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GRAPHIC, ORTHOGRAPHIC, AND DIACHRONIC CONSIDERATIONS REGARDING THE INITIAL SIGN COLLOCATION OF MAYAN WRITING

by

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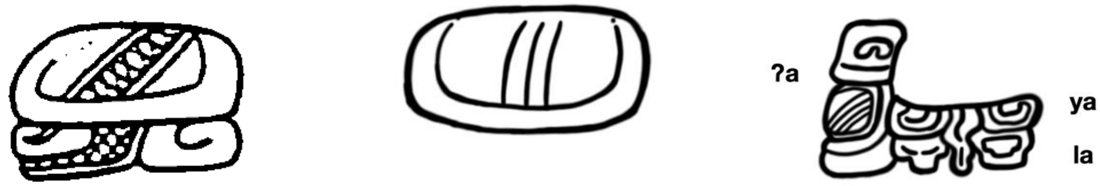
The study of the so-called Primary Standard Sequence (PSS), as defined by Michael Coe (1973, 1978), has led to a more complete understanding of Mayan writing, including numerous decipherments of signs and expressions by many scholars since the 1980s. One of these scholars, Barbara MacLeod (1990), wrote a dissertation on the subject that remains the single most comprehensive and detailed analysis of the structure and nature of this genre to date. In that work, MacLeod (1990) addressed the case of the Initial Sign Collocation (ISC) (**Figure 1A**), designated that way by Coe (1978) because of its typical occurrence at the beginning of the PSS on portable texts. The collocation typically consists of a likely logographic "main sign," T617/1M3 (**Figure 1B**), and up to three syllabograms (**ʔa, ya, la**) (**Figure 1C**). The main sign may also be replaced by a variety of presumed allograms (i.e. distinct graphemes with the same value), which are not studied here.[1] Although the ISC's status as "Initial" may be questioned due to its typically non-text-initial occurrence on monumental texts (e.g. Schele 1982:317–320, Chart 130), the fact is that it is most frequently clause-initial and pre-verbal in position, following only fronted temporal phrases (distance numbers, calendar rounds) on a few stone monuments and even fewer portable texts, and thus its label remains largely well-earned.[2]

[1] I apply the long-standing conventions for transcribing values of Mayan signs (e.g. Fox and Justeson 1984): logograms are represented in uppercase, bold letters (e.g. T544 **K'IN** for *k'iin* 'sun, day'); syllabograms in lowercase, bold letters (e.g. T77 **k'i**); and signs whose values are unknown may be represented by means of codes from either Thompson (1962) or Looper et al. (2022), the latter a revised version of Macri and Looper (2003) and Macri and Vail (2009), or by means of convenient (descriptive or associative) labels in English in uppercase, normal letters (e.g. **ʔa-**INITIAL.SIGN**-ya** or the abbreviated version **ʔa-**IS**-ya**). The following linguistic abbreviations are employed: A3 = third person singular ergative/possessive, B3 = third person singular absolutive, CMP = completive status marker, ENCL = enclitic.

[2] Though not the focus of this paper, the following statistics apply: the Initial Sign Collocation occurs as the very first glyph block of a text in 565 (84.5%) of the 669 cases for which text position was studied, somewhere after the first glyph block of the text but not text-finally in 93 (13.9%) cases, and text-finally, where it likely constitutes a clause by itself, in 11 (1.64%) instances.



A B C

Figure 1. The Initial Sign Collocation and associated syllabograms. a) ISC on Balakbal Stela 5. Drawing from Justeson and Mathews (1990:112, Fig. 8). b) IS Main Sign, T617/1M3. Drawing by author based on drawing in Tokovinine and Estrada-Belli (2015:204). c) Syllabograms ʔa, ya, la on ISC from Tikal Stela 31. Drawing by the author based on drawing by Linda Schele.

Despite the rapid development of scholarship surrounding the PSS and its components since the 1980s, and the predictable structural position of the ISC, which seems ideally suited for correlation with a precise morphological category and lexical identification, the collocation has remained problematic in no small part due to the overwhelming number of spelling variants and apparent allograms substituting for T617/1M3, as well as the varying positions of two of the commonly associated syllabograms (**la**, **ya**) with respect to the logogram.[3] At the present time, there exist three major alternatives for analyzing and reading the ISC: 1) a deictic demonstrative *alay* (Boot 2003; MacLeod and Polyukhovych 2005), which has gained very wide support in the literature; 2) a reportative verb *'a('a)lay* (Grube 1991; Lacadena 2004a, 2004b; Beliaev and Davletshin 2006; Beliaev et al. 2013); and 3) an existential particle *ʔay*, possibly inflected as *ʔay-al* (MacLeod 1990; Mora-Marín 2001, 2004, 2005; Law and Stuart 2017).

In this paper, the first part in a series of papers on the orthography, lexical value, and morphosyntax of ISC that I have planned, I present evidence showing that the spelling patterns in favor of the reading **<ʔalay>** for the ISC supported by MacLeod

[3] I ignore the following dramatically different spelling variants, which are present in a small fraction of overall texts: **ʔa-ja-ya** (5 cases), **ʔa-ja** (3 cases), **ʔa-ja-la** (2 cases), **ʔu-**IS-**ya** (1 case), **na-**IS-**ya** (1 case). The **ʔa-ja(-ya/la)** variants are geographically confined to Late Classic, Nebaj-style vases. I suspect that these are cases of graphic convergence between T617/1M3 (Initial Sign) and T181/ZU1a **ja**. The **ʔu-**IS-**ya** and **na-**IS-**ya** spellings are exceptional, each is represented only once. If all of these were included in my overall sample of ISC spellings, they would amount to a mere 1.77% of the total (679 cases of ISC with T617/1M3 in MHD, excluding cases with other Main Sign allograms). Also, the two exceptional spellings appear on texts (K7602, K5940) that bear other anomalies (e.g. missing signs resulting in incomplete expressions), suggesting that the scribes responsible were not following conventions. The Nebaj variants are undoubtedly an important phenomenon, pointing to either a different linguistic variant (e.g. perhaps a scribe who spoke Tojol Ab'al, given the cognate form *ʔajy* in that language, which could be spelled **ʔa-ja-ya**) or perhaps more likely, a case of graphic convergence between 1M3 and ZU1. Being a late phenomenon, I do not consider them relevant for the origin and early evolution of the ISC. The **ʔu-**IS-**ya** spelling could possibly relate to some codical spellings with T667 such as **ʔu-**T667**-ya** (Dresden 30c-39c), **ʔu-**T667**-wa** (Dresden 30c-39c), **ʔa-**T667**-wa** (Dresden 32c), but this too is a very late phenomenon.

and Polyukhovych (2005) are contradicted, in equal or greater numbers, by patterns supporting a sequence **<ʔayal>**. I use the angle bracket, bold letters notation for proposed values for a sign collocation (i.e. a grouping of signs that likely spell a word), regardless of the make up of such word in terms of roots and affixes, and ignoring, provisionally, phonological details such as vowel length and preconsonantal glottal consonants (e.g. /h ʔ/). Moreover, the reading **<ʔayal>** is strongly supported by the chronological development of the spellings of the ISC (e.g. IS-**ya**, IS-**ya-la**, IS-**la**, **ʔa**-IS-**ya**, **ʔa**-IS-**ya-la**), with spellings supporting the reading **<ʔalay>** appearing much later in time (Late Classic period), and explained by graphic composition choices rather than linguistic motivations.

Methods and Assumptions

I have employed the Maya Hieroglyphic Database (MHD) by Looper and Macri (1991–2022).[4] The MHD contains 679 examples of the ISC that include T617/1M3, as well as 266 cases including mostly IS substitutes but also a very few purely syllabographic spellings, for a total of 945 cases. After checking all cases for clarity, to make sure that *all* the signs in the ISC could be securely identified, a total of 669 examples have been retained, although the focus has been on all cases with 1M3, all cases of purely syllabographic spellings, and especially all cases in which the syllabograms **ya** and **la** co-occurred regardless of which allograms functioned as the IS.[5] In other words, I have not systematically studied all cases of IS substitutes (non-1M3), only those in which **ya** and **la** co-occur. The downloaded dataset was then processed for epigraphic and quantitative analysis using Apple Numbers, with special attention paid to the precise order of signs contained within the ISC; the dataset is available as a CSV file (**Online Supplement**).[6] I then used the dataset DATAtab (DATAtab Team 2022), an online statistics calculator, to carry out the descriptive and inferential statistics to better assess the spelling patterns. To this end, I coded the dataset for the analysis of dependent and independent variables, as summarized in **Table 1**.

[4] Originally, the data for this part of the study came primarily from the PSS Database I compiled two decades ago (Mora-Marín 2001, 2004), revised over the years, and updated from 840 texts to 860 in 2019. The MHD (Looper and Macri 1991–2022) is much more comprehensive, and contains many more categories of associated information.
[5] Other authors, after carrying out their own culling procedure, may arrive at a different final number of “usable” data points, but I strongly suspect that the general patterns described in this paper will hold.
[6] The MHD unfortunately follows a standardized ordering of components, placing **la** before **ya** whenever the two syllabograms co-occur, even when **ya** precedes **la** in the actual spelling. Thus, it is necessary for the researcher to review all cases through visual inspection of the actual glyphic collocations, and not all cases could be checked against drawings or photographs. Another issue is that when a dataset is downloaded, the resulting file will not retain any information about the type of dating (long count, calendar round, distance number, association, estimate). Thus, such information has to be checked with the MHD online on a case-by-case basis.

Variables	Header title	Type	Values
Dependent	ISC Spelling	Nominal	IS, IS-**ya**, IS-**la**, IS-**ya-la**, **la**-IS-**ya**, **ʔa**-IS-**ya**, **ʔa**-IS, **ʔa-ya**-IS, **ʔa-la**-IS, **ʔa**-IS-**ya-la**, **ʔa**-IS-**la-ya**, **ʔa**-IS-**la**, **ʔa-ya**, **ʔa-la-ya**
	ʔa presence	Nominal	Yes, No
	ya before	Nominal	Yes, No
	la before	Nominal	Yes, No
	la presence	Nominal	Yes, No
Independent	Gregorian	Metric	Gregorian years (based on non-estimate Long Counts)
	Period	Ordinal	Late Preclassic, Early Classic, Late Classic, Terminal Classic
	Region	Nominal	Central, Eastern, Northern, Unprovenienced, Usumacinta, Usumacinta Petexbatun, Usumacinta west, Southern
	Media	Nominal	Monument, Portable
	Position	Ordinal	Beginning, Middle, End
	Dispersion	Metric	Numerical (Position within text/length of text)
Non-variables	ID		Record identification
	ObjAbbr		MHD object abbreviation code

Table 1. Variables considered in this study.

I am employing the following assumptions and constraints: 1) I assume the IS, specifically T617/1M3, is a logogram, evidence for which is presented below; 2) as a logogram, it could represent a lexeme, i.e. a root plus or minus derivational and inflectional affixes; 3) as a logogram, it may have been polyvalent, with at least one alternative value **LEM** (Stuart 2010) or **WIN** (Mora-Marín 2012) supported in contexts when it refers to stone celts, and thus, I assume that in the ISC context, scribes *may* have attempted to disambiguate its value by means of phonetic complements or fully phonetic spellings; 4) I have focused on cases that involve the presence of the syllabograms **ya** and **la**, especially cases involving both, in whatever order relative to the IS; and 5) I am considering a variety of IS allograms to have the same value, but will not attempt to justify their iconographic or graphemic equivalence, but simply assume it on linguistic and epigraphic grounds (i.e. their equivalent morphosyntactic distribution and collocational associations with respect to signs like **ʔa**, **ya**, and **la**) grounds.

I am assuming that Epigraphic Mayan represents varieties of the Ch'olan and Yucatecan subgroups of the Mayan language family, but also that the basis of the script can be attributed to Ch'olan innovators (Fox and Justeson 1982; Justeson and Fox 1989; Houston et al. 2000; Lacadena and Wichmann 2002, 2004; Mora-Marín 2001, 2003, 2009). I will explain linguistic transcription conventions as they come up.

Investigating Spelling Patterns

Before reviewing the variety of spelling patterns, a few words about the IS itself are in order. There is evidence that the IS could, in principle, be used on its own, devoid of phonetic complements. Looper and Macri (1991–2022) have coded one example of the ISC as consisting of a single grapheme, 1M3, the IS itself. I agree with their assessment.

The case in question, seen in **Figure 2A**, is found on a pottery vessel categorized, stylistically, as Late Classic in the MHD. I believe the text is from the late Early Classic, probably from the sixth century, during which the shift of U-shaped elements to O-shaped elements took place. This example shows 1M3 superfixed with T533/ZA1a and a smaller version of T617/1M3 itself. The implication is that the graphic composition of ZA1a.1M3:1M3 is the full form of 1M3. Several other Early Classic examples from the fifth and sixth centuries show this probable full version of 1M3, seen in **Figures 2B-F**. There is one instance, seen in **Figure 2G**, in which ZA1a is upside down, and thus could correspond to T534/ZA2, the syllabogram **la**. This may have been a scribe's reanalysis of ZA1a **ʔAJAW**, which when rotated 180 degrees becomes ZA2 **la**, for by the time of this text, in the early fifth century, ZA2 **la** had already been in use for some time. All other cases of this probable full version of 1M3, though, show ZA1a in its normal orientation, including the example in **Figure 2B**, which shows this probably full form of 1M3 subfixed with a more typical ZA2 **la**. The example in **Figure 2H**, which shows the full form of 1M3 with a doubled T533/ZA1a, can be shown to distinguish this doubled T533/ZA1a from an early version of ZA2 **la** that appears elsewhere in the same text, seen in **Figure 2I**. It is possible, though, that the doubling of T533/ZA1a could have been due to analogical influence of the typically doubled T178/ZA2 **la**.[7] The example from Tikal seen in **Figure 2J** appears to show a spelling **la-**IS**-ya**, a spelling that figured prominently in Macleod and Polyukhovych (2005), but one that is inconsistent with either a **<ʔayal>** or **<ʔalay>** reading. It is plausible that what appears to be a case of T178/ZA2 **la**, nonetheless, could actually be part of the full version of 1M3, only this time analogically rotated to resemble a doubled version of T534/ZA2 **la**, and thus resembling T178/ZA2 **la**.

[7] Alternatively, it is possible that what we are seeing in these examples is the very process of 180-degree rotation that led scribes to coin the value **la** out of ZA1a. However, ZA2 **la**, specifically the rotated and often doubled T533, had already been in use prior to several of these examples (cf. Tikal Stela 39, Bejucal Stela 2, the Kendall jade clamshell effigy pendant), including the case of MMC831473 that is likely late Early Classic in age.

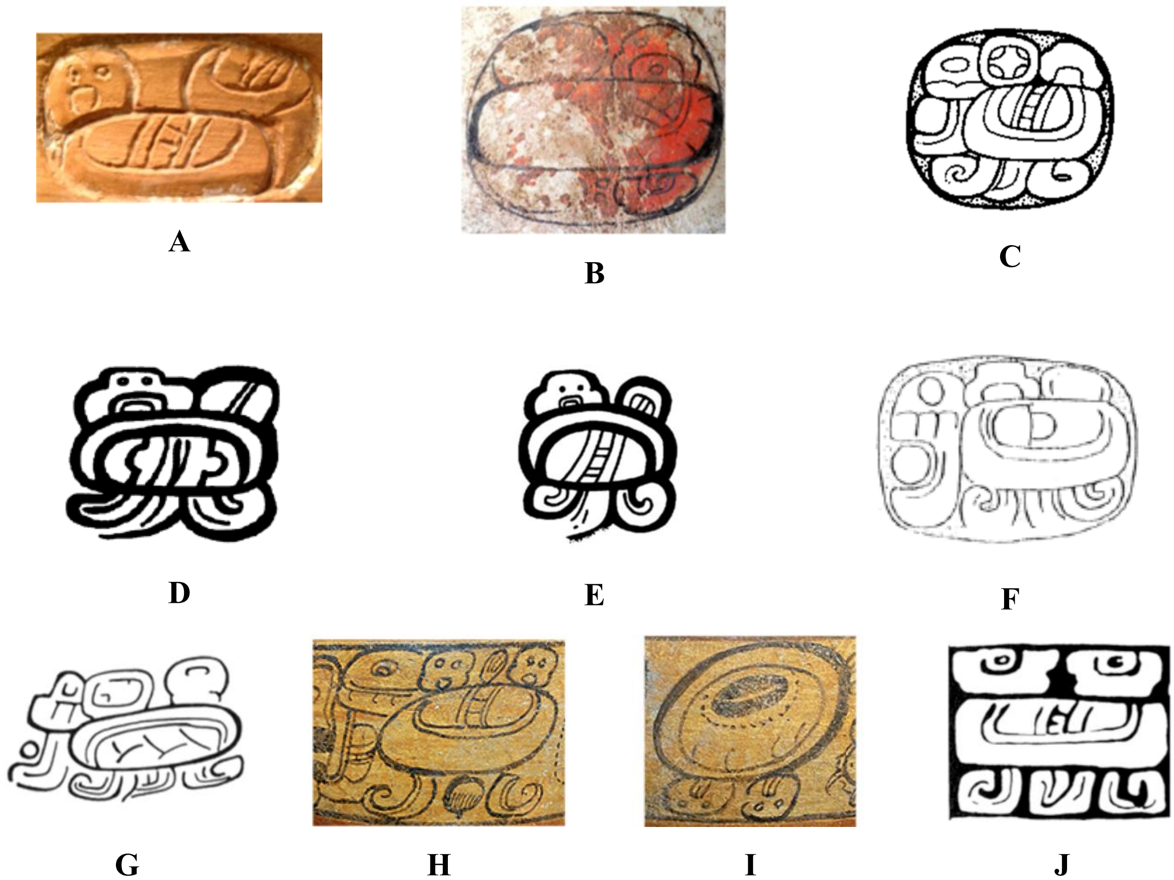


Figure 2. Probable full versions of T617/1M3. a) Detail from K5197. b) Detail from K2027. Photograph by Matthew Looper in Looper and Macri (1991–2022). c) Detail from tetrapod vase at Staatliche Museen zu Berlin. Drawing by Nikolai Grube in Grube and Gaida (2006:86–88). d)-e) Details from two separate bowls from Baking Pot, Belize. Drawings by Christophe Helmke in Colas et al. (2002). f) Detail from El Resbalon Hieroglyphic Stairway 3. Drawing by Ian Graham in Looper and Macri (1991-2022). g) Detail from lidded tripod vase from Tikal. Drawing from Culbert (1993:Fig. 19b). h) Detail from MMC831473, Glyph A. Photograph by Matthew Looper (Looper and Macri 1991–2022). i) Detail from MMC831473, Glyph G. Photograph by Matthew Looper (Looper and Macri 1991–2022). j) Detail from TIKMT140, Glyph A. Drawing by Culbert (1993:Fig. 108d).

It is time to examine the variety of spelling patterns. MacLeod (1990), Grube (1991), Mora-Marín (2001, 2004, 2005), MacLeod and Polyukhovych (2005), and Boot (2003), among others, have explored the wide variety of spelling patterns of the ISC. The patterns attested in the present dataset are seen in **Table 2**, keeping in mind a few corrections to the transcriptions in the MHD (a few cases in which T534/ZA2 **la** was transcribed as 1M3, and cases in which the order of signs in the collocation was rearranged in the transcription). Note that 94.23% of all instances include a syllabogram **ʔa** preposed to the IS main sign; all five purely phonetic spellings bear **ʔa**. Also, note that 94.51% of examples exhibit the syllabogram **ya**, while only 5.38% exhibit the syllabogram **la**. Assuming that T617/1M3 was polyvalent, as already mentioned, then the consistent presence of **ʔa** and **ya** point to a disambiguating function, the need by scribes to clarify that in this context T617/1M3 was not **WIN** or **LEM**, for example.

ISC Spelling	Frequency	%	With ʔa	With ya	With la	ya before	la before
IS	1	0.15%	0	0	0	0	0
IS-IS-la	1	0.15%	0	0	0.45%	0	0
IS-la	1	0.15%	0	0	0.45%	0	0
IS-ya	25	3.72%	0	3.72%	0	0	0
IS-ya-la	8	1.19%	0	1.19%	1.19%	1.19%	0
la-IS-ya	1[1]	0.15%	0	0	0.45%	0	0.45%
ʔa-IS	29	4.32%	4.32%	0	0	0	0
ʔa-IS-la	3	0.45%	0.45%	0	0.45%	0	0
ʔa-IS-la-ya	3	0.45%	0.45%	0.45%	0.45%	0	0.45%
ʔa-IS-ya	583	86.76%	86.76%	86.76%	0	0	0
ʔa-IS-ya-la	6	0.89%	0.45%	0.89%	0.89%	0.89%	0
ʔa-la-IS	1	0.15%	0.15%	0	0.15%	0	0.15%
ʔa-la-IS-ya	2[2]	0.3%	0.45%	0.3%	0.3%	0	0.3%
ʔa-la-ya	3	0.45%	0.45%	0.45%	0.45%	0	0.45%
ʔa-ya	1	0.15%	0.15%	0.15%	0	0.15%	0
ʔa-ya-IS	3	0.45%	0.45%	0.45%	0	0	0
ʔa-ya-la	1	0.15%	0.15%	0.15%	0.15%	0.15%	0
Total	*672*	*100%*	*94.23%*	*94.51%*	*5.38%*	*2.38%*	*1.8%*

[1]This example (TIKMT140) of this spelling pattern may actually be a case of the full version of the Initial Sign, and if so, it would actually correspond to a case of IS**-ya**.
[2]One of the two examples of the **ʔa-la-**IS**-ya** spelling (MMC831473), may actually be a case of the full version of the Initial Sign, instead of **la-**IS. If so, it would actually correspond to a case of **ʔa-**IS**-ya**.

Table 2. Overall spelling patterns of ISC in MHD based on *visually* inspected examples.

Table 3 provides the patterns for spellings including either *both* the syllabograms **ya** and **la**, **ya** placed before the Initial Sign, or **la** placed before the Initial Sign, and considering instances of all allograms of the Initial Sign, not just T617/1M3. The two are very close, and the difference, in total numbers, is not significant: 19 cases of **ya** before **la** or Initial Sign; 9 cases of **-la** before **ya** or Initial Sign. The examples of **ya** before **la**, 15 cases, outnumber those of **la** before **ya**, with 9.

ISC Spelling	Frequency	% Total	With ʔa	With ya	With la	ya before	la before
IS-ya-la	8	1.19%	0	1.19%	1.19%	1.19%	0
ʔa-IS-ya-la	6	0.89%	0.45%	0.89%	0.89%	0.89%	0
ʔa-ya	1	0.15%	0.15%	0.15%	0	0.15%	0
ʔa-ya-IS	3	0.45%	0.45%	0.45%	0	0	0
ʔa-ya-la	1	0.15%	0.15%	0.15%	0.15%	0.15%	0
la-IS-ya	1[1]	0.15%	0	0	0.45%	0	0.45%
ʔa-IS-la-ya	3	0.45%	0.45%	0.45%	0.45%	0	0.45%
ʔa-la-IS	1	0.15%	0.15%	0	0.15%	0	0.15%
ʔa-la-IS-ya	2[2]	0.3%	0.45%	0.3%	0.3%	0	0.3%
ʔa-la-ya	3	0.45%	0.45%	0.45%	0.45%	0	0.45%
Total	*29*	*4.33%*	*2.7%*	*4.03%*	*4.03%*	*2.38%*	*1.80%*

[1] This example (TIKMT140) of this spelling pattern may actually be a case of the full version of the Initial Sign, and if so, it would actually correspond to a case of IS-**ya**.
[2] One of the two examples of the **ʔa-la-**IS-**ya** spelling (MMC831473), may actually be a case of the full version of the Initial Sign, instead of **la-**IS. If so, it would actually correspond to a case of **ʔa-**IS-**ya**.

Table 3. Cases where ya or la can be said to precede the other or the Initial Sign (IS). Total examples are 59, but percentages of the overall Total of 672 are shown. Cases of ya before la or Initial Sign are on top half, those of la before ya or Initial Sign on bottom half. Two likely examples of the full version of the Initial Sign were counted as cases of la before the Initial Sign (see footnotes). Shaded spelling patterns show both ya and la.

It is now worth reviewing some actual examples. The following 8 examples (out of 19) provide evidence for a general reading **<ʔay...>** and **<...yal>**, with the /y/ preceding the /l/: **ʔa-ya-** on K9130 (**Figure 3A**); **ʔa-ya-**IS on K5009 (**Figure 3B**); **ʔa-ya-**IS on K3844 (**Figure 3C**); **ʔa-ya-**IS on Tikal Stela 26 (**Figure 3D**); **ʔa-**IS-**ya-la** on Tikal Stela 31 (**Figure 3E**); **ʔa-**IS-**ya-la** or **ʔa-**IS-**ya:la** on an Early Classic pottery vessel

(**Figure 3F**); IS-**ya-la** on an Early Classic pottery vessel (**Figure 3G**); and **ʔa-**IS-**ya-la** or **ʔa-**IS-**ya:la** on a Late Classic pottery vessel (**Figure 3H**). I have not illustrated the **ʔa-ya-la** spelling from a mural fragment from the site of San Bartolo, for it remains unpublished, and more research is needed to validate its identification as an instance of the ISC; nevertheless, its text-initial occurrence is supportive of its function as a spelling of the ISC.

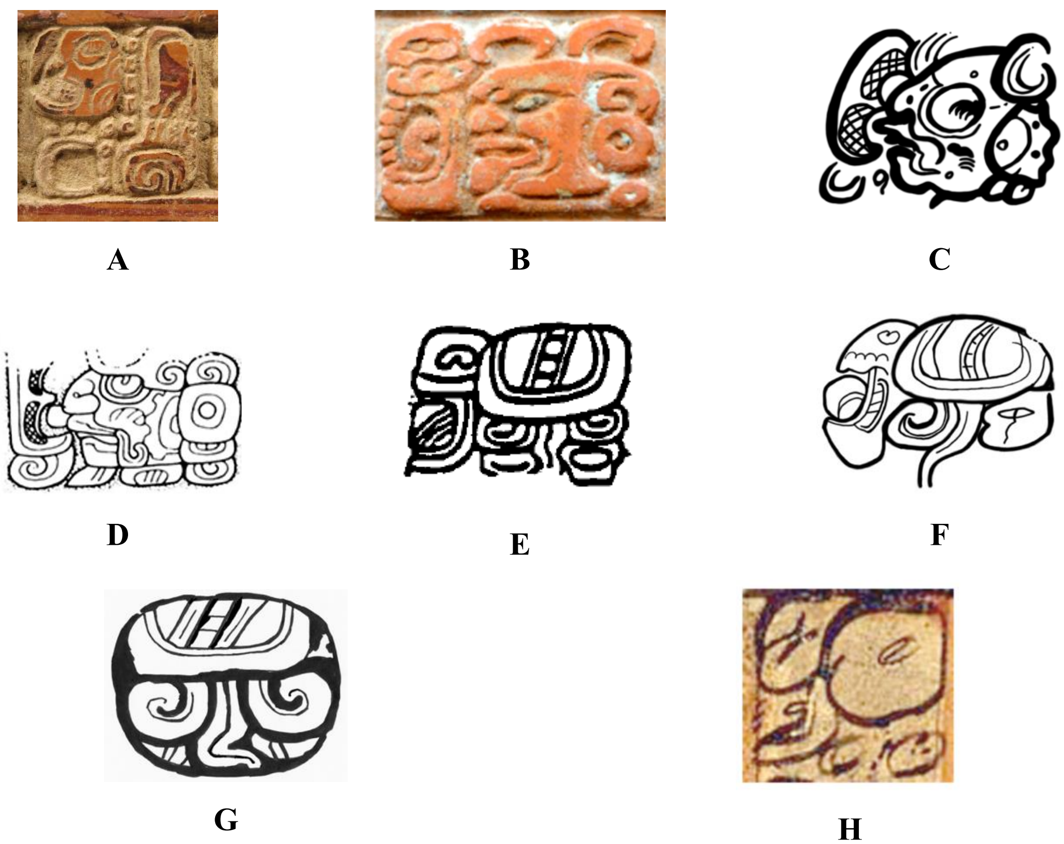


Figure 3. Examples of spellings favoring <ʔayal> value of Initial Sign Collocation. a) Detail from vase COLK9130. b) Detail from vase COLK5009. Photograph by Yuriy Polyukhovych in Looper and Macri (1991–2022). c) Detail from COLK3844. Drawing by the author after drawing by Barbara Kerr. d) Detail from Tikal Stela 26:zB1 (TIKSt26). From Jones and Satterthwaite (1982:Fig. 44). e) Glyph block from Tikal Stela 31 (TIKSt31). f) Glyph from carved pottery plate (COLDYF121), #354 illustrated in Berjonneau and Sonnery (1985:230–231). Drawing by the author. g) Glyph from globular vessel (COLDYF57), Land Collection, drawing by the author after rubbing in Nicholson (1979:138–139, Cat. 133). h) Detail from COLK9144. Looper and Macri (1991–2022).

The first example demonstrates that the IS main sign, T617/1M3 (or its various substitutes), may be omitted if at least the syllabograms **ʔa-ya** are present; this **ʔa-ya-** spelling would point to a reading as *ʔay* or *ʔay-a(l)*, the latter with either a suffix *-a* or a suffix *-al* (with a final underspelled consonant). Boot (2009:24) had already drawn attention to the **ʔa-ya** spelling on K9130, but he suggested it functioned as an abbreviation of the **ʔa-la-ya** spelling attested on K8123, a possibility that cannot be discounted. Nevertheless, the crucial lesson is that the **ʔa-ya** spelling on K9130 demonstrates that the entire ISC can be captured (however completely or incompletely) with **ʔa** and **ya** alone. To my knowledge, there are no cases, thus far, of a spelling **ʔa-la** that on their own take the place of the ISC: underspellings are more likely to omit the final syllabogram used to represent the final consonant, rather than a middle syllabogram, so that if the ISC were read **<ʔalay>**, the expected underspelling would be **ʔa-la**. The examples in **Figures 3E–H** also support the relative ordering of **ya** before **la**, taking into account that in some of these examples (**Figures 3F** and **3H**), both syllabograms have been abbreviated.

Next, I review 10 examples that provide evidence for a reading **<ʔalay>**, proposed by MacLeod and Polyukhovych (2005) and Boot (2003), and currently cited by a majority of authors. The examples in **Figures 4A–B** also support the proposition that the IS logogram is optional, and that the syllabograms **ʔa**, **la**, **ya** can represent the entirety of the expression represented by the ISC.

The case of **Figure 4C** is interesting: it shows **ʔa-[**IS**]la-ya** or **ʔa-[**IS**]la-ya**, with the Initial Sign graphically infixed within the syllabogram **la**, and because of this, the relative order of the two signs with respect to each other is ambiguous, but, given the similarity of the collocation as a whole to those in **Figures 4A-B**, I have counted it as a case of **la** before **ya**. The examples in **Figures 4D–F** further support the relative **ʔa-la-ya** ordering of the syllabograms. In the examples in **Figures 4C–H**, as with the examples in **Figures 3F** and **3H** above, the syllabograms **ya** and **la** were abbreviated, but in this case, they are ordered differently, **la** before **ya**. The case in **Figure 4I** shows **ʔa-la-**IS, while that in **Figure 4J** shows **ʔa-la-**IS**-ya**, but it is possible that, as with the case of TIKMT140 (**Figure 2J**), this is a case where what appears to be T178/ZA2 **la**, or a doubled version of T534/ZA2 **la**, is actually an instance of a doubled T533/ZA1 functioning as part of the full graphic form of T617/1M3, the Initial Sign.

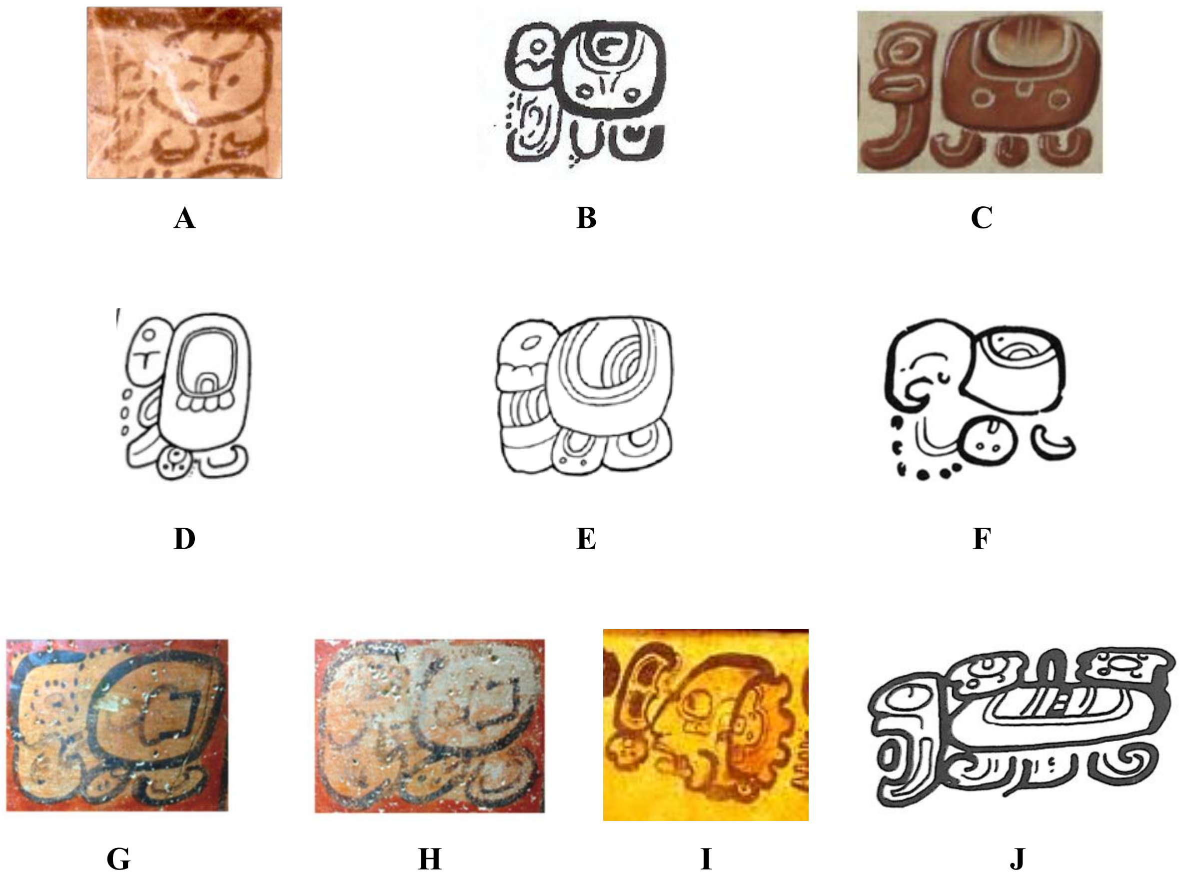


Figure 4. Examples of spellings favoring <ʔalay> value of Initial Sign Collocation.
a) Detail from vase K8123, after Boot (2003:3). b) Detail from vase illustrated in MacLeod and Polyukhovych (2005:166). c) Detail from Vessel I Dieseldorff Collection, MHD code COLDies01. Drawing by Mary Louise Baker in Looper and Macri (1991-2022). d) Detail from Quirigua region jade plaque fragment (COLQClt2). Drawing by Matteo (2007:Fig. 1). e) Detail from Copan Altar of Stela 13 (CPNSt13Alt). Drawing from MacLeod and Polyukhovych (2005:171). f) Detail from Naj Tunich Drawing 49 (NTND49), after drawing by Andrea Stone in Stone (1995:177, fig. 7-25). g)-h) Details from bowl at the University of Colorado Museum of Natural History, MHD code COLBoul26304. Photographs by Matthew Looper in Looper and Macri (1991–2022). i) Detail from COLK8955. Photograph by Justin Kerr in Maya Vase archive (famsi.org). j) ISC from MS0040/COLK5458. Drawing by Barbara MacLeod in Reents-Budet (1994:82, Fig. 3.10b).

The most explicit evidence is thus contradictory. For this reason, a review of the chronological sequence of the spelling types could prove useful. To this end, the use of the MHD has been particularly helpful. All examples were checked with drawings, and when necessary, photographs. **Table 4** presents the majority of early, *reliably* dated examples known in sequential order.

#	SPELLING	TEXT	REGION	DATING	GREGORIAN
1	T617-**ya**	Rio Azul Stela 1	Central	08.17.16.12.02	393
2	T617-**ya-la**	Bejucal Stela 2	Central	08.17.17.00.00	393
3	T617-**ya**	Balakbal Stela 5	Central	08.18.10.00.00	406
4	T617-**ya-la**	Sufricaya Stela 5	Eastern	08.19.06.08.05	422
5	T617-**ya-la**	El Zapote Stela 1	Central	08.19.10.00.00	426
6	T617-**ya**	El Zapote Stela 1	Central	08.19.10.00.00	426
7	T617-**ya**	El Zapote Stela 1	Central	08.19.10.00.00	426
8	T617-**ya**	Calakmul Stela 114	Central	09.00.00.00.00	435
9	T617-**ya**	El Zapote Stela 5	Central	09.00.00.00.00	435
10	T617-**ya**	El Zapote Stela 5	Central	09.00.00.00.00	435
11	**ʔa**-T617-**ya-la**	Tikal Stela 31	Central	09.00.10.00.00	445
12	T617-**ya-la**	Tikal Stela 31	Central	09.00.10.00.00	445
13	T617-**ya-la**	Tikal Stela 31	Central	09.00.10.00.00	445
14	T617-**ya**	Tikal Stela 40	Central	09.01.13.00.00	468
15	T617-**ya**	Oxkintok Lintel 2	Northern	09.02.00.00.00	475
16	**ʔa**-T617-**ya-la**	Tres Islas Stela 1	Usumacinta	09.02.00.00.00	475
17	**ʔa**-T617-**ya**	Pacbitun Stela 6	Eastern	09.02.10.00.00	485
18	**ʔa**-T617-**ya-la**	Tikal Stela 3	Central	09.02.13.00.00	488
19	T617-**ya**	Oxkintok Lintel 13	Northern	09.03.07.02.09	502
20	**ʔa**-T617-**ya-la**	Calakmul Stela 43	Central	09.04.00.00.00	514
21	**ʔa**-T617-**ya**	Caracol Stela 16	Eastern	09.05.00.00.00	534
22	T617-**ya**	El Palmar Altar 1	Eastern	09.06.00.00.00	554
23	**ʔa**-T617-**ya**	Pol Box Stela 3	Eastern	09.07.00.00.00	573
24	**ʔa**-T617-**ya**	El Resbalon Hieroglyphic Stairway 3	Eastern	09.07.06.04.18	580
25	**ʔa**-T617-**ya-la**	Pol Box Stela 2	Eastern	09.07.10.00.00	583

Table 4. Chronologically arranged spellings in texts spanning the Early Classic period. Several texts with uncertain dates were omitted (Tikal Stela 26, Copan Stela 63).

The data just presented can be quantified to assess their significance. **Table 5** presents the descriptive statistics for the spelling types with respect to time, and

Figure 5 provides a graphic representation of the same data. The descriptive statistics show higher mean values for the spellings with **ʔa-** compared to those without it.

	N	Mean	Std. Deviation
T617-ya	11	450.45	46.35
T617-ya-la	5	426.2	21.37
ʔa-T617-ya-la	5	501	52.14
ʔa-T617-ya	4	543	43.64
Total	***25***	***470.52***	***57.66***

Table 5. Descriptive statistics for spelling types with respect to time (Gregorian years).

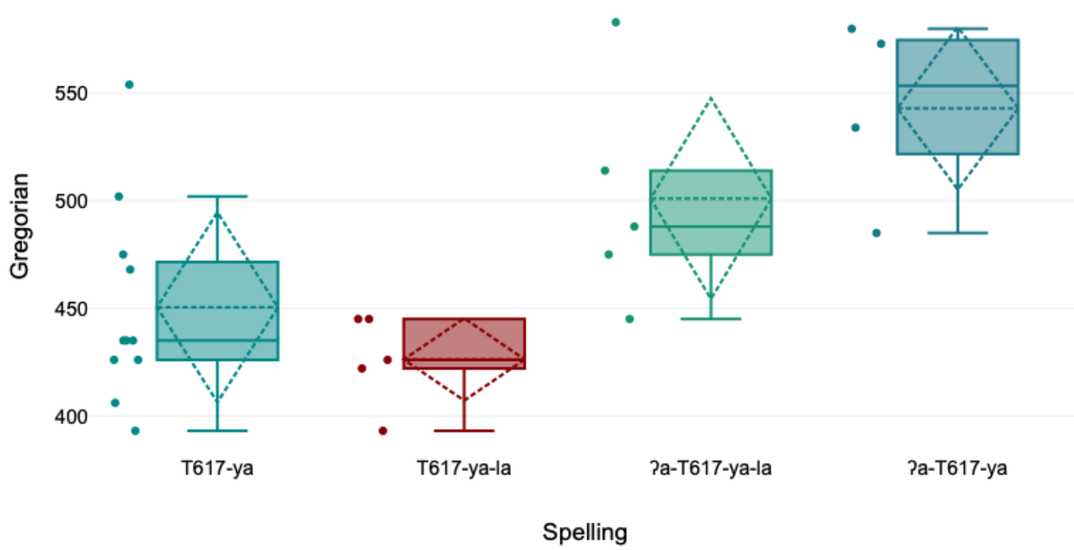


Figure 5. Box Plots showing distribution of spelling types in time. Prepared with DATAtab (DATAtab Team 2022).

The Analysis of Variance (ANOVA), see **Table 6**, yielded results ($F = 7$, $p = 0.002$) that point to a statistical significance between the differences in temporal distribution among the four spelling types documented. A Bonferroni Post-hoc Test, with results shown in **Table 7**, support the proposition that the pairwise group comparisons of T617**-ya** - **ʔa-**T617**-ya** and T617**-ya-la** - **ʔa-**T617**-ya** have a *p*-value point to statistically significant differences. What these tests show is that the pairwise comparisons between spellings exhibiting **ʔa-** and those lacking it appear to be significant.

	Sum of Squares	df	Mean Squares	F	p	Critical F-Value
Between Groups	39,908.71	3	13,302.9	7	.002	3.07
Within Groups	39,893.53	21	1,899.69			
Total	79,802.24	24				

Table 6. ANOVA for four ISC spellings in dated Early Classic texts.

		Mean diff.	Std. Error	p	95% CI lower limit	95% CI upper limit
T617-ya	T617-ya-la	24.25	23.508	1	-45.71	94.22
T617-ya	ʔa-T617-ya-la	-50.55	23.508	.26	-120.51	19.42
T617-ya	ʔa-T617-ya	-92.55	25.448	.009	-168.28	-16.81
T617-ya-la	ʔa-T617-ya-la	-74.8	27.566	.078	-156.84	7.24
T617-ya-la	ʔa-T617-ya	-116.8	29.238	.004	-203.81	-29.79
ʔa-T617-ya-la	ʔa-T617-ya	-42	29.238	.994	-129.01	45.01

Table 7. Bonferroni Post-hoc-Tests.

Focusing on this binary distinction (i.e. the presence or absence of **ʔa-**), one may ask whether **ʔa-**T617/1M3**(-ya-la)** spellings postdate T617/1M3**(-ya-la)** spellings by a statistically significant amount of time. **Table 8** presents the descriptive statistics, while **Figure 6** illustrates them. Spellings of the **ʔa-**T617/1M3**(-ya-la)** type show higher mean values than the T617/1M3**(-ya-la)** spellings. A t-Test for Independent Samples yields results ($t(22) = -4.69$, $p = < 0.001$, 95% confidence interval [-124.21, -48.04]) that point to a statistical significance to that difference, and thus, spellings with **ʔa-** do significantly postdate those without it.

		N	Mean	Std. Deviation	Std. Error Mean
Gregorian	No	16	442.88	41.09	10.27
	Yes	8	529	45.1	15.94

Table 8. Descriptive statistics for ISC spellings with (Yes) and without (No) ʔa.

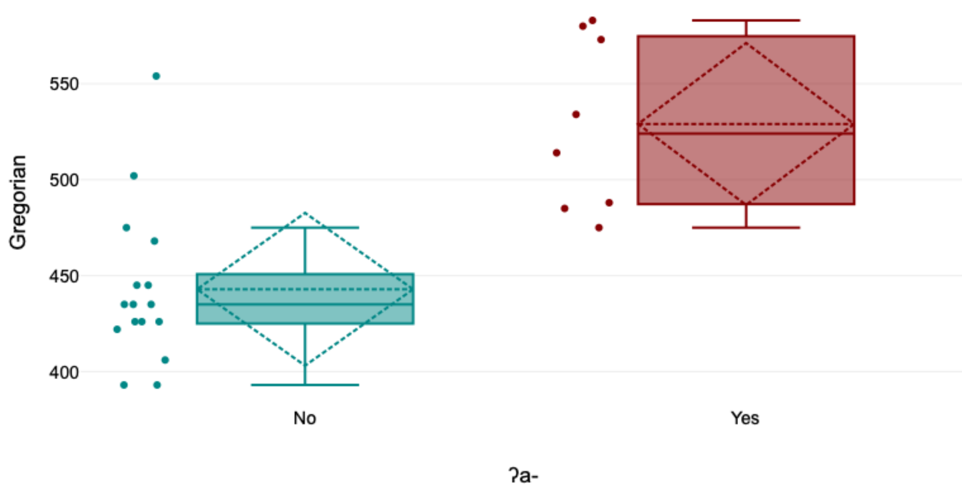


Figure 6. Distribution of ISC spellings with (Yes) and without (No) ʔa. Prepared with DATAtab (DATAtab Team 2022).

Indeed, the ten earliest examples (**Table 4**) all lack the syllabogram **ʔa**, showing only the ISC main sign, T617/1M3, and either T126/32A **ya**, or both T126/32A **ya** and T178/ZA2 **la**. Recall also that the undated example on K5197 (**Figure 2A**) appears to be a case where the IS is used without any syllabograms at all, standing for the entire ISC. The first reliably dated example of a preposed **ʔa** is seen on Tikal Stela 31, 445 CE, where it appears in a spelling **ʔa**-IS-**ya-la**, as one of three cases of the ISC, the other two showing IS-**ya-la**.[8] The spelling **ʔa**-IS-**ya** is first seen on 485 CE and 514 CE.

[8] Previously, MacLeod (1990:49–50) had proposed that one of the three spellings of the ISC on Tikal Stela 31 could be transcribed IS-**ya-na**, and used this spelling in support of her original proposal of the ISC as based on proto-Ch'olan *ʔay-an. More recently, based on the recent digital documentation of Tikal Stela 31 by Tokovinine (2020), as well as the paleographic evidence of relevance to the graphic designs of both the syllabograms **na** and **la** on Tikal Stela 31, Mora-Marín (2021a) has shown that the putative IS-**ya-na** spelling on Stela 31 is actually IS-**ya-la**.

Up until this point, whenever both **ya** and **la** are present on a reliably dated monumental inscription, they only occur in that order, with **ya** before **la**, i.e. **(ʔa-)** T617**-ya-la**. I propose that these early spelling patterns reflect exactly what scribes were intending to represent: the optionality of **ʔa**, suggesting that the IS began with /ʔa…/, and the need for **ya** to precede **la** when they co-occurred, suggesting that /y/ precedes /l/, whatever the ultimate reading of the entire ISC.

The statistical tests conducted thus far do not seem to obviously distinguish between spellings bearing **la** and those lacking it. If we now focus on this binary distinction, one may also ask whether **(ʔa-)**T617/1M3**(-ya)-la** spellings differ significantly from **(ʔa-)**T617/1M3**(-ya)** with respect to time, during the Early Classic period. **Table 9** presents the descriptive statistics, while **Figure 7** illustrates them. Spellings without **la** show higher mean values than those with **la**. A t-Test for Independent Samples yields results ($t(23) = 0.48$, $p = .634$, 95% confidence interval [-37.97, 61.04]) that point to a lack of statistical significance to that difference. However, when the same test is applied to all dated examples from the Classic period, with spellings employing **la** exhibiting lower values ($M = 503.25$, $SD = 101.38$) than the those lacking it ($M = 678.83$, $SD = 161.57$), the results ($t(25.51) = -4.78$, $p = < 0.001$, 95% confidence interval [-251.17, -99.99]) point to a statistically significant difference. This could suggest that scribes were in fact more attuned to the intended function of the syllabogram **la** within the ISC collocation during the Early Classic period than later.

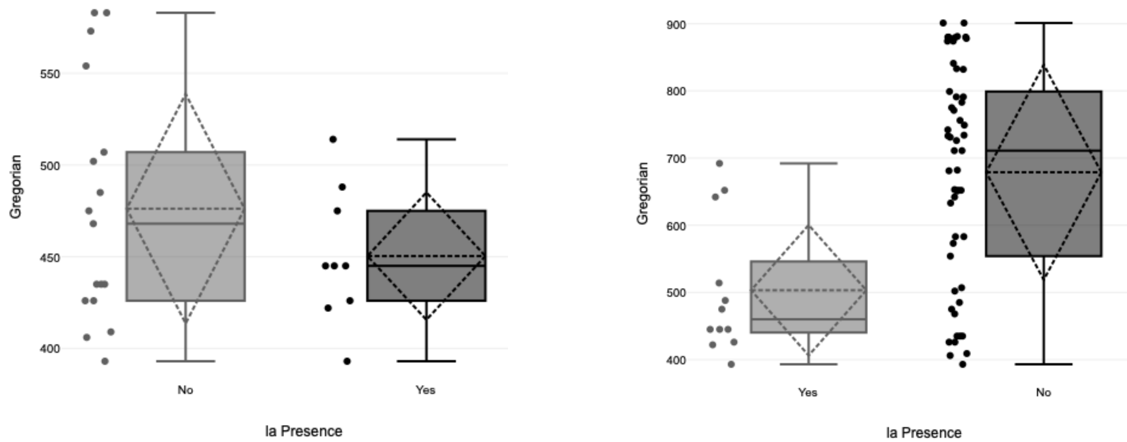
		N	Mean	Std. Deviation	Std. Error Mean
Gregorian	No	15	475.13	61.13	15.78
	Yes	10	463.6	54.46	17.22

Table 9. Descriptive statistics for ISC spellings with (Yes) and without (No) la. a) Early Classic period. b) Classic period.

a. Early Classic period

		N	Mean	Median	Standard deviation
Gregorian	Yes	12	503.25	460	101.38
	No	53	678.83	711	161.57

b. Classic period



a b

Figure 7. Distribution of ISC spellings with (Yes) and without (No) la. a) Early Classic distribution. b) Classic distribution.

There exist several Early Classic texts lacking dates that are of course relevant. Some were excavated and can be dated more or less narrowly. One of these, a lidded bowl (**Figure 2J**), can be dated stratigraphically to the last quarter of the fifth century, and it bears what could be a spelling **la-**IS**-ya** that supports *neither* the **<ʔayal>** nor the **<ʔalay>** reading. That said, as already observed above, it is also possible that this case is really an instance of the full version of 1M3, one in which the T533/ZA1 sign has been doubled and inverted, perhaps due to the analogical influence of the graphically related T178/ZA2 **la**. There is one text that appears to bear the IS in isolation, already discussed, likely dating to the late Early Classic period (**Figure 2A**). There exist two undated, Early Classic spellings which bear only T178/ZA2 **la** juxtaposed to the IS: one case, painted on a pottery vessel, shows IS**-la** (**Figure 2B**); the other, incised on a tubular jade bead from the Sacred Cenote, also shows IS**-la**. Such examples are ambiguous: they could support either the **<ʔayal>** or the **<ʔalay>** reading. The example from **Figure 4I**, showing a spelling **ʔa-la-**IS, is either late Early Classic or early Late Classic in dating, while the example from **Figure 4J**, showing a spelling **ʔa-la-**IS**-ya**, is likely late Early Classic, but again, it is possible that what appears to be ZA2 **la** was really a part of the full version of 1M3, or an instance of ZA2 **la** placed in the position of the doubled T533/ZA1 that makes up part of the full version of 1M3. These two cases would support the **<ʔalay>** reading. Otherwise, the majority of spellings supportive of the **<ʔalay>** reading are Late Classic.

Consequently, the chronological pattern based on dated texts is clear. If one assumes that the earlier scribes were more likely than later scribes to be aware of the precise value of both the IS logogram and the ISC as a whole, the following inferences can be made:

1. The optional addition of **ʔa**, after several centuries of representation of the ISC, suggests that T617/1M3 is a logogram whose phonographic value begins with

<ʔa...>, thus refuting a value **LAY** favored in MacLeod and Polyukhovych (2005).
2. The consistent order of **ya** before **la** on reliably dated stone monuments throughout most of the Early Classic period suggests that the more likely value of the whole collocation was **<ʔayal>**, not **<ʔalay>**.
3. The optionality of any of these syllabograms, whether **ʔa**, **ya**, or **la** up until this point (and thereafter), as well as the consistent precedence of **ya** before **la** whenever the two co-occur during the Early Classic period, and the inscription where the IS occurs in isolation (**Figure 2A**), all suggest that the likely value of the T617/1M3 was in fact **ʔAY(AL)**.
4. The majority of spellings (94.6%) provide no explicit indication of a **la** syllabogram, and thus, in such majority of spellings, the ISC could be explained as representing a collocation **<ʔay>** if no underspelling is involved, or **<ʔaya(l)>** if final consonant-deletion underspelling is involved whenever the **ya** syllabogram is present (94.5% of cases), and likewise, such spellings would favor a logographic value **ʔAY** for T617/1M3.

Given this last point, spellings like T617**-ya** would point to either **<ʔay>** as **ʔAY (-ya)**, or an underspelling **<ʔaya(l)>** as **ʔAYAL(-ya)**; spellings like T617**-ya-la** would point to a full spelling **<ʔayal>** as **ʔAYAL(-ya-la)**; and spellings like T617**-la** would point to a spelling of **<ʔayal>** as **ʔAYAL(-la)**, and crucially, also to a logographic value **ʔAYAL**.[9] Of course, the **ʔa-ya-la** (T743:126:178) spelling from San Bartolo, likely dating to ca. 100 BCE, if indeed relevant to the ISC, would be further support of the intended syllabographic sequence, and the overall value of the collocation.

Visual Motivations for ʔa-la-ya Order

I have previously suggested (Mora-Marín 2004:footnote 7, 2005) that the **ʔa-la-ya** spellings can be explained as a visually-motivated grapheme reversal strategy favored by the fact that T126/32A **ya** is a graphic affix (elongated sign) while T534/ZA2 **la** is a graphic main sign (squarish sign): since main signs tend to occupy the core of a glyph block, it is not uncommon for signs in a collocation to be placed in a reversed reading arrangement in order to preserve the graphic requirement calling for a main sign as the core of a glyph block. Next, I present the evidence in favor of this visual motivation.

The scribes who spelled **ʔa-la-ya** on K8123 (**Figure 8A**) and elsewhere (**Figures 4B–C**) may have placed the graphic main sign T534/ZA2 **la** as the second sign in the collocation because that is the position that T617/1M3, which is absent in this spelling and is also a graphic main sign, would normally occupy, whereas T126/32A

[9] That such a high-frequency logogram would require such a high rate of complementation could suggest that scribes were intentionally disambiguating the sign, that is, that we are dealing with a polyvalent sign. This is in fact supported, as T617 appears in contexts where a semantic value ‘eye/face’ has been proposed (Stuart 2005:67; Mora-Marín 2012), and in such contexts it appears to bear no relationship whatsoever to the lexical and grammatical function it bears in the PSS. There are many uses of T617 in the script, in some cases incorporated within other signs; it also bears a strong resemblance to some designs of T178 **la** and some designs of T24 **li**, though at least in the latter case the resemblance is likely the result of graphic convergence over time (Mora-Marín 2022).

ya would typically follow T617/1M3 and is also a graphic affix. A similar process is evident on K4379, where the spelling **MUY-la-ya** (**Figure 8B**) is found, instead of the more common **MUY-ya-la** for *muyal* ‘cloud’ (e.g. K2085, K7185), and on K1815, where the spelling **la-ya-ja** (**Figure 8C**) is found, instead of the more common **ya-la-ja** (e.g. Comalcalco Spine 7, La Corona Altar 4, Piedras Negras Altar/Throne Support 1), for *y-al-aj-Ø* (A3-say-CMP-B3) ‘s/he/it has said it’, and **ya-la-ji-ya** for *y-al-[a]j-Ø-iy* (A3-say-CMP-B3-ENCL) ‘s/he/it has said it (earlier?)’ (cf. K793, K1775, K2026, K3296, K7727, K8008, Cleveland Shell Silhouette). Another example like that on K1815 is found on K1644, also showing **la-ya-ja**.

A B C

Figure 8. Example of ISC on K8123 and cases of reordering of T534/ZA2 based on main sign visual principle.
a) Detail from K8123, from photograph by Justin Kerr in Justin Kerr’s Maya Vase archive (famsi.org). b) Detail from K4379, drawn by the author from photograph by Justin Kerr in Justin Kerr’s Maya Vase archive (famsi.org). c) Detail from K1815, drawn by the author from photograph by Justin Kerr in Justin Kerr’s Maya Vase archive (famsi.org).

The BM4 Sign

A few years ago, Krempel et al. (2017) proposed that BX5b, a sign that is known to spell the term for ‘child of mother’ (Schele and Freidel 1990:363), a reflex of proto-Mayan *ʔaal, was used to spell the ISC in one text. Mora-Marín (2021b) has recently presented evidence suggesting that the glyph in question was very likely spelling the ‘child of mother’ collocation, that it appeared as the last glyph of the text, and that the PSS text in question is simply one of a small subset of PSS texts with dedicatory verbs that do not begin with an ISC. The case of BX5b, therefore, is the last glyph block on the text before the text wrapped around to the beginning verbal expression.

Conclusions

This paper has applied epigraphic and statistical methods to a dataset prepared with the Maya Hieroglyphic Database (Looper and Macri 1991–2022) to assess the spelling patterns of the Initial Sign Collocation (ISC). The basic claims are that the ISC represented a term of the general shape **<ʔay(al)>**, and that the T617/1M3 logogram had a value **ʔAY(AL)**. The omissible syllabograms (**ʔa**, **ya**, **la**), their incremental order of diachronic appearance (IS-**ya** ~ IS-**ya-la** > **ʔa**-IS-**ya** ~ **ʔa**-IS-**ya-la** > …), the number of spellings with **ya** preceding **la** relative to spellings with **la** preceding **ya**, and finally, the evidence suggesting that the three purely phonetic spellings **ʔa-la-ya** are motivated visually, all coincide to favor the reading **<ʔay(al)>** for the collocation as a whole, while the very high proportion of **(ʔa-)**IS**-ya** spellings (roughly 76% for dated cases, 91.08% for all cases), that is, spellings lacking **la**, points to a likely canonical logographic value **ʔAY**, and suggests that **la** (5.38% of cases) was used to spell some sort of postposed grammatical morpheme, whether a suffix or enclitic. This canonical logographic value agrees with the existential particle (MacLeod 1990; Mora-Marín 2001, 2004, 2005; Law and Stuart 2017), which the next paper in this series will propose is reconstructible to proto-Ch'olan as *ʔay ~ *ʔay-an, and that it is in fact what the Initial Sign represents in the context of the PSS.

The final paper in this series will discuss its morphosyntactic contexts in Classic texts, highlighting two major functions of the existential particle in such texts: as the predicate of predicative possession constructions, on the one hand, and as a grammaticalized evidential or perfective aspect, which ultimately led to the development of the aspect marker *ʔa* 'perfective' in both Tzeltalan and Western Ch'olan, on the other.

References

Beliaev, Dimitri, and Albert Davletshin. 2006. Los sujetos novelísticos y las palabras obscenas: los mitos, los cuentos y las anécdotas en los textos mayas sobre la cerámica del período clásico. In *Sacred Books, Sacred Languages: Two Thousand Years of Religious and Ritual Mayan Literature*, edited by Rogelio Valencia Rivera and Geneviève Le Fort, pp. 21-44. Verlag Anton Saurwein, Markt Schwaben.

Beliaev, Dmitri, Alexandre Tokovinine, Sergey Vepretskiy, and Camilo Luín. 2013. Los Monumentos de Tikal. In Proyecto Altas Epigráfico de Petén, Fase I, Temporada abril-mayo 2013, editado por Dmitri Beliaev y Mónica de León Antillón, pp. 37–170. Informe Entregado al Instituto de Antropología e Historia de Guatemala. DOI: 10.13140/RG.2.2.29498.54726.

Boot, Erik. 2003. A Comment on the Initial Sign Collocation of Kerr No. 8123. http://www.mayavase.com/8123/Kerr8123.pdf.
-----. 2009. *The Updated Preliminary Classic Maya - English, English - Classic Maya Vocabulary of Hieroglyphic Readings.* Mesoweb Resources: https://www.mesoweb.com/resources/vocabulary/Vocabulary-2009.01.pdf.

Coe, Michael. 1973. *The Maya Scribe and His World*. New York: The Grolier Group.
-----. 1978. *Lords of the Underworld: Masterpieces of Classic Maya Ceramics*. Princeton: Princeton University.

Colas, Pierre Robert, Christophe G. B. Helmke, Jaime J. Awe, and Terry G. Powis. 2002. Epigraphic and Ceramic Analyses of Two Early Classic Maya Vessels from Baking Pot, Belize. *Mexicon* 24(2):33-39.

Culbert, T. Patrick. 1993. *The Ceramics of Tikal: Vessels from the Burials, Caches, and Problematical Deposits.* Tikal Report 25, Part A, University Museum Monograph 81. Philadelphia: The University Museum, University of Pennsylvania.

DATAtab Team. (2022). DATAtab: Online Statistics Calculator. DATAtab e.U. Graz, Austria. URL https://datatab.net.

Fox, James A., and John S. Justeson. 1982. Hieroglyphic evidence for the languages of the Classic Maya. Ms.
-----. 1984. Appendix C: Conventions for the transliteration of Mayan hieroglyphs. In *Phoneticism in Maya hieroglyphic writing*, edited by John Justeson and Lyle Campbell, pp. 363–367. Institute for Mesoamerican Studies, Publications, 9. Albany: State University of New York.

Grube, Nikolai. 1991. An Investigation of the Primary Standard Sequence on Classic Maya Ceramics. In Sixth Palenque Round Table, 1986, edited by Merle Greene Robertson. Norman: University of Oklahoma Press.
-----. 2022. Der Ort der alten Sonne. In *Liber Amicorum Claus Pellling*, pp. 129–142, edited by Thomas Finkenauer and Alfred Nordheim. Eberhard Karls, Universitat Tübingen. Tübingen Library Publishing.

Grube, Nikolai, and Maria Gaida. 2006. *Die Maya: Schrift und Kunst.* Berlin: SMB-DuMont.

Houston, Stephen D., John Robertson, and David S. Stuart. 2000. The language of Classic Maya inscriptions. *Current Anthropology* 41:321–56.

Jones, Christopher and Linton Satterthwaite. 1982. *The Monuments and Inscriptions of Tikal--The Carved Monuments: Tikal Report 33A*. https://doi.org/10.9783/9781934536377.

Justeson, John S. 1989. The representational conventions of Mayan hieroglyphic writing. In *Word and Image in Maya Culture: Explorations in Language, Writing, and Representation*, edited by William F. Hanks and Don S. Rice, pp. 25–38. Salt Lake City: University of Utah Press.

Justeson, John S., William M. Norman, Lyle Campbell, and Terrence Kaufman. 1985. *The Foreign Impact on Lowland Mayan Language and Script.* Middle American Research Institute, Publication 53. New Orleans: Tulane University.

Justeson, John S., and Peter Mathews. 1990. Evolutionary Trends in Mesoamerican Hieroglyphic Writing. *Visible Language* 24:88–132.

Krempel, Guido, Sebastián Matteo, and Albert Davletshin. 2017. A Cup Joins a Bowl: The Ceramics of Naranjo's King K'ahk' "Skull" Chan Chaahk in The Chocolate Museum in Cologne, Germany. *Mexicon, 39*(1), 8-15.

Lacadena, Alfonso. 2004a. Passive Voice in Classic Mayan Texts, CV-*h*-C-*aj* and -*n-aj* Constructions. In *The Linguistics of Maya Writing*, edited by Søren Wichmann, pp. 165–194. Salt Lake City: University of Utah Press.
-----. 2004b. The Glyphic Corpus from Ek' Balam, Yucatán, México. Crystal River: Foundation for the Advancement of Mesoamerican Studies, Inc. http://www.famsi.org/reports/01057/index.html.

Lacadena, Alfonso, and Søren Wichmann. 2000. The dynamics of language in the Western Lowland Maya region. Paper presented at the *2000 Chacmool Conference, Calgary, November 9–11, 2000*.
-----. 2002. The distribution of Lowland Maya languages in the Classic period. In *La organización social entre los mayas: Memoria de la Tercera Mesa Redonda de Palenque, vol. 2*, edited by Vera Tiesler Blos, Rafael Cobos, and Merle Greene Robertson, pp. 275–319. México, D.F.: Instituto Nacional de Antropología e Historia; Mérida: Universidad Autónoma de Yucatán.

Law, Danny, and David Stuart. 2017. Classic Mayan: An overview of language in ancient hieroglyphic script. In *The Mayan Languages*, edited by Judith Aissen, Nora C. England, and Roberto Zavala Maldonado, pp. 128-174. London and New York: Routledge/Taylor and Francis Group.

Looper, Matthew G. and Martha J. Macri. 1991-2022. *Maya Hieroglyphic Database*. Department of Art and Art History, California State University, Chico. URL: http://www.mayadatabase.org/.

Looper, Matthew, Martha J. Macri, Yuriy Polyukhovych, and Gabrielle Vail. 2022. MHD Reference Materials 1: Preliminary Revised Glyph Catalog. *Glyph Dwellers Report* 17. http://glyphdwellers.com/pdf/R71.pdf.

MacLeod, Barbara. 1990. *Deciphering the Primary Standard Sequence*. Unpublished Ph.D. dissertation. University of Texas at Austin.

MacLeod, Barbara, and Yuriy Polyukhovych. 2005. Deciphering the Initial Sign. In *Sourcebook for the 29th Maya Hieroglyph Forum, March 11-16*, pp. 166-174. Department of Art and Art History, University of Texas, Austin.

Macri, Martha J., and Matthew Looper. 2003. *The New Catalog of Maya Hieroglyphs. Volume One: The Classic Period Inscriptions*. Norman: University of Oklahoma Press.

Macri, Martha J., and Gabrielle Vail. 2009. *The New Catalog of Maya Hieroglyphs. Volume Two: The Codical Texts*. Norman: University of Oklahoma Press.

Matteo, Sebastian. 2007. Pendentif de jade de provenance inconnue. *Lecture hiéroglyphique* 8 (23 Mars 2007). Bruxelles, Belgique.

Mora-Marín, David F. 2001. The Grammar, Orthography, and Social Context of Late Preclassic Mayan Texts. Unpublished Ph.D. Thesis. University at Albany, Albany, New York.

-----. 2003. Pre-Ch'olan as the standard language of Classic Lowland Mayan texts. Paper presented at the Annual Meeting of Society for the Study of Indigenous Languages of the Americas, Atlanta, January 2003.
-----. 2004. Final FAMSI Grant Report: The Primary Standard Sequence: Database Compilation, Grammatical Analysis, and Primary Documentation. URL: http://www.famsi.org/reports/02047/index.html.
-----. 2005. The Initial Sign Glyph of the Primary Standard Sequence Part I: Spelling Patterns. 18 pp. Unpublished note distributed among epigraphers in attendance at the 2005 Texas Maya Meetings. Available at https://davidmm.web.unc.edu/david-mora-marin/.
-----. 2009. A Test and Falsification of the "Classic Ch'olti'an" Hypothesis: A Study of Three Proto-Ch'olan Markers. *International Journal of American Linguistics* 75:115–157.
-----. 2012. The Mesoamerican Jade Celt As 'Eye, Face', and the Logographic Value of Mayan 1M2/T121 as **WIN** 'Eye, Face, Surface'. *Wayeb Notes* 40.
-----. 2021a. On the Initial Sign Collocations from Tikal Stela 31. *Notes on Mesoamerican Linguistics and Epigraphy* 22. https://davidmm.web.unc.edu/2021/12/24/note-22/.
-----. 2021b. Reanalysis of the BM4 Sign on A Vessel from The Chocolate Museum, Cologne, Germany. *Notes on Mesoamerican Linguistics and Epigraphy* 20. https://davidmm.web.unc.edu/2021/09/25/note-20/.
-----. 2022. Some Notes on the Paleography of T617 and T24, and Evidence for Their Graphic Convergence. *Notes on Mesoamerican Linguistics and Epigraphy* 24. https://davidmm.web.unc.edu/2022/02/04/note-24/.

Nicholson, Henry B. 1979. Maya Region. In *Pre-Columbian Art from the Land Collection*, edited by Lewis K. Land, pp. 129–175. San Francisco: California Academy of Sciences and Lewis K. Land.

Reents-Budet, Dorie. 1994. *Painting the Maya Universe: Royal Ceramics of the Classic Period*. Durham: Duke University Press.

Stone, Andrea. 1995. *Images from the Underworld: Naj Tunich and the Tradition of Maya Cave Painting.* Austin: University of Texas Press.

Stuart, David. 2005. *Sourcebook for the 29th Maya Hieroglyph Forum, March 11-16*. Department of Art and Art History, University of Texas, Austin.

Stuart, David. 2010. Shining Stones: Observations on the Ritual Meaning of Early Maya Stelae. In *The Place of Stone Monuments: Context, Use, and Meaning in Mesoamerica's Preclassic Transition*, edited by Julia Ellen Guernsey, John E. Clark und Barbara Arroyo, pp. 283-296. Washington, D.C: Dumbarton Oaks Research Library and Collections.

Thompson, John Eric S. 1962. *A Catalogue of Maya Hieroglyphics*. Norman: University of Oklahoma Press.

Tokovinine, Alexandre. 2020. Stela 31, Tikal (Version I). Licensed under Creative Commons Attribution. URL: https://skfb.ly/6QTrP.

Tokovinine, Alexandre, and Francisco Estrada-Belli. 2015. La Sufricaya: A Place in Classic Maya Politics. In *Classic Maya Polities of the Southern Lowlands: Integration, Interaction, Dissolution*, edited by Damien B. Marken and James L. Fitzsimmons, pp. 195–223. Boulder: University Press of Colorado.

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