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SOME METHODOLOGICAL CONSIDERATIONS ON
THE USE OF HERMAN'S QUANTITATIVE METHOD*

ALESSANDRO PAPINI

1. Framing the problem

Inscriptions have been used as a source for the study of diatopic (or regional) variation in Latin ever since the early 1900s, but academic appreciation for the use of this source often varied over the years, to the extent that scholars even doubted that it could serve the inquiry into local variation at all. As Adamik emphasises, before the late 1960s the answer to this question was “an unhesitant no”.¹ The early and pioneering studies based on the epigraphic material found in different provinces of the Roman Empire could only reveal that the same deviations from the “Classical Latin” (CL) “norm” (although linguistically significant) appeared almost everywhere, so that they could not differentiate

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¹ ADAMIK 2012, 125.

one region from another.² In other words, inscriptions were regarded as a reliable source for the study of “sub-standard” (or “Vulgar”) Latin, but researchers completely distrusted the possibility that they could reveal features of language use in specific areas.³

These unpromising results were refined during the “methodological revival”⁴ which took place approximately between 1950 and 1980, when more precise statistical surveys recognised that the frequency (and the incidence) of these widespread “misspellings” varied significantly throughout the Roman world, suggesting the existence of an actual “dialectalisation” of Latin from as early as the time of the Empire (or even the Roman Republic).⁵ The scepticism initially cast on using inscriptions for the inquiry into the local diversification of Latin gave therefore way to a completely new enthusiasm, to such an extent that, after presenting his own method of “extracting” regional variations from the epigraphic sources, Herman could confidently assert that systematic differences in the spoken usage of different areas of the Latin world did actually exist, and that this was reflected in the “language” of inscriptions.⁶

The optimistic statement of Herman was motivated by the better reliability of his quantitative approach as compared to the methodology proposed by Gaeng (1968), and later by Omeltchenko (1977) and Barbarino (1978). To summarise, these latter scholars all believed that by measuring the ratio between certain errors and the corresponding “standard”

² See for instance: PIRSON 1901; CARNOY 1906²; KONJETZNY 1908; SKOK 1915; and PRINZ 1932.

³ Accordingly, most accounts on inscriptional Latin described features of “Vulgar” Latin in various regions of the Roman world, but completely avoided further discussing the methodological problem. See for instance: VON WARTBURG 1950; LÖFSTEDT 1959; VÄÄNÄNEN 1966; ZAMBONI 1965–66; 1967–68; and LUPINU 2000. Cf. the discussion by ADAMIK 2012, 125–126.

⁴ As ADAMIK 2012, 125 defines it. See also ADAMS 2007, 624.

⁵ Such a quantitative approach was ushered in by GAENG 1968; OMELTCHENKO 1977; and BARBARINO 1978; and was later refined by J. Herman in several contributions (see below). For the study of diatopic variation in Latin during the Republican age, see ADAMS 2007, 37–187. Cf. also GALDI 2011, 565–567.

⁶ Cf. HERMAN 2000, 133: “*si, differenze sistematiche nel parlato delle diverse regioni esistono, ed è possibile provarlo*” (*scil.* by using the epigraphic sources).

orthographies (“degree of error”) in epigraphic corpora from various regions of the Empire, they could measure linguistic differences in the speech of these regions.⁷ However, they did not consider that this calculation was likelier to reveal only differences in the educational level of the writers who produced the corpora under investigation.⁸

Herman, on his part, “distanced himself from this method on every possible occasion”.⁹ He fully acknowledged that the degree of error was only likely to reveal extra-linguistic (or cultural) factors, which led him to focus on “positive” evidence alone. Herman pointed out that “misspellings” in inscriptions are either due to “technical” causes, or to the fact that the speech habits of the writers somehow differed from the CL “norm”. Consequently, if writers show uncertainties at some points of the linguistic structure, they can only have a linguistic reason for not showing similar uncertainties at other points. The only satisfactory way of extracting regional variations from inscriptions, according to Herman, is therefore isolating every “fault” occurring in the epigraphic corpus from a particular area, and then calculating the relative frequency of these “faults” in relation to each other (cf. section 2 below).¹⁰ In this way, every region will have its own linguistic profile (based on the peculiar distribution of the “faults”) and linguistic differences between regions will emerge as differences between these profiles.¹¹

⁷ GAENG 1968 analysed vocalic “misspellings” in the epigraphic corpora of Spain, Gaul, Italy and Rome, while OMELTCHENKO’s 1977 successive study supplemented his results by covering the provinces not included in the original work from Gaeng (Africa, Britain, Dalmatia and the Balkans). BARBARINO 1978 on his part studied the spelling variation involving vs. <v> in the same corpora jointly covered by his predecessors (see section 3 below).

⁸ Cf. ADAMIK 2012, 128–129 and ADAMS 2007, 662–663.

⁹ ADAMIK 2012, 128. See for instance HERMAN 2000, 126: “Parlando di statistica, è chiaro che vanno evitati tutti i calcoli [...] che rischino di riflettere, anziché tratti linguistici, differenze culturali [...]. Per esempio, le variazioni da un territorio all’altro della proporzione di tale ‘sbaglio ortografico’ rispetto alla grafia corretta [...] di per sé mostrano solamente la differenza culturale fra i territori considerati.”

¹⁰ “Faults” being all those inscriptional spellings that deviate from the CL “norm”. Cf. the discussion by ADAMIK 2012, 133–134. See also HERMAN 2000, 124.

¹¹ ADAMIK 2012, 134–135. See also HERMAN 2000, 124–127.

Proposed for the first time already during the 1960s,¹² Herman's quantitative method defined a completely new way of investigating diatopic variation in Latin by using inscriptions. This is illustrated by the fact that not only was this method successfully applied by Herman himself in several later contributions (cf. below), but it also provided the conceptual basis of the Computerized Historical Linguistic Database of Latin Inscriptions of the Imperial Age (that is, the biggest inscriptional corpus ever created for the study of diatopic variation in Latin).¹³

Notwithstanding these impressive results, the optimistic attitude deriving from the application of Herman's method has recently given way to new scepticism, with several scholars returning to question whether inscriptions are a valid source for the inquiry into local variation in Latin. According to Adams, for instance, "of the evidence that might be called on in investigating the regional diversity of Latin, inscriptions, with their uniformity right across the Empire, are the weakest".¹⁴ The criticism of Adams is twofold. First, he argues that linguistic data in the epigraphic sources are not reliable. Second, he criticises the quantitative method proposed by Herman.

When it comes to the inscriptions, Adams points out that these kinds of documents are often undated, and that the identity of the writers who produced them is often impossible to establish.¹⁵ Moreover, he stresses that the language of inscriptions might have been influenced by several extra-linguistic factors, such as the different spelling policies adopted by epigraphic workshops across the Empire.¹⁶ These considerations led him to conclude that the best evidence for diatopic variation is found in different non-literary documents, including curse tablets, ostraca and *instrumenta inscripta*, especially when these documents are arranged in the form of a "coherent corpus" (defined as "a body of texts [...] which belong together in one or more senses").¹⁷

¹² Cf. HERMAN 1965.

¹³ See <http://lldb.elte.hu/en/database/> and cf. ADAMIK 2009.

¹⁴ ADAMS 2007, 7.

¹⁵ ADAMS 2007, 632–633.

¹⁶ ADAMS 2007, 651.

¹⁷ ADAMS 2007, 633.

The criticism of Adams of the inscriptional sources is very well-founded, but the solution he proposes is (perhaps) too idealistic. “Coherent corpora” (as defined by him) only represent a limited percentage of the surviving non-literary Latin documents. Consequently, they can surely illustrate peculiar features of language use in a given area, but their rarity across the Empire implies that they can provide little to no evidence for local variation.¹⁸ Moreover, the very texts that form these corpora are often so limited with respect to both their number and their extension (and, sometimes, so well-written) that such corpora mainly allow for qualitative (as opposed to quantitative/statistical) analyses, a fact which also reduces their scope for the inquiry into local variation.

In the light of these limitations, corpora such as the Bu Njem ostraca or the Vindolanda writing tablets can hardly represent our sole source for the study of the regional diversification of Latin. Instead, they are better used alongside those documents that have been traditionally investigated for this purpose, namely inscriptions on stone (cf. section 3 below).

Having discussed the remarks of Adams on the epigraphic sources, I shall now address the part of his criticism pertaining to the application of Herman’s quantitative method. As a starting point, one must clarify that Adams completely agrees with Herman in saying that “the significance of one error can only be assessed in the light of other errors in the same corpus”.¹⁹ He is only unsatisfied with the way in which Herman applied this principle.²⁰

Adams emphasises that certain errors are likelier to occur in inscriptions than others, simply because they affect a higher number of (potential) contexts (i.e., word-items that may possibly bear them are either more numerous in the lexicon or better represented in the corpus), which led him to conclude that Herman’s “microtechnique”²¹ is not likely to establish convincing regional variations. In other words, Adams argues

¹⁸ The “lack of what might be called coherent corpora” is explicitly addressed by ADAMS 2007, 633. See also *ibid.* 663.

¹⁹ ADAMS 2007, 635.

²⁰ ADAMIK 2012, 131.

²¹ As ADAMS 2007, 676 defines it.

that the figures of Herman (based on the calculation of the “relative frequency of faults”) may over-represent those epigraphic errors that are more frequent and under-represent the errors that are less expected to occur in the corpus.

To address this concern, Adams proposes combining the method of Herman with the method of Gaeng and his followers.²² Namely, he suggests assessing the “relative frequency” of two (or more) errors in a corpus only after comparing their number with that of the corresponding correct orthographies, i.e., only after establishing the “degree” of those errors. In this way, Adams states, the figures of every error will not be dependent on the chance occurrence of the relevant liable contexts and may thus reveal actual linguistic differences in the speech of the areas that are represented by the inscriptional corpora under investigation.²³

The criticism of Adams is, again, very well-informed, but his proposal to overcome the limitations of Herman’s method is not entirely convincing. First, he himself admits that his own method “cannot always work”. On the contrary, this method can only be revealing when there is “a stark contrast” between the frequency of two (or more) errors in a corpus, or, as Adams puts it, “when error 1 is non-existent but error 2 (and ideally other errors as well) numerous”.²⁴ However, this kind of evidence is rare. As pointed out earlier, the same deviations from the CL “norm” tend to appear throughout the Empire, meaning that Adams’ own methodology only allows for limited use of inscriptions in the study of the regional diversification of Latin (a fact that also justifies his scepticism toward the use of these sources for this very purpose).²⁵

Second, the absence of a specific error from a corpus (or its marked infrequency) is also likely to emerge from the mere counting of “absolute figures” (that is, from only counting instances of a particular error

²² ADAMIK 2012, 129.

²³ ADAMS 2007, 636–637, and 649–650. See also RODRÍGUEZ BELLO 2015, 19–20.

²⁴ ADAMS 2007, 649. See also the discussion by ADAMIK 2012, 133.

²⁵ See for instance ADAMS 2007, 649: “[...] by examining a second error we may be able to interpret the significance of the first, if only under restricted circumstances” (my emphasis). Cf. also ADAMIK 2012, 132.

without reference to any other *comparandum*).²⁶ Consequently, it is not clear how the proposal of Adams should improve the results obtained from the application of Herman's quantitative method in its original form, as such method can also address more nuanced differences in the frequency of various errors in a corpus (instead of only revealing sharp contrasts).²⁷ Instead, the remarks of Adams on his own methodology seem to invalidate the entire point of implementing such a complex quantitative approach at all.²⁸

Third, and most importantly, Herman was well aware that certain errors are likelier to occur in a corpus than others. He never confined himself to simply comparing the figures of a particular error (in which he was interested) with the figures concerning errors of different types.²⁹ Instead, he always compared these figures with the figures that one would expect given a random distribution.

Adams, however, has the merit of having addressed one of the main issues of Herman's quantitative approach: the fact that he never introduced an (objective) method to ensure the statistical significance of his results. In other words, Herman never verified that the difference in the observed vs. expected frequency (of errors) in his epigraphic corpora was actually statistically significant (and not simply due to chance), which raises the question of whether this difference reflected actual regional variations.³⁰

²⁶ ADAMIK 2012, 126–127. See also ADAMS 2007, 629 and HERMAN 1985, 69–70.

²⁷ ADAMIK 2012, 133.

²⁸ As ADAMIK 2012, 131, n. 49 points out, “getting rid of the ballast” of also collecting “correct spellings” alongside the relevant deviations from the CL “norm” (that is, the main target of the research) may significantly accelerate the entire data collection process. To give just one example, GAENG 1968, 95 had to register no less than 242 correct instances of <u>/<o> for ū/ō in order to compare these instances with only 3 “misspellings”.

²⁹ E.g., “misspellings” regarding <o>/<u> vs. “misspellings” regarding <e>/<i> (HERMAN 1971), errors on the stressed syllables vs. errors on the unstressed syllables (HERMAN 1982), deviations affecting vowels vs. deviations affecting consonants (HERMAN 2000).

³⁰ As ADAMS 2007, 625 declares (while discussing the methodology of both Herman and Gaeng): “doubtful claims have been based on weak evidence”. The same criticism, however, also applies to his own quantitative approach. As highlighted above, the method of Adams can only reveal “stark contrasts” in the frequency of various errors in a corpus,

In this article, therefore, I will propose integrating Herman's methodology through the application of various statistical tests (e.g., χ -square and exact binomial).³¹ More specifically, section 2 will apply these tests to verify the findings of Herman on the existence of regional variations in the phonological system of (Christian) Italian inscriptions.³² It will become clear that some of these results are open to refinement. However, this section will also suggest that one may be able to establish convincing regional variations even by focusing on "positive" evidence alone (i.e., by considering only the "relative proportion of faults" in different corpora). This circumstance is particularly important. On the one hand, the method proposed here will not deviate significantly from the method of Herman in its original form. On the other hand, this proposal will address one of the key points of Adams' criticism of it.

Having discussed the quantitative approach defined by Herman in the year 2000, section 3 will address the use of "negative" evidence, i.e., the count of correct spellings alongside the corresponding deviations from the CL "norm". Similarly to Adamik, I do believe that this kind of evidence should be used primarily to assess the chance occurrence of the relevant errors in the corpus.³³ Nonetheless, the analysis of /<v> vs. <e>/<i> spelling confusions in Roman Britain will suggest that this evidence may also serve the study of local variation, especially in inscriptional corpora resulting from the work of competent scribes (whose "level of literacy" could obscure the linguistic changes that were occurring in speech).

Finally, section 4 of this article will offer some methodological observations on the use of inscriptions for the study of diatopic variation in

but, similarly to Herman, he does not clarify when these contrasts become "stark" enough to actually inform convincing regional variations. See for instance ADAMS 2007, 637: "if [...] errors of both types are common [...] we have established nothing about regional variation" (my emphasis).

³¹ The need to apply objective statistics to the study of inscriptions was already emphasised by PURNELLE 1995, who made extensive use of χ -square tests in his investigation on the use of the aspiration in inscriptions from Rome. Similar tests are also (occasionally) found in modern scholarly accounts focusing on the epigraphic sources (e.g., MAROTTA 2015).

³² HERMAN 2000.

³³ Cf. ADAMIK 2022.

Latin. There, I will argue that statistical analysis (as opposed to purely quantitative analysis) represents a methodological advance for this field of study. This, however, does not mean that the use of statistics alone can solve the problems of interpreting epigraphic data. Instead, I suggest that the statistical significance of the data in the epigraphic corpora under investigation should always be verified, and that one should also attempt to justify the (possible) non-significance of these data.

2. The method of Herman (or “the relative proportion of faults”)

In his most methodologically advanced essay, Herman used his own method to inform the existence of local differences in the phonological system of the Italian Peninsula. He studied a corpus of ca. 1,300 Christian (funerary) inscriptions by comparing the relative frequency of deviations affecting consonants with the number of errors related to the vowel system. As he clarified, the choice of Christian epitaphs was mainly dictated by the necessity of working with as coherent a corpus as possible, i.e., of analysing a mostly “homogenous” body of texts, both in terms of the dating of the inscriptions considered and their “sociolinguistic” level.³⁴

The results of the research carried out on this (not extensive but coherent) corpus led Herman to divide the Italian territory into three macro-areas, based on the linguistic profile of the Augustan regions included in them.

Herman’s first territorial unity (roughly corresponding to North-Western Italy) comprehended *Liguria (Regio IX)* and *Transpadana (Regio XI)*. The linguistic profile of these regions exhibited a clearly innovative vowel system, as opposed to a conservative consonant system, for the greatest majority of deviations from the CL “norm” clustered on vowels instead of affecting consonants (that is, 76% and 71% of the total number of faults in, respectively, the former and the latter region).

³⁴ HERMAN 2000, 127–128.

Etruria (*Regio VII*), *Bruttium et Lucania* (*Regio III*) and *Sardinia* displayed a completely specular picture. According to Herman, these regions were characterised by a significantly innovative consonantism, as illustrated by the fact that the greatest majority of “non-standard” spellings found in their epigraphic corpora represented linguistic changes in the consonant (as opposed to the vowel) system. More precisely, errors of this last kind represented 84%, 62% and 55% of the total number of deviations in, respectively, *Sardinia*, *Bruttium et Lucania*, and *Etruria*.

Finally, Herman’s last macro-area included Augustan regions *I* (*Latium et Campania*), *X* (*Venetia et Histria*), and the city of Rome. Their linguistic profile appeared to combine features of the other areas. Their Christian inscriptions attested to errors in both the vowel and consonant systems, but none of these errors exceeded those of the other type (in numbers). According to Herman, this state of affairs was due to the influence of Rome and Aquileia. He hypothesised that these two cities may have received (and reflected) all the linguistic innovations (in the vowel and consonant systems) that were taking place in the speech of the extra-urban areas of the Italian Peninsula.³⁵

The findings of Herman anticipate some of the features that will later characterise Italian linguistic geography, which advocates *per se* for the legitimacy of his own method. For example, *Sardinia* (and Southern Italy) merged /b/ and /w/ in both the initial and the internal syllables (e.g., Logudurese [ˈboʝzi] “you [pl.]” < Lat. *vōbis* = [ˈboːnu] “good” < Lat. *bōnum*), whereas these two phonemes were usually kept distinct word-initially in Northern and Central Italy (e.g., It. [ˈvedo] “see [1st.sg.ind.pres.]” < Lat. *vid(e)o* ≠ It. [ˈbevo] “drink [1st.sg.ind.pres.]” < Lat. *bībo*, with /b/ > /v/ in internal position).³⁶ The high number of consonantal “misspellings” in the epigraphic corpus of *Sardinia* (and *Regio III*), with special reference to the /<v> spelling variation, may therefore suggest that the underlying linguistic change (the merger of /b/ and /w/ as a bilabial fricative [β]) was more advanced in these regions than it was

³⁵ HERMAN 2000, 128–133.

³⁶ Cf. LOPORCARO 2009, 52; ADAMS 2007, 627–628.

in other areas of the Italian Peninsula, foreshadowing, in a way, the subsequent Romance developments.³⁷

The same applies to the vowel system. As is well known, *Sardinia* seems to have neutralised the close vs. open allophonic differentiation that is usually assumed for the CL long vs. short vowels, to the extent that no re-association of the short-high /i/, /u/ and mid-long phonemes /e:/, /o:/ (as the close /e/ and /o/ appearing in most Romance Languages) occurred on the island. On the contrary, the so-called “Sardinian” vowel system merged each of the CL long vs. short pairs (that is, /e:/, /e/ and /o:/, /o/).³⁸ Even the features that characterise this vowel system are represented by the figures of Herman. Sardinian inscriptions (where as low as 16% of the total number of faults happen to affect vocalic phonemes) mirror the future Romance developments, similarly to how the figures of *Liguria* (*Regio IX*) and *Transpadana* (*Regio XI*) indicate that the two aforementioned vowel mergers (i.e., /i/, /e:/ > /e/ and /u/, /o:/ > /o/) were already occurring *ab antiquo*.³⁹

The description of Herman of vocalic “misspellings” in the epigraphic corpus of *Bruttium et Lucania* may also be revealing. This area roughly corresponds to modern Calabria, and incorporates the so-called Lausberg area, whose dialects share some of the features that characterise both the Sardinian and the so-called “Romanian” vowel system (showing the merger of /e:/ and /i/ as /e/, but not the merger of /o:/ and /u/ as /o/).⁴⁰ The fact that *Regio III* is grouped together with *Sardinia* (with 62% of

³⁷ “Non-standard” spellings pertaining to the graphemic oscillation involving vs. <v> represent 73% (or, 71 out of 97) and 45% (i.e., 15 out of 33) of the total number of faults affecting the consonant system in the inscriptional corpora of, respectively, *Sardinia* and *Bruttium et Lucania*. These figures, however, are only partially explained by HERMAN 2000, 130–132, who considered them less relevant than the percentages that they represent (cf. ADAMIK 2012, 135, n. 73). The data presented in this article have therefore been retrieved from the calculation in ADAMIK 2012, 136–137.

³⁸ Cf. LOPORCARO 2015, 56. See also BARBATO 2017, 50.

³⁹ As pointed out in HERMAN 2000, 131–133, the majority of vocalic “misspellings” that are found in his epigraphic corpora illustrate the merger of the CL long /e:/ and short /i/ as a close /e/ and the corresponding merger on the back-vowel axis (namely, /u/, /o:/ > /o/). Cf. also the tables in ADAMIK 2012, 136–137.

⁴⁰ LOPORCARO 2015, 54 and 56–57.

its linguistic faults pertaining to the consonant system) may therefore provide some evidence that the vowel system of dialects in the Lausberg area never experienced a “common Romance” stage.⁴¹

Part of the findings of Herman, however, are not entirely convincing. *Etruria* (ca. modern Tuscany), for example, essentially experienced the same changes that occurred in most of the Italian Peninsula (e.g., “common Romance” merger of both /i/, /e:/ > /e/ and /u/, /o:/ > /o/). Consequently, it is not clear why it should be grouped together with *Sardinia* and *Bruttium et Lucania* among the areas characterised by a particularly innovative consonant system. Instead, based on its linguistic profile (with inscriptional errors almost equally distributed between vowels and consonants), the region should be better considered alongside *Regio X* and Rome.

These inconsistencies stem (partially) from the fact that Herman never applied an objective (statistical) method to test whether his observed figures (in our case, the relative frequency of errors on consonants vs. errors on vowels) differed significantly from the figures that would be expected based on a random distribution (cf. section 1 above). In his 2000 study, for instance, he only declared that consonants represent ca. 57% of the total number of phonemes in Latin and that errors on these phonemes should consequently represent ca. 55% to 60% of all phonological faults in an average inscriptional corpus.⁴² However, he did not clarify the extent to which percentage figures for consonantal “misspellings” need to deviate from this expected 55–60% in order to draw solid conclusions about language use in a given area.

The case of *Etruria* (*Regio VII*) is, again, emblematic. Phonological errors cluster here on consonants (instead of vowels) with the exact expected ratio of 55%, which makes it unclear why Herman defined its consonant system as particularly innovative.⁴³ The same applies to *Regio III*

⁴¹ See the references in LOPORCARO 2015, 57. Cf. also below this same chapter.

⁴² HERMAN 2000, 128, n. 10. See also HERMAN 1968, 196.

⁴³ HERMAN 2000, 131–132. This is recognised by Herman himself, since he admits that the proportion of vocalic confusions in *Etruria* (ca. 45%) “corrisponde alla proporzione normale delle vocali nelle catene di fonemi” (ibid. 131).

(*Bruttium et Lucania*). On the one hand, its linguistic profile shows the proportion of “misspellings” on consonants (62%) as being slightly higher than the expected 57%. On the other hand, one is left wondering whether a deviation of only 5% is significant enough to safely assume that linguistic changes in the phonological system of this area affected consonants more than vowels (especially when one considers that the entire linguistic profile of *Regio III* is based on as few as 53 “misspellings”).⁴⁴

In the following pages, I will try to validate the results of Herman by means of various statistical tests. The main aim of this statistical analysis will be addressing the limitations of his quantitative method, as described above. To begin with, individual exact binomial tests will verify whether the observed proportion of errors on consonants vs. errors on vowels in each of the five Augustan regions investigated by Herman significantly deviates from the chance frequency. More in detail, these tests will use the data of the sample to determine whether the proportion of these errors in each region significantly differs from the expected 57% (i.e., the chance occurrence of consonantal errors in an average inscriptional corpus; cf. above). The results of this analysis are summarised in Table 1.⁴⁵

As shown in this table, only results for *Liguria*, *Transpadana* and *Sardinia* are statistically significant. More precisely, based on two exact binomial tests, the proportion of errors on the consonant system in *Liguria* and *Transpadana* (respectively, 24% and 29%) is significantly lower than the expected 57% (*p*-values for both corpora being < 0.001).⁴⁶ In other words, our results are likely to confirm Herman’s suggestion that these two regions presented a very innovative vowel system (and a fairly conservative consonant system). This appears from the fact that stone-cutters operating in these areas had doubts on the writing of vocalic phonemes, but not on the writing of consonants.

⁴⁴ HERMAN 2000, 132.

⁴⁵ For the exact binomial test, cf. <http://sites.utexas.edu/sos/guided/inferential/categorical/univariate/binomial/>. The absolute numbers of errors on vowels and consonants in each region are given in Table 2.

⁴⁶ Conventionally, *p*-values < 0.05 are regarded as significant.

Likewise, and conversely, a third exact binomial test suggested that the very opposite was true for *Sardinia*, since the ratio of deviations on consonants in the epigraphic corpus of this area (84%) significantly exceeds the expected 57% ($p < 0.001$).

Results for *Etruria* and *Regio III*, on the contrary, are not statistically significant (cf. the high p -values for both corpora in Table 1). This outcome confirms our remarks on the conclusions of Herman. More specifically, the statistical analysis thus far does not depict linguistic changes as particularly advanced in the consonant system of these two regions. Conversely, it suggests that the same changes happened for vowels and consonants with more or less the same intensity in *Etruria* and *Regio III*, as it seems to have happened in both *Regio X* and *Latium et Campania* (with special reference to the city of Rome; cf. above).

The results obtained from the statistical analysis of individual inscriptional corpora via our exact binomial tests have been further validated by means of a Pearson's χ -square test for independence. This test is used to verify whether two categorical variables (in the present case, the relative proportion of inscriptional errors affecting consonants instead of vowels and the regions in which these errors occur) are independent of each other.⁴⁷

However, this does not seem to be the case in our inscriptions, as the low p -value of the χ -square suggests the existence of a very significant statistical association between regions and types of errors committed ($\chi^2(4) = 131.19, p < 0.001$; cf. Table 2).

To paraphrase, even the χ -square analysis seems to confirm that the different frequency of errors on consonants vs. errors on vowels in the five Augustan regions investigated by Herman is not simply due to chance. Instead, this frequency is likely to reflect linguistic differences in the speech of these regions (changes in the vowel system being more advanced in some regions than others). This further demonstrates that Herman's method can establish convincing regional variations.

On the other hand, the analysis of the standardised residuals suggests that the results of this method are open to refinement, for only errors

⁴⁷ On the χ -square test, cf. FIELD et al. 2012, 814–818.

occurring in the epigraphic corpora of *Liguria*, *Transpadana* and *Sardinia* significantly contributed to the obtained *p*-value.⁴⁸

To put it more precisely, the χ -square suggested that inscriptions of Augustan regions IX (*Liguria*) and XI (*Transpadana*) attest to more errors than expected in the case of the vowel system (St. res. = 3.576 and 3.266 in, respectively, the former and the latter region), but significantly to less of these errors in the case of the consonant system (St. res. = -3.892 for *Liguria* and -3.556 for *Transpadana*). This output indicates that linguistic changes in the phonological system of these regions were mainly affecting vocalic phonemes.

As for *Sardinia*, it offers, once again, a specular picture. Inscriptional errors in the epigraphic corpus of *Sardinia* cluster on consonants with much more than the chance frequency (St. res. = 6.116), but these same errors affect the vowel system less often than expected given a random distribution (St. res. = -5.618).

Finally, the figures of *Regio VII (Etruria)* and *Regio III (Bruttium et Lucania)* emerge, again, as not statistically significant, which further validates our suggestion that the distribution of errors on consonants vs. errors on vowels in these areas does not indicate that changes in the consonant system were more advanced in *Etruria* and *Bruttium et Lucania* than changes in the vowel system (as maintained by Herman).

It is important to emphasise that our results are not likely to depend on the fact that the “level of literacy” of the writers operating in *Etruria* (or *Bruttium et Lucania*) was higher than the level of the writers who produced the inscriptional corpora of *Liguria*, *Transpadana* and *Sardinia*. Instead, the figures of the <ae>/<e> spelling variation in each corpus indicate exactly the opposite (cf. Figure 1). As Herman points out, the linguistic change underlying the spelling variation involving <e> vs. <ae> (that is, the monophthongisation of /ae/) had already been completed

⁴⁸ The standardised residuals provide a measure of the difference between the expected and the observed frequencies in a χ -square. Therefore, they express the contribution of each cell to the obtained *p*-value. More precisely, a standardised residual value greater than 1.96 (or smaller than -1.96) indicates that a particular cell made a statistically significant contribution to the result of the χ -square (the plus or minus sign indicating the direction of such contribution). See FIELD et al. 2012, 821–822.

in Latin during ca. the 1st cent. CE, meaning that the occurrence of <ae>/<e> confusions in a corpus of Christian inscriptions can only measure the orthographic competence of the writers who realised this corpus.

More specifically, Herman suggests that one can assess this orthographic competence by comparing the frequency of “misspellings” representing the graphemic oscillation involving <ae> vs. <e> with all other phonological errors in the corpus and by expressing the resulting proportion as a percentage (the higher this percentage, the lower the level of literacy of the writers who produced the corpus).⁴⁹

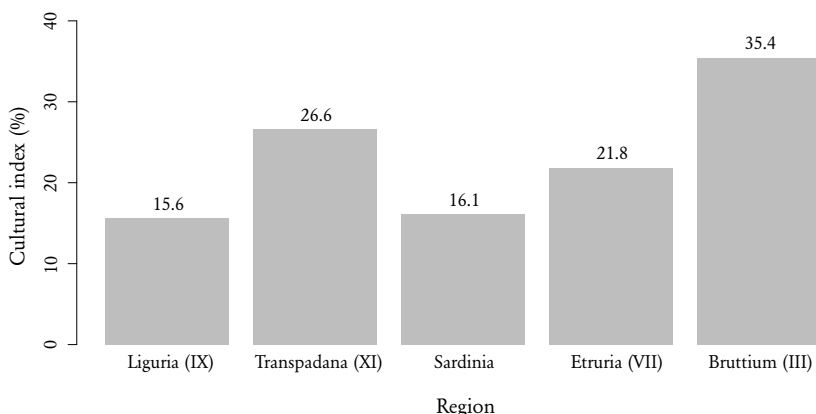


Figure 1: “Cultural index” of the Augustan regions analysed by Herman (2000)

Based on this hypothesis, the data in Figure 1 describe stonecutters active in *Liguria* and *Sardinia* (that is, our most contrastive regions) as better acquainted with the CL “norm” than the writers operating in *Etruria* and

⁴⁹ HERMAN 2000, 126, n. 7. See also ADAMIK 2012, 135. On the monophthongisation of /ae/ see PAPINI 2020 and references therein. Since the entire point of considering inscriptional errors pertaining to the <ae>/<e> spelling variation is to measure the “level of literacy” of the writers who produced a given inscriptional corpus, I would rather suggest comparing the number of these errors with the number of the corresponding correct orthographies (instead of comparing them with the number of other phonological errors in the corpus). Cf. section 3 below.

Regio III, which suggests that the “balanced” profile of these latter regions is likelier to reflect actual linguistic features than merely cultural factors.

In other words, the statistical analysis thus far may suggest refining some of the findings of Herman (2000). This analysis advocates for the fact that the aforementioned Augustan regions (i.e., *Etruria* and *Bruttium et Lucania*) never shared the same linguistic changes of *Sardinia* (and Africa; cf. section 3 below) with respect to the consonant system. Instead, their linguistic profile (displaying a “balanced” distribution of inscriptional errors on vowels and consonants) seems to mirror the same dialectal features characterising Christian inscriptions of *Venetia et Histria* and Rome.

These results are in keeping with the subsequent Romance developments. When it comes to *Etruria*, for example, they may explain why this area later experienced the same linguistic changes that informed most of the Italian Peninsula (and the Romance languages). Instead, the “balanced” linguistic profile of *Regio III* may provide some evidence that the vowel system of dialects in the Lausberg area might have gone through a phase with a “common Romance” type of vowel system (cf. above). This issue, however, is far beyond the scope of the present article and will therefore be addressed in a future contribution.

3. “Negative” evidence and the study of local variation in Latin (or Adams’ criticism of Herman)

Having discussed the scope (and limitations) of the method proposed by Herman (2000), the present section will focus on Adams’ criticism of it, for this criticism also invests the use of the inscriptional evidence for the study of diatopic variation in Latin.

As highlighted in section 1, Adams (2007) voiced the concern that some inscriptional errors may be likelier to occur than others, which led him to conclude that one should compare the relative frequency of different errors in a corpus only after assessing their “degree” (i.e., after comparing the number of deviations of each type with the number of the corresponding correct orthographies). He also stressed that one should never calculate the frequency of a particular spelling in isolation. Instead,

the degree of other spellings in the corpus should be established to provide comparison with the spelling under investigation, “the more numerous the other types of spellings used in the comparison the better”.⁵⁰

Adams applied the principles informing this quantitative method to the study of inscriptional corpora from various areas of the Roman Empire (Gaul, Africa, Britain, Italy, Rome etc.). Nonetheless, similarly to Herman, he only investigated “misspellings” of two different types: the use of <e> for the CL short /i/, and the spelling variation involving vs. <v>.⁵¹

In the following pages, however, I will only address Adams’ discussion on Christian inscriptions of Gaul, Africa, and Britain. First, he analysed the latter epigraphic corpora in greater detail. Second, linguistic information in these corpora can be complemented by the evidence from other types of non-literary documents (i.e., different from inscriptions on stone), and from metalinguistic *testimonia* in Latin grammarians (especially in the case of Africa). The results of Adams’ analysis are summarised in Figure 2.

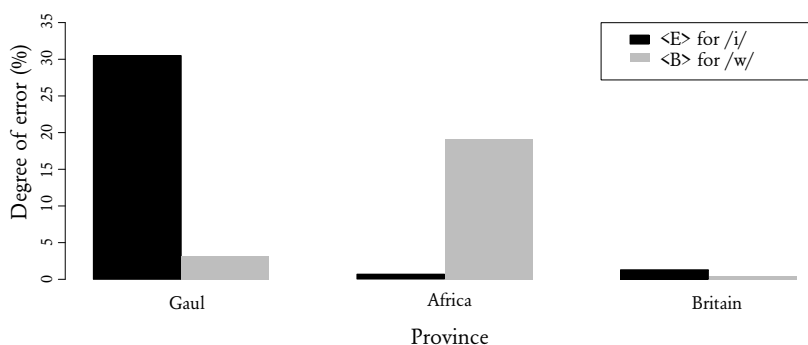


Figure 2: <e>/<i> vs. /<v> in Gaul, Africa and Britain (Adams’ method)

As portrayed in this figure, the epigraphic corpora of Africa and Gaul provide a striking contrast with respect to the writing of the Latin phonemes /i/ and /w/. The spelling variation involving <i> vs. <e> is very well

⁵⁰ ADAMS 2007, 662.

⁵¹ ADAMIK 2012, 133.

represented in inscriptions of Gaul (4th–7th cent. CE). There, the CL short /i/ is graphicised as <e> 107 times and correctly rendered with the grapheme <i> 244 times (a degree of error of ca. 30.5%). The opposite applies to the inscriptional corpus of Africa (3rd–7th cent. CE). In this area, one finds 1,420 “standard” orthographies for the short /i/ phoneme (i.e., /i/ = <i>) against as few as 10 cases of <e> for /i/ (a rate of error of less than 1%).⁵²

An entirely specular picture emerges when the writing of consonantal /w/ (in word-initial, internal, and final position) is addressed, for the figures of the graphemic oscillation involving vs. <v> are much higher in Africa than Gaul. African inscriptions attest to 175 instances of for /w/ as compared with 740 correct spellings (a degree of error of ca. 19.1%). Instead, only 19 deviations are found in the inscriptional corpus of Gaul, in spite of the fact that, there, /w/ is correctly written 593 times (i.e., stonemasons of Gaul happened to write this phoneme incorrectly in as few as ca. 3% of the possible occasions).⁵³

The interpretation of the figures of Britain is problematic. Adams notices that this inscriptional corpus (1st–4th cent. CE) hardly attests to any deviation with respect to either the <e>/<i> or the /<v> spelling variation, and suggests that this corpus is the work of well-educated scribes, who, thanks to their orthographic competence, were able to disguise linguistic changes that were occurring in speech.⁵⁴ This leads him

⁵² ADAMS 2007, 640–644. Adams derives the inscriptional data of the <e>/<i> spelling variation in Gaul and Africa from, respectively, GAENG 1968 and OMELTCHENKO 1977. These latter scholars divided their figures into numerous categories (e.g., errors in stressed vs. unstressed position, “misspellings” in the open vs. the close syllables) and analysed these figures century by century. In this paper, however, I will follow the practice of Adams of combining the figures for different centuries and those for all the possible inscriptional contexts. Unlike OMELTCHENKO 1977, however, GAENG 1968 did not provide detailed figures for undated inscriptions (cf. the criticism by OMELTCHENKO 1977, 48). The comparison of the figures presented by these scholars (as carried out by ADAMS 2007), therefore, may not be entirely reliable.

⁵³ ADAMS 2007, 638–640 and 642–643. Figures of the /<v> spelling variation in Gaul and Africa were firstly presented by BARBARINO 1978. For the treatment of these figures in the present paper cf. n. 52 above.

⁵⁴ This is further suggested by the general level of spelling correctness that characterise other non-literary documents from Roman Britain, such as the Vindolanda writing tablets. See ADAMS 2007, 652.

to the conclusion that inscriptional documents from Roman Britain are “useless as evidence for regional variation”.⁵⁵

The same does not hold true for Africa and Gaul, since the “stark contrast” that was just described in their epigraphic corpora may indicate the existence of local differences in the language of the two areas. As Adams points out, the extreme rarity of instances of <e> for /i/ in African inscriptions gains significance when compared with the frequency of /<v> confusions (the reverse occurring in Gaul, where /<v> is almost non-existent, but <e>/<i> frequent).⁵⁶ This state of affairs is likely to indicate that the merger of the CL long /e:/ and short /i/ (as a close /e/) did not occur in Africa (as it never occurred in *Sardinia*), but that the same merger was *vice versa* widespread in the Latin of Gaul.

This hypothesis is further confirmed by metalinguistic testimonies in Latin grammarians and by the study of other African non-literary corpora.⁵⁷ In *De doctrina Christiana*, IV,10,34, for instance, Augustine (354–430 CE) incidentally reports that African speakers (at least the *imperiti*) could not perceive the difference between *ōs* “mouth” and *ōs* “bone”, which implies that the CL long and short /o(:)/ were pronounced in the same way in Africa. This squares with the evidence in African inscriptions (displaying little sign of the corresponding merger on the front-vowel axis) suggesting that African Latin had a vowel system of the Sardinian type (cf. section 2 above).⁵⁸

⁵⁵ ADAMS 2007, 637. In more detail, this corpus presents 10 cases of <e> for /i/ as compared to 743 instances of correctly written /i/ (a degree of error of ca. 1.3%) and only as few as 2 cases of for /w/ set against 518 “standard” orthographies (rate of error = ca. 0.4%). See ADAMS 2007, 651–655. Even for Roman Britain, Adams used the data previously collected by OMELTCHENKO 1977 and BARBARINO 1978. The judgement of Adams, however, does not pertain specifically to this area. It concerns every (non-coherent) corpus presenting a high level of spelling correctness.

⁵⁶ ADAMS 2007, 647.

⁵⁷ The method of ADAMS 2007 was defined as a mathematical formula only by ADAMIK 2012, 130. He calculates the degree of error of several “misspellings” in the corpus and then treats the resulting percentages as absolute figures (see also RODRÍGUEZ BELLO 2015, 20). The latter methodology, however, was never adopted by Adams himself. In this paper, therefore, I will confine myself to discussing his data in their original form.

⁵⁸ ADAMS 2007, 647–648. See also MANCINI 2015. Further proof that African Latin had a vowel system of the Sardinian type comes from the testimony of the Italian humanist Paolo Pompilio (1455–1491), for he declares that the Romance variety of Tunisia was fairly similar to the Sardinian one (see LOPORCARO 2015, 48 and references therein).

When it comes to non-literary corpora (other than inscriptions on stone), the Bu Njem ostraca (ca. 250 CE) and the Albertini tablets (late 5th cent. CE) again attest to no instances of <e> for /i/ (or <o> for /u/), in spite of the fact that spelling errors of practically every other type (including /<v>) are frequent.⁵⁹ This kind of evidence is particularly important. It confirms that the vowel mergers that took place in most Romance languages (that is, /i/, /e:/ > /e/ and /u/, /o:/ > /o/) never occurred in Africa, not even at the sociolinguistic levels represented by the non-literary corpora mentioned above.⁶⁰ The African Latin vowel system, therefore, must have differed from the vowel system that one could have found in other areas of the Roman Empire and, particularly, Gaul, whose inscriptions often confuse <e> and <i>, but display little sign of the spelling variation involving vs. <v>.

Similar results as those acknowledged by Adams, however, may have been obtained even by analysing our inscriptional corpora by applying the method proposed by Herman (as discussed in section 2). Nevertheless, the main difference is that, focusing on “positive” evidence alone, this latter method allows studying regional variation independently of cultural factors, which potentially leads to a more accurate interpretation of the figures of Britain.

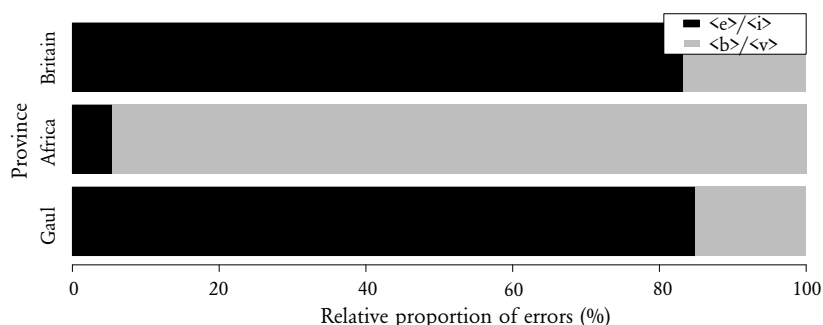


Figure 3: <e>/<i> vs. /<v> in Gaul, Africa and Britain (Herman’s method)

⁵⁹ ADAMS 2007, 644–647. The Bu Njem ostraca were further analysed by ADAMS 1994. For the Albertini tablets, see VÄÄNÄNEN 1965.

⁶⁰ The sociolinguistic level of the Bu Njem ostraca is probably very low. On the contrary, the Albertini tablets are official texts.

As portrayed in Figure 3, instances of <e>/<i> (ca. 85% of the total number of faults in the corpus) are much more frequent in Gaul than instances of /<v>, whereas the opposite happens in Africa. In comparing the relative frequency of the two errors, African inscriptions show a clear predominance of the latter deviation (i.e., /<v>), with much higher figures than those representing the spelling variation involving <e> vs. <i> (that is, ca. 94.6% vs. 5.4%).

The discussion of the method of Herman in section 2, however, highlighted that similar percentages should not be taken at their face value as indicating convincing regional variations. Instead, it emphasised that one should always verify that the observed figures for two (or more) errors in a corpus (in the present case, the relative frequency of /<v> vs. <e>/<i> confusions) significantly differ from the figures that would be expected based on a random distribution.

This, however, seems to be the case in our inscriptions (barring the ones of Britain). The African corpus, for instance, attests to 1,420 cases of correctly written /i/ and 10 cases of <e> for /i/, as compared to 915 instances of consonantal /w/ (including 175 deviations). In other words, stonecutters who produced this corpus had more occasion of writing /i/ incorrectly as <e> than of using the grapheme for /w/. Based on the hypothesis that the underlying linguistic changes (namely, /i/, /e:/ > /e/ and /b/, /w/ > [β]) were equally widespread in Africa, one would therefore expect <e>/<i> confusions to represent ca. 61% of the total number of faults in the African corpus (when compared to /<v>).⁶¹

Nonetheless, as discussed, African inscriptions display a completely opposite picture, since /<v> is much more frequent there than <e>/<i>. More precisely, based on an exact binomial test, the observed proportion of “misspellings” representing the merger of the CL short /i/ and long /e:/ in African inscriptions (ca. 5.4%) is significantly lower than

⁶¹ The given value (61%) has been calculated by dividing the number of tokens that represent the phoneme /i/ in the African corpus (both deviations and correct spellings: 1,420 + 10 = 1,430) by the total number of spellings representing both /i/ and /w/ in the same corpus (that is, 2,345 = 1,430 + 915, the latter value including 740 cases of <v> for /w/ + 175 deviations) and expressing the resulting proportion as a percentage. A similar method is also used by ADAMIK 2022.

the expected ca. 61% ($p < 0.001$), which further suggests that the latter merger never occurred in Africa.

Same, and conversely, consonantal /w/ appears more often than /i/ in Christian inscriptions of Gaul, but cases of <e> for /i/ are significantly more frequent there than instances of for /w/.⁶² More in detail, a second exact binomial test suggested that the proportion of these “mis-spellings” (i.e., <e> for /i/) in Gaul (ca. 85%) significantly exceeds the expected ca. 36% ($p < 0.001$). This output indicates that /i/, /e:/ > /e/ was more advanced in Gaul than /b/, /w/ > [β].⁶³

The picture emerging from Britain is again not clear-cut. On the one hand, percentage figures of our <e>/<i> vs. /<v> spelling variations in this corpus closely resemble the figures of Gaul, as cases of <e> for /i/ represent ca. 83% of the total errors in the corpus (as compared with a value of ca. 85% in Gaul; cf. Figure 3). On the other hand, such percentages are based on such a low number of tokens (12 in total) that they emerge as not statistically significant (our exact binomial test having $p = 0.14$).⁶⁴

However, the figures of the <ae>/<e> spelling variation suggest that this state of affairs is mostly due to the higher level of literacy of the writers who produced the inscriptional corpus of Britain, as compared to the level of the writers who operated in Gaul and Africa. This is evidenced by the fact that instances of <e> for /ae/ occur less frequently in Britain than they do in the other two areas.

More precisely, the quantitative study of Omeltchenko (1977) could only locate 71 cases of monophthongisation in pagan inscriptions form

⁶² When “standard” orthographies and deviations from the CL “norm” are counted together, we have 612 instances of /w/ (593 correct spellings + 19 deviations) and only 351 instances of /i/ (244 correct spellings + 107 deviations).

⁶³ The expected value of <e>/<i> confusions in Gaul (ca. 36%) has been calculated identically as for the same value in Africa. That is, 351/(351+612)%. For a discussion of the exact binomial test, cf. above section 2.

⁶⁴ Based on the same method used for Africa and Gaul, cases of <e>/<i> should represent ca. 59% of the total number of errors in inscriptions of Britain when compared to /<v>, that is 753/(753+520)%. More precisely, 520 is the total number of occurrences of /w/ in this corpus (correct spellings + deviations), while 753 represent 743 cases of <i> for /i/ + 10 cases of <e> for /i/.

Britain, as compared to 337 instances of correctly written <ae>, a degree of error of ca. 17%.⁶⁵ Conversely, such low figures are not found in Gaul and, especially, Africa. The former corpus attests to 94 examples of <e> for /ae/ set against 122 “standard” orthographies, representing a rate of error of ca. 43.5%. Finally, the “Classical” diphthong is spelled as <e> 199 times in African documents, and correctly written as <ae> only 162 times (degree of error = ca. 55.1%).⁶⁶

This last piece of information may be particularly relevant. First, it suggests that the high percentage of cases of <e> for /i/ in the inscriptional corpus of Britain (ca. 83%) is likely to indicate that the underlying linguistic change (that is, the merger of /e:/ and /i/ as a close /e/) was more advanced in Britain than /b/, /w/ > [β] (as in the case of Gaul). Second, it corroborates the hypothesis that the importance of this linguistic change in the Latin of Britain was efficiently disguised by the stonecutters who produced the relevant inscriptional corpus (thanks to their orthographic competence).

This assumption is further supported by the study of the British curse tablets. As Adams points out, these documents contain several examples of the orthographic confusion involving <i> vs. <e> (e.g., <san(g)uene> for *sanguine* “blood [(m.)abl.sg.]” or <vendicas> instead of *vīndicas* “avenge [2nd.sg.ind.pres.]”), but not a single case of for /w/,⁶⁷ leading him to conclude that “there is an hint, no more than that” that /b/, /w/ > [β] “had not taken place in Britain” (whereas /i/, /e:/ > /e/ had).⁶⁸

⁶⁵ OMELTCHENKO 1977, 373. As for /<v> and <e>/<i>, I have here combined the figures for all positions (stressed, internal and final) and all time periods (1st–4th cent. CE). It may be worth mentioning that most of the *e*-spellings (instead of *ae*) in Omeltchenko’s analysis (that is, 50 out of 71) occur in word-final position.

⁶⁶ See again OMELTCHENKO 1977, 373 (for Africa) and GAENG 1968, 240–250 (for Gaul). As highlighted in section 2, the monophthongisation of /ae/ was completed in Latin during ca. the 1st cent. CE, meaning that the figures of the <ae>/<e> spelling variation in a corpus of Christian inscriptions can only serve as an indicator of the orthographic competence of the writers who produced this corpus (the higher the value of these figures, the lower the level of literacy of the writers).

⁶⁷ ADAMS 2007, 653–655.

⁶⁸ ADAMS 2007, 654.

In order to confirm the hypothesis of Adams, I have further analysed the distribution of the instances of <e> for /i/ and for /w/ in the inscriptional corpora of Gaul, Africa, and Britain by means of a log-linear analysis for categorical data. This is an extension of the standard χ -square procedure, which accounts for significant interactions between more than two categorical variables.⁶⁹ In the present case, this procedure has been used to relate the two variables already addressed in the χ -square in section 2 (i.e., type of error and region) with the study of a third categorical variable: the ratio of correct and incorrect spellings (degree of error). In other words, this statistical test allowed studying whether the degree of error concerning the use of <e> for /i/ and the use of for /w/ varied significantly in Africa, Britain, and Gaul.

The three-way log-linear analysis produced a final model that retained all the effects (i.e., the saturated model, having likelihood ratio $\chi^2(0) = 0$ and $p = 1$), an output indicating that the highest order three-way interaction (i.e., degree of error x error type x region) was statistically significant ($\chi^2(2) = 409.97$, $p < 0.001$). To paraphrase, the analysis suggested that the proportion of correct and incorrect spellings for the phonemes /i/ and /w/ varied significantly in inscriptions of the three areas under investigation. The saturated model produced by our analysis is visualised by means of the mosaic plot in Figure 4, which provides a graphic representation of the frequency data regarding the use of <e>/<i> for /i/, and the use of /<v> for /w/ in Gaul, Africa, and Britain.⁷⁰

⁶⁹ See FIELD et al. 2012, 835–852.

⁷⁰ The area of the cells in the mosaic plot is proportional to the frequency of the relevant variable that the same cell represents. Instead, the hatching and colour of each cell exemplify its contribution to the obtained p -value. Uniform hatching and darker colour indicate a positive (and statistically significant) standardised residual value for the cell in question. In contrast, dashed lines and darker colour indicate a negative estimate for the same value. Finally, cells in light grey are not significant.

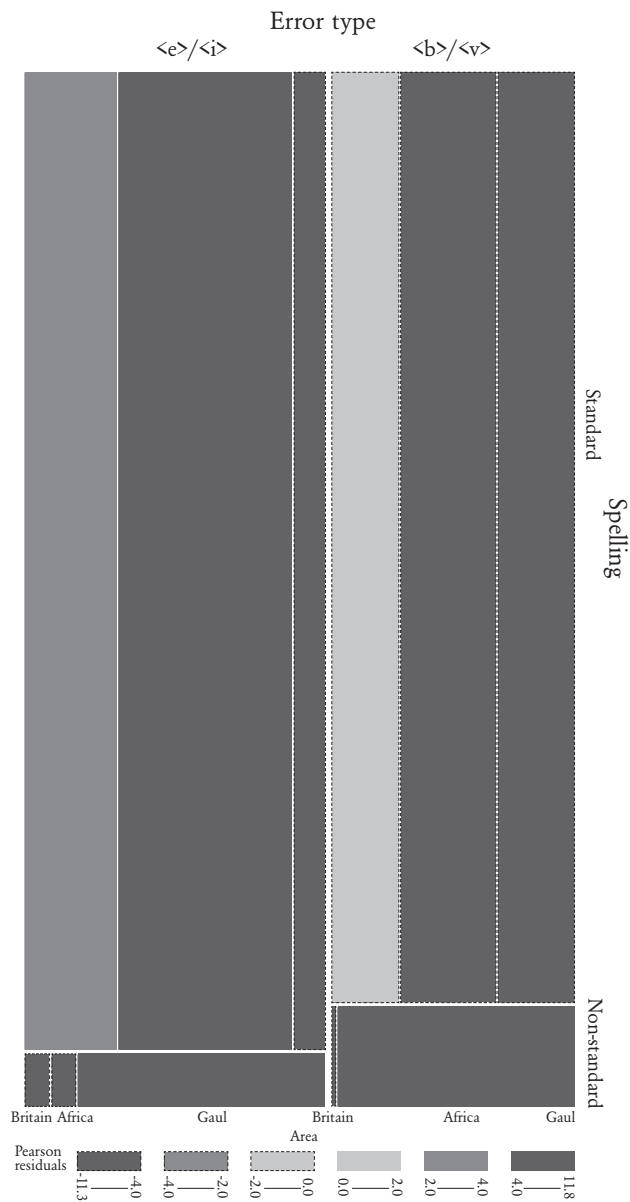


Figure 4: <e>/<i> vs. /<v> in Gaul, Africa and Britain (mosaic plot)

As exemplified by this plot, even the log-linear model suggests that the merger of the CL long /e:/ and short /i/ was more advanced in Gaul than Africa (the reverse occurring for /b/, /w/ > [β]). More precisely, our statistical analysis highlighted that significantly more instances of <e> for /i/ than expected occurred in inscriptions of Gaul, as compared to significantly fewer instances of <i> for /i/. Same, and conversely, /i/ is correctly written as <i> more often than expected in Africa, whereas cases of <e> for /i/ occur there with less than the chance frequency.

When it comes to /<v>, these two epigraphic corpora display a specular picture. African inscriptions attest to more cases of for /w/ than expected, as compared to fewer instances of correctly written /w/. On the contrary, for /w/ is particularly rare in Gaul, but the corresponding “standard” orthography is frequent.

The figures of Britain are not easy to interpret. On the one hand, our log-linear model may have suggested that the spelling variation involving vs. <v> was not widespread on the island. On the other hand, this kind of evidence is counterbalanced by the fact that even cases of <e> for /i/ occur in Britain with less than the chance frequency. This circumstance, however, is likely to stem from the fact that, because of their orthographic competence, writers of Britain hardly committed any error at all (as mentioned above).

In the attempt to address this issue, I conducted a further χ -square analysis at different levels of the same variables; namely, I performed several χ -square tests on degree of error and region. Specifically, each test compares the figures of correct and incorrect spellings (representing both /i/ and /w/) in Britain with the corresponding figures in, respectively, Gaul and Africa (Table 3).

When it comes to the spelling variation involving vs. <v> (cf. Table 3 A) deviations are significantly less frequent (with respect to the correct orthographies) in Britain than Gaul (Table 3 A.1: $\chi^2(1) = 11.42$, $p < 0.001$) and, especially, Africa (Table 3 A.2: $\chi^2(1) = 107.70$, $p < 0.001$). The same, however, does not hold true for <e>/<i> (cf. Table 3 B). As expected, the short /i/ is incorrectly written as <e> more often in Gaul (i.e., our most “extreme” region in this respect) than Britain (Table 3 B.1:

$\chi^2(1) = 214.80, p < 0.001$),⁷¹ but our test detected no significant difference in the use of <e> (and <i>) for /i/ in inscriptions of Africa and Britain (Table 3 B.2: $\chi^2(1) = 2.148, p = 0.14$).

In other words, the statistical analysis thus far (likely) suggests that the writers who produced the inscriptional corpus of Britain could disguise the consonantal merger of /b/ and /w/ as [β], better than they could obscure the merger of /e:/ and /i/ as a close /e/.

This last piece of evidence could be particularly important. First, it may corroborate the hypothesis that the aforementioned vowel merger (that is, /i/, /e:/ > /e/) may actually have occurred in Britain (as it did in Gaul), but that /b/, /w/ > [β] may have not taken place in the Latin variety of the island. This claim is further confirmed by the analysis of the British figures by means of the method of Herman (cf. Figure 3), and by the linguistic features of the British curse tablets (displaying several cases of <e> for /i/, but not a single case of for /w/; cf. above).

Second, and most importantly, our statistical analysis may have suggested that the inscriptional corpus of Britain is not “useless as evidence for regional variation” (as maintained by Adams).⁷² Instead, the inscriptional data in this corpus may point to the fact that the vowel system that characterised the Latin variety “spoken” in Britain was closer to the system attested in Gaul than to the vowel system of African Latin (*pace* Omeltchenko, according to whom Britain had a vowel system of the Sardinian type).⁷³

4. Some preliminary conclusions

In the first section of this article, I have highlighted that scholars often doubted that inscriptions are a reliable source for the study of diatopic variation in Latin and that this claim has recently been advocated by

⁷¹ This circumstance, however, is only likely to reflect that the level of literacy of the writers of Gaul was lower than that of the writers who realised the inscriptional corpus of Britain, and should in no way be used to claim that /i/, /e:/ > /e/ was more advanced in Gaul than Britain.

⁷² ADAMS 2007, 637.

⁷³ OMELTCHENKO 1977, 196.

Adams (2007). However, the discussion of the case studies in sections 2 and 3 suggested that this may not (always) be the case.

The distribution of faults in the epigraphic corpora of different areas of the Empire varies to such an extent that it is very unlikely for it not to reflect linguistic differences in the speech of these areas. The spelling variation involving <e> vs. <i>, for instance, is practically absent in the inscriptional corpora of *Sardinia* and *Africa*, whereas “misspellings” representing this same variation (and other deviations as well) abound in inscriptions of *Gaul* and *Northern Italy*. Moreover, they also appear in *Britain*. This state of things can only lead to one conclusion: the merger of the CL long /e:/ and short /i/ (as a close /e/) never took place in *Sardinian* and *African Latin*, but occurred *ab antiquo* in other areas of the Latin-speaking world. To paraphrase, one can safely assume that not only can inscriptions provide first-hand access to so-called “Vulgar” Latin, but that these sources can also be successfully employed for the inquiry into its regional variations.

However, Adams is perfectly right in suggesting that the linguistic information in the inscriptional evidence (meaning inscriptions on stone) should always be supplemented by the study of other non-literary documents (such as ostraca, *instrumenta inscripta*, and *tabellae defixionum*).⁷⁴ Inasmuch as the educational level of the writers who produced those documents was often low, they can reveal linguistic features that are not represented (to the same extent) in the language of more “formal” inscriptions (see, for instance, the case of curse tablets from Britain in section 3).⁷⁵

When it comes to methodology, Herman’s quantitative approach has proven to be a suitable one. In view of the fact that (even uneducated) writers do not always spell phonetically, the best way of “extracting” regional variations from inscriptions seems to be isolating every error in the epigraphic corpus from a particular area, and then calculating the relative frequency of these errors in relation to each other. In this way,

⁷⁴ Even these kinds of documents, however, are published in the volumes of the *CIL*, which means that they can rightfully be regarded as inscriptions.

⁷⁵ On this point, see MANCINI 2014.

every area will have its own linguistic profile, and linguistic differences between areas will emerge as differences between these profiles.

However, the discussion of this method in section 2 suggested that it can be further refined. More precisely, I have advocated that the method proposed by Herman (2000) should be supplemented by the application of objective statistical tests, and that these tests should be used to verify that the observed figures differ significantly from the figures expected based on a random distribution (see, for instance, the cases of *Etruria* and *Bruttium et Lucania*).

As for the count of correct spellings alongside the corresponding deviations from the CL “norm”, the statistical study in section 3 suggested that this kind of “negative” evidence should be mainly used to calculate the chance occurrence of the relevant errors in the corpus.⁷⁶ Nonetheless, the analysis of /<v> vs. <e>/<i> spelling confusions in inscriptions of Britain supported the conclusion that such negative evidence may also serve the inquiry into local variation in inscriptional corpora resulting from the work of well-educated scribes, provided that the evidence is used in the context of a statistical (as opposed to merely quantitative) analysis.

In conclusion, the discussion in this paper suggested that statistics can be successfully applied to the study of diatopic variation in Latin (when using inscriptions), as it indicated that any hypothesis based on the distribution of linguistic data in one epigraphic corpus should first verify the significance of such distribution (as opposed to mere randomness), for this substantially reduces the risk of basing “doubtful claims [...] on weak evidence”.⁷⁷

However, this represents only the first step in the interpretation. The statistical analysis in section 3, for example, revealed the importance of the inscriptional corpus of Britain in a diatopic perspective (which was less likely to emerge from a merely quantitative study), but the same may not necessarily hold true for other corpora. Nevertheless, similar cases cannot be ignored. Instead, I suggest that one should always attempt to

⁷⁶ See also ADAMIK 2022.

⁷⁷ ADAMS 2007, 625.

justify why the data in a specific corpus are not significant (from a statistical point of view). In this way, it can be argued that (almost) no epigraphic corpus will be “useless as evidence for regional variation”.⁷⁸

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⁷⁸ ADAMS 2007, 637.

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Summary

IPSA LATINITAS ET REGIONIBUS COTIDIE MUTETUR ET TEMPORE. SOME METHODOLOGICAL CONSIDERATIONS ON THE USE OF HERMAN'S QUANTITATIVE METHOD

This article discusses whether statistical analysis (as opposed to quantitative analysis) can be successfully applied to the study of diatopic variation in Latin (when using inscriptions). Section 1 introduces the methodological problem. First, previous research on the topic is reviewed, with particular attention to the quantitative method proposed by József Herman in the year 2000. Second, the limitations of this method (and of inscriptions in

general) are addressed in the light of the criticism made by James Noel Adams in 2007. In section 2, the findings of Herman (2000) on the existence of regional differences in the phonological system of the Italian peninsula are validated by means of various statistical tests. The results in this section suggest that the quantitative method proposed by Herman is reliable. However, they also suggest that this same method should be supplemented by the application of objective statistics. More precisely, one should verify that the observed figures differ significantly from the figures expected based on a random distribution. In section 3, the discussion turns to the use of “negative” evidence, i.e., the count of correct forms alongside the corresponding deviations from the “Classical Latin” “norm”. This kind of evidence is distrusted by Herman, but the statistical study in this paper indicates that even such evidence can be useful, at least in limited circumstances. Finally, section 4 draws some preliminary conclusions and clarifies the importance of the epigraphic sources for the study of diatopic variation in Latin.

Keywords: Latin inscriptions; diatopic variation; corpus linguistics; quantitative analysis; statistical analysis

ALESSANDRO PAPINI

Gent University

Department of Linguistics

Blandijnberg 2, 9000 Gent, Belgium

Alessandro.papini@ugent.be