Sign Frequency and Repeated Sequences in Isthmian Texts

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This report, like Report 52 (Macri 2017a), continues with a structural and quantitative examination of the Isthmian texts without reference to language. **Table 1** lists the signs of the Isthmian script with their MS number (see Macri 2017b), sequenced by the total number of times they occur. These totals are further divided to show how many times a sign occurs in each of the principal Isthmian texts: La Mojarra Stela 1, the Feldspar Mask, the Tuxtla Statuette, the Ceramic Mask, and the Chiapa de Corzo Sherd. Noting the presence or absence of a sign or of several signs in one or more texts can be instructive in comparing similarities and differences between them. For example, among signs occurring more than 10 times, MS38 and MS101 occur exclusively on La Mojarra Stela 1, while MS39 and MS141 only occur on the Feldspar Mask and the Tuxtla Statuette (see further discussion of these signs below).

A word of caution, however: counting signs in an undeciphered script with partially eroded texts can only be considered approximate. Judgments about where to divide one sign from another, and about when two similar signs are distinct signs or variants of one another are unlikely to be met with universal agreement. Nevertheless, only a few signs present such uncertainties, and as long as the approximate and provisional nature of the tabulation is understood, such counts can prove valuable.

Table 1. Isthmian signs listed by frequency. Abbreviations: LM: La Mojarra Stela 1, FM: Feldspar Mask, TS: Tuxtla Statuette, CM: Ceramic Mask, CD: Chiapa de Corzo Sherd. Images redrawn by the author.

MS#	Total	LM	FM	TS	CM	CD
20	52	40	0	10	0	2
38	32	32	0	0	0	0
63	23	19	3	1	0	0
101	17	17	0	0	0	0
39	16	0	11	5	0	0
149	16	10	2	3	0	1
44	15	14	0	0	1	0
42	14	9	2	3	0	0
143	14	12	0	2	0	0
45	12	8	2	2	0	0
72	12	10	1	1	0	0
93	12	5	3	3	0	1
100	12	4	3	3	0	2
22	11	9	1	1	0	0
141	11	0	9	2	0	0
54	10	9	1	0	0	0
75	10	6	2	2	0	0
124	10	6	2	0	0	2
165	10	8	1	1	0	0
171	9	8	0	1	0	0
28	8	4	4	0	0	0
57	8	6	2	0	0	0
169	8	2	4	0	2	0
170	8	6	0	2	0	0
24	7	7	0	0	0	0
138	7	6	1	0	0	0
176	7	6	0	1	0	0
56	6	5	0	0	1	0
68	6	5	0	1	0	0
97	6	4	1	1	0	0
103	6	6	0	0	0	0
129	6	5	0	1	0	0
37	5	4	0	0	0	1
114	5	5	0	0	0	0
150	5	3	1	0	1	0
164	5	2	1	1	1	0
23	4	4	0	0	0	0
65	4	3	0	1	0	0
79	4	2	2	0	0	0
91	4	3	0	1	0	0
96	4	3	0	1	0	0
107	4	2	1	1	0	0
125	4	3	1	0	0	0
152	4	4	0	0	0	0
25	3	3	0	0	0	0
26	3	1	0	2	0	0
31	3	3	0	0	0	0
34	3	2	0	1	0	0
43	3	3	0	0	0	0
50	3	3	0	0	0	0
52	3	3	0	0	0	0
60	3	3	0	0	0	0
61	3	2	0	1	0	0
64	3	3	0	0	0	0
83	3	3	0	0	0	0
85	3	3	0	0	0	0
89	3	3	0	0	0	0
99	3	1	2	0	0	0
105	3	3	0	0	0	0
119	3	3	0	0	0	0
136	3	3	0	0	0	0
139	3	2	1	0	0	0
140	3	3	0	0	0	0
145	3	2	0	1	0	0
153	3	3	0	0	0	0
162	3	0	2	1	0	0
179	3	3	0	0	0	0
182	3	3	0	0	0	0
214	3	0	3	0	0	0
29	2	2	0	0	0	0
30	2	2	0	0	0	0
33	2	2	0	0	0	0
36	2	2	0	0	0	0
41	2	2	0	0	0	0
46	2	2	0	0	0	0
48	2	2	0	0	0	0
49	2	2	0	0	0	0
73	2	0	0	2	0	0
74	2	2	0	0	0	0
77	2	2	0	0	0	0
80	2	2	0	0	0	0
81	2	2	0	0	0	0
87	2	1	1	0	0	0
88	2	1	1	0	0	0
95	2	2	0	0	0	0
102	2	2	0	0	0	0
104	2	2	0	0	0	0
109	2	2	0	0	0	0

MS#	Total	LM	FM	TS	CM	CD
113	2	1	0	1	0	0
123	2	1	0	1	0	0
128	2	2	0	0	0	0
133	2	2	0	0	0	0
134	2	2	0	0	0	0
144	2	2	0	0	0	0
147	2	2	0	0	0	0
154	2	1	1	0	0	0
161	2	2	0	0	0	0
178	2	2	0	0	0	0
202	2	0	2	0	0	0
207	2	0	2	0	0	0
212	2	0	2	0	0	0
216	2	0	2	0	0	0
21	1	0	0	1	0	0
32	1	1	0	0	0	0
47	1	1	0	0	0	0
51	1	1	0	0	0	0
59	1	1	0	0	0	0
62	1	0	0	1	0	0
66	1	1	0	0	0	0
67	1	1	0	0	0	0
69	1	1	0	0	0	0
70	1	1	0	0	0	0
71	1	1	0	0	0	0
76	1	1	0	0	0	0
78	1	1	0	0	0	0
82	1	1	0	0	0	0
84	1	0	0	1	0	0
90	1	1	0	0	0	0
92	1	1	0	0	0	0
94	1	1	0	0	0	0
98	1	1	0	0	0	0
106	1	0	0	1	0	0
110	1	1	0	0	0	0
111	1	1	0	0	0	0
112	1	1	0	0	0	0
115	1	1	0	0	0	0
116	1	1	0	0	0	0
117	1	1	0	0	0	0
118	1	0	0	1	0	0
120	1	1	0	0	0	0
121	1	1	0	0	0	0
122	1	1	0	0	0	0
126	1	0	0	1	0	0
130	1	1	0	0	0	0
131	1	0	0	1	0	0
132	1	1	0	0	0	0
135	1	1	0	0	0	0
137	1	1	0	0	0	0
146	1	1	0	0	0	0
148	1	0	0	1	0	0
151	1	0	0	1	0	0
155	1	1	0	0	0	0
156	1	1	0	0	0	0
157	1	1	0	0	0	0
158	1	1	0	0	0	0
159	1	1	0	0	0	0
160	1	1	0	0	0	0
163	1	1	0	0	0	0
166	1	1	0	0	0	0
167	1	1	0	0	0	0
168	1	1	0	0	0	0
172	1	1	0	0	0	0
173	1	1	0	0	0	0
174	1	1	0	0	0	0
175	1	0	0	1	0	0
177	1	0	0	1	0	0
180	1	0	0	1	0	0
181	1	1	0	0	0	0
183	1	0	0	1	0	0
184	1	1	0	0	0	0
185	1	0	0	1	0	0
201	1	0	1	0	0	0
203	1	0	1	0	0	0
204	1	0	1	0	0	0
205	1	0	1	0	0	0
206	1	0	1	0	0	0
208	1	0	1	0	0	0
209	1	0	1	0	0	0
210	1	0	1	0	0	0
211	1	0	1	0	0	0
213	1	0	1	0	0	0
215	1	0	1	0	0	0
217	1	0	1	0	0	0
218	1	0	1	0	0	0
219	1	0	1	0	0	0

Table 2 represents a further analysis, showing the numbers of signs occurring once, twice, etc. The number of unique signs in the Isthmian script, probably about 175 once variants are identified, suggests that the script is a mixture of phonetic and logographic signs. That is, some signs represent sounds without reference to meaning, and some signs represent morphemes (words or parts of words).

Table 2. Signs grouped by number of occurrences (using 175 as the total number of signs).

number of signs	occur _ times	approximate percentage of total number of signs
73	1	42% of signs occur once
33	2	
25	3	
131		**75% of signs occur fewer than four times**
8	4	
4	5	
5	6	
3	7	
4	8	
1	9	
4	10	
30		17% of signs occur 4–10 times
2	11	
4	12	
0	13	
2	14	
1	15	
2	16	
1	17	
1	23	
1	32	
1	52	
15		8% of signs occur 11-52 times
45		**25% of signs occur 4 -52 times**

If the script were primarily logographic, even in a limited corpus of about 700 items (the total signs in currently known texts bar-dot numbers not included), a larger number of unique signs would be expected. Instead, more typical of a mixed logographic-syllabic script, a small number, only 8.6% of the 175 signs, accounts for over a third of the texts (about 38%). Many of these occur in repeated sequences or variations of these sequences suggesting that at least some of the most frequent signs represent sounds rather than entire words. In contrast, 75% of the known signs occur fewer than four times. With the exception of bar-dot numbers, the long count introductory glyph, three day signs, and some signs representing animals or human/deity portraits, little can be said of the 75% of signs that occur less than three times. It is not possible to identify signs as syllabic and logographic solely on the basis of frequency. Nevertheless, the large number of signs that occur once or twice, or even three times, is likely to include a considerable number of logographic signs. Likewise, the 25% of signs that occur four or more times, especially the 8% that occur more than 10 times, are very likely to include syllabic signs.

Given the restricted sample of known Isthmian texts it is likely that some syllabic signs occurring in the script may not appear at all, and likewise, depending on the topic of the texts, one or more logographic signs might occur multiple times.

Glyph Dwellers Report 52 (Macri 2017a) uses structural analysis to establish that MS20 is neither a syllabic or logographic sign, but is a punctuation mark used to indicate the ends of phrases or other text segments. Also based on structural analysis, both Macri and Stark (1993) and Justeson and Kaufman (1993) agree that MS38 and MS39 are equivalent in value (**Fig. 1a, b**), since the two are extremely common (38 and 32 occurrences, respectively), appear in similar contexts (**Fig. 2, Fig. 4b, e, g**), and are in complementary distribution—that is, MS38 only occurs on the La Mojarra Stela, while MS39 only occurs on the Tuxtla Statuette and the Feldspar Mask.

Fig. 1. a. MS38, **b**. MS 39

MS141, two lines of small u-shapes, occur exclusively bordering MS39 on 11 of the 16 examples. It cannot be determined whether the u-shaped signs are an integral component of MS39, or whether the four examples of a vertical orientation of MS39 on the Feldspar Mask are distinctive (**Fig. 2, Fig. 4c**).
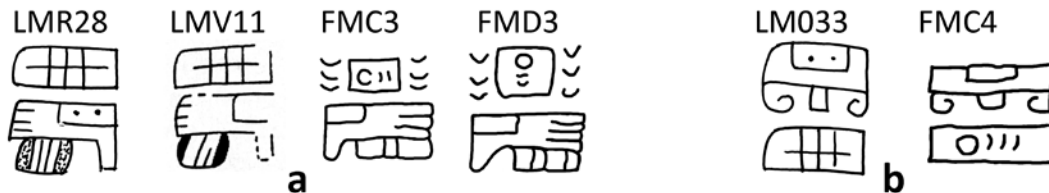
Fig. 2. MS38 and MS39 in identical contexts on La Mojarra Stela 1 and the Feldspar Mask.

Since the La Mojarra text is by far the longest, most Isthmian signs occur in it, with scattered occurrences in other texts. In fact, any sign that occurs a total of three or more times is present in the La Mojarra text, with two interesting exceptions: MS39, the fifth most frequent sign, and MS141, the fifteenth most frequent sign. Since the two never occur on La Mojarra Stela 1, and since MS39 can be shown to be equivalent to MS38, perhaps there a sign equivalent to MS141 on the La Mojarra Stela. The most likely candidate is MS101, the fourth most frequent sign in the corpus, and one that occurs exclusively on the La Mojarra stela (**Fig. 3**). Unlike MS141, MS101 occurs separately from MS38 in a variety of contexts. Notably, however, it immediately follows MS38 twice (LMH3–4, LMT7a-b), precedes it four times (**Fig. 4d**), occurs within one sign between it and MS38 six times (LMM5-6b, LMO34–36, LMP27–28b, LMP29–Q2b, LMR44–46, LMV1–2b), and with two signs between it and MS38 twice (LMS25–27b, LMT30–33). Although these patterns are not yet understood, there appears to be an association between MS38 and MS101. Establishing whether it is analogous to the relationship between MS39 and MS141 will require additional texts and/or further analysis.
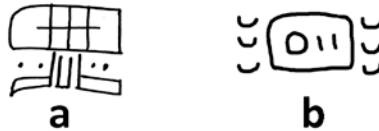
Fig. 3. a. MS38-MS141, **b**. MS39-MS101

The comparison of MS38 and MS39 is only one of many that can be based on data from **Table 1**. Once the unique signs of a script have been identified and tabulated, the next task is to look for sequences of signs that occur more than once. **Figure 1** demonstrates the usefulness of this in determining the equivalence between MS38 and MS39. Additional repeated sequences are shown in **Figures 4–6**. These illustrations by no means exhaust the number of sequences; the reader can undoubtedly find more.

The illustration of La Mojarra Stela 1 is from an unpublished and uncorrected drawing by George Stuart; the Tuxtla Statuette, and the Chiapa de Corzo Sherd are by George Stuart in Winfield Capitaine (1988); La Mojarra column V is by Justeson (Justeson and Kaufman 1997); and the Feldspar Mask is by Macri (2016). Column lettering follows those in the publications above with minor differences in vertical numbering of signs. The coordinate for the first item in a sequence appears above it. These repeated sequences demonstrate, first of all, that signs are patterned, not random; second that the texts represent the same script; and third, that the inscribed objects are authentic indigenous records. Furthermore, the repetition of sign sequences, and the variations within them strongly suggest that the texts represent words and phrases in a particular language. The identity of that language is beyond the scope of this discussion.

In lieu of a lengthy description of the sign patterns in **Figures 4–6**, what follows are simply a few observations given with the hope that they will inspire further study. Most of the items in **Figure 4** show patterns that include MS38/39. Several sequences found both on La Mojarra Stela 1 and the Feldspar Mask point to a significant relationship between the two texts (**Fig. 4b, e, g, Fig. 5m**, and **Fig. 6i**). The two sequences of five signs on the Feldspar Mask (**Fig. 4i**) were noted by Houston and Coe (2003) as evidence for reading column D before column C, since the sequence beginning at FME3 is fully contained in that column, but the sequence beginning with FMD14 continues into column C. **Figure 4j** is one of a number of examples of partially repeated sequences. The three glyphs (or four, if you separate the "feet" from the third glyph) in **Figure 5d** were recognized early on as a likely name phrase. Likewise, the paired human heads with headdresses in **Figure 5e** have been suggested as male and female pairs, possibly parents. The "star" signs in **Figure 5f** from opposite sides of the La Mojarra Stela may relate to Venus phenomena (Macri 2010). **Figure 6c, d, e** are examples of pair reversals. **Figure 6e** may reflect on the relationship between MS164 and MS165, two very similar signs. **Figure 6h** and **j** each have one image that appears to be a jaguar or other feline. In each pair is another animal head less easy to identify, but given similar contexts, might also be a jaguar. Such patterns are not proof of identity, but they do point to items for further investigation.

Figure 6j and **k** contain MS72, a sign that has a horizontal line with two double lines below it. Macri and Stark (1993) note that the lower section resembles the top half of the Maya **HAB'** sign (Macri and Looper 2003:190). **Figure 6j** shows it as part of the long count introductory glyph on the La Mojarra and Tuxtla Statuette, analogous to the position of the **HAB'** sign in the initial series introductory glyph of the Classic Maya. **Figure 7k** shows additional examples, four of which have a coefficient preceding it (a bar-

dot number or a thumb/finger). The first two examples show a sign that Macri (1991) identifies as a hide representing the number 20. Whatever its value (and visual referent) might be, its position preceding MS72 strongly suggests that it is numerical.

This look at sign frequency and sign sequences is part of an overall structural examination of the Isthmian script ideally to be accomplished before the "reading" of individual signs or the identification of a language affiliation is attempted. Adding this data to the physical characteristics of the inscribed artifacts, archaeological contexts, calendrical information, related iconography, and larger textual patterns can offer valuable checks on attempts to fully decipher a script whose creators and whose readers, due to the vagaries of history, have failed to pass their knowledge on to the generations—and cultures, that followed them.
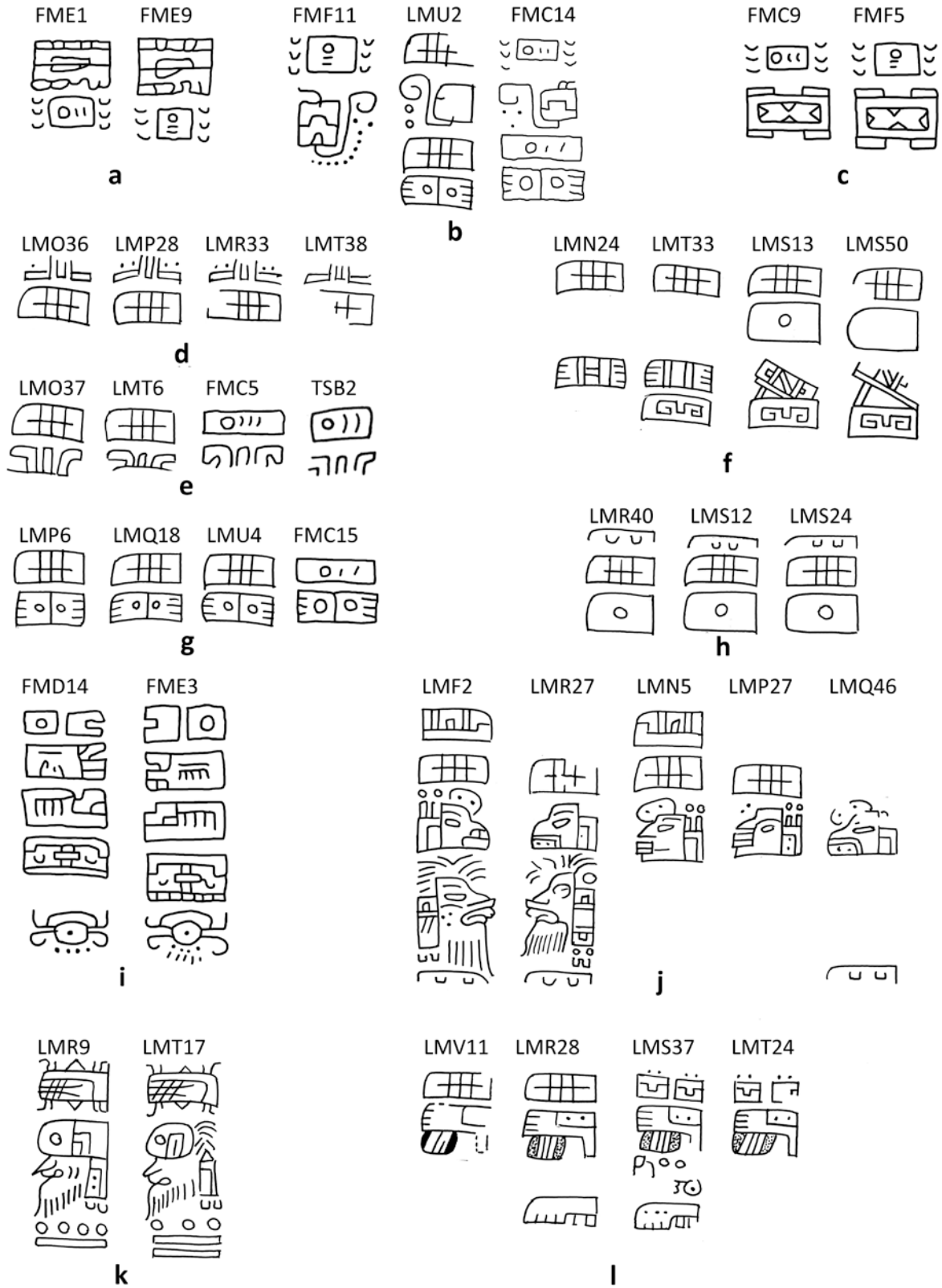
Fig. 4. Repeated sequences in Isthmian texts.
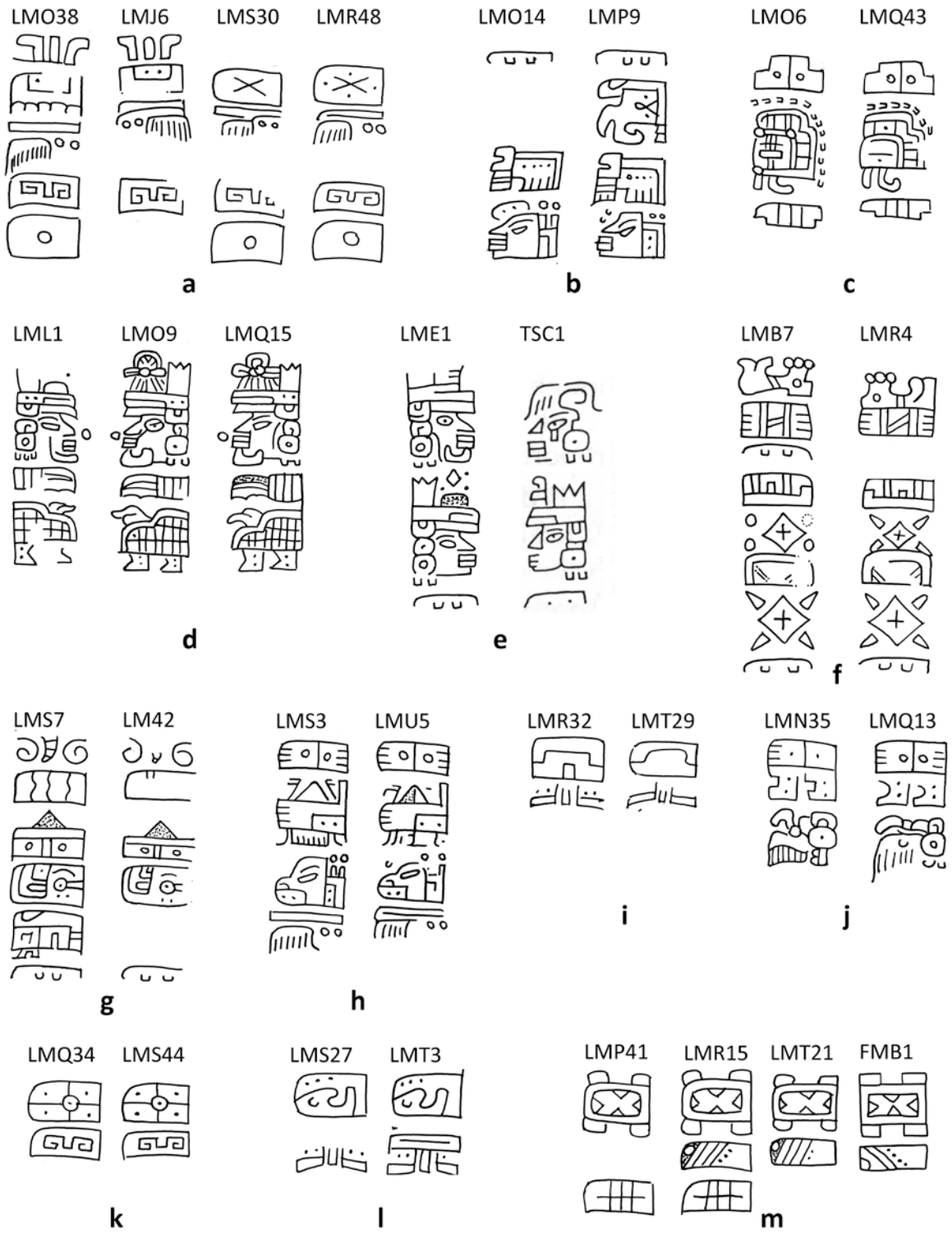
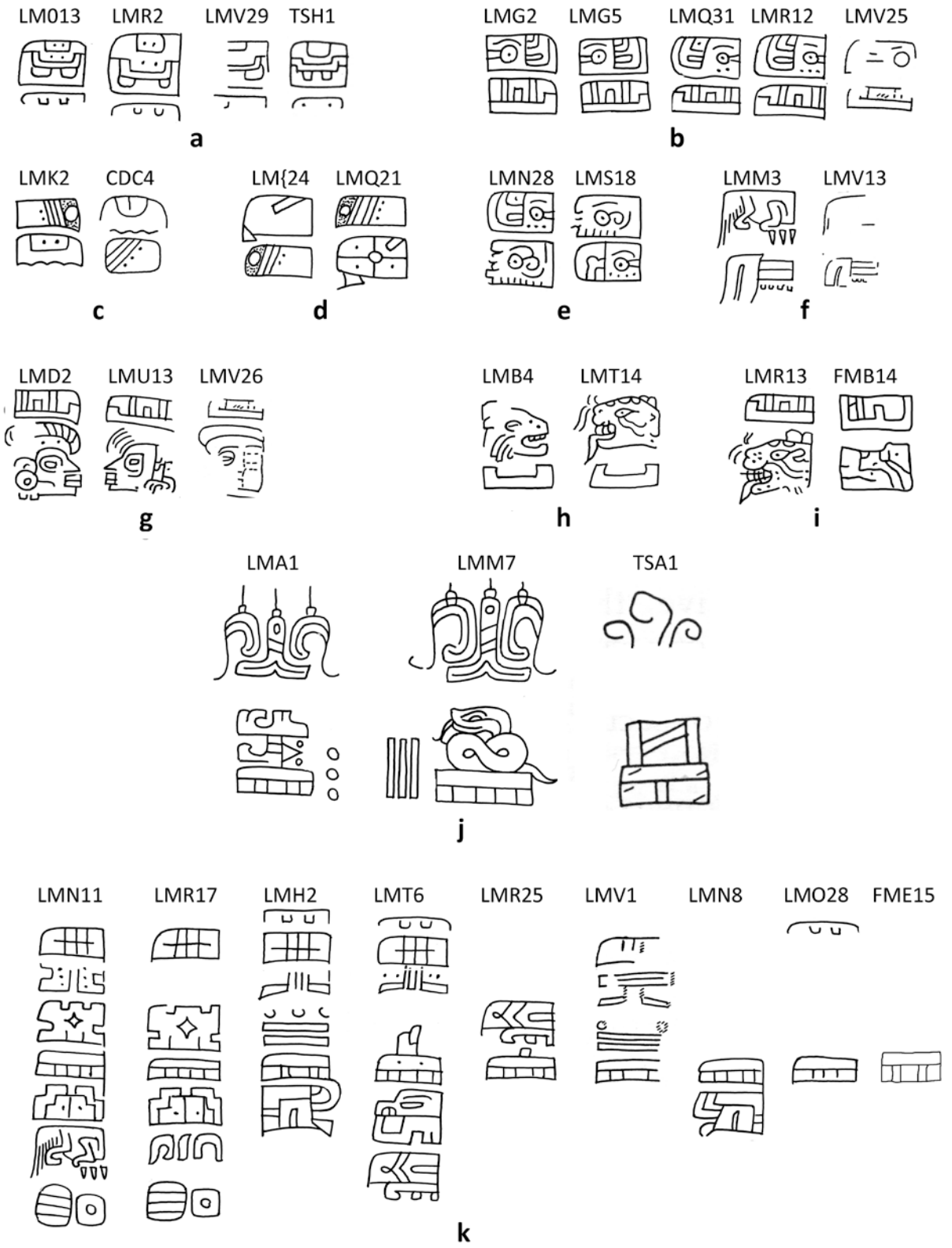**Fig. 5.** Repeated sequences in Isthmian texts.

LM013   LMR2   LMV29   TSH1   LMG2   LMG5   LMQ31   LMR12   LMV25

a   **b**

LMK2   CDC4   LM{24   LMQ21   LMN28   LMS18   LMM3   LMV13

c   **d**   **e**   **f**

LMD2   LMU13   LMV26   LMB4   LMT14   LMR13   FMB14

g   **h**   **i**

LMA1   LMM7   TSA1

j

LMN11   LMR17   LMH2   LMT6   LMR25   LMV1   LMN8   LMO28   FME15

k

Fig. 6. Repeated sequences in Isthmian texts.

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