

EVOLUTIONARY TRENDS IN MESOAMERICAN HIEROGLYPHIC WRITING

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ABSTRACT

This paper surveys the origin and development of the representational conventions of Mesoamerican writing systems. Writing probably grew out of the iconography of ceremonial celts, with which it shares many representational conventions; this iconography was used throughout Mesoamerica. Writing per se seems to have taken shape during or just before the period in which state-level political organization was emerging, in at least two separate regional traditions. Many of the representational features of these scripts are understandable in terms of the structures of the languages they represented and the patterns of development often resemble those of Old World systems. Other features are understandable in terms of the close relations that Mesoamerican writing maintained with iconography.

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This paper summarizes our investigations into the structure and development of Mesoamerican hieroglyphic systems, both in their visual organization and in their relationships to Mesoamerican languages. The first section argues that these scripts emerged from the iconography of Mesoamerican ceremonial celts, perhaps via a single ancestral hieroglyphic system. The existence of a non-iconographic common ancestor is largely hypothetical, this stage of writing being attested poorly if at all; we infer the main features of such a script from those common to the earliest attested systems. These early systems we classify into two basic groups, the Oaxacan and Southeastern scripts; the Southeastern group itself had an Isthmian branch spanning the Isthmus of Tehuantepec, and a Maya-Izapan branch running from the Yucatan Peninsula south to the northern borders of El Salvador. The remainder of the paper treats the radically different developmental trajectories of the Oaxacan and Southeastern script traditions.

Mesoamerican writing systems can be usefully compared, structurally and developmentally, with writing systems from other culture areas. However, they have only recently begun to enter more general discussions of the history of writing, long dominated by Egyptian and Mesopotamian traditions. In large part this is because Mesoamericanists themselves have concentrated on traits specific to Mesoamerican cultures and scripts, rather than addressing general representational and historical issues. It is due also in part to the amount of data on which general formulations can be based and decipherments secured. Compared with the evidence of script development in the Old World, the written record in Mesoamerica is spotty; the most basic historical relations among scripts have, at least until recently, been more a matter of conjecture than of argumentation. Texts for some scripts number in the dozens and fewer; the Mayan script, far and away the best-represented system, has only a few thousand partially legible texts. Most texts are quite brief, though some number in the hundreds and, in Mayan, even into the thousands of signs. Accordingly, many ideas that the data suggest cannot be tested definitively.

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Nonetheless, much of the data is quite revealing, and similarities and differences between Mesoamerican and early Near Eastern developments are briefly mentioned throughout this paper. The Mesoamerican material, in fact, has several special advantages for students of writing and its evolution. Most of the languages being written descend directly from languages reconstructable by historical linguists, independent of the evidence from the writing systems themselves; thus, it is possible to investigate relations between language structure and script development more rigorously than in any Old World system. Suggestive links between the earliest written texts and earlier iconographic symbolism suggest closer ties between representational art and the emergence of writing than have been demonstrated elsewhere. Particularly in the case of Mayan, texts are reliably dated in an absolute chronology, and significant representational variation and change can be monitored across six hundred years of this chronology. Finally, the history of Mesoamerican writing is of interest in part because of its peculiarities. For example, linguistically, the Oaxacan tradition exemplifies script “devolution,” decreasing the closeness of its correspondence with any spoken language; visually, Mayan writing developed a non-linear organization of its signs into blocks.

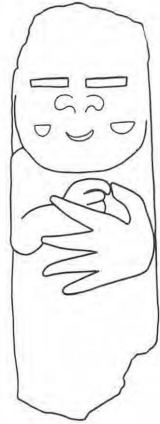
THE ORIGIN OF MESOAMERICAN SCRIPTS

A Precursor System¹

It is widely thought, though not universally accepted, that Mesoamerican writing owes its origin to Olmec-style iconography,² a pan-Mesoamerican system of religious and political art that functioned within a pan-Mesoamerican ceremonial complex.³ This section focuses on the iconography of incised ceremonial celts, apparently used in rituals of this complex.⁴ We argue that it was in the iconography of these celts that representational conventions were used from which those of writing can be seen to have emerged.⁵ This suggests that writing grew out of celt iconography in particular.

One feature shared by Olmec iconography and Mesoamerican hieroglyphic writing that suggests some kind of historical relation between them is a *pars pro toto* principle of representation.⁶ In Mesoamerican writing, very few signs represented an animal, person, or supernatural by depicting its full figure, a contrast with Egyptian hieroglyphic canons; instead, the head alone was depicted. Similarly, profile and full-frontal faces serve as conventional icons throughout Olmec-style iconography;

a.



b.

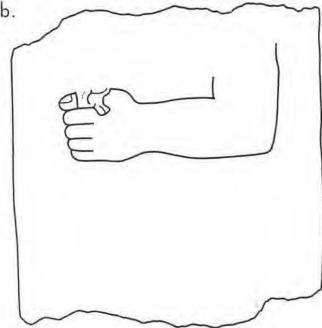
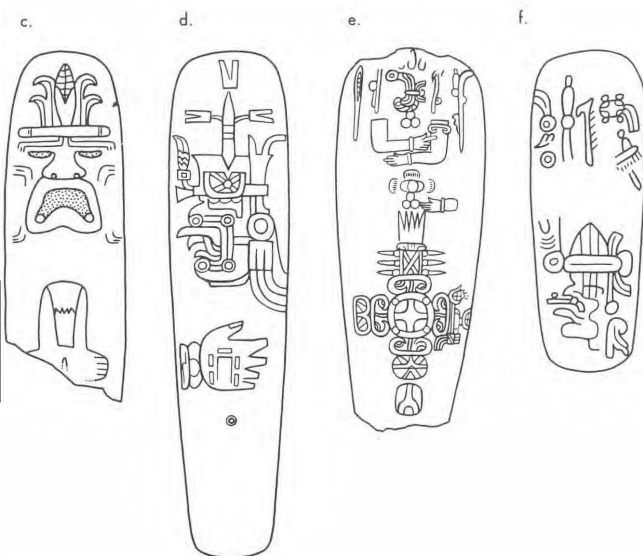


FIGURE 1

Precursor iconography and its iconographic sources.

- a. San Lorenzo Monument 41, with disembodied hand, and
- b. Monument 42, with disembodied arm;
- c. celt from El Sitio (near Izapa);
- d. celt of unknown provenance;
- e. the Humboldt Celt;
- f. celt from Tlaltenco, Valley of Mexico.



though their meanings are not secure, most are thought to refer to supernatural entities or elite humans. In the iconography, a fuller range of variation is found, with full-figure representation being typical, but this is not the case in celt iconography. The incised ceremonial celts normally present elements of an anthropomorphic figure (figure 1). A face, a mask or head ornamentation always occurs at the top, with no body; typically, hands, arms or legs are placed below, delimiting a region that the body would occupy were it depicted.

Other features of the iconography have pretty clear developmental significance for the emergence of writing. Many depictively opaque icons that did not contribute pictorially to scenes were evidently used to encode particular concepts or associations. These icons appear in all media and styles of presentation. The existence of conceptually-specific graphic units with no direct depictive interpretation may have stimulated or supported other developments that are virtually restricted to ceremonial celts, all involving the depiction of parts or accoutrements of a human figure without depicting the figure itself. One such convention is the representation of manual actions by depicting the hands or arms in a revealing posture (figures 1d and e)—sometimes in identifiable gestures, at other times seemingly in the performance of casting rituals documented in later iconographic and ethnographic sources. Another is the grouping in free

space of paraphernalia normally worn or held by figures in Olmec-style art (*figures 1e and f*); we interpret these groupings as statements attributing the statuses and/or roles that are conveyed in normal depictions of these objects, and, presumably, in their actual use. The lower body was also sometimes involved: on the El Sitio celt (*figure 1c*), legs are depicted with a long, decorated loincloth. We refer to such depictions as “isolated” or “segmental” forms.

This excising of visual forms from their normal relations to pictorial art appears to have evolved within the Olmec iconographic tradition. Rudimentary versions of the segmental hand and arm icons go back to the earliest known Olmec art (c. 1150-1050 B.C.), the monolithic basalt Monuments 41 and 42 of San Lorenzo (*figure 1a-b*).⁷ Proskouriakoff discusses these as having a “pictographic intent”; of the more complete Monument 41 she observes that, given the absence of most anatomical features, it “can hardly be a pictorial representation; it is more like a composition of signs of conventional meaning: a visage and gesture.”⁸ Even in the more developed phase characterized by the later incised celts, the source of these forms in the canonical tradition is reflected in their anthropomorphic placement, roughly where they would be were they part of a complete figural depiction. This source is also suggested by the full range of variation of celt iconography. Only one surface on an Olmec-style celt is carved. On celts with relief-carving,⁹ the entire surface is carved, so that the celt itself constitutes a single figure; on a few incised celts,¹⁰ a single figure is depicted, occupying most of the available space. The anthropomorphic organization of the majority of incised celts, with the upper portion consisting of elements excised from an anthropomorphic model, is therefore simply a variation on a more traditional iconographic pattern characterizing the carved celts and some incised ones. Finally, while the source of the excised forms was iconographic, they may well have influenced Mesoamerican writing—or indeed have led to it. Several hieroglyphic signs for verbs were depictions of body parts involved in the performance of the activities referred to by the verb (sitting, running, letting blood, holding/having or grasping something, flinging with a spear thrower, casting grains or droplets).

Compared to the holistic, gestalt type of interpretation to which pictorial representation of a figure or scene is subject, the effect of these practices is to focus attention on particular ideas and events that the segmental elements convey and to compactly convey sequences of events; they admit the representation both of a sequence of ritual activities and of its supernatural and social context. An example is provided by the Humboldt celt (*figure*

te), as we interpret it.¹¹ At the top of the celt, the accoutrements of war and rulership are placed together in the position of the head of an imaginary figure. The figure's braceleted arms are depicted immediately below in a gesture later used as a greeting to a local lord.¹² This is the extent of depiction of this figure, or at least of its first instance. Below the arms is another complex (of uncertain significance, though it has some suggestive analogues in Maya writing), which surmounts an outstretched, braceleted hand and wrist. Whatever its meaning,¹³ it seems very likely to indicate a different event from the gesture of greeting.

In its isolation of discrete event references by discrete groups of graphic elements, this iconographic system appears on the verge of a rudimentary logography like that of Protoliterate Sumerian. It differs in that it probably bore no direct relation to language, and the most proximate elements of the discrete groups are generally related by depictive pictorial relations: the relation of the possible casting hand to the associated objects, and the position of both arms and hands relative to one another in the greeting. However, in these respects it is not so far removed from the earliest hieroglyphic systems that, seemingly, supplanted it; several of the later, written forms sometimes have a pictorially-motivated spatial organization which often renders them interpretable mainly via pictorial, rather than linguistic, convention.

When more than one segmental form is used in an iconographic "statement" on a celt, these forms are intrinsically organized relative to one another in space. Typically, there are two such forms, or groups of forms. In these cases, the organization adopted is essentially anatomical realism, largely interpretable in terms of standard pictorial conventions: forms pertaining to the headdress are placed at the top; next highest is the head; next highest the hands or arms; and next the torso or leg regions. Most of these elements are optional, although when any of them occur at least a head or headdress elements are among them. The organization deviates from that in pictorial representation, in that the segmental forms occur in free space rather than being joined anatomically by overt indications of intermediate portions of the implied figure—the minimum deviation required by the use of segmental forms. They also differ in subtler details. For example, some of the accoutrements signalling status and role appear to have been objects held upright alongside the head; they are grouped above with headdress elements, which were perhaps the archetypical examples of status symbols in Mesoamerica.

An extension of these organizing principles is required when more than one iconographic statement is involved, as on the Humboldt Celt. While the first statement can be recorded in a traditional way, a second gesture performed by the same individual must be placed in relation to the other forms on the celt. The bias in such an extension seems most likely to involve the traditional record of one statement, with the second appended spatially in some way. An anatomically correct placement is impossible in the case of multiple gestural or manual statements; the vertically-elongated orientation both of the celts and of standing anthropomorphic forms biases in favor of its placement below rather than alongside the first statement. Thus, multiple statements produce a vertical columnar sequence of segmental visual forms or form groups in free space; they thereby reinforce the deviations from the pictorial conventions of other genres of Olmec art and produce an organization homologous to the sequence of syntactically clause-level conceptual structures in language.¹⁴

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Accordingly, the principles of celt iconography appear to have provided bases for those of writing. In fact, if some of the segmental iconographic elements below the head on these celts were simply standardized in size or format, they would be readily interpreted as a hieroglyphic text. We suspect that something very much like this did happen as writing emerged from this special iconography, and a fully developed example of the result may be reflected on the El Sitio celt (*figure 1c*): one side presents a headdress, deity mask and lower body in standard precursor format, and the other a single column of text in what appears to be a primitive form of the Isthmian (*epi-Olmec*) tradition.

This hypothesis cannot yet be tested directly. Too few of the inscribed ceremonial celts have been recovered, especially in controlled excavations, to provide adequate documentation for the precursor system itself. There is some indirect support beyond the similarity in representational conventions. If writing was emerging in this way from the system of celt iconography, being in effect merely a later form of that representational system, then it was doing so in the context of whatever functions the celts were serving. Celts and early writing do, in fact, appear to have been used in connection with comparable types of ritual activity relating to the power and prestige of individual political leaders. The columnar format of the earliest scripts would also follow from such an origin, the iconographic format of celt iconography itself being basically columnar.

The only well-developed alternative hypothesis for iconographic origins of Mesoamerican writing is due to Hanns Prem.¹⁵ He argues that the crucial precursor to writing is a system of narrative pictography, a codified iconographic system for recording historical events. Prem assumes that narrative pictography derives from representational art, a development that "is rather hazy and at best is to be recognized in an intensified conventionalization" of iconographic systems that included transparently depictive forms as well as abstract icons. He appears to have in mind the kinds of conventionalized gestures, postures, accoutrements and contexts that are the basis for interpreting the Mixtec manuscripts,¹⁶ and in fact the prototypical examples of narrative pictography are the Mixtec and other manuscript traditions of highland Mexico. Prem concludes that "This tendency of narrative pictography to produce independent conventional signs offers the basis for the development of a true writing system."

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We see little evidence for an Olmec narrative pictography. Sequential information of any sort is rare in Olmec-style art, whose symbolism is far more propositional than narrative. Prem's criterion of intensified conventionalization, applied either to symbolic forms or to their organization, leads to the same conclusion: the few possible narrative sequences in Olmec-style relief sculpture exhibit, if anything, less symbolic conventionalization than do static presentations in the style. In Mesoamerica, at least, it appears rather that narrative pictography emerged from a complex system in which pictorial imagery was associated with increasingly restricted written annotations (see *The Oaxacan Tradition*, below). Writing helped foster the development of a true narrative pictography; it did not develop from one.

In addressing the development of writing from Olmec-style iconography, it is useful to separate the issues of conventionalization of sign forms, independence (our "segmenting") of sign forms and narrative. They relate, according to Prem, in that narrative pictography fostered independent (segmental), conventional symbols that would come to be used in writing; however, it is iconographic conventionalization more than separateness of forms that is most evident in narrative pictography. For us, it is the organization of visual forms that was of primary importance in the evolution of writing from iconography. Functionally, conventionalization of individual visual forms has no necessary, intrinsic relation to their organization; in contrast, independence of forms is, by definition, organizational, and multiclausal state-

ments entail organization, relative to one another, of forms corresponding to the separate clauses. Thus, narrative has a very different role, if any, in our picture of the emergence of writing: chronologically, it is near the end rather than the beginning of the development; functionally, whatever effect it may have had was not by spawning increased conventionalization of gesture, pose, clothing and architectural context but by forcing the extension of representational principles that had originally differed far less substantially from those of representational art.

Though it may have had some limited role, we do not attach much importance to the conventionalization of symbols, at least for the *origin* of Mesoamerican writing from its iconography. According to our scenario, visual forms should have been presentable in an iconographic source for writing in any way that they were presented for the same communicative purposes in iconography; it is not their form but their relation to other segmental visual forms that we take to be crucial for the development of a linguistic interpretive framework for the graphic system. This is exemplified in early Mesoamerican writing by the range of viewing angles and, to some extent, postures of Mayan hand gestures¹⁷ and of both Mayan and Zapotec seating signs (*figure 2*). Concerning the celts in particular, we see no evidence that the visual forms inscribed on the celts are conventionalizations of visual forms in pictorial representations. Rather, what is conventionalized in the celts are the small deviations from the traditional pictorial patterns of organization of visual forms, and these, we claim, are leading to writing via their homology with clause sequences in language.

We also differ with Prem concerning the sources of celt iconography and its relation to writing. He briefly relates celt iconography to narrative pictography in a passage¹⁸ which, if we are interpreting it correctly, expresses doubt concerning a direct relation between the celt iconography and writing. He considers celt iconography to exhibit "a self-sufficiency of form which derives from narrative picture writing." This "self-sufficiency" seems to be equivalent to his earlier "independent conventional signs," a reference to the rendering of just one part of an anthropomorphic figure, such as a gesturing arm, to convey what it would in a full depiction of the figure. This would agree with Proskouriakoff's characterization of San Lorenzo Monument 41 and with our own presentation. We are also agreed that the conventions have their source in Olmec-style art. However, we see no evidence that celt iconography grew out of a specifically

narrative iconographic system. Celts typically carry static presentations, with the rarer narrative pattern seemingly interpretable within the format of the static celt iconography. Prem's further comments on celt iconography seem to emphasize the distinctness of the tradition from that of writing, while allowing that the visual forms involved could have been part of a broader inventory of symbols that were as a whole becoming the signs of a script. In contrast, we take the iconography of incised ritual celts to be the proximate source of writing.

Common Features of Early Mesoamerican Writing

Across its history, Mesoamerican writing appears in diverse guises. The earliest scripts, however, appear rather similar to one another. Since the decipherment of most of these scripts is in a quite rudimentary state, these similarities are discussed initially with respect to the visual organization of these systems. As in other scripts, most texts have several levels of visual organization: component features of signs (not discussed here); signs; complexes of signs; columns or rows of sign complexes; and text segments of columns and/or rows. A persistent relationship between iconography and early writing affected this visual system up to the level of sign complexes: not only were most signs, effectively, pictorial renderings consistent with the local art style, but signs and components of signs were often organized according to iconic principles even when they conflicted with the reading order. In these respects, they recall the organization of ritual celt iconography.

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Iconicity: Sign Form and Sign Value

Many or most signs in most of the scripts are depictively transparent. Easily recognized objects were simply depicted in a characteristic view: for example, pyramids, ball courts, hills, shields, hatchets. Their depictive conventions also appear to continue, and probably to elaborate, those of the precursor iconography. The *pars pro toto* depictive convention not only related sign forms and sign values in references to animate beings that were depicted but also in references to an individual whose name was a word for that being. Not only were events involving manual activity portrayed by hands in an appropriate pose, accompanied by the primary manipulated objects, but also other actions performed by individuals were depicted by presenting the primary parts of the body involved in the performance: for seating in office, a view of the crossed legs and waist in full-profile, half-profile or full-frontal view (*figure 2*); for genital bloodletting, a kneeling torso with blood issuing forth (*figure 3*).¹⁹

FIGURE 2

Mesoamerican signs
for seating in office.

Zapotec:

- a. Monte Alban Stela 12;
- b. Monte Alban Stela 15;
- c. Monte Alban Tablet 14;
- d. Monte Alban Stela 2.

Preclassic Maya-Izapan:

- e. Maya text on a stone pectoral, Dumbarton Oaks.
- f. El Porton Monument 1;
- g. Maya monument of unknown provenance, now in the Seattle Art Museum;

Early Classic Maya:

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- h. Leyden Placque, with **mu** phonetic complement suffixed (for Yucatecan **kum*, Cholan **čum* "to sit");
- i. Leyden Placque, with probable *-lax* grammatical suffix for completive aspect;
- j. Ixteilha cave mural;
- k. Yaxchilan lintel 11;
- l. Tikal Stela 21;
- m. Pomoná Tablet 1;
- n. Palenque Palace Tablet.

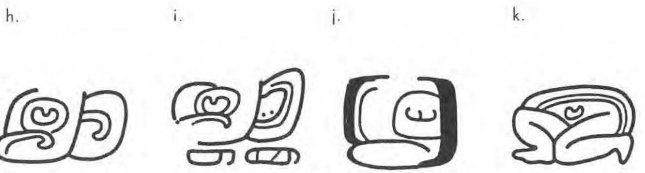
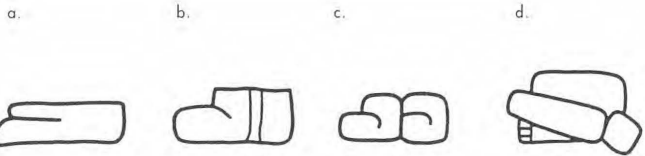




FIGURE 3

Sign complex for male genital bloodletting.

a. Posture of Maya genital bloodletting: iconographic depiction, Huehuetenango vase. *Maya genital bloodletting sign*, depicting a human seated torso in position to perform genital bloodletting, with sign for "stone" in lap possibly for penis; words for stone mean "penis," "testicle(s)," or both in many Mayan languages.

b. Tikal Stela 31;

c. Tikal Stela 12.

La Mojarra Stela 1:

d. sign depicting a human seated torso in position to perform genital bloodletting, with blood issuing forth from the loins; followed immediately by penis sign with two wounds or scars visible on the shaft.

e. Another instance of the scarified penis sign.

f. *Maya penis-and-testicles sign*, Copan Temple 18, with twin wounds or scars.

Spatial proximity was used to signal a close interpretive relationship among visual units, in particular syntactic relations among signs. This is most readily demonstrated using calendrical signs, whose syntactic interpretation is clear; usually, they consist of a numeral + noun construction. A numeral often abuts the sign for the noun it modifies, less often other adjacent signs; when they do not abut each other, the numeral and modified sign are typically separated by less space than separates either from any other adjoining sign. Non-numerical compounds, when we recognize them, behave similarly. In the Zapotec script, for example, a year was referred to by adjoining the headdress of a particular deity²⁰ above the sign complex for the ritual calendar day that named that year.²¹ Whether or not this differential spacing was intentional,²² it constitutes a level of visual organization of signs into sign complexes.

This level of sign organization by juxtaposition is often iconically motivated, as exemplified by the lightning god headdress just discussed—it is effectively being “worn” as headdress by the ritual calendar day naming the year. There are many noncalendrical examples, such as the seating sign (*figure 4*). In Preclassic Zapotec texts, the seating sign is often surmounted by a directly adjoining sign; in one case (*figure 4a*), on Monte Alban Stela 15, the surmounting sign is a jaguar head that a parallel text helps secure as the ruler’s name.²³ On (Isthmian) La Mojarra Stela 1 (A.D. 156), a “lord” or “ruler” sign adjoins a platform throne sign immediately below (*figure 4b*), indicating the seating/placement of a named individual as ruler.²⁴ And on (Maya-Izapan) El Porton Monument 1 (c. 450-350 B.C.),²⁵ a seating sign adjoins another sign immediately below it (*figure 4c*), plausibly a seat of some sort;²⁶ these two signs together may indicate seating on the throne, of an individual probably named in the following blocks. In all these cases, the juxtaposition of signs captures an essentially iconic relationship: a jaguar head naming the ruler is placed upon the ruler’s seated body; a head sign for ruler or rulership is upon the throne; the seated body of the ruler is upon a seat.

Another type of visual unit akin to these sign complexes is a more intimate visual union, either of signs (*figure 5c-e*) or of depictive elements that together form a single sign (*figure 5a,b*). In these units, one sign or element is cradled or entwined in another; this is typical of signs depicting hands holding objects, where a finger or thumb may cradle an object, or the hand may wrap around part of an object.

FIGURE 4

Iconic compounds for seating of rulers on thrones.

- a. A lord Jaguar seated, Monte Alban Stela 15 (Zapotec);
- b. lord on his throne, La Mojarra Stela 1 (Isthmian);
- c. seating, possibly on an object, El Porton Monument 1 (Maya-Izapan).

FIGURE 5

Depictive sign complexes.

- a. Hand grasping a rattle or, more likely, a mace; Monte Alban Stela 12 (Zapotec).
- b. Hand grasping a spear-thrower; Tikal Stela 31 (Maya).
- c. Hand holding or grasping an unidentified object; Monte Alban Stela 15 (Zapotec).
- d. “Ahau-in-hand,” conveying the grasping (**b’ak’*) of a scepter of supreme authority; jade plaque, probably from Rio Azul (Maya).
- e. Inverted, formal analogue of d., from La Mojarra Stela 1 (Isthmian).

The iconic organization of sign complexes and complex signs creates semantically coherent groupings of units that normally form well-defined syntactic constituents of a sentence. In the examples above, manipulation of objects normally involves predicates, such as “casts incense” combining a verb and direct object; seatings normally involve subject and intransitive verb; and the year sign with day position defines a named year, whether as a noun phrase or equational predicate. Together with the effects of simple juxtaposition of related units, as in the numeral + day name compounds, this level of sign organization was a level of both visual and syntactic organization of the script.

a.



b.



c.



a.



b.



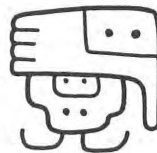
c.



d.



e.



In some cases, however, the sequencing implicit in the iconic organization of signs conflicted with the linear sequence of corresponding units in language, particularly in Zapotec and Mayan but perhaps not in the (probably Mixe-Zoquean) Isthmian texts, because verbs characteristically precede both subjects and objects in Zapotec and Mayan. In iconically motivated sign complexes and complex signs, signs referring to the subject or object of the verb may precede the sign for the verb: objects held in hands are typically above them (*figure 5c-d*); names of persons being seated may be upon the seating verb (*figure 4a*). Headdress elements in Olmec iconography provide a comparable example. Several of these elements end up designating titles or offices in Southeastern scripts, both Isthmian and Mayan, where they continue to be represented in headdress position.²⁷ Reading order in Isthmian is unknown, but in Mayan they are demonstrably read after the units they surmount.²⁸ Such cases suggest conceptual interpretation via iconographic conventions for depictive referents of visual elements and their spatial organization, not a direct rendering into language via linguistic correspondences (sign values). In other cases, sign organization and word order are not in conflict; nouns for locations normally follow verbs in all three language groups, as in the “seating on throne” compounds of figure 4.

In Southeastern writing and perhaps in Zapotec writing as well, spatial organization was used in some contexts to clarify the interpretation of sign groups. In the Southeastern area during the Late Preclassic, numerals were appended on the left of day signs rather than above them if the numeral would otherwise appear to be part of an immediately preceding column of digits in a place value count of days leading to the ritual calendar date.²⁹ Not long thereafter (c. A.D. 100-400) in the Zapotec area, numerals were also appended alongside (typically left of), rather than below, associated signs,³⁰ as on Monte Alban Stela 1. Names of ritual calendar days sometimes serve calendrically as dates, but often they were used as personal names or as names for years, both common practices in most of Mesoamerica. Numerals are appended alongside the deity headdress associated with names for years and alongside day names that appear to function as personal names, but we are not confident that any case refers to a date. Since this orthographic practice is not found with day names clearly used as dates, we suspect that these numeral + noun compounds are for personal and year-names; if so, they would conflict with Zapotec word order, and constitute an orthographic convention aiding semantic interpretation. A few might be simple numeral + noun constructions, in which numerals precede

nouns in Zapotec, as is usual in Mesoamerican languages.

Reading Order

In all the earliest scripts, text is organized into columns of signs or sign complexes. Apparent instances of row format are rare, almost always consist of a single row (which is also, of course, a series of columns, each of which contains only one sign complex), and are virtually restricted to rims and borders. A deviation developed in the Maya-Izapan group: in segments of text with multiple columns, columns were read in pairs.³¹ Columns are read from top to bottom: in text regions with multiple, contiguous columns, the tops of columns always align at least as closely as the bottoms, and often the tops align neatly while the bottoms are ragged. Within contiguous sections of text, reading is normally from left to right: this can be demonstrated by sign sequences that occur both within a single column and split across columns, the first half reaching the bottom of one column and the second half starting at the top of the adjacent column on the right.³² Rare cases of right to left order are motivated by very limited compositional circumstances, discussed below.

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On monuments presenting both scene and text, several segments of text may be spatially separate, the placement of these segments typically adapted to open space left by the scene. For example, many monuments are organized visually around a central figure or iconographic motif; signs may be grouped in short columns alongside or axially, and text segments placed variously with respect to the figure may be read starting with segments to the right, to the left or in the center. Elaborations of these formats in iconographic context appear to be the basis for a greater variety of later visual formats for sign sequences.

In early Mesoamerican scripts, signs depicting figures or heads in profile face in the direction from which one reads, a practice also characteristic of ancient writing in the Old World. Throughout the history of these scripts, reversal of reading order is accompanied by a reversal in the orientation of signs, again a typical practice worldwide. Such reversals are adopted for compositional reasons. Except in the case of screenfold manuscripts, they almost always involve exactly two text segments facing one another, usually in a central position architecturally (e.g., around a doorway) and usually accompanying a figure facing left or right; a reversed segment faces either with an accompanying figure placed above or below it, or toward an accompanying figure placed alongside it. Similar conditions typify Egyptian

text segment reversal. The practice is rare in Mesoamerican monumental inscriptions, the prime example in the Preclassic being La Mojarra Stela 1. Probably beginning in the Late Classic period, screenfold books in the Oaxacan tradition used a boustrophedon pattern in narrative pictography; by this time, however, sign complexes were limited to one-word captions to portions of iconography and have no sequential textual organization.

Common Origin of Mesoamerican Writing

While these visual features may be inherited from a system ancestral to the Oaxacan and Southeastern scripts, they do not constitute evidence for the existence of such an ancestor. Single-column format, top-to-bottom order within columns, left-to-right order of the columns themselves and profile head signs facing in the direction from which they are read, all are typical of the earliest Old World scripts; universal patterns are not criteria for genetic relationship. Some kinds of content are also typical of royal inscriptions elsewhere: chiefly, the ruler's genealogical justification for rulership; key historical events leading up to his rule, including birth, marriage, and accession; propagandistic boasts concerning warfare, raiding and human sacrifice; and celebrations of regular, scheduled rituals by the political elite. Finally, most signs evidently shared among different script traditions are transparently depictive, and their depictive norms relate to the representational art of their respective cultures. They may, therefore, reflect shared content rather than a common script tradition. For example, a footprint or series of footprints is used to indicate travel or a path in highland Mexican iconography, on an Olmec monument from La Venta and in Maya iconography and hieroglyphic writing (where it also had the phonetic readings *be* and *bi*, based on a descendant of proto-Mayan **b'e:h* "road, path").

Other shared features are specifically Mesoamerican. A few signs involve what appear to be conventionalized or depictively arbitrary features providing evidence of relationship. A prime example is the use of bar-and-dot numerals, a bar conveying 5, a dot conveying 1, with numbers from 1 to 19 formed additively by a horizontal stack of bars surmounted by 0 to 4 dots. Another widely attested feature is the use of a cartouche surrounding most day signs, when they function as such. A rectangular field was frequently infixed at the wrist in signs depicting hands, a feature with no known depictive basis. Some shared content, including the recording of days in the ritual calendar and of certain rituals, is also specific to Mesoamerica; while these could arise from cultural interaction rather than being an inherited practice, they do typify the precursor system and, thus, suggest common

descent, whether or not through the intermediacy of an ancestral script.

The historical interpretation of these Mesoamerican elements is not yet clear. The sharing of many can be explained as a common inheritance from the precursor system as readily as from a common writing system. The iconic aspects of the visual organization of Preclassic writing—the iconic organization of depictive elements with respect to one another and to depictively abstract signs—look very much like the conventions of the precursor iconography. The isolation of heads to represent individuals, of hands to represent manual activities, and of headdresses and headbands to represent statuses or offices, are all attested in early writing as well as in Olmec-style celt iconography. Bar-and-dot numeration may go back to the precursor system; Michael Coe suggests it is much older than writing,³³ and it does seem to be attested in Olmec-style iconography outside of the celts.³⁴ Indeed, it may be the juxtaposition of these numerals with depictions of the referents of day names that led to the emergence of writing from a pre-existing graphic system not aligned with language.³⁵ A few signs in Zapotec and Southeastern writing seem to go back to the precursor system as well: the deity headdress becomes the Zapotec year sign, evolving into the year signs and lightning god headdresses of both the Mixtec and Aztec; and headdress elements of rulers show up in Isthmian texts for statuses or offices. Since precursor iconography was part of a shared ceremonial complex, it could have given rise to different scripts separately in different areas, or it could have evolved into writing as part of the ceremonial complex.

There are some indications that a common Mesoamerican script did emerge from the shared precursor iconography since a very few features shared by the scripts do not show up in Olmec-style art. The clearest indicators are the cartouches around day signs and the field infix at the wrist of hand signs. Less definite evidence comes from the representation of seating in office, using disembodied, cross-legged, seated haunches; the body-part convention was rarely applied to the lower body in surviving examples of precursor iconography, and the theme of inauguration in office is not yet known from that iconography (it is treated in the more usual variants of the Olmec style). And since the precursor system is part of a ceremonial complex thought to be shared throughout Preclassic Mesoamerica, and since the function of the earliest surviving texts is political, it makes sense to see writing as simply a variant form of precursor iconography emerging in the context of political use of that iconography in ritual. However, the evidence for an

ancestral script is too sparse to preclude the possibility that two regionally distinct hieroglyphic systems emerged and developed separately from precursor iconography.

There is in fact some reason for suspecting that separate scripts emerged from the precursor system, the iconography of ritual celts. Although we suggest above that writing effectively replaced this precursor system, the two co-existed at c. 600-500 B.C. Writing is found on at least one monument from La Venta, and precursor iconography apparently survived at that site until its fall (c. 600-500 B.C.³⁶) since one example was placed in an offering during its last construction phase. The ceremonial complex, of which the precursor to writing was a part, is unknown outside the Olmec region after this time. Writing existed in both the Olmec and Zapotec areas by 500 B.C., in clearly distinct written traditions by 400 B.C. This timing for the emergence of writing is rather suspicious: it appears to be associated with the fall of the shared ceremonial complex and its iconography, and with development of several autonomous incipient states. The changing nature of political ritual in these last days of the shared ceremonial complex may have been related to the changing nature of the symbol system used in association with it. If so, writing as a variant form of precursor iconography was supplanting the classical form of that iconography, and doing so in the context of a replacement of the shared ceremonial complex by autonomous regional developments. This points to the emergence of separate hieroglyphic systems from the precursor via the process of state formation, as regionally distinctive developments from a decreasingly shared iconography no longer restricted to ritual celts.

The Emergence of Regional Traditions

By c. 500 B.C., writing evidently existed throughout southern Mesoamerica at sites that had participated in the Formative ceremonial complex. One badly weathered text, tentatively dated to the period c. 700-500 B.C., has been found at Chalcatzingo,³⁷ a highland Mexican site with Olmec-style monuments. A possible day name is recorded in association with the depiction of a sacrificial victim from San Jose Mogote, a regional center in the Valley of Oaxaca,³⁸ by 700-500 B.C., and a genuine text tradition was in place by c. 400 B.C. at Monte Alban, the capital of the newly founded Zapotec state. An undeciphered columnar text (c. 600 B.C.) is found on Monument 13 from La Venta, a major center of Olmec civilization; dated texts in the descendant Southeastern tradition begin c. 50 B.C. Another textual monument was erected c. 450-350 B.C. at El Porton, a site in the northern Guatemala highlands that did not participate in the Formative

ceremonial complex: some of its hieroglyphs relate stylistically to the iconography of the southern Guatemala highlands and Pacific coast,³⁹ a region that had participated in the ceremonial complex.

Several diagnostic traits allow the attested examples of writing to be separated pretty clearly into two distinct script traditions.⁴⁰ One is part of the Valley of Oaxaca tradition first attested on the monument from San Jose Mogote; in origin it was probably a Zapotec system, but it later came to be used by Mixtec and then Nahuatl speakers, among others. The other is an essentially Olmec tradition, the Southeastern Mesoamerican. It continued with no obvious change into the Isthmian regional tradition,⁴¹ whose geographic distribution correlates closely with that of Zoquean languages.⁴² Maya-Izapan writing, probably an offshoot of the Southeastern tradition, developed a unique pattern of visual organization and was the only script tradition in Mesoamerica from which a substantial corpus survives.

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THE OAXACAN TRADITION

The Zapotec region provides the fullest corpus of texts from the Middle and Late Preclassic periods. The identification of its texts with Zapotec specifically was long suspected and is now generally accepted; the best hieroglyphic evidence is the suffixing of numerals to names of ritual calendar days,⁴³ an exotic feature in Mesoamerican languages, and it is also suggested by the evidence for linguistic continuity in the region. While there have been attempts to demonstrate an association between signs in the script and particular Zapotec words,⁴⁴ the evidence is not compelling.⁴⁵ Extremely terse records in the same script are found in the Mixtec highlands during the era 200 B.C. - A.D. 100.⁴⁶ The script was apparently introduced into the Mixtec lowlands (the Nuiñe region) by the same era although surviving texts are from the succeeding archaeological phase (A.D. 100-400).⁴⁷ Nahuatl writing is probably also its descendant, being quite similar to Mixtec manuscript writing in its restriction of content to proper names (place names, personal names and day names), in the conventions used to represent them and in the signs used to represent day names.

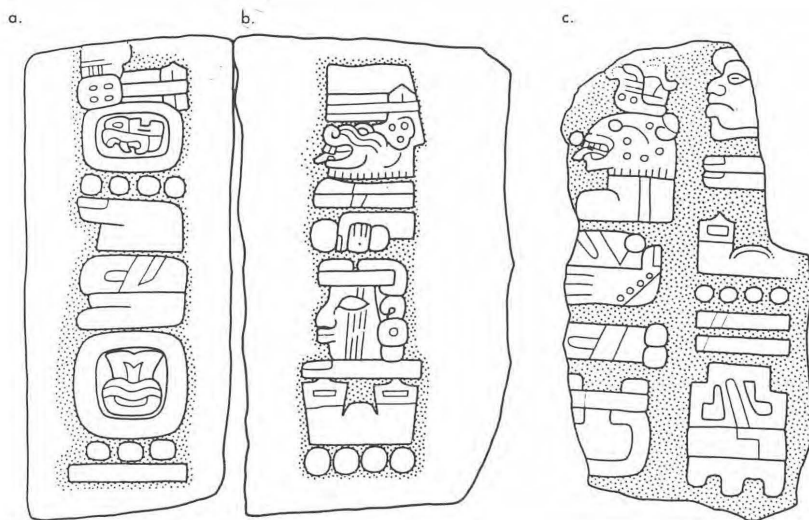
The representational principles of the Zapotec script have not been investigated explicitly. Decipherment research has generally proceeded on logographic assumptions. The possibility that Zapotec writing was partly phonetic was raised very early by Caso;⁴⁸ he eventually came to believe that Zapotec place-name spellings were probably in part phonetic⁴⁹ though as yet there is not direct, internal evidence for this.⁵⁰ Whittaker states expli-

citly though without supporting argumentation, that the system was logographic.⁵¹ It can be demonstrated, at least, that the script was largely logographic, and, like Whittaker, we believe its principles were comparable to those of pre-Sargonic Sumerian writing.

The key to this demonstration, as to almost all decipherment work in Mesoamerican scripts, is provided by calendrical records. Days in the ritual calendar are almost always followed by a numeral in bar-and-dot notation; this reflects the structure of calendrical names, a juxtaposition of a word for a numeral between 1 and 13 with one of twenty day names. The ritual calendar record is often followed immediately by the so-called "Glyph W," a sign followed by a numeral between 1 and 18; formerly thought to represent a month name,⁵² Glyph W appears to record a count, or a station in a count, of an as yet undetermined time period.⁵³

Using ritual calendar records, Glyph W and the year names, often only one sign intervenes between successive calendrical statements. For example, on Monte Alban Stela 13 (*figure 6b*) is a column of four compounds: a year bearer, a sign depicting a hand grasping a mace or rattle, a ritual day position and four Glyph W time units. The hand sign is evidently logographic, quite possibly for a verb concerning an event such as warfare or

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sacrifice. Other signs, depictively transparent, have logographic analogues in other Mesoamerican scripts whose meanings are contextually appropriate; the best example is the seating sign discussed above (figures 2, 4 and 6a, c, e), associated with accession to supreme power. The logographic nature of some signs can be established by contextual analysis; for example, the seating sign is usually closely followed by a sign depicting a tied pouch or bundle⁵⁴ (figure 6c, e), bundles being associated with accession both glyphically and iconographically among the Maya,⁵⁵ and glyphically in the Isthmian script (see below).

This leaves relatively few sign groups for possible interpretation as partially phonetic spellings, and there is no evidence for a subset of signs from which the members of these residues are drawn, i.e., for a syllabary used in purely phonetic spellings. Indeed, there were probably no simple phonetic signs of this sort. Proto-Zapotec roots were mostly of two syllables, each consisting of a single consonant followed by a vowel (CV),⁵⁶ so it would be difficult for rebus phoneticism to take root.⁵⁷ Thus far, there is no evidence of even this sort of phonetic representation for a Zapotec sign, but such usage did eventually develop in Mixtec writing, an offshoot of the Zapotec tradition.

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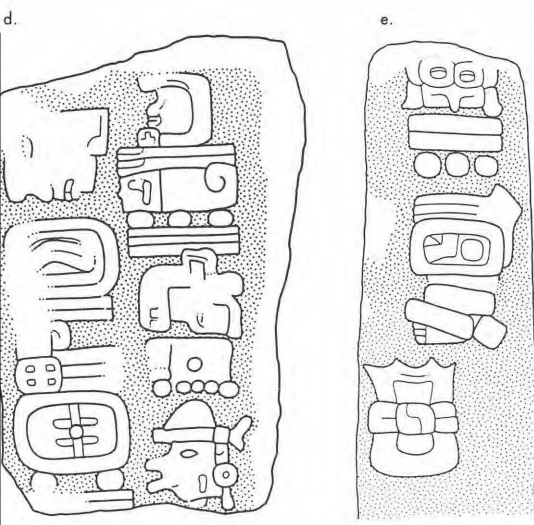


FIGURE 6

*Early Zapotec texts
from Monte Alban.*

- a. Stela 12;
- b. Stela 13;
- c. Stela 15;
- d. Stela 17;
- e. Stela 2, left side.

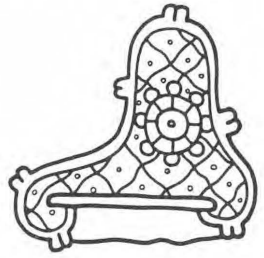
The Mixtec manuscripts use a logographic system of representation for personal and place names.⁵⁸ Rebus is extensively used in the Mixtec place names, as well as in the Aztec system, which evidently descends from the same tradition (*figure 7*). The most common Mixtec use of rebus is to provide a phonetic cue (i.e., a phonetic complement—M.E. Smith’s “phonetic indicators”) to the interpretation of a morpheme represented in a depictively transparent way (M.E. Smith’s “primary signs”); see *figure 7b*. In addition, rebus is sometimes used as the sole sign representing the morpheme (Smith’s “phonetic transfer”); see *figure 7c, f*. At least in later, Aztec inscriptions, the two were combined, with rebus complements to rebus logograms; see *figure 7e*.

The Zapotec place signs are constructed similarly to the Mixtec, and seem to be the historical source of the Mixtec system of place name representation; this is in fact how their function was recognized.⁵⁹ However, all the signs in the Zapotec place name compounds appear to function logographically or iconographically, and are so interpreted by both Marcus and Whittaker. Few contain enough signs for any to serve as a secondary indicator. This contrast adds to the evidence for strict logographic representation without rebus in the early Zapotec texts. Nonetheless, rebus representation, as simple logograms or as phonetic complements to other logograms, could easily exist in the uninterpreted portion of the Zapotec corpus.

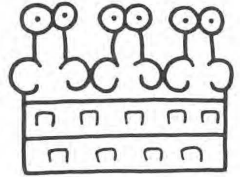
In Sumerian, Egyptian, Chinese and Mayan hieroglyphic writing, rebus is repeatedly the prime basis for the development of non-logographic phonetic values for signs that were originally logographs. In Egyptian, this is reflected in the orthographic principles of phonetic representation. Different inflected forms of roots can be produced by varying the root vowel so that before grammatical variations were represented, the same sign represented forms differing phonologically in the vowel associated with the root. The phonological principles of the script were indeed based on consonants only. Similarly, tonal variation served inflectional purposes in Mixtec, and tonal variation was legitimate in Mixtec rebuses.⁶⁰

The Zapotec hieroglyphic system shows substantial evolution in its visual organization. The conquest tablets of Mound J at Monte Alban (200 B.C.-A.D. 100) present an iconographic representation of the conquest of a named place during a named year, with a glyphic text proceeding from this central design.⁶¹ This pattern is close to that of the Olmec-style precursor iconography from which, we have argued, Mesoamerican writing derives, but it is not the only attested pattern. Simple day name captions accompany depictions of cap-

a.



d.



b.



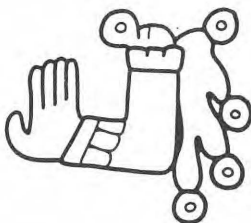
c.



e.



f.

**FIGURE 7**

*Rebus representation
in Mixtec and Aztec
place names.*

Mixtec spellings:

a. Depictively transparent pictorial/logographic representation of *Yucu Yusi* "Hill of the Turquoise Jewel," by a depictive sign for "hill" with a depictive sign for "turquoise jewel" at its center; Codex Sanchez Solis.

b. A depiction of a cradle (Mixtec *dzoco* "cradle"), added to a depiction of water welling up, secures the reading of the latter as Mixtec *dzoco* "spring"; Lienzo de Jicayan.

c. A depiction of a bundle of feathers (Mixtec *yodzo* "large feather") represents the word *yodzo* "plain"; Codex Bodley.

*Aztec spellings, all
from the Tizoc Stone:*

d. *Šoči-mil-ko*, "Place of Flower Gardens," depicting flowers growing in a field; -ko is a locative suffix.

e. *Akol-man* or *Akol-wakan*, "Place Pertaining to the Leader" or "Place of the Acolhua," with an arm *akol-* for the root, and *a-* "water" as complement.

f. *Čal-ko*, probably for "Place of the Chalca (people)" or "Place of the Hollow," depicting a disk of green stone *čal=čiw-*.

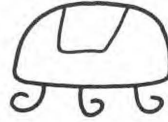
a.



b.



c.



d.



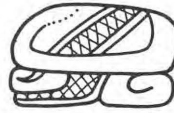
e.



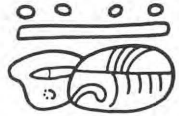
f.



g.



h.



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tives, rarely as part of a lengthier text. Texts consisting of more than a few signs are typically organized into columnar format, but shorter texts often are not.

The same variety of formats characterizes the script during the period beginning c. A.D.100-400, except that examples involving both scene and text tend to be much more crowded, with small text segments crowded into small spaces of the scene rather than being presented alongside a scene in free space.

A number of tablets attributed to the region of Zaachila⁶² begin to become important after A.D. 100, during and after the era of Teotihuacan influence, and their general iconographic conception may have been influenced by the art of that Mexican center. However, the iconographic content of these monuments is obviously close to those of the individual registers of the Mixtec screenfold books.⁶³ Glyphically, they are sometimes much more elaborate than the later manuscripts, with many more names and/or dates than a single manuscript register; this is correlated with the use of text for narrative that in later manuscripts would be made more explicit in iconographic depictions of the activities taking place on the dates mentioned or of the named people conducting them. Genuine texts in this period are relatively fewer, limited to standing shaft stelae, and consist mainly of dates. This period, then, probably sees the beginnings of the tradition of a complex narrative iconographic tradition on screenfold books,⁶⁴ accompanied by simple captions giving day names (of people or days) and place names. The latter had been iconically rather more than linguistically organized

FIGURE 8

Relationships between Maya and Isthmian signs.

Examples a-d are Isthmian signs, e-h their Maya correlates.

- a. Knotted cloth sign, for accession to office, La Mojarra Stela 1;
 b. "Ahau-in-hand" sign, La Mojarra Stela 1, with two dots in the "mouth" of the "Ahau" element held in the hand, and in the rectangular field infixed in the hand;
 c. so-called "initial sign," with characteristic 3-hooked suffix, El Sitio celt;
 d. evidently, a count of 13 days, **13**-"hill-obsidian", La Mojarra Stela 1;
 e. knotted cloth sign, for accession to office, Piedras Negras Lintel 2;
 f. "Ahau-in-hand" sign, "grasp a scepter," jade pectoral bead from Cenote of Sacrifice, Chichen Itza, with a U-shaped element in the "mouth" of the "Ahau" element held in the hand, and in the rectangular field infixed in the hand;
 g. "initial sign," with characteristic 3-hooked suffix, Balakbal Stela 5;
 h. a count of 9 days, **9-la-ta₂**, jade plaque probably from Rio Azul; **ta₂** probably depicts an obsidian core (Cholan and Yucatecan Mayan **ta:h* 'obsidian').

from earliest times; they remained so forever, except that rebus phoneticism and some phonetic complementation was introduced at least by the time of the screenfold books. Finally, it should be pointed out that this period evidently saw the birth of the tradition of narrative pictography of which the Mixtec manuscripts are the quintessential example. That tradition emerged as the confluence of iconographic and textual traditions, its existence depending upon the earlier glyphic historical narrative tradition. True narrative pictography was an outcome of Mesoamerican writing, not its source as Prem had suggested.⁶⁵

In some respects, our record of the Zapotec script seems to reflect the political fortunes of its users. San Jose Mogote Monument 3 was dated by its excavators to the period c. 700-500 B.C.,⁶⁶ which would make it the earliest inscribed monument from the region and perhaps in all Mesoamerica. Its signs differ stylistically from those of the next earliest Zapotec texts (c. 400 B.C.-A.D. 100) while agreeing with later forms (c. A.D. 100-900).⁶⁷ However, the monument's early date is quite secure as it was recovered from a sealed stratigraphic context.⁶⁸ The absence of its features from the earliest royal inscriptions, together with their later reintroduction, suggests their use throughout the period in families or communities that were not in the ascendancy at the time of the founding of the Zapotec state.

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THE SOUTHEASTERN TRADITION

Southeastern Mesoamerican writing has two major branches, Isthmian and Maya-Izapan.

Isthmian (Epi-Olmec)

Isthmian writing is probably the direct descendant of the Olmec script attested on La Venta Monument 13. The system continued to Early Classic times in the Olmec heartland, and in its southerly extension into the Chiapas highlands.⁶⁹ The single most important monument of this tradition is the recently discovered La Mojarra Stela 1;⁷⁰ with about 520 signs, it is the longest non-Maya text in Mesoamerica.

Several features providing evidence for a special historical relation between the Isthmian script and Maya-Izapan writing have been discussed elsewhere;⁷¹ the La Mojarra text provides additional signs that relate directly to Maya-Izapan signs and provide evidence for historical retention⁷² (figure 8). For example, a tied knot sign is associated with accession to royal power, the actual meaning of an identical sign in Mayan

writing. It is compounded with what appears to be a glyphic title and with what may be an accession bundle, and it is prefixed to a name of the ruler beginning with the occasion of his accession (marked by the “lord on his throne” compound, figure 4b). The accession bundle theme was quite differently executed in the tied pouch sign of early Zapotec inscriptions, also relating to bundles containing accession ritual paraphernalia; this difference reflects the closer historic relationship of Isthmian and Maya-Izapan to each other than of either to Zapotec writing. Even more indicative are several signs, on the La Mojarra stela, with rectangular infixed fields in which two punctations are infixed; these signs regularly correspond to early Maya signs of similar form, with corresponding infixed fields in which a single small circle or (in early times) U-shaped element is infixed. In securing historical relationship, this regular graphic correspondence among visually arbitrary elements is analogous to regular sound correspondences.⁷³ Finally, several signs or compounds having no obvious Zapotec parallel suggest a special relation of Isthmian with Maya-Izapan writing; some are discussed in this section on Maya-Izapan writing, below.

Little can be said with assurance about the relation of Isthmian writing with language since the decipherment of the script is in its infancy. Most signs with reasonably clear Mayan parallels are depictively transparent, probably logograms for words whose referents they depict; and most of the signs in Isthmian texts appear to be logographic. However, Zoquean word structure⁷⁴ would not inhibit the development of phonetic or grammatical signs⁷⁵ and a few very frequent signs do appear to render grammatical particles or affixes, whether by rebus logograms or syllabic signs. A very substantial minority of Isthmian signs could well be syllabic or grammatical.

Maya-Izapan

The Izapan side of the Maya-Izapan subgroup is very poorly represented, a handful of Late Preclassic monuments providing the entire corpus. There is nothing distinctly non-Maya about these texts; they are classed as Izapan based on their geographic distribution and, in some cases, a somewhat “primitive” appearance of their signs relative to that of Terminal Preclassic Maya signs.

Accordingly, an ancestral Maya-Izapan script could be ancestral to separate Maya and Izapan traditions, or all of the texts of this tradition could be considered forms of a single script tradition. In the Maya lowlands at least, this tradition was linguistically associated with speakers of Cholan and Yucatecan Mayan languages; elsewhere, it may have been used for a Mayan language

a.



c.



e.



g.



b.



d.



f.

**FIGURE 9**

El Porton seating sign comparisons.

- a. El Porton Monument 1;
 b. Yaxchilan Lintel 11;
 c. Tikal Stela 21;
 d,e. Leyden Placque;
 f. Ixtelha cave;
 g. Monte Alban Stela 15.
 (Examples from figure 2.)

ancestral to Cholan, for a Mixe-Zoquean language, or for both.⁷⁶ Distinctive, shared-features of the Maya-Izapan and Isthmian scripts suggest that these scripts descend from an ancestral Southeastern writing system which, in all likelihood, relates to the Olmec heartland region and, thus most likely, to Zoquean speech.

Whether directly from this ancestral script, from a Maya-Izapan intermediate ancestor or by diffusion from Isthmian, a very few Maya signs have plausible interpretations in terms of Mixe-Zoquean logographic values, yielding discordant phonetic and logographic values in Mayan usage; the single most likely candidate is a sign read *ma* or “great,” based perhaps on Mixe-Zoque **mAb*.⁷⁷ Additional evidence of this sort comes from two Mayan hieroglyphic compounds whose structure has thus far resisted satisfactory interpretation, the so-called “initial sign” of pottery texts (*figure 8c, g*) and the *la-ta*, compound for counts of days (*figure 8d, b*).⁷⁸ These compounds seem to occur in the Isthmian tradition, and their functional contexts in Mayan and Isthmian writing appear to be the same. A Mixe-Zoque linguistic basis for these spellings would account for the fact that they do not seem appropriately interpretable in Mayan.

El Porton Monument 1 (450-350 B.C.) is the earliest monument that may derive from this tradition. A Maya-Izapan attribution is consistent with its location in the northern Guatemalan highlands, between the Greater Izapan region to the south and the Maya lowlands to the north, but we base this attribution on the infixing of a small, vertically banded oval on the torso of the seating sign of its accession record (*figure 9a*). An oval infix is a non-depictive feature found only in Maya examples of the seating sign, and the oval almost always contains either a curving vertical band (*figure 9b, c*) or a U-shaped element (*figure 9d,e*).⁷⁹ In Zapotec texts, a vertical band appears in what seems a directly depictive fashion (*figure 9g*), possibly for a loincloth strap, but not in the conventionalized, nondepictive fashion of the Maya and El Porton infix. Since no seating sign seems to appear in the small corpus of Isthmian texts, we cannot know whether the infix was specific to the Maya-Izapan subgroup or to the Southeastern group as a whole. If the latter, it was executed according to local stylistic norms, as the two profile face signs in the text are specific to the Maya-Izapan art style.

A series of texts from Kaminaljuyu are dated to c. 50 B.C.-A.D. 50,⁸⁰ as are other texts in both

the Maya-Izapan and Isthmian traditions. It is with these monuments that we first find evidence of double-column format in the Maya-Izapan tradition, and this format is always found in this tradition when a single text segment spans multiple columns. As in the Isthmian tradition, signs form complexes arrayed in these columns chiefly by vertical juxtaposition and by iconic relations. Rarely, some signs are infixed within other signs, or are rotated ninety degrees and affixed on the left. By c. A.D. 200, this practice had become pervasive in Maya texts (*figure 10*): sign complexes formed roughly rectangular blocks organized around a central sign (usually a so-called “main-sign,” of approximately equal length and width) with elongated signs (so-called “affixes”) appended around it, lying horizontally above or below or standing vertically to the left or right; and such complexes could themselves serve as central cores around which further signs could be affixed. A comparable non-linear organization developed within Chinese writing for the structure of characters and in Egyptian hieroglyphic spellings of words.

Mayan Developmental Trends

For several reasons, Mayan hieroglyphic writing is unusually useful for studying early script development. Most of the early Maya records are on dated monuments. Although no doubt a biased sample of the full range of written records, most of these texts are precisely dated so that we can monitor script development in an unambiguous, absolute chronology. Important developments occur during the period of the dated monuments; these changes can be monitored while they were in progress, so the factors affecting them can be investigated. Finally, the nature of the spoken language corresponding to the written is known from evidence independent of the script, via historical reconstruction; there are twenty-five to thirty Mayan languages from which to reconstruct various stages of Mayan language history, nine of them ancestral to the two or three recognizable varieties written in hieroglyphs.

Phoneticism

The Mayan language family is very well studied, and the main lines of its development are known. We therefore have a good idea not only of the features that appear to be of most importance for understanding the evolution of the correspondence between language and writing—word structure, morphophonemics and phonology—but also of syntactic features that may have influenced these developments. Mayan spelling conventions can be understood for the most part in terms of interactions between these aspects of Mayan language structure and conventions for

a.



b.



c.



d.



rebus representation, neglecting phonological differences among inflected forms; for example, vowel length and postvocalic *b* were inflectional infixes and their presence was disregarded in phonetic spellings. The postulated processes of development are not addressed here as they are more complex than those from the Oaxacan tradition, discussed above, but the logic of development is similar.⁸¹

Most of the earliest phonetic spellings appear to involve phonetic complementation, i.e., a word is spelled by a logogram, but another sign is prefixed or suffixed to it to indicate part of its pronunciation. As in the Old World, the earliest phonetic complements were used mainly to resolve ambiguities in the interpretation of logograms or to indicate grammatical suffixes. The phonetic contexts of the syllabic sign *ni* are illustrative (figure 11). The two or three earliest spellings of the month name #*cikin*⁸² (Yucatec Xul) use only the logogram (figure 11a), which represented other words in other contexts. The sign *ni* (also used for *-in*) was evidently introduced for spellings of the month name sometime between A.D. 415 and 603 (figure 11 b); effectively rendering the apparent suffix *-in* of *cikin*, this determines the appropriate interpretation of the logogram. It was also during this period, beginning c. A.D. 455, that the *ni* sign began to be suffixed to a highly ambiguous logogram when it represented the word *tu:n* ("year [ending]," figure 11c, d) to indicate that reading (*-in* and *-un* are grammatical alternatives showing dissimilation with respect to root vowels). Only after this development did the sign come to be used as a suffix to the unambiguous logogram K'IN, which represented only the word *k'i:n* for "sun, day."

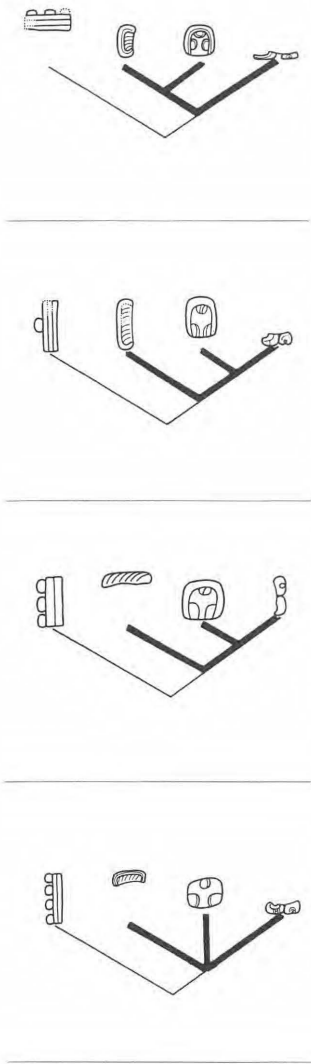


FIGURE 10

Organization of signs in spellings of the month name *kasew*.

In all cases, the compound consists of a numeral followed by the signs *ka*, *se*, and *wa*, in that order; visual organizations are represented by tree structure diagrams. In all cases, the numeral is prefixed to a sub-block consisting of the three signs spelling the month name. In a. and b., the orientation of the signs in the month name are the same: *ka* is in vertical orientation, *wa* horizontal. However, their organization into intermediate levels of sign complex differ: in a., *ka* and *se* form a single graphic unit to which *wa* is suffixed; in b., *se* and *wa* form a single graphic unit, to which *ka* is prefixed. The structure of c. agrees with that of b., but the orientations of signs differ: *ka* is now horizontal, while *wa* is vertical. In d., the structure is different from all the above, with the three signs having no distinctive structural subgrouping, and *ka* and *wa* are both horizontal; a case with *ka* and *wa* both vertical would have the same structural organization.

- Copan Hieroglyphic Stairway;
- Altar de Sacrificios Sculptured Stone 1;
- Tortuguero wooden box;
- Tortuguero Monument 6.

Extensions of orthographic practices are often promoted by similar practices in similar contexts. For example (*figure 12*), adjacent glyph blocks stated the number of twenty-day periods and the number of one-day periods in records of the 360-day civil calendar (i.e., in “Initial Series” dates). The twenty-day period, the *wink-il* or *winal* (derived from **winik*-“man, person”), was usually spelled by a single logogram (*figure 12a*), but it was fairly common in the Early Classic to postpose a sign for the grammatical suffix *-il* or *-al* (*figure 12b*). The earliest cases of suffixing the redundant phonetic complement **ni** to the logogram **K’IN** occur in these calendrical statements immediately following a **WINIK-VL** spelling (*figure 12c*). Accordingly, the practice of suffixing an optional grammatical/phonetic complement in the spelling for one time-period word was being extended to that for the following word, for “day.” This extension resulted in a visual parallel between the structures of the adjacent glyph blocks, in which respect they repeated the parallel between the suffixation on the preceding two time-period compounds. Since **ni** represented a grammatical suffix *-in* in the month name *eikin*, the extension was of the use of a grammatical suffix sign (though not serving in this case as a grammatical suffix) in the environment of the use of another, that for the *-Vl* suffix of *win(k)-Vl*. This structural/grammatical context seems to have been the prime basis for the spread of the **K’IN-(ni)** spelling pattern, and it set up a correlation between the use of the **ni** suffix to the sign for *k’i:n* and the use of a sign for the *-Vl* suffix on the logogram for the twenty-day period; it may also have been promoted by the use of the **ni** suffix on the *tikin* month name and on the *tu:n*-ending compound. The use of the sign **ni** as a phonetic complement to **K’IN** steadily increased over the next three centuries.

The extension of novel spelling patterns like phonetic complementation follows a pattern that can be verified in the internal developments of other writing systems: the analogical extension of representational practices was most successful in the least frequent contexts and in contexts most similar to the sources of the pattern being extended.⁸³ This pattern characterizes both the replacement of logographic by syllabic spellings, and purely logographic spellings by logographic spellings with phonetic complementation.⁸⁴

Several words are common enough to permit a demonstration that phonetic complementation exhibits this pattern, and one of them is *k’i:n*. The context most similar to its use in civil calendar dates is its use for the same word, *k’i:n*, in other contexts, and the most frequent recurrent context of this sort is in the month name

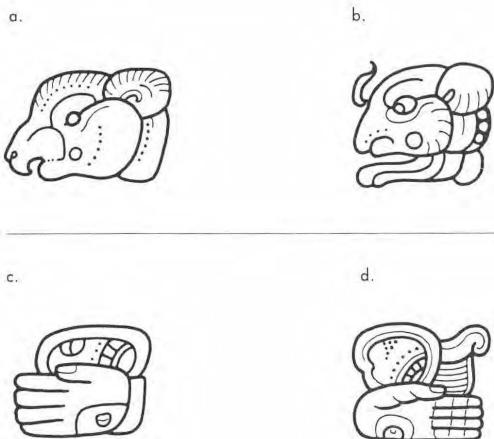


FIGURE 11

Early uses of the sign **ni. #aikin**:
 a. unprovenanced monument in Seattle Art Museum, A.D. 199;
 b. Caracol Stela 3, A.D. 603. *tu:n*:
 c. Stone bowl, with Kaminaljuyu-style iconography;
 c. 50 B.C.–A.D. 50;
 d. looted monument pertaining to Bonampak, c. A.D. 497.

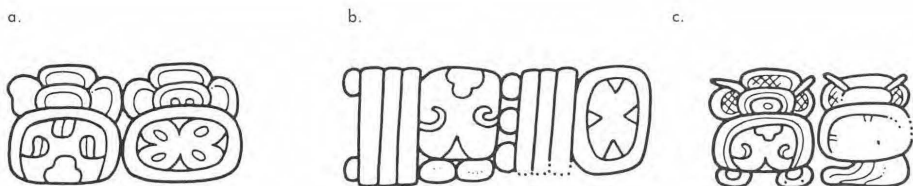


FIGURE 12

Patterns of suffixation on adjacent **winal** and **k'i:n** signs.

- a. No suffix on either, Tikal Stela 31, A.D. 445;
- b. suffix on **winal**, not **k'i:n**, Balakbal Stela 5, A.D. 425;
- c. suffixes on both, Caracol Stela 1, A.D. 514.

**ya*^s *k'i:n* (Yaxkin). The spread of the K'IN-(ni) spelling in the month name does indeed appear to have been based on that in civil calendar context. Cases of Yaxkin retaining the old spelling K'IN are concentrated in texts that lack a spelling of the word *k'i:n* in civil calendar context. In fact, texts with spellings of *k'i:n* in both the civil calendar count and in the month name almost invariably spell both the same, and the civil calendar spelling of the word *k'i:n* in these texts precedes (and can thus provide a model for) the month name spelling. The rate of spelling of K'IN-(ni) in the month name lags behind that in civil calendar context until c. A.D. 672, after which the rates are indistinguishable.

The Visual System

The visual and linguistic organization of Mayan writing co-evolved in ways that are in part straightforward and readily recoverable. The interaction producing these correlations is discussed elsewhere.⁸⁵ Here we concentrate on the results of that interaction, in particular on visual regularities in the system of sign values with respect to sign form, and on the visual organization of signs with respect to the syntactic organization of the corresponding linguistic units.

Sign form, and in particular the iconic transparency of signs, played a continuing role in the evolution of the script. Iconically, transparent mainsigns in general have a lower rate of phonetic complementation than other logograms, especially those signs depicting persons or deities (which are usually profile face signs); and a lower proportion of these signs are used in non-logographic phonetic values.⁸⁶ Similarly, in Egyptian hieroglyphic writing, signs depicting human beings are always logographic references to humans; they never generalized to purely phonetic usage.⁸⁷

The crucial element may have been a sense of distance from linguistic representation, not simply depictive transparency. This point can be illustrated by the patterns of use of the signs that represent the word K'I:N₂ "day" when it occurs in the civil day count calendar (figure 13). One, K'IN (figure 13a, e, b, k), is quite abstract; another, K'IN₂ (figure 13b, f, i, l), is a depiction of the profile face of a sun god, which usually has the abstract K'IN sign infixed. Two others are depictive signs, one for a so-called "grotesque" (figure 13c, g, j) and one for a monkey (figure 13d). Why these last two signs are used for the day position in day counts is not fully understood, but they do not relate depictively or linguistically to "sun" or "day" and metaphoric or mythic symbolism is supposed. Their distance from direct logographic representation of the word *k'i:n* is indicated by the failure of

FIGURE 13

*Signs that, in day count records, are used for the word k'i:n, and their appearances in day counts and in spelling the month name *ya^s=k'i:n.*

Day count context, without ni complement:

- a. Tikal Stela 31;
- b. Yaxchilan Lintel 46;
- c. Tikal Stela 3;
- d. Tikal Stela 12.

Spellings of ya^s=k'i:n, without ni complement:

- e. Tikal Stela 4;
- f. Tikal Stela 12;
- g. Tikal Stela 6, the only instance in which this sign spells *k'i:n* in the month name;

Day count context, with ni complement:

- h. Caracol Stela 1;
- i. Yaxchilan Stela 6;
- j. Dos Pilas Stela 2, the only instance in which this sign takes a ni phonetic complement.

Spellings of ya^s=k'i:n, with ni complement:

- k. Pusilha Stela K;
- l. Palenque Palace Tablet.

a.



b.



c.



d.



e.



f.



g.



h.



i.



j.



k.



l.



scribes (with one exception, so far as we know; figure 13g) to use either sign to spell the word *k'i:n* when it occurs in other contexts, such as the month name ²⁶*ya's=k'i:n*, directional words, and titles. The pattern of complementation is sensitive to these differences. As noted above, K'IN came to be complemented by *ni* during the period A.D. 515-600. Complementation of K'IN₂ was established during the same period but occurred at half the rate. Complementation never was really established for the other two logograms; it does occur in late, sporadic examples at sites (Dos Pilas and Quirigua) showing other evidence of unusually extensive complementation and phonetic spelling. Most likely, then, cognitively distinct types of information were used in interpreting Mayan hieroglyphic texts, some relating to world knowledge, some to language.

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There was, however, a historical basis for phonetic use of depictively transparent signs. When logographic signs did generalize to phonetic usage as signs for CV syllables, this set up a regular correspondence among depicted entities, words for those entities and phonetic values approximating the pronunciations of those words. Comparable correspondences found in other systems—sign form with sign name, for example—motivate the innovation of new values for old signs or of new signs for a phonetic value. In the Mayan case, some depictively transparent signs are used textually only in their phonetic values, never as logograms for their depictive referent—e.g., *wi*, based on *wi* 'root'. Given this pattern of correspondence, new signs could be introduced at will by adapting pictorial forms to glyphic context.

Finally, there was a strong tendency for logographs representing noun and verb roots to be among the roughly square mainsigns in Mayan writing, with logograms for modifiers and grammatical affixes represented more often by elongated signs. This may be an extension of early patterns, with profile head signs being typically for nouns and of roughly square shape and numerals being the most common modifiers and usually elongated.

Sign Organization and Syntactic Organization

Like all other Mesoamerican writing systems, Mayan writing maintained close relations with the iconographic descendants of the symbol system from which writing originated; indeed, it has been argued that Maya iconography played a major role in the development of specifically Maya writing.⁸⁸ At a minimum, both the depictive conventions of sign forms and the organization of signs continued to be influenced by the iconographic system.

A continuing role of iconography in the visual organization of the written record is most obvious in spellings that accord with iconographic usage while conflicting with the pattern of correspondence with language that is otherwise typical of the script. Two illustrative examples mirror depictively-motivated sign organization in early Zapotec texts, discussed above. One concerns verbs for manual actions.⁸⁹ The standard convention for depicting the holding of an object, when the fingers do not curl around it, is to show the flat of the hand outstretched and the object placed above it; i.e., the hand is shown in a conventional, identifiable view rather than in a naturalistic perspective, and is interpreted as though the hand were palm up rather than facing the viewer, and the object is displayed above the hand in which it is to be interpreted as resting. This visually motivated pattern is not “read” top to bottom, but rather is interpreted as a complex; were reading involved, it would be bottom to top. Another example concerns the Maya sign AXAW₂, for the title *a:xa:w*.⁹⁰ Several titles in early Maya-Izapan or Isthmian (Olmecoid) writing evidently descend from headband designs found on Olmec sculpture long before evidence for complex glyphic compounds. These headbands are elongated in form and descend into both Maya and Isthmian writing as elongated signs for titles and/or offices, often as compound signs based on separate components of the headband and/or forehead attachments. When one of these elongated signs is affixed to another sign, whether in Isthmian or Mayan writing, it almost always lies horizontally and in topmost position in the sign complex; this continues the naturalistic position the headbands had occupied in the iconography. We do not know what titles these signs represented in Isthmian writing. In Mayan writing, however, the title *a:xa:w* was represented by one of these elongated signs (AXAW₂), as well as by alternative spellings occupying the full space of a glyph block. Used as an independent glyph block, the mainsign form follows, and this is the correct reading order.⁹¹

Syntactic relationship was signalled not only by sign proximity but also by the organization of signs within a block. For example, among the Maya month names were spelled by a sequence of two or more signs, as in YAŠ-K'IN and eventually also YAŠ-K'IN-(ni) for **ya's k'in*. In these cases, the signs spelling the name of the month (e.g., YAŠ-K'IN) formed a core sign complex, and the numeral for the day within the month was prefixed to this core as a whole (e.g., 3-[YAŠ-K'IN]). Never did the Maya exploit the logical possibility that the numeral would combine with a subset of signs spelling

the month name to form a core to which the remaining signs would attach (e.g., never [3-YAŠ]-K'IN). Thus, the visual structure of spellings of month names reflected the syntactic structure numeral + month name. Developmentally, this signalling of syntactic relationship by spatial organization was probably as a side effect of signalling by spatial proximity.

The organization of signs did not always admit a clean correlation of syntactic with visual structure. The roughly square mainsign is the central core about which the remaining signs are ultimately organized, with flexibility in organization depending on the placement of elongated signs. Thus, in a block containing one mainsign and two elongated signs, the mainsign is first grouped with one adjacent elongated sign and then this pair is grouped with the remaining elongated sign (*figure 10*). When one elongated sign was placed vertically and the other horizontally, this produced a structure in which the mainsign and one elongated sign form a substructure; otherwise, no visual substructure is apparent. When instead the referents of the two elongated signs form a single syntactic constituent excluding the referent of the mainsign, then the visual organization of signs and the syntactic organization of morphemes must disagree (*figure 14*). For example, when the numeral classifier #*te* is suffixed to a numeral, this unit modifies a following month name grammatically. For the spelling, however, only two visual structures are feasible. One is [numeral-[TE-month]], as in [3-[TE-SOČ']] (*figure 14a*), where the numeral is prefixed to a graphic unit consisting of the numeral classifier + month name; this structure conflicts with the syntactic organization of #*oš-te so'č'*. The other feasible visual structure in this case is [numeral-TE-month], where the numeral, TE, and the month compound are in a linear sequence, horizontally (*figure 14b*) or vertically (*figure 14c*); in this structure, no visual organization is apparent.

In cases of direct conflict between the preferred visual organization of signs and the syntactic structure of the words represented, the visual preference was almost always maintained; in contexts (like numeral + month name) in which syntactic organization could always be reflected accurately, visual organization almost never conflicts. Thus, a syntactically sensitive system of sign organization was developed that must have shaped and been shaped by the Maya understanding of word grammar.

A possible side effect of the correlation of sign organization with word structure is that elongated signs strongly correlating with a particular grammatical

a.



construction (verb suffixes, for instance) seem to have developed sign-specific preferences for organization with respect to the core of a sign complex and the peripheral elongated signs organized around it. These organizational preferences sometimes motivated sign sequences that conflict with the order of the linguistic elements to which they correspond,⁹² as had the iconographically-based positional preferences. For example, the sign *ya*/-IX was suffixed immediately below the core mainsign for time periods when it represented temporal distance suffixes, and when it represented a completive aspect suffix it was normally suffixed immediately below either the core complex representing the verb or the core expanded by one additional verb suffix. Spellings of the month name #*k'anasi* with its signs in linguistically correct sequence can only adopt a visually noncommittal sign organization or one in which *ya*/-IX is the most peripheral sign in the spelling; in a small minority of instances, the sign is appended instead to the mainsign core of the compound, resulting in a linguistically incorrect sign sequence. Several cases of variable sign sequencing seem attributable to this sort of extension.

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CONCLUDING REMARKS

The iconography of incised ceremonial celts established the basic features of Mesoamerican writing. Independent symbols were segmented off from their pictorial contexts as parts of figures; so segmented, they rendered particular concepts, independent of pictorial context. The context of

b. c.

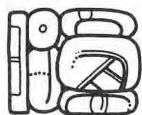


FIGURE 14

Visual organization not according with syntactic organization.

- a. [**3**-[**TE**-**SO**']], Arroyo de Piedra Stela 1; the numeral classifier **TE** and the month sign **SO** form a visual sub-block not including the numeral **3**;
- b. [**5**-**TE**-[**IHK**'-**K**'-**AT**-(**ta**)]], Naranjo Stela 10; levels of sign organization including **TE** also include both the numeral **5** and the month compound **IHK**'-**K**'-**AT**-(**ta**);
- c. [**5**-**TE**-[**ČAK**-**K**'-**AT**-(**ta**)]], Naranjo Stela 10; levels of sign organization including **TE** also include both the numeral **5** and the month compound **ČAK**-**K**'-**AT**-(**ta**).

use of this iconography, on ritual objects with heavy political overtones, was probably limiting enough that the relationships among the referents of individual units could be inferred from the identification of those referents. Juxtaposition therefore sufficed as an organizing principle for these units, pre-adapting them for interpretation via sequences of linguistic units to which they correspond *de facto*, and related sets of symbols were evidently placed in close proximity to one another, relative to the remaining symbols. This deviant subsystem of Olmec-style iconography therefore provided the basis for an ideographic system of iconography homologous to a primitive logographic system of writing in which grammatical variation was neglected.

As this precursor system was essentially a genre of Olmec-style iconography, so the earliest scripts maintained a tight integration of iconographic and written genres, with some practices continuing to be shared between them. New signs were continually added to scripts, based on pictorial conventions for representing objects in the world. Conversely, written compounds served in place of pictorial units in scenes, or as "captions" comparable to the pictorial icons identifying saints in Christian iconography. In the Oaxacan area, both the functions of writing and the visual contexts of use of writing narrowed considerably, until writing served only these identifying-icon functions. Nonetheless, this trend was not accompanied by a shift to pictorial imagery for identifiers; logographic representation was maintained, and phonetic representation via rebus evidently increased, even perhaps to incipient pure-phonetic representation among the Aztec. In the Southeastern region, the range of functions of writing increased, and a full textual tradition was maintained. The Isthmian tradition of writing is little in evidence, though it may have continued outside of monumental contexts. Mayan writing developed into a logosyllabic system whose logographic and syllabic signs were both heavily utilized.

The depictive transparency of signs in most Mesoamerican scripts makes a large sign inventory less onerous than in more abstract systems in which the relation of sign to significance is much more arbitrary. No trend toward reduction of sign inventories has been demonstrated for these scripts, and, indeed, the inventories do not seem to have been static at all, new signs being added based on pictorial conventions for representing objects in the world. In this respect, Mesoamerican and Egyptian writing seem comparable, and contrast with the cuneiform scripts. Isthmian writing is much less transparent iconically, or at least the conventions of its pictorial system are less obvious to us. The amount of

sign repetition among and within Isthmian texts impressionistically suggests a more limited sign inventory for Isthmian, and perhaps more extensive phonetic representation, than for Mayan.

The linguistic representational principles of Mesoamerican scripts appear to be largely derivable from the grammatical structures of words in the languages they represented, with respect both to the distinctions they fail to represent and to how they represent what they do represent. Representational conventions appear to have spread by processes of analogical change. These analogies are carried mainly via correlations with particular types of linguistic information, and otherwise most successfully for spelling rarer forms.

ADDITIONAL READINGS

- Linda Schele and Mary Ellen Miller. 1986. *The Blood of Kings*. New York: Brazillier.
- Victoria R. Bricker. (In press.) *Handbook of Middle American Indians. Supplement 6: Epigraphy*. Austin: University of Texas Press.

NOTES

- ¹ John S. Justeson. 1986. "The Origins of Writing: Preclassic Mesoamerica." *World Archaeology* 17:437-58.
- ² Hanns J. Prem. 1971. "Calendrics and Writing." In *Observations on the Emergence of Civilization in Mesoamerica*, ed. by Robert F. Heizer and John A. Graham, 112-32. Berkeley: University of California Archaeological Research Facility Contribution 11. Prem, 1973. "A Tentative Classification of Non-Maya Inscriptions of Mesoamerica." *Indiana* 1:29-58. Michael D. Coe. 1976. "Early Steps in the Evolution of Maya Writing." In *Origins of Religious Art and Iconography in Preclassic Mesoamerica*, ed. Henry B. Nicholson, 107-22. UCLA Latin American Studies Series, vol. 31. Tatiana Proskouriakoff. 1971. "Early Architecture and Sculpture in Mesoamerica." In *Observations on the Emergence of Civilization in Mesoamerica*, 141-56. John S. Justeson, 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 Press. Justeson. "Origins of Writing," 442-45. Prem relates writing to Olmec-style relief carving in particular, and to a postulated tradition of narrative pictography, neither of which, in our view, contributed directly to the emergence of writing. Others discuss the contribution of the Olmec style without emphasis on particular genres.
- ³ For an illustration of the Olmec style across many genres, focusing on its status as political iconography, see F. Kent Reilly III, "Cosmos and Rulership: the Function of Olmec-Style Symbols in Formative Period Mesoamerica," in this issue.
- ⁴ Kent V. Flannery. "The Olmec and the Valley of Oaxaca: a Model for Interregional Interaction in Formative Times." In *Dumbarton Oaks Conference on the Olmec*, ed. Elizabeth P. Benson, 79-117. Robert D. Drennan. 1983. "Ritual and Ceremonial Development at the Early

Village Level." In *The Cloud People*, ed. by Kent V. Flannery and Joyce Marcus, 46–50. New York: Academic Press.

- ⁵ This section elaborates on Justeson, "Origins of Writing," 442–44. Proskouriakoff first called attention to the key elements of celt iconography relating to writing that we develop here, in "Early Architecture and Sculpture in Mesoamerica," 148.
- ⁶ Coe. "Early Steps in the Evolution of Maya Writing," 111.
- ⁷ Proskouriakoff. "Early Architecture and Sculpture in Mesoamerica," 147–48; Justeson, "Origins of Writing," 442.
- ⁸ Proskouriakoff. "Early Architecture and Sculpture in Mesoamerica," 147–48.
- ⁹ For example, see figures 27 and 28 in Michael D. Coe. 1965. "The Olmec Style and its Distribution." In *Handbook of Middle American Indians* 3:739–75.
- ¹⁰ For example, in two of the five celts from La Venta Offering 2; see figure 35 in Philip Drucker, Robert F. Heizer and Robert J. Squier. 1957. In *Excavations at La Venta, Tabasco, 1955*, Bureau of American Ethnology Bulletin 170, Smithsonian Institution, Washington.
- ¹¹ Justeson, "Origins of Writing," figure 3d–f.
- ¹² Virginia E. Miller. 1983. "A Re-examination of Maya Gestures of Submission." *Journal of Latin American Lore* 9:17–38.
- ¹³ Based on the circular elements at the fingers of this hand, Justeson ("Origins of Writing," figure 3e) suggests that it indicates the ritual casting of corn (or blood or incense resin). On another celt (figure 1d), another segmental, braceleted hand in what is probably the same posture has markings that could be intended to indicate either scarification or the holding of grains or droplets in the palm.
- ¹⁴ Note that the sequencing of smaller groups of graphic units need not and in fact does not agree with the order of corresponding units in spoken language; this was also true of earliest cuneiform practice.
- ¹⁵ Prem. "Calendrics and Writing," 112–13, 126.
- ¹⁶ For illustrations of such conventions, see Troike. "Pre-Hispanic Pictorial Communication: the Codex System of the Mixtec of Oaxaca, Mexico," in this issue.
- ¹⁷ John S. Justeson, William M. Norman and Norman Hammond. 1988. "The Pomona Flare: a Preclassic Maya Hieroglyphic Text." In *Maya Iconography*, eds. Elizabeth P. Benson and Gillett Griffin, 94–151, Princeton University Press.
- ¹⁸ John S. Justeson and Peter Mathews. 1989. "Relationships between Maya and Isthmian Hieroglyphic Writing, with Special Reference to La Mojarra Stela 1." Unpublished manuscript.
- ¹⁹ This deity was identified by Alfonso Caso as the god of rain and lightning, and this identification is generally accepted. Alfonso Caso. 1928. *Las Estelas Zapotecas*, Talleres Gráficos de la Nación, Mexico, 45–51.
- ²⁰ Years were named for the day on which they began or ended; people were named for the day of their birth or "baptismal" rituals.
- ²¹ It could, for example, be an unconscious side effect of adjusting hand or arm position after a syntactic or semantic grouping is completed.
- ²² In the other cases, it is not yet clear whether the surmounting sign refers to an individual.
- ²³ Justeson and Mathews. "Relations between Maya and Isthmian Hieroglyphic Writing."
- ²⁴ Robert J. Sharer and David W. Sedat. 1987. *Archaeological Investigations in the Northern Maya Highlands, Guatemala: Interaction and the Development of Maya Civilization*. University Museum Monograph 59, 169. Philadelphia: University Museum, University of Pennsylvania. Robert J. Sharer. 1989. "The Preclassic Origins of Maya Writing: a Highland Perspective." In *Word and Image in Maya Culture: Explorations in Language, Writing, and Representation*,

eds. William F. Hanks and Don S. Rice, 165–75. Salt Lake City: University of Utah Press.

- ²⁶ Alternatively, it could be a grammatical suffix (cf. figure 2i) or phonetic complement (cf. figure 2h), as in the seating verbs on the Leyden Plaque.
- ²⁷ See discussion under *Mayan Developmental Trends*, below.
- ²⁸ Justeson and Mathews. "Relations between Maya and Isthmian Hieroglyphic Writing."
- ²⁹ Justeson et al. *Foreign Impact*, 40.
- ³⁰ The practice could go back to the Middle Preclassic, but it is not documented by the handful of texts from this era.
- ³¹ That is, reading did not proceed from block n of column $2i-1$ to block $n+1$ of that column, but to block n of the adjacent column $2i$ and only then to block $n+1$ of column $2i-1$. This double-column format is unknown until c. 50 B.C. Marcus considers double-column format a possibility for Zapotec writing, but the signs in adjacent columns align poorly, due to differences in sign size, and in some instances reading clearly passes from the bottom of the first member of a hypothetical pair to the top of the next. See Justeson et al. *Foreign Impact*, n.28, 45–47. Joyce Marcus. 1976. "The Origins of Mesoamerican Writing." *Annual Review of Anthropology* 5:35-67. See pp. 45–47. Marcus. 1980. "Zapotec Writing." *Scientific American* 242(2): 50–64. Marcus. 1983. "The First Appearance of Zapotec Writing and Calendrics." In *The Cloud People*, 91–96.
- ³² In the Isthmian script group such sequences can be recognized on the recently discovered La Mojarrá Stela 1 (see Stross, this volume, figure 3); for such sequences at Monte Alban, see Justeson et al. *Foreign Impact*, n.22, refuting p. 49 of Gordon Whittaker. 1980. "The Hieroglyphs of Monte Alban." Ph.D. diss., Yale University. Ann Arbor: University Microfilms International.
- ³³ M. Coe. "The Olmec Style," 756.
- ³⁴ David C. Grove. 1970. *The Olmec Paintings of Oxtotitlan Cave, Guerrero, Mexico*, Studies in Pre-Columbian Art and Archaeology pp.6,20 and 32. Washington, D.C.: Dumbarton Oaks. Justeson et al. *Foreign Impact*, 34. Justeson. "Origins of Writing," 444.
- ³⁵ Justeson. "Origins of Writing," 445.
- ³⁶ Rainer Berger, John A. Graham and Robert F. Heizer. 1967. "A Reconsideration of the Age of the La Venta Site." In *Studies in Olmec Archaeology*, 1–24. Berkeley: University of California Archaeological Research Facility Contributions, 3. William F. Rust and Robert J. Sharer. 1988. "Olmec Settlement Data from La Venta, Tabasco, Mexico." *Science* 242:102–04.
- ³⁷ David C. Grove and Jorge Angulo V. 1987. "A Catalog and Description of Chalcatzingo's Monuments." In *Ancient Chalcatzingo*, ed. David C. Grove, 114–31. Austin: University of Texas Press. Jorge Angulo V. 1987. "The Chalcatzingo Reliefs: Iconographic Analysis." In *Ancient Chalcatzingo*, 132–158.
- ³⁸ Marcus. "Origins of Mesoamerican Writing," 44–45.
- ³⁹ Robert J. Sharer and David W. Sedat. 1973. "Monument 1, El Porton, Guatemala and the Development of Maya Calendrical Systems and Writing." In *Studies in Ancient Mesoamerica*, ed. by John A. Graham, 177–94. Berkeley: University of California Archaeological Research Facility Contributions 18.
- ⁴⁰ These groups were originally proposed by Prem ("Calendrics and Writing" and "Non-Maya Inscriptions of Mesoamerica"), with further evidence provided by Justeson et al., *Foreign Impact*, 38–44.
- ⁴¹ The term "Isthmian" (actually, "Early Isthmian") was suggested for designating this script group by John Graham. 1971. "Commentary on 'Calendrics and Writing'." In *Observations on the Emergence of Civilization in Mesoamerica*, 133–40, and for the culture generally by Gareth W. Lowe and Dee F. Green. 1967. *Altamira and Padre*

Piedra, Early Preclassic Sites in Chiapas, Mexico. New World Archaeological Foundation Paper 20.

- ⁴² Justeson, "Origins of Writing," 451.
- ⁴³ P. 335, n.3 in John S. Justeson. 1978. *Maya Scribal Practice in the Classic Period: a Test-Case of an Explanatory Approach to the Study of Writing Systems*. Ann Arbor: University Microfilms International.
- Gordon Whittaker. 1983. "The Structure of the Zapotec Calendar." In *Calendars of Mesoamerica and Peru*, ed. Anthony Aveni and Gordon Brotherston, 99–133. British Archaeological Reports. Justeson et al. *Foreign Impact*, 45.
- ⁴⁴ Marcus. "Origins of Mesoamerican Writing," 45; Whittaker. *Hieroglyphs of Monte Alban*, 42, 45.
- ⁴⁵ Justeson. *Mayan Scribal Practice*, 335–46; Whittaker. *Hieroglyphs of Monte Alban*, 47.
- ⁴⁶ Ignacio Bernal. 1965. "Archaeological Synthesis of Oaxaca." *Handbook of Middle American Indians* 3:788–813. Joyce Marcus. 1983. "The Style of the Huamelulpan Stone Monuments." In *The Cloud People*, 125–26.
- ⁴⁷ Christopher Moser. 1977. *Nũĩne Writing and Iconography of the Mixteca Baja*. Vanderbilt University Publications in Anthropology, 19.
- Christopher Moser. 1983. "The Middle Classic Nũĩne Style of the Mixteca Baja, Oaxaca: a summary report." In *The Cloud People*, 211–13.
- ⁴⁸ Caso. *Las Estelas Zapotecas*, 65.
- ⁴⁹ P. 135 in Alfonso Caso. 1947. "Calendario y Escritura de las Antiguas Culturas de Monte Alban." In *Obras completas de Miguel Othon de Mendizabal*, vol. 1, 5–102 (Mexico). Caso. "Zapotec Writing and Calendar," 938–40.
- ⁵⁰ Prem. "Calendrics and Writing," 121–22.
- ⁵¹ Whittaker. *The Hieroglyphs of Monte Alban*, 5.
- ⁵² P. 938 in Alfonso Caso. 1965. "Zapotec Writing and Calendar." In *Handbook of Middle American Indians* 3:931–47. Marcus. "The First Appearance of Zapotec Writing and Calendrics," 94.
- ⁵³ Prem. "Calendrics and writing," 120–21. Whittaker takes it as enumerating the twenty groups of thirteen days in the ritual calendar; a count of twenty-day months within the 365-day year fits the data better, but discrepancies remain.
- ⁵⁴ Identified as a knotted bag by Caso, *Las Estelas Zapotecas*, 65.
- ⁵⁵ Linda D. Schele and Jeffrey H. Miller. 1983. *The Mirror, the Rabbit, and the Bundle: "Accession" Expressions from the Classic Maya Inscriptions*. Studies in Pre-Columbian Art and Archaeology 25. Washington, D.C.: Dumbarton Oaks.
- ⁵⁶ Terrence S. Kaufman. 1983. "Comparative Oto-Manguan Phonology." Unpublished manuscript.
- ⁵⁷ A small proportion of CV and CVCVCV roots existed, e.g., proto-Zapotecan *ka:'sweet potato', proto-Zapotecan #tiyaka 'ear', mostly for concrete nouns representable via depictive conventions. The few non-concrete roots, such as proto-Zapotec *nawi'ini' "small", could have provided a basis for the emergence of simple phonetic spelling from rebus.
- ⁵⁸ Alfonso Caso. 1965. "Mixtec Writing and Calendar." In *Handbook of Middle American Indians* 3:948–51. Mary Elizabeth Smith. 1973. *Picture Writing from Ancient Southern Mexico*. Oklahoma City: University of Oklahoma Press. Smith. 1983. "The Mixtec Writing System." In *The Cloud People*, 238–45.
- ⁵⁹ Caso. "Zapotec Writing and Calendar," p.938–40. Joyce Marcus. 1976. "The Iconography of Militarism at Monte Alban." In *Origins of Religious Art and Iconography in Preclassic Mesoamerica*, 123–39. Marcus. 1983. "The Conquest Slabs of Mound J, Monte Alban." In *The Cloud People*, 106–08. Whittaker. *Hieroglyphs of Monte Alban*, 92–182. Whittaker. 1983. "The Tablets of Mound J at Mont Alban." In *International Colloquium: the Indians of Mexico in Pre-Columbian*

- and *Modern Times*, eds. Martin Jansen and Th. J. Leyenaar, 50–86. Rutgers, Leiden: Rutgers.
- ⁶⁰ Troike, this issue. M.E. Smith. "The Mixtec Writing System." Smith. *Picture Writing from Ancient Southern Mexico*, 40–41.
- ⁶¹ Prem. "Calendrics and Writing," 120.
- ⁶² Caso. "Zapotec Writing and Calendar," 942.
- ⁶³ Gordon Whittaker. 1977. "The Evolution of Writing in Central Mexico." Paper presented at the 42nd annual meeting of the Society for American Archaeology. Whittaker. *The Hieroglyphics of Monte Alban*, 20–21. Joyce Marcus. 1983. "Changing Patterns of Stone Monuments after the Fall of Monte Alban." In *The Cloud People*, 191–97.
- ⁶⁴ Screenfold books have been recovered from Maya burials around this time, c. A.D. 350–650, two from Mirador, Chiapas and one from Altun Ha, Belize. Jorge Angulo V. 1970. "Un Posible Códice de El Mirador, Chiapas." In *Instituto Nacional de Antropología y Historia Departamento de Prehistoria, Serie Tecnología*, núm. 4. Pierre Agrinier. 1975. *Mounds 9 and 10 at Mirador, Chiapas, Mexico*. New World Archaeological Foundation Paper 39. David M. Pendergast. 1979. *Excavations at Altun Ha, Belize, 1964–1970*, vol. 1, Royal Ontario Museum.
- ⁶⁵ Prem. "Calendrics and Writing," 112–113, 114–15, 126.
- ⁶⁶ Marcus. "Origins of Mesoamerican Writing," 45. "Zapotec writing," 53, 55. Kent V. Flannery and Joyce Marcus. 1983. "The Growth of Site Hierarchies in the Valley of Oaxaca: Part I." In *The Cloud People*, 53–64.
- ⁶⁷ Whittaker. *The Hieroglyphs of Monte Alban*, 104–05. Justeson et al. *Foreign Impact*, 34. These stylistic observations were presented in discussions supporting a later date for the monument; at the time, the excavators' publications had not indicated that the dating was determined stratigraphically.
- ⁶⁸ Kent V. Flannery. 1985. Personal communication.
- ⁶⁹ Fernando Winfield Capitaine. 1988. "La Estela I de La Mojarra, Veracruz, Mexico." *Research Reports on Ancient Maya Writing* 16, 22.
- ⁷⁰ Winfield Capitaine. "La Estela 1 de La Mojarra, Veracruz, Mexico." An illustration is provided as figure 3 in Brian Stross's paper "Mesoamerican Writing at the Crossroads: the Late Formative," this issue.
- ⁷¹ Justeson et al. *Foreign Impact*, 41–44. Justeson. "Origin of Writing," 451.
- ⁷² Justeson and Mathews. "Relations between Maya and Isthmian Hieroglyphic Writing."
- ⁷³ Cf. Justeson et al. *Foreign Impact*, 3, 72–73 n.3.
- ⁷⁴ Terrence S. Kaufman. 1963. *Mixe-Zoque Diachronic Studies*. Unpublished monograph.
- ⁷⁵ Justeson. "Origin of Writing," 451–52.
- ⁷⁶ James A. Fox and John S. Justeson. 1982. "Hieroglyphic Evidence for the Languages of the Lowland Maya." Revised version in *New Interpretations of Maya Writing and Iconography*, ed. Richard M. Leventhal and John S. Henderson. (In press.) Justeson et al. *Foreign Impact*, 66–68.
- ⁷⁷ Justeson et al. *Foreign Impact*, 44. Justeson. "Origins of Writing," figure 8b,c.
- ⁷⁸ Justeson and Mathews. "Relations between Maya and Isthmian Hieroglyphic Writing."
- ⁷⁹ The band and the U-shaped element evidently had separate associations with the seating sign. In the Late Classic examples with ovals, the band is infixed to the torso and a small circle is infixed at the thigh; the circle descends from the U-shaped element in Maya signs generally. A third infix came to be associated with the sign as well, a phonetic complement representing the syllable *mu* and indicating the Lowland Mayan word **kum* "to sit". It was not an alternative for either the banded oval or the U-element; these are sometimes infixed

to the torso with the complement suffixed below the seating sign (figure 9e,c), and in the Late Classic examples the small circle is usually infixed to the thigh when the complement is infixed to the torso.

- ⁸⁰ Lee A. Parsons. 1988. "Proto-Maya Aspects of Miraflores-Arenal Monumental Stone Sculpture from Kaminaljuyu and the Southern Pacific Coast." In *Maya Iconography*, 6–43.
- ⁸¹ John S. Justeson. 1989. "The Representational Conventions of Mayan Hieroglyphic Writing." In *Word and Image in Maya Culture*, 25–38, see especially 30–33. Justeson. "Origin of Writing," 451–53.
- ⁸² There is no standard orthography for transcribing Mayan words. We use an orthography fairly standard in linguistic work on Amerindian languages, which conflicts in some features with colonial Spanish-based orthographies; both are widely used. Our orthography is essentially that of the International Phonetic Alphabet, except that we use *s* in place of *š*. Potential confusions with colonial orthography that appear in this paper: *x* is for a velar fricative, not for *š*; *k* (not *c*) is for a plain (not glottalized) velar stop.
- ⁸³ John S. Justeson and Laurence D. Stephens. 1981. "Elamite Spellings of Closed Syllables." Paper presented at the annual meeting of the American Oriental Society, Boston. Justeson and Stephens. 1988. "Representational Variation and Analogical Change in Elamite Spelling." Paper presented at the annual meeting of the Linguistic Society of America, New Orleans. Justeson and Stephens. 1990. "Representational Variation and Change." Paper presented at the Workshop on an Explicitly Scientific Cognitive Archaeology, Cambridge University.
- ⁸⁴ John S. Justeson and Peter Mathews. 1989. "Comparative Perspectives on Mayan Script Development." Paper presented at the Symposium on the Language of Maya Hieroglyphs, University of California, Santa Barbara.
- ⁸⁵ Justeson. "Origins of Writing," 453.
- ⁸⁶ Justeson. *Mayan Scribal Practice*, 267–68. Justeson. "Mayan Representational Conventions," 29.
- ⁸⁷ P. Kaplony. 1972. "Die Prinzipien der Hieroglyphenschrift." In *Textes et Langue de l'Égypte Pharaonique*, Cairo.
- ⁸⁸ David Friedel and Linda Schele. 1988. "Symbol and Power: a History of the Lowland Maya Cosmogram." In *Maya Iconography*, 44–93.
- ⁸⁹ Justeson. "Origins of Writing," 449–50.
- ⁹⁰ Justeson and Mathews. "Relations Between Maya and Isthmian Hieroglyphic Writing."
- ⁹¹ Peter Mathews and John S. Justeson. 1984. "Patterns of Sign Substitution in Maya Hieroglyphic Writing: the 'Affix Cluster'." In *Phoneticism in Mayan Hieroglyphic Writing*, eds. John S. Justeson and Lyle Campbell, 185–231. Albany, New York: Institute for Mesoamerican Studies Publication 9.
- ⁹² John S. Justeson. 1979. "Variable and Antilinguistic Order of Signs in Script." Paper presented at the International Conference on Phoneticism in Mayan Hieroglyphic Writing, SUNY Albany.