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ON BACK AND FRONT VOWELS IN LATIN INSCRIPTIONS FROM SARDINIA

Summary: Despite the numerous studies carried out on Latin inscriptions from different parts of the Empire, up to date a complete quantitative analysis on the vowel alternations occurring in Latin inscriptions from Sardinia has not yet been carried out. However, such an investigation could shed light on the dynamics of the emergence of the Sardinian vowel system, where the ‘common romance’ mergers of *ĩ*, *ē* and *ũ*, *ō* did not take place. Therefore, we conducted a quantitative and qualitative analysis of the graphemic alternations ⟨O⟩ ~ ⟨U⟩ and ⟨E⟩ ~ ⟨I⟩ occurring in an epigraphic corpus containing the available Latin inscriptions from Sardinia. The alternations have been examined with reference to four variables: the proportion against standard spellings, the dating of the inscriptions, the position of lexical stress and the amount of other misspellings in the texts examined. The results show a vowel system which seems to foreshadow the Romance development of the Sardinian varieties from early times due to the low number of misspellings. The reconstruction of the sociocultural context of the inscriptions could help us to explain the distribution of the vowel alternations.

Key words: historical linguistics, Sardinian epigraphy, Latin, phonology

1. THE SARDINIAN VOWEL SYSTEM

As is well known, the most remarkable property of the vowel systems of the Romance languages is that none of them preserves Latin distinctive vowel quantity.¹ In particular, as far as stressed vowels are concerned, most Romance languages (e.g. Italian, French, Spanish, etc.) display the so-called ‘Common Romance vowel system’, which shows a merger of Latin /*ĩ*/ and /*ē*/ (on the front axis) and /*ũ*/ and /*ō*/ (on the back axis), as summarized in Figure 1.²

¹ LOPORCARO, M.: Phonological Processes. In MAIDEN, M. – SMITH, J. C. – LEDGEWAY, A. (eds): *The Cambridge History of the Romance Languages. Vol. 1: Structures*. Cambridge 2011, 109–154, here 110.

² This outcome do not apply to unstressed vowels where, as is well known, in the Common Romance vowel system /*ĩ*/, /*ē*/ and /*ě*/ merged to /*e*/ and /*ō*/, /*ō*/ and /*ũ*/ merged to /*o*/.

CLat.	ī	ĩ	ē	ě	ā	ǎ	ō	ō	ũ	ū
CR	i	e		ɛ	a		ɔ	o		u

Figure 1. Common Romance vowel system (stressed syllables)

However, this outcome has some notable exceptions: in Romanian, the merger took place only on the front axis (i.e. between /ĩ/ and /ē/); in the dialect of Castelmezzano (Lucania), /ĩ/, /ē/ and /ě/ merged to /e/, whereas /ō, ō/ and /ũ, ū/ merged to /o/ and /u/, respectively. Moreover, the Sicilian vowel system can be considered to be a development of the Common Romance vowel system due to the influence of Byzantine Greek, where the Proto-Romance /u, o/ and /e, i/ merged.³

Among these exceptions to the Common Romance vowel system the most striking one is Sardinian, where distinctive vowel quantity was lost but the mergers of /ĩ, ē/ and /ũ, ō/ did not occur, both in stressed and unstressed vowels (see Figure 2).

CLat.	ī	ĩ	ē	ě	ā	ǎ	ō	ō	ũ	ū
Sard.	i		ɛ		a		ɔ		u	

Figure 2. Sardinian vowel system (stressed and unstressed syllables)

In Sardinia, the vowel system illustrated above is shared nowadays by the Logudorese and Gallurese varieties; however, there is evidence that also the other varieties spoken in the island displayed it, such as Campidanese and Sassarese.⁴ This system is also displayed by the so-called ‘Lausberg area’ (Northern Calabria)⁵ and is thought to be once shared by African Latin as well, as shown by the testimony of Augustine (*De doctr. christ.* IV 10. 24), who reports that African uneducated speakers could not perceive the difference between *ōs(sum)* (‘bone’) and *ōs* (‘mouth’), and Consentius (Keil V 392), who illustrated how African speakers used to lengthen short vowels, such as in [‘pi:per] for CLat. *pīper* [‘piper].⁶

³ FANCIULLO, F.: Un capitolo della Romania submersa: il latino africano. In KREMER, D. (ed.): *Actes du XVIII^e Congrès International de Linguistique et de Philologie Romanes (Trier 1986)*, I. Tübingen 1992, 162–187.

⁴ LOPORCARO, M.: *Vowel Length From Latin to Romance*. Oxford 2015, 56. See also WAGNER, M. L.: *Fonetica storica del sardo, ristampa con traduzione, introduzione e appendice di G. Paulis*. Cagliari 1984, XIX ff., 41 ff.

⁵ For a more detailed discussion of these issues, which cannot be fully assessed here, see LOPORCARO: *Phonological Processes* (n. 1) 112 ff.

⁶ For a more detailed discussion on the interpretations provided on these passages, see LOPORCARO, M.: *Syllable, Segment and Prosody*. In MAIDEN, M. – SMITH, J. C. – LEDGEWAY, A. (eds): *The Cambridge History of the Romance Languages. Vol. 1: Structures*. Cambridge 2011, 50–108, here 55 ff. In accordance with Loporcaro’s interpretation, we hypothesize that Consentius referred to vowel length, as shown by the choice of the technical terms *correpta* and *producta*, and that Augustine referred to vowel lengthening in African Latin. These testimonies are also supported by the comparison between the errors on stressed and unstressed vowels in metrical inscriptions from Africa (1st–4th centuries CE) and from Rome, which points to an early loss of vowel quantity in African Latin according to HERMAN, J.: *Un vieux dossier réouvert: les transformations du système latin des quantités vocaliques* (1982). In HERMAN, J.:

Scholars have long argued about the causes of the characteristic outcome of the Sardinian vowel system. Traditionally, it is believed that these varieties were conservative, since Sardinia was an isolated area and therefore more likely to have archaic features.⁷ However, more recently some scholars have suggested that this vowel system could instead be an innovation: for example, Franco Fanciullo⁸ suggested that this outcome could be due to the inability of the inhabitants of Sardinia to perceive the opposition between the long and short counterparts of the phonemes.

For this reason it is interesting to verify whether the Latin inscriptions from the island foreshadow this process.

It is thus worth examining the vowel alternations ⟨E⟩, ⟨I⟩ / ⟨O⟩, ⟨U⟩ in these texts: as is well known, alternations such as the use of ⟨E⟩ for /ī/ (e.g. *menus* for *minus*) and ⟨O⟩ for /ū/ (e.g. *sob* for *sub*) could be due to a qualitative similarity of Lat. /ī/, /ē/ and /ū/, /ō/ from early times,⁹ thus pointing to the existence of a vowel system of the ‘Common Romance’ type in Sardinia. On the contrary, the absence of such alternations, when not due to a high level of literacy of those involved in the crafting of the inscriptions, could indicate a vowel system which foreshadows the Romance outcome of the Sardinian varieties.

This type of analysis has been partially carried out by József Herman¹⁰ and Giovanni Lupinu,¹¹ whose results point to a scarcity of vowel mergers in Sardinia.

Firstly, József Herman¹² examined the vowel alternations occurring in Latin inscriptions from the island dating back mainly to the 3rd and 4th centuries CE. His results show a vowel system which seems to foreshadow the Romance outcome of the Sardinian variety, especially in stressed syllables. These results are confirmed by the qualitative analysis performed by Giovanni Lupinu¹³ on the Christian inscriptions from the island.

Finally, Herman¹⁴ compared the number of deviant spellings involving vowels in a number of Christian inscriptions from Sardinia with the number of consonantal

Du latin aux langues romanes. Études de linguistique historique. Réunies par S. KISS. Tübingen 1990, 217–231.

⁷ See e.g. LAUSBERG, H.: *Linguistica Romanza. Vol. 1: Fonetica.* Transl. by N. Pasero. Milano 1971, 203–204.

⁸ FANCIULLO (n. 3) 180–181.

⁹ ALLEN, W. S.: *Vox Latina: A Guide to the Pronunciation of Classical Latin.* Cambridge 1978, 49. On this subject see also, among others, LOPORCARO: *Syllable* (n. 6) 57–59 and ADAMS, J. N.: *Social Variation and the Latin Language.* Cambridge 2013, 43.

¹⁰ See HERMAN, J.: *Témoignage des inscriptions latines et préhistoire des langues romanes: le cas de la Sardaigne* (1985). In HERMAN, J.: *Du latin aux langues romanes. Études de linguistique historique.* Réunies par S. KISS. Tübingen 1990, 183–194; and HERMAN, J.: *Differenze territoriali nel latino parlato dell’Italia: un contributo preliminare.* In HERMAN, J. – MARINETTI, A. (eds): *La preistoria dell’italiano. Atti della Tavola Rotonda di Linguistica Storica. Università Ca’ Foscari di Venezia 11-13 giugno 1998.* Tübingen 2000, 123–135.

¹¹ LUPINU, G.: *Latino epigrafico della Sardegna. Aspetti fonetici.* Nuoro 2000.

¹² HERMAN: *Témoignage* (n. 10) 185–189.

¹³ LUPINU (n. 11) 23–33.

¹⁴ HERMAN: *Differenze territoriali* (n. 10) 129–132.

misspellings. The results point to a scarcity of vowel alternations, with only 16% of the deviant spellings involving vowels.¹⁵

The examinations illustrated so far yield interesting results; however, a complete quantitative analysis of the entire number of epigraphic texts from Sardinia has not yet been performed. For this reason we decided to extend the quantitative analysis to all the Latin inscriptions from the island, with the aim of casting light on the Romance development of the Sardinian vowel system. As will be shown in the following paragraphs, the error rate has been calculated against the corresponding correct spellings (i.e. occurrences of ⟨l⟩ for /ī/ and /ĩ/, ⟨E⟩ for /ē/ and /ě/ etc.). This methodology will enable us to verify whether the scarcity of vowel alternations from Sardinia is due to the relatively limited number of tokens with respect to other areas of the Empire.¹⁶ Moreover, the literacy level of those involved in the crafting of the inscriptions has been considered (see §3.2) in order to exclude that the absence of deviant spellings could be due to the writers' high degree of literacy. Finally, lexical stress and dating of the inscriptions have been taken into account as variables.

In order to perform this analysis, an annotated epigraphic corpus containing all the available inscriptions from Sardinia has been constructed, as will be shown in the following paragraph.

2. THE CORPUS

2.1. Composition

The analysis presented in this paper has been conducted on an annotated epigraphic corpus which gathers Latin inscriptions from Sardinia; when available, the dating of the texts ranges between the 1st century BCE and the 7th century CE. The corpus is provided with extra- and metalinguistic information which allows us to analyze the spelling variants occurring in the inscriptions, with the aim of interpreting them with reference to extralinguistic variables such as the dating and the provenance of the texts. The corpus will be part of the *CLaSSES* database (Corpus for Latin Sociolinguistic Studies on Epigraphic textS),¹⁷ which gathers various types of non-literary Latin texts (inscriptions, writing tablets, letters) of different periods and provinces of the Roman Empire.¹⁸

¹⁵ HERMAN: *Differenze territoriali* (n. 10) 129–130.

¹⁶ HERMAN: *Témoignage* (n. 10) 184.

¹⁷ The database is developed at the Department of Philology, Literature and Linguistics of the University of Pisa and is accessible online: <http://classes-latin-linguistics.fileli.unipi.it/>.

¹⁸ At the time of writing, the database contains more than 1200 inscriptions, mainly from Rome and Central Italy, 200 ink-written tablets from Vindolanda and 219 letters from the North-African and Near-East areas. For a more exhaustive illustration of the corpus, see MAROTTA, G.: *Talking Stones. Phonology in Latin Inscriptions*. *SSL* 53.2 (2015) 39–64; MAROTTA, G.: *Sociolinguistica storica ed epigrafia latina. Il corpus CLaSSES I*. *Linguarum Varietas* 5 (2016) 145–160; DE FELICE, I. – DONATI, M. – MAROTTA, G.: *CLaSSES: A New Digital Resource for Latin Epigraphy*. *Italian Journal of Computational Linguistics* 1.1 (2015) 119–130.

The epigraphic texts from Sardinia have been selected through the examination of the main collections of Latin inscriptions from the island, i.e. *Corpus Inscriptionum Latinarum X* (fasc. I, section *Pars posterior inscriptiones Siciliae et Sardiniae comprehendens*);¹⁹ *Ephemeris Epigraphica VIII* (section *Additamenta ad Corporis vol. IX et X*)²⁰ and the collections edited by Giovanna Sotgiu.²¹

Among the texts available for this province (ca. 2.000), the inscriptions considered not to be relevant for linguistic analysis have been excluded. Therefore, fragmentary texts and inscriptions composed only of single letters and initials have not been included.

Therefore, the corpus contains 1.168 inscriptions (14.212 tokens). As mentioned above, the dated inscriptions cover a broad time span, from the 1st century BCE to the 7th century CE: the majority of them date back to the 1st–3rd century CE, before the end of the Roman influence and the conquest of the island by the Vandals in 455 CE²² and, subsequently, their defeat and the start of the Byzantine domination in 533–534 CE.²³

It is worth noting, however, that this information was available only for 616 texts (9.379 tokens): as is well known, the dating of inscriptions can, in many cases, be highly problematic.²⁴

2.2. Annotation

All the selected texts have been digitalized; the entire corpus was tokenized and an index was created, so that each token (i.e. a string of contiguous characters between two spaces) is univocally associated with a token-ID containing the epigraphic collection and the number of the inscription, as well as the position of the token within the text.

The innovative aspect of our corpus is the linguistic analysis of the tokens, which focuses on the graphemic/phonological aspects of the language. The deviant spellings, i.e. spellings which do not conform to the Classical norms, were manually retrieved and classified according to the type of variation phenomena that distinguish them from the corresponding classical equivalents. The phenomena identified involve vowels, consonants and morpho-phonology (i.e. involving morphological endings):

¹⁹ Henceforth *CIL X*.

²⁰ Henceforth *EE VIII*.

²¹ SOTGIU, G.: *Iscrizioni Latine della Sardegna (Supplemento al Corpus Inscriptionum Latinarum, X e all'Ephemeris Epigraphica, VIII)* I. Padova 1961; SOTGIU, G.: *Iscrizioni Latine della Sardegna, II: Instrumentum domesticum. I. Lucerne*. Padova 1968; SOTGIU, G.: L'epigrafia latina in Sardegna dopo il *CIL X* e l'*EE VIII*. In *ANRW II.11.1*. (1988) 552–739.

²² BLASCO FERRER, E.: *Storia linguistica della Sardegna*. Tübingen 1994.

²³ SPANU, P.G.: L'età vandolica. In MASTINO, A. (ed.): *Storia della Sardegna Antica*. Nuoro 2005, 499–509, here 506–507; BLASCO FERRER, E.: Il latino e la romanizzazione. In BLASCO FERRER, E. – KOCH, P. – MARZO, D. (eds): *Manuale di linguistica sarda*. Berlin–Boston 2017, 85–103.

²⁴ For a detailed insight on the main issues connected to the dating of epigraphic texts, see COOLEY, A. E.: *The Cambridge Manual of Latin Epigraphy*. Cambridge 2012, 398 ff.

for each level, the different types of linguistic phenomena have been tagged through specific labels. In particular, the categories adopted for classification are the following:

- vowels: alternations (<E> for <I>, <I> for <E>, <O> for <U>, <U> for <O>), presence of *I longa* or *apex*, gemination, syncope, epenthesis, monophthongization *ae > e*, archaic spellings of diphthongs (<AI> for <AE>, <OE> for <U>) and presence of diphthongs for long vowels (<EI> for /i:/, <AE> for /e:/).
- consonants: /<V> confusion (for <V> or <V> for), omission of final consonants (<S>, <M>, <T>), deletion, insertion, assimilation, dissimilation, spurious gemination, degemination, confusion between voiceless and voiced stops, omission of <H>, use of the graphemes <K> and <Q> for <C>.

It is important to highlight the fact that we did not annotate the misspellings which were presumably due to extralinguistic reasons, such as the state and the dimension of the support. For example, we did not label as deviant spellings instances of omission of graphemes at the end of the line if the support was damaged.

This corpus will enable us to shed light on the vowel alternations in the inscriptions from Sardinia, as will be shown in the following paragraph, which focuses on the confusions between <E>/<I> and <O>/<U> in the corpus.

3. THE DATA

3.1. Error rate

In Sardinia, the number of vowel alternations is very low: this is particularly evident when measuring the error rate against the number of the corresponding correct spellings. In Tables 1 and 2, all the types of <E>/<I> and <O>/<U> alternations have been examined, following the ‘full version’ of the methodology proposed by Herman²⁵ and by Adamik.²⁶ In Tables 3 and 4, the analysis is restricted to the instances of <E> for /i/, <O> for /ū/ (and their corresponding inverse spellings, i.e. <I> for /ē/ and <U> for /ō/), which could point to a ‘Common Romance’ development. Moreover, in the qualitative analysis (cf. §3.4), the different types of misspellings will be addressed separately.²⁷

As shown in Table 1, only 19 tokens show <E> for <I>, which amount to 0.3%; on the back axis, only 5 tokens show <O> for <U> (0.2%). A similar picture emerges

²⁵ HERMAN, J.: Aspects de la différenciation territoriale du latin sous l’Empire (1965). In HERMAN, J.: *Du latin aux langues romanes. Études de linguistique historique*. Réunies par S. KISS. Tübingen 1990, 10–28.

²⁶ ADAMIK, B.: A Study on the Dialectology of Vulgar Latin Vocalic Mergers: The Interaction between Confusion of Vowel Quality, Syncope and Accent. In GARCÍA LEAL, A. – PRIETO ENRIALGO, C. E. (eds): *Latin vulgaire – latin tardif XI: XI Congreso Internacional sobre el Latín Vulgar y Tardío (Oviedo, 1–5 de septiembre de 2014)*. Hildesheim – Zürich – New York 2017, 183–194.

²⁷ On this methodology and the issues connected with the instances of /ē/ for <I> and /ō/ for <U>, see ADAMIK (n. 26) 182.

from the analysis of the mid-high vowels (Table 2): 8 tokens show ⟨I⟩ for ⟨E⟩ (0.2%); on the back axis, the number of occurrences of ⟨U⟩ for ⟨O⟩ amounts to 8 tokens (0.3%).

/ĩ/			/ũ/		
Grapheme	Tokens	%	Grapheme	Tokens	%
⟨E⟩	19	0.3%	⟨O⟩	5	0.2%
⟨I⟩	6243	99.7%	⟨U⟩	2696	99.8%
Total	6262	100%	Total	2701	100%

Table 1. Graphic representation of /ĩ/, /ũ/ in the corpus

/ẽ/			/õ/		
Grapheme	Tokens	%	Grapheme	Tokens	%
⟨I⟩	8	0.2%	⟨U⟩	8	0.3%
⟨E⟩	3421	99.8%	⟨O⟩	2334	99.7%
Total	3429	100%	Total	2342	100%

Table 2. Graphic representation of /ẽ/, /õ/ in the corpus

The percentages are still very low when the different types of vowel alternations are examined separately. In particular, Tables 3 and 4 show the percentages concerning the instances of ⟨E⟩ for /ĩ/, ⟨O⟩ for /ũ/ and their corresponding inverse spellings, i.e. ⟨I⟩ for /ẽ/ and ⟨U⟩ for /õ/. Vowel length has been annotated automatically with the Latin Macronizer developed by Johan Winge. In this way, it has been possible to obtain estimated percentages against the corresponding correct spellings.²⁸

/ĩ/			/ũ/		
Grapheme	Tokens	%	Grapheme	Tokens	%
⟨E⟩	16	0.4%	⟨O⟩	3	0.1%
⟨I⟩	3890	99.6%	⟨U⟩	2238	99.9%
Total	3906	100%	Total	2241	100%

Table 3. Graphic representation of /ĩ/, /ũ/ in the corpus

²⁸ The tool is available online at (<http://alatius.com/macronizer/>). The macronization is performed using a part-of-speech tagger (RFTagger) trained on the Latin Dependency Treebank, with macrons provided by a customized version of the Morpheus morphological analyzer. The expected accuracy on an average Classical text is estimated to be about 98% to 99%. Due to the brevity and the layout of epigraphic texts, we are aware that the accuracy of the tool could decrease when inscriptions are analyzed. For this reason, we reserve to deal with this issue in the near future.

/ē/			/ō/		
Grapheme	Tokens	%	Grapheme	Tokens	%
⟨I⟩	1	0.1%	⟨U⟩	6	0.4%
⟨E⟩	1059	99.9%	⟨O⟩	1431	99.6%
Total	1060	100%	Total	1437	100%

Table 4. Graphic representation of /ē/, /ō/ in the corpus

As is shown in the tables, the percentages are still very low: the cases of ⟨E⟩ for /ī/ amount to 0.4% (i.e. 16 tokens against 3890 correct spellings); the instances of ⟨O⟩ for /ū/ amount to 0.1% (i.e. 3 tokens against 2238 correct spellings). The picture is similar for the corresponding inverse spellings, with only one case of ⟨I⟩ for /ē/ (i.e. 0.1%) and 6 instances of ⟨U⟩ for /ō/ (i.e. 0.4%).

As far as the other types of alternations are concerned, there are no instances of ⟨O⟩ for /ū/ and only one case of ⟨E⟩ for /ī/ (against 2353 corresponding correct spellings) and ⟨U⟩ for /ō/ (against 903 corresponding correct spellings). Finally, our corpus shows 6 cases of ⟨I⟩ for /ē/ against 2362 corresponding correct spellings (i.e. 0.2%), most of which have a morphological explanation, as will be illustrated in more detail in section 3.4.

These percentages show that the vowel alternations under analysis are very rare in the island. This is particularly evident when comparing the data with e.g. the ones provided by Gaeng²⁹ in his analysis of the phenomenon in the inscriptions from Roman Gaul (4th–6th c. CE), where the same methodology for calculating the error rate is adopted. Indeed, Gaeng's data show a strong presence of the phenomenon in Gaul: the instances of ⟨O⟩ for /ū/ amount to 57.5% in *Lugudunensis* and 30.2% in *Narbonensis* (73 tokens out of 127 and 35 out of 116, respectively), and those of ⟨E⟩ for /ī/ amount to 30% both in *Lugudunensis* and *Narbonensis* (61 tokens out of 199 and 46 tokens out of 152, respectively).³⁰

For this reason, given the scarcity of alternations in Sardinia in comparison with other areas of the Empire, the mergers between /ī, ē/ and /ū, ō/ seem not to have taken place on the island, in a manner coherent with the Romance development of the Sardinian varieties.

²⁹ GAENG, P. A.: *An Inquiry into Local Variations in Vulgar Latin*. Chapel Hill 1968.

³⁰ If we accept the hypothesis of a continuity between the processes occurring in Archaic and Late Latin (cf. MAROTTA: *Talking Stones* [n. 18] 51–52), it is possible to compare our data with the ones provided by Giovanna Marotta in her analysis of the phenomenon in a set of inscriptions from Rome and Italy dating from 350 to 150 BCE, where the same methodology for calculating the error rate is adopted (MAROTTA: *Talking Stones* [n. 18] 52 ff.). The hypothesis of a continuity between the two processes is a debated issue, which cannot be fully addressed here (for an overview of the question see e.g. LOPORCARO: *Syllable* [n. 6] 57 ff.). However, it is interesting to note that also Marotta's data show a higher presence of the phenomenon than in Sardinia: the instances of ⟨O⟩ for /ū/ amount to 64% (298 tokens out of 464), and those of ⟨E⟩ for /ī/ to 13% (70 tokens out of 542); moreover, in many cases these forms could not be considered to be archaisms (such as in words belonging to the everyday life of Roman people, e.g. *pocolom* for *poculum*).

3.2. Literacy

As shown in the previous paragraph, the methodology of calculating the error rate as a percentage against the total number of correct spellings can be applied to examine linguistic variation in Latin inscriptions from Sardinia. However, this procedure does not account for the level of literacy of those involved in the crafting of the inscriptions. The literacy level is instead of great importance for avoiding conclusions based on ‘negative evidence’, i.e. on the absence of a phenomenon in a given corpus. In principle, if the level of literacy of the writers was high, the lack of deviant spellings in the inscriptions could not be taken as a reflection of their pronunciation, but only of their knowledge of the classical norms.

As Adams³¹ and Clackson³² pointed out, one of the most problematic aspects when dealing with inscriptions is to determine their authorship, since the following participants could be involved in their crafting:

- the commissioner of the inscription;
- the person who composed the text;
- the engraver who cut the text into the stone;
- the *ordinator*, who traced the letters on the stone in order to be engraved by the lapicide.³³

Establishing the number and identity of the participants involved in the crafting of an inscription is therefore problematic, if not impossible, since only rarely is any explicit reference made to its authorship, especially in non-official texts.³⁴ Different possibilities should be taken into account: even if up to four different people could be responsible for the text, in some cases the inscription could have been crafted by only one person, who both drafted and carved it; in other cases, the commissioner could have written a draft of the text, which was then carved by a lapicide, or the latter could have both written and carved it.³⁵

The degree of error found in the texts could therefore differ in relation to the number and degree of education of the participants: both the drafters and the commissioners could have different degrees of education and orthographic competence, and the engraver could have been illiterate.³⁶ The degree of error would probably be reduced if the drafter and the stonemason were professionals,³⁷ but several other factors should also be taken into account, such as the eventual check by the author,

³¹ ADAMS, J. N.: *Bilingualism and the Latin language*. Cambridge 2003, 84–93.

³² CLACKSON, J.: Latin Inscriptions and documents. In CLACKSON, J. (ed.): *A Companion to the Latin Language*. Cambridge 2011, 29–39, here 36.

³³ SOLIN, H.: Che cosa possono dire agli studi linguistici iscrizioni e graffiti?. In MOLINELLI, P. – PUTZU, I. (eds): *Modelli epistemologici, metodologie della ricerca e qualità del dato. Dalla linguistica storica alla sociolinguistica storica*. Milano 2015, 13–36.

³⁴ ADAMS: *Bilingualism* (n. 31) 85.

³⁵ ADAMS: *Bilingualism* (n. 31) 84–88.

³⁶ MAROTTA: *Talking Stones* (n. 18) 43.

³⁷ ADAMS: *Bilingualism* (n. 31) 88.

which could be lacking, or the degree of education of the customer in checking the text.³⁸

In order to take into account the writers' literacy level, the methodology proposed by Béla Adamik³⁹ has been adopted, and the percentage of the alternations has been calculated against the total number of other deviant spellings occurring in the corpus.⁴⁰ This approach lies on the assumption that, by taking into account only the inscriptions with at least one misspelling, it is possible to examine only the texts produced by speakers which had uncertainties in (at least) one other point of the language. As a consequence, the absence of vowel alternations in these texts could be due to a correspondence between the classical norms and the pronunciation of those involved in the crafting of the inscription. The results are summarized in Table 5.

	Tokens	%
Vowel alternations	40	4.6%
Other deviant spellings	823	95.4%
Total	863	100%

Table 5. Literacy and vowel alternations in Sardinia

As shown above, the percentage of vowel alternations is very low: taking into account all the available Latin inscriptions from the island, the deviant spellings involving vowels amount only to 4.6%.

In order to have a clearer picture of the phenomenon, we decided to perform a more fine-grained analysis on the 616 dated inscriptions included in the corpus, subdividing them into different periods that correspond to the different dominations in Sardinia (i.e. the Roman period, the Vandal domination and the Byzantine conquest; Table 6).

	1st BCE–3rd CE		4th–5th CE		6th–7th CE	
	Tokens	%	Tokens	%	Tokens	%
Vowel alternations	17	3.5%	12	7.9%	4	5.5%
Other deviant spellings	476	96.5%	140	92.1%	69	94.5%
Total	493	100%	152	100%	73	100%

Table 6. Diachronic evolution of the process

³⁸ MAROTTA: *Talking Stones* (n. 18) 43.

³⁹ ADAMIK, B.: In Search of the Regional Diversification of Latin: Some Methodological Considerations in Employing the Inscriptional Evidence. In BIVILLE, F. ET AL. (eds): *Latin vulgaire – Latin tardif IX. Actes du IX^e colloque international sur le latin vulgaire et tardif*, Lyon, 6–9 septembre 2009. Lyon 2012, 123–139, esp. 134 ff.

⁴⁰ Examples of other types of deviant spellings taken into account are the following: deletion of consonants (final ⟨s⟩, ⟨m⟩, ⟨t⟩, etc.), insertion of vowels or consonants, monophthongization, dissimilation, non-etymological gemination, degemination, confusion between voiced and voiceless stops, loss or insertion of ⟨h⟩, confusion between ⟨b⟩ and ⟨v⟩.

As shown in the Table, the percentage of vowel alternations is very low in each period. Though the amount of confusions slightly increases in the 4th century (7.9%), it decreases again in the 6th (5.5%).⁴¹ Therefore, we cannot observe a growing amount of vocalic misspellings, which could point to an undergoing phonetic process.⁴²

3.3. Stress

Lexical stress has also been taken as a variable in this analysis, in order to investigate the possible interaction between vowel mergers and lexical stress in Sardinia.⁴³ Therefore, the proportion between the vowel mergers occurring in stressed and unstressed syllables has been calculated, as shown in Table 7.

Prosodic context	Tokens	%
Stressed syllable	5	12.5%
Unstressed syllable	35	87.5%
Total	40	100%

Table 7. Vowel alternations and lexical stress

The results of the analysis show that the vowel alternations affect predominantly unstressed syllables (87.5%), and vowel qualities are better preserved under stress (12.5%). Therefore, the proportion between the vowel mergers in stressed and unstressed syllables is 1:7. As illustrated by Herman,⁴⁴ statistically in a given Latin text the proportion between stressed and unstressed syllables is 1:2.5. Both front and back vowels are better preserved in stressed syllables (4 misspellings out of 27 involve stressed syllables on the front axis and one misspelling out of 13 involves stressed syllables on the back axis).⁴⁵ Therefore in our corpus vowel quality seems to be better preserved under stress regardless of the original vowel duration, and being coherent with the results of the qualitative analysis of the tokens, which will be illustrated in the next section.

⁴¹ This irregularity is particularly evident when examining the front vowels (2.9% before the 4th century, 5.4% between the 4th and 5th century and 1.4% from the 6th century onwards). The percentages are still very low on the back axis (0.6%, 2.8% and 4.2% in the first, second and third time frame respectively); though in this case the percentages seem to be increasing with time, some misspellings could have a non-phonetic explanation, as will be shown in more detail in section 3.4.

⁴² See e.g. the observations put forward for ⟨B⟩/⟨V⟩ confusions in other regions of the Empire in ADAMIK, B.: On the Vulgar Latin Merger of /b/ and /w/ and Its Correlation with the Loss of Intervocalic /w/: Dialectological Evidence from Inscriptions. *PALLAS* 103 (2017) 25–36.

⁴³ On the interaction between stress and vowel alternations see the recent contribution by ADAMIK: A Study (n. 26) 183 ff.

⁴⁴ HERMAN: Aspects (n. 25) 23.

⁴⁵ In particular, in stressed syllables we recorded only one instance of ⟨E⟩ for /i/ (against 17 in unstressed syllables); 2 instances of ⟨I⟩ for /ē/, one out of 6 of ⟨I⟩ for /ē/ and one instance of ⟨U⟩ for /ō/.

3.4. Qualitative analysis

The picture illustrated so far is further confirmed by a qualitative analysis of the tokens showing the alternations. As will be shown in this section, most of the instances could not be considered to be phonetic spellings.

First of all, almost all the instances of ⟨E⟩ for /ī/ (13 out of 17) involve the morpheme *-et* (for *-it*) of the 3rd person singular of the present tense (3rd conjugation), such as in *ducet*, *adducet*, *quiescet* and *requiescet*. As pointed out by Herman,⁴⁶ these deviant spellings could be due to the reorganization of the verbal system, and therefore not considered to be phonetic spellings. Indeed, the morpheme *-et* for the third person singular is attested in ancient Logudorese as well; in modern Nuorese, forms such as the 3rd person singular of the present tense *fàket* ('he/she does')⁴⁷ are attested. These observations are confirmed thanks to the analysis of the dating of these inscriptions, which in our corpus is easily accessible for linguistic research. Indeed, the forms showing the morpheme *-et* are more frequent in later texts when they occur in dated inscriptions: whereas there is only one instance at the end of the 2nd century CE (*ducet* in *EE* VIII 792), 5 occurrences of the morpheme *-et* date back to the 3rd century and 6 to the 4th–5th centuries.

Along the same lines, the spelling *conseruos* (for *conseruus* 'fellow-slave', in *ANRW* B2, 2nd century CE) cannot be considered to be a phonetic spelling, since the spelling ⟨O⟩ after ⟨U⟩ was long retained in writing to avoid the ambiguity of the ⟨VV⟩ group.⁴⁸ Finally, among the instances of ⟨U⟩ for /ō/, *anus* (for *annos*, in *CIL* X 7767, 5th century CE) could be explained as a confusion between the nominative and the accusative form.⁴⁹

Moreover, a morphosyntactic explanation could be provided for some of the other alternations concerning the nominal inflection.

In particular, among the instances of ⟨I⟩ for /ē/, for the ablatives *potestati* (for *potestate*) and *paci* (for *pace*), a confusion with the dative ending or with the ablative ending of *-i-* stems (such as the ablative *animali* from *animal*, *animalis*) cannot be excluded.⁵⁰ Similarly, the dative *coniuge* (for *coniugi*) could be explained as a confusion with the ablative form, and the nominative *tubicin* (for *tubicen*, 'trumpeter') could be due to a confusion with oblique cases such as the accusative *tubicinem*.⁵¹

In conclusion, nearly half of the vocalic confusions found in the corpus (18/40) have a non-phonetic explanation. If those tokens are excluded because of their morphological status, our corpus shows only 22 deviant spellings involving vowels against 14.694 instances of standard spellings for the vowels examined. The percentages are

⁴⁶ HERMAN: *Témoignage* (n. 10) 188.

⁴⁷ LUPINU (n. 11) 27.

⁴⁸ NIEDERMANN, M.: *Précis de phonétique historique du latin*. Nouv. éd. rev. et augm. éd. [Nouvelle collection à l'usage des classes XXVIII]. Paris 1931; see also ADAMS: *Social Variation* (n. 9) 63.

⁴⁹ HERMAN: *Témoignage* (n. 10) 188.

⁵⁰ LUPINU (n. 11) 24.

⁵¹ HERMAN: *Témoignage* (n. 10) 188.

still very low when limiting the analysis to the spellings which could have reflected a ‘Common Romance’ development.

Therefore, the qualitative analysis supports the conclusions put forward in the preceding sections, pointing to a maintaining of the qualitative difference between /i/, /ē/ and /ū/, /ō/ in Sardinia on the one hand and showing morphological shifts on the other.

4. CONCLUSION

The quantitative analysis of a wide range of inscriptions from Sardinia, which includes those dating from the 1st century BCE to the 7th century CE, was not available up to now, and let us shed light on the development of the Sardinian vowel system. In particular, the results illustrated so far show that the graphemic representation of the vowels in Latin inscriptions from Sardinia foreshadows the Romance outcome of the Sardinian vowel system.

First of all, the vowel alternations under analysis are rare in Sardinia in comparison with other areas of the Empire, even in late texts: this is evident when calculating the error rate as a percentage against the corresponding correct spellings (§3.1). The absence of the alternations cannot be explained as being due to a high level of literacy of the writers; moreover, the deviant spellings involving vowels do not increase with time, which discourages us from hypothesizing an undergoing phonetic process (§3.2). It is also interesting to note that vowel qualities are better preserved under stress in Sardinia (§3.3), coherently with the results of a more fine-grained qualitative analysis carried out on the inscriptions, which confirms the picture given above, showing that most of the few alternations found in the corpus could be due to morphological shift (§3.4).

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