactics because this would be the boundary syllable's onset. Mochica does not accept onset

consonant clusters. The resulting consonant sequence in the case of syncope of <æ> in the case of <focaltæc> 'shoulder' and <facatæc> 'groin' is <tc>. The same happens with several other body part terms that are formed with the locative nominalizer suffix <-tæc> / <-tærr> like <altærr> 'throat' (Carrera 1644: 178), <xemetæc> 'armpit' (Carrera 1644: 178), <xllontærr> 'stomach' (Carrera 1644: 180) and <caxlltæc> 'bladder' (Carrera 1644: 180), where their oblique forms do not have syncopation of <æ>. Moreover, Cerrón-Palomino (1995: 142) considers another more decisive factor that would generate this process of syncopation: the position of the vowel. Cerrón-Palomino suggests that vowel <æ> would be in an unstressed syllable. This suggestion matches perfectly with unstressed vowel loss, which is a common phonological process.

3.9.3.2. Vowel height harmony

Vowel height harmony is triggered by genitive inflection and the addition of the locative case suffix <-Vc>. A way to generalize this is to say that case (oblique and locative) causes vowel height harmony. The harmony caused by genitivization, however, differs from the one produced by the locative case marker. In genetivization, the vowel involved gets raised, as in example (17), while in the locative, the vowel involved undergoes a vowel height harmony process (18). The quality of this vowel gets raised through assimilation to the height of the vowel present in the locative suffix <-Vc>, which contains a [+high] feature. This [+high] feature spreads leftwards onto the root, see example (18). This suffix has different allomorphs, all of them containing a high vowel: <-ic>, <-ec> and <-æc>. With regards to the locative case, it needs to be said that it appears in Mochica to be non-productive (Hovdhaugen 2004: 23) prevailing in some lexicalized items such as spatial relation markers that

will be explained later in (6.4.2.2.). The examples in (18) all exhibit spatial relation markers.

Example (17) shows genitivized pronouns. The root vowel gets raised because of the effect of the genitivization process.

(17)

<moiñ>	'1SG'	+	genitivization	<mæ[87]iñ(ô)>	'mine'	(Carrera 1644: 16)
<tzhang>	'2SG'	+	genitivization	<tzhæng(ô)>	'yours'	(Carrera 1644: 17)
<çio>	'3SG'	+	genitivization	<çiung(ô)>	'his'	(Carrera 1644: 18)
<mo>	'this'	+	genitivization	<mung(ô)>	'of this'	(Carrera 1644: 18)
<aio>	'that'	+	genitivization	<aiung(ô)>	'of that'	(Carrera 1644: 19)
<eiñ>	'who'	+	genitivization	<iñ(o)>	'whose'	(Carrera 1644: 21)
<ech>	'what'	+	genitivization	<ich(ô)>	'whose'	(Carrera 1644: 21-22)

Spatial relation markers, which are lexicalized items, are shown in (18). These spatial relation markers consist of body part terms in combination with the locative suffix <-Vc>. The quality of the vowel of the locative suffix determines the quality of the vowel of the noun root. There is not much information about the actual meaning of these spatial relation markers, which function as adpositions according to Carrera (1644: 161). Carrera's texts inform us that <funæc>, literally, 'on the nose' and <lucɥæc>, literally, 'in the eyes' mean 'according to' and 'between', respectively.

[87] Even though the change <o> > <æ> does not appear an obvious case of vowel raising, I suspect that the vowel could have been heard like an /u/. Moreover, I believe, this example may support the idea that <æ> was not a diphthong but rather a simple vowel.

(18)

<ssol>	'forehead'	+	<-æc> LOC	>	<ssulæc>	'on the forehead'
<loc>	'foot'	+	<-æc> LOC	>	<lucæc>	'on the foot'
<fon>	'nose'	+	<-æc> LOC	>	<funæc>	'on the nose'
<locų>	'eye'	+	<-æc> LOC	>	<lucųæc>	'in the eyes'

3.9.3.3. Vowel epenthesis

In Cerrón-Palomino's analysis (1995: 145-148), this phenomenon is interpreted as harmony ("armonía"). Nevertheless, I consider it to be a clear case of epenthesis in both contexts analyzed by Cerrón-Palomino. Mochica phonotactics appears to force vowel epenthesis in order to break consonant clusters. According to Cerrón-Palomino's analysis, this is exemplified by the addition of the past participle suffix (PTCP) <-(V)d(o)> (see examples in (19)) and the agentive nominalizer suffix (AG.NMLZ) <-(V)pæc> (see examples in (20)). However, it should be mentioned that the <-(V)çVc> / <-(V)ssVc> event nominalizer also triggers vowel epenthesis (see examples in (21)).

Verbal stems ending in a vowel take the past participle suffix <-(V)d(o)>, while the verbal stems ending in a consonant need to add a vowel after the consonant. In (19) the first two examples represent the only two attested verbal stems ending in a vowel. In such a case, the past participle suffix is added without vowel epenthesis. The remaining examples are stems ending in consonant, where epenthesis occurs breaking consonant clusters.

(19)

<chi-	d(o)>	‘been’	(Carrera 1644: 32)
<funo-	d(o)>	‘eaten’	(Carrera 1644: 70, 119)
<man-	**a**d(o)>	‘eaten’, ‘drunk’	(Carrera 1644: 153, 167)
<al-	**a**d(o)>	‘descended’	(Carrera 1644: 219)
<t-	**e**d(o)>	‘come’	(Carrera 1644: 32, 118)
<ton-	**o**d(o)>	‘killed’	(Carrera 1644: 167)
<pui-	**u**d(o)>	‘ascended’	(Carrera 1644: 214)
<ai-	**æ**d(o)>	‘done’	(Carrera 1644: 148)
<fañ-	**æ**d(o)>	‘lied’	(Carrera 1644: 149)
<ñieñ-	**æ**d(o)>	‘played’	(Carrera 1644: 151)
<xemæc-	**æ**d(o)>	‘taken (away)’	(Carrera 1644: 155)
<eng-	**æ**d(o)>	‘said’, ‘wanted’	(Carrera 1644: 155)
<quesseç-	**æ**d(o)>	‘nailed’, ‘crucified’	(Carrera 1644: 213)

As the examples in (19) show, the verbal stems ending in a vowel do not require an epenthetic vowel, while the ones ending in a consonant do. The vowel can be either <a>, <e>, <o>, <u> or <æ>. The majority of the cases show an epenthetic <æ>.

The addition of the agentive nominalizer <-(V)pæc> to the verbal stem also triggers vowel epenthesis (20). When the verbal stem is a vowel, there is no epenthesis. When the verb stem ends in a consonant, there is need to break the consonant cluster. Therefore, vowel epenthesis occurs.

(20)

<chi-	pæc>	'the one who is'	(Carrera 1644: 36)
<funo-	pæc>	'the one who eats'	(Carrera 1644: 141)
<fam-	**a**pæc>	'the one who cries'	(Carrera 1644: 141)
<mit-	**a**pæc>	'the one who brings'	(Carrera 1644: 53)
<fil-	**a**pæc>	'the one who sits'	(Carrera 1644: 141)
<ai-	**a**pæc>	'the creator'	(Carrera 1644: 143)
<cụum-	**a**pæc>	'the drunk'	(Carrera 1644: 111)
<tun-	**a**pæc>	'the killer'	(Carrera 1644: 44)
<ac-	**a**pæc>	'the one who hears'	(Carrera 1644: 44)
<chim-	**a**pæc>	'the dancer'	(Middendorf 1892: 92)
<eng-	**a**pæc>	'the one who says'	(Middendorf 1892: 92)
<kall-	**a**pæc>	'the one who smiles'	(Middendorf 1892: 92)

The epenthetic vowel in all the cases presented in (20) is <a>. Interestingly, <a> vowel epenthesis is not the only morphophonological process occurring. It is clear that the verb root vowels in <mit-apæc>, <fil-apæc> and <tun-apæc> have undergone a vowel height harmony process where the vowel's quality is assimilated to the quality of the vowel present in the agentive nominalizer suffix <-Vpæc>, which contains a [+high] feature. The original verb roots are: <met-> 'to bring', <fel-> 'to sit' and <ton-> 'to kill'.

When the event nominalizer <-(V)çVc> / <-(V)ssVc> gets suffixed to verbal stems and the verb ends in a vowel, epenthesis does not occur. The verb stem ending in consonant triggers vowel epenthesis, as can be observed in (21). It is important to mention that there is orthographic variation between <-(V)çVc> and <-(V)ssVc>. Besides, in Carrera's texts there is alternation in the use of the orthographic representation <j> present in <aijçæc> (21), which could be used for the voiced palatal approximant /j/ or for the high front unrounded vowel /i/. The examples shown in (21) are all event nominalizations, I have translated most of them using an English *-ing* form.

(21)	<chi-	çæc>	'existence'	(Carrera 1644: 209)
	<funo-	çæc>	'eating'	(Carrera 1644: 238)
	<ac-	**a**ssæc>	'seeing'	(Carrera 1644: 241)
	<man-	**a**ssæc[88]>	'drinking'	(Carrera 1644: 251)
	<met-	**e**ssæc[89]>	'bringing'	(Carrera 1644: 25)
	<fæp-	**i**çæc>	'dream'	(Carrera 1644: 144)
	<læm-	**i**çæc>	'death'	(Carrera 1644: 229)
	<xam-	**i**çæc>	'sign'	(Carrera 1644: 198)
	<ap-	**i**çæc[90]>	'teaching'	(Carrera 1644: 206)
	<ai-	**j**çæc>	'creation'	(Carrera 1644: 237)
	<tæp-	**æ**ssæc>	'flogging'	(Carrera 1644: 219)
	<t-	**æ**çæc>	'coming, arrival'	(Carrera 1644: 233)

The following words violate the vowel epenthesis rule breaking up consonant clusters: <cqumepssæc> (Carrera 1644: 255), <rru cqup ssæc> (Carrera 1644: 219), <mañapssæc> 'reciting' (Carrera 1644: 206), <llop ssæc> 'stealing, theft' (Carrera 1644: 224), <nam ssæc> 'fall' (Carrera 1644: 241) and <ælssæc> 'sickness' (Carrera 1644: 216). Excepting the last case, these examples present the voiceless bilabial stop /p/ or the voiced bilabial nasal /m/ as the coda of the syllable preceding the event nominalizer. These consonants share the same place of articulation: bilabial. In the case of <ælssæc>

[88] In Carrera (1644: 238) <manassæc> 'drinking' appears also registered as <maniçæc>.

[89] In Carrera (1644: 25) <metessæc> 'bringing' appears also registered as <metiçæc>.

[90] The event nominalization of verb <ap-> 'teach' is also registered as <apaçæc> in Carrera (1644: 219).

'sickness' the coda consonant of the syllable preceding the nominalizer is the voiced alveolar lateral approximant /l/.

3.9.3.4. Apocope of <e>

Mochica has three invariant copulas as will be shown in 5.2. One of the three copulas is <fe> 'to be', which often appears apocopated as <-f>. In the case of the copula appearing apocopated it gets cliticized, as Cerrón-Palomino (1995: 149) states. Carrera (1644: 113) explains that, in order "to speak elegantly", one has to use this verb "syncopated". Carrera refers, in this manner, to the loss of the final vowel <e> of the verb <fe>. After apocope of <e>, the verb becomes a clitic <-f> phonologically dependent on the host it is attached to. Attested examples show the presence of this clitic bound to pronouns (22a) and (22b) and nouns (23). However, its most recurrent occurrence is when attached to the first element of the correlative conjunction that pairs up negative options, <ænta/ezta>, 'neither/nor' (24).

(22a) <Mofmæiñó> (Carrera 1644: 113)

Mo	=f	mæiñ-	ó
DEM.PROX	=COP	1SG.OBL-	POSS.NMLZ

'This is mine'

(22b) <Aiof chido> (Carrera 1644: 33)

Aio	=f	chi-	do
DEM.DIST	=COP	be-	PTCP

'That (he) has been'

(23) <Pedrongof> (Carrera 1644: 113)

Pedro-	ng-	o	=f

Pedro- OBL- POSS.NMLZ =COP

'It is Pedro's'

The translation of <Æntaf ezta> (24) is registered in Carrera (1644: 160) as 'It is not'. This correlative conjunction is constituted of two elements, namely <ænta> and <ezta>. Carrera (1644: 124) registers the meaning of the first element <ænta> 'no', the second element remains untranslated. However, I believe that the most appropriate translation is 'It is neither nor'. The acopocopated form of the verb <-f> appears always bound to the the first element.

(24) <Æntaf ezta> (Carrera 1644: 113)

Ænta =f ezta

Neither =COP nor

'It is neither nor'

3.9.3.5. Consonant alternation

Cerrón-Palomino (1995: 149-150) proposes three consonant variations: the change <c> > <r>, the variation <ss> > <l> and the alternation of the valence changing suffixes <æm>, <ær> and <æp>. This proposal is problematic because the suggested <ss> > <l> change does not really occur. Cerrón-Palomino's proposal is based on the misinterpretation of two nominalizers as a single one. Cerrón-Palomino assumes that <-(V)ssVc> and <lVc> are two representations of the same form. The latter one is actually a grammatical nominalizer that serves an adverbial function. With regard to the assumption of all the valence changing suffixes as variations is not adequate either, because they are actually three different suffixes.

The only case of consonant alternation, I consider here is the change <c> > <r>. It corresponds to the final consonant-changing rule <c> > <r>, which applies to three nominalizers, namely (a) <-Vc> place and instrumental nominalizer, see example (25), (b) <-(V)çVc> / <-(V)ssVc> event nominalizer, see example (26) and (c) <-tVc> locative nominalizer, see example (27). This rule applies to the final <c> of the involved nominalizer suffixes which become <r> when found possessed in a possessive construction.

The locative nominalizer <-tVc> is a segmental part of several body parts. Body parts are registered in Carrera (1644: 177-181) and some of the body part terms appear registered with the locative nominalizer variants <-tær>, <-tærr>. These are in fact possessed forms ending in <-r> that are registered without being in a possessive construction. This registration pattern seems to be common with regard to body part terms and gets explained because of the relational character of these terms that establish a part-whole relation, i.e. body part term-possessor's body relation.

In the *Arte* there are no examples of possessive constructions containing place and instrumental nominalizations, nevertheless Carrera (1644: 5) offers the pairs shown in (25) explicitly stating that the forms ending in <-r> are the possessed forms.

(25)

non-possessed form	**possessed form**	
<filuc> 'chair'	<filur>	(Carrera 1644: 5)
<ñeñuc> 'toy'	<ñenur>	(Carrera 1644: 5)
<cunuc> 'blanket'	<cunur>	(Carrera 1644: 5)
<catæc> '?'	<catær>	(Carrera 1644: 5)

In contrast to the place and instrumental nominalization, examples of <-(V)çVc> / <-(V)ssVc> event nominalizations in possessive constructions are common, as in (26). In (26) <læmiçæc> 'death' appears possessed with the final <c> converted into <r>.

(26) <Iesu Christong læmiçær> (Carrera 1644: 229)

Iesu Christo-	ng	læm-	içær
Jesus Christ-	OBL	die-	EVENT.NMLZ

'the death of Jesus Christ'

Examples in (27) illustrate some of the body part terms registered in Carrera (1644: 177-180). One can notice that some of them are registered as possessed because of the ending <r>.

(27)

<caxlltæc>	'bladder'	(Carrera 1644: 178)
<facatæc>	'groin'	(Carrera 1644: 178)
<pitær>	'esophagus'	(Carrera 1644: 178)
<xllontærr>	'stomach'	(Carrera 1644: 180)
<altærr>	'throat'	(Carrera 1644: 178)