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Theory and Method in Maya Decipherment

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In this paper, I review the principal assumptions, theoretical orientations, and working methodologies of archaeological decipherment in detail and exemplify them as they apply to the ongoing investigation of Maya hieroglyphic writing. While the practice of decipherment derives foundationally from early nineteenth century work on the scripts of the Ancient Near East—principally Egyptian hieroglyphic, but also Achaemenid Persian and successively older cuneiform scripts—it has also been applied to numerous additional writing systems around the world, where it has been further tested, developed, and refined. In particular, scholars of New World writing systems have been actively engaged with these theories and methods for more than a hundred and fifty years, since at least the initial decipherment of Aztec hieroglyphic writing in the mid-nineteenth century (Aubin 1849; see Zender 2008). More recently, and in testimony to the continued applicability and importance of these principles, Maya hieroglyphic writing and Mycenaean Linear B were deciphered within a year of each other in the middle of the twentieth century (Knorozov 1952; Ventris and Chadwick 1953). The remarkable coincidence of two primary decipherments, achieved in two hemispheres, involving two completely unrelated ancient languages, yet on the basis of fundamentally identical theories and methodologies, spurred the arrival of some of the first synthetic accounts of script typology and decipherment (Friedrich 1954; Gelb 1952). In the following decades, explicitly comparative approaches to archaeological decipherment began to develop (Barber 1974; Pope 1975), and while Mesoamerican specialists were very much at the forefront of these new approaches (Justeson 1978; Whittaker 1980), it was not until the early 1990s that the study of New World scripts came to be generally recognized as having made substantial contributions to the theory and methodology of decipherment (Coe 1992, 1995; Daniels 1996; Houston et al. 2001; Pope 1999).[1] As just one example, Gelb's (1952:212-220) argument that writing first originated in Mesopotamia, whence it spread to all other regions, foundered on the evidently independent origin of Mesoamerican writing systems. Once this was generally acknowledged, scholars could entertain independent origins of writing even among proximal civilizations of the Old World, and were prompted to develop better tools for the investigation of script relationships (Trigger 1998, 2004). Due in no small part to this relatively recent incorporation of evidence from all writing systems—regardless of when or where they evolved—specialists have developed a robust and increasingly consensual set of grammatological principles. Among other things, these new perspectives have: (1) guided ongoing work in script comparison; (2) stimulated investigations into the origins, development, and demise of writing systems; and (3) served as a yardstick against which to measure proposed decipherments, as encapsulated in recent edited volumes on these topics by Baines et al. (2008), Houston (ed. 2004a, 2012), and Woods et al. (2010). Following

[1] As Gordon Whittaker (1980:1) cogently noted on the eve of these developments: "[t]o the historian of writing, who is normally a specialist in Near Eastern studies, Mesoamerica is terra incognita, a distant and unfamiliar land where ... writing, the very hallmark of civilization, was a development still unrealized at the time of the Spanish Conquest." These perspectives, once widely held, have thankfully shifted significantly in the past decade.

a thorough review and exemplification of these principles, I shift focus to a case study: the decipherment of the Maya phonetic sign 1SE **me**.[2] The aim is to illustrate how the evidence in support of this particular decipherment measures up against the aforementioned general principles, stressing controlled contexts (sufficient in number and variety to allow testing), an appreciation of the reconstructed grammatical rules and orthographic conventions of Classic Maya writing, and, not least, the critical importance of biscripts and similar script-external constraints. Throughout, analysis is guided by the prerequisite that "[s]trong readings show a full, transparent basis: a redundancy of proof" (Houston and Martin 2016:444). As will be shown, this and other recent decipherments comport themselves well, even against the most rigorous comparative criteria and the most "austere and remorseless standards" of evidence (Houston and Lacadena 2004:104).

Theory of Decipherment

Despite the strikingly different settings of the world's scripts (chronological, cultural, and geographical) and their radically different linguistic affiliations, it is nonetheless a basic truth that all decipherments follow similar patterns, and rely on the same kinds of evidence. Specialists in decipherment were quick to observe and apply this truism, consciously modeling their efforts on the successful decipherments of scholars who had preceded them. Especially influential in this regard was the work of Jean-François Champollion (1822) in his decipherment of Egyptian hieroglyphic writing. Champollion's countryman and contemporary, Joseph Marius Alexis Aubin, closely referenced Champollion's methods and results in his foundational decipherment of the Aztec script (Aubin 1849:25-26). Similarly, Zelia Nuttal (1888:49-50) credited the Egyptologist Carl Abel for providing her with key information on the workings of Egyptian hieroglyphic writing, thereby allowing her to recognize the principle of phonetic complementation in Aztec glyphs. Most importantly for the theme of this paper, it should never be forgotten that Yuriy Valentinovich Knorozov studied Egyptology at Moscow State University, and that he was thoroughly familiar with Champollion's approach (Kettunen 1998:1; Ulving 1956:184). Knorozov's breakthrough paper on the phonetic decipherment of Maya writing contains a brief but critical section on the comparative features of logosyllabic scripts, grounded in his detailed understanding of the structure of Middle Egyptian (Knorozov 1952:108-110).[3] Nor does our debt to Champollion end there. In his accessible history of the decipherment of the Maya script, the Mayanist Michael Coe (1992:34-41) elaborates on Champollion's assumptions and methods within a framework first proposed by the influential German Hittitologist and grammatologist Johannes Friedrich (1954, 1957). From these key works, Coe synthesized his influential concept of "five fundamental pillars on which all successful decipherments have rested" (Coe 1992:43; see also Coe 1995:393; Houston and Coe 2003:151-152). Slightly reorganized to reflect recent advances in comparative grammatology (e.g., Daniels 1996:142-143; Zender 2013:65-73), Coe's pillars are:

Script typology. The *type* of writing system must be known. As Friedrich (1957:152) observed, "*the number of the written symbols* usually warrants a conclusion as to whether the script is alphabetic, a pure syllabary ... or a mixture of ... word-signs and syllabic signs." That is, all else being equal: scripts with less than forty signs tend to be alphabets; those with forty to a hundred signs tend to be syllabaries; and those with more than a few hundred signs are uniformly mixed logophonetic writing systems (see also Daniels 1996:142; Hill 1967; Justeson 1978:188-198). Gelb (1952:115) long ago provided a useful chart correlating script type with numbers of signs, and expanded and updated versions of this chart are provided by Coe (1992:43) and Zender (1999:101, 2013:71). To Friedrich's original typology can now be added the *abjad* (a consonant-only script) and the *abugida* or *alphasyllabary* (a mixed alphabetic-syllabic script) (Daniels 1990:729-730).

Corpus. The database of texts available for study must be large enough to allow effective comparisons (Coe 1992:44, 1995:393; Daniels 1996:142; Houston and Coe 2003:151). There should be at least a few long texts, in a diversity of genres, giving signs ample opportunity to occur (Zender 2013:74-81). Additionally, Daniels (1996:142) stresses the compilation of a sign catalog as an important precondition of decipherment, although this has just as often followed as preceded primary decipherment. All of this naturally presumes that texts are both accurately recorded and accessible, by no

[2] Maya signs are identified by number in Thompson's (1962) system or, as here, in that of Macri and Looper (2003). By established convention, deciphered sign values are provided in boldface: lower case for phonetic signs, upper case for logograms.

[3] Among other things, Knorozov (1952:108-109) follows Champollion in noting that "what is important is not the origin of a given sign, but its actual meaning in a given text ... [I]t is quite unimportant whether the sign is a realistic picture of an object, a stylized picture, or a conventional symbol" (my translation). Largely due to Knorozov, this *functional* approach to sign use is now taken for granted in the study of Mesoamerican scripts (e.g., Justeson and Kaufman 1993:1707; Lacadena 2008:6, n.9; Stuart 1995:47-48; Whittaker 2009:54-56, 2013:137-139). Further, in a concise discussion of sign typology—highlighting logographic (Knorozov's *ideograms*), semantic (his *determinatives*), and phonetic sign types—Knorozov (1952:109) provides clear examples of each type in context from Middle Egyptian. Finally, Knorozov identifies the important scribal tactic of *phonetic complementation/indication* (see Gelb 1952:104, 250), providing as an example the Egyptian logogram **NFR** "good" which can appear in isolation or in phonetic complementation with **-r**, **-f-r**, and even completely redundant **n-f-r**.

means always safe assumptions (Houston 2013:37-38, see especially Fig. 4.1). The gold standard for meticulous documentation and rapid dissemination was set by the sorely missed Ian Graham; the Corpus of Maya Hieroglyphic Inscriptions Program which Graham founded at Harvard's Peabody Museum thankfully continues its work under the direction of Barbara W. Fash.[4]

Language. The language represented by an ancient writing system must be known. If a direct descendant no longer exists, then it must be possible to reconstruct the language on the basis of either: (a) records in another language and/or writing system, as with the extinct Sumerian language, which is understood almost entirely on the basis of Akkadian records of it; or (b) comparative/historical linguistic reconstruction on the basis of other languages to which it is related (Coe 1992:44, 1995:393; Daniels 1996:143; Houston and Coe 2003:151; Zender 2013:82-90). Absent some external evidence of the language, decipherment is impossible.

Cultural context. "The *cultural context* of the script should be known, above all traditions and histories giving place-names, royal names and titles" (Coe 1992:44). As Friedrich (1957:154) notes, the provision of ancient names is a particularly important element of cultural context and "often the only means of gaining the first foothold in the reading of an unknown script" (Friedrich 1957:154; see also Daniels 1996:143; Houston et al. 2001:9; Zender 2013:91-97). But equally importantly, as Houston and Coe (2003:151) urge, "[a]ny proposed reading of an ancient text should 'make sense' within [its cultural] context to be accepted as plausible."

Bilingual, biscript, or similar constraint. "The decipherment of any unknown script or language presupposes the availability of some clue or reference; *nothing can be deciphered out of nothing*. In those cases where one has absolutely no possibility available to link the unknown to something known, ... no real or lasting result can be accomplished" (Friedrich 1957:151). Foremost among these clues is "a *bilingual text*..., i.e., an inscription in which the text written in the unknown language or script is followed or preceded by its translation in some known language or script" (Friedrich 1957:153). All but a very small handful of decipherments have crucially depended on a bilingual or a biscript, whose presence permits the scholar to isolate proper names in an otherwise unknown writing system, making initial guesses (subject to further testing) regarding sign values.[5] In the absence of a bilingual or biscript, the corpus should at the very least contain "*pictorial references*, either pictures to accompany the text, or pictorially-derived logographic signs" (Coe 1992:44). To this can be added iconically-transparent semantic signs, such as the "ideograms" of Myceanaean Linear B and the "determinatives" of Egyptian hieroglyphs (Zender 2013:103). Finally, the utility of historical relationships between scripts must also be mentioned, as in the decipherment of Linear B with the assistance of the affiliated Cypriotic syllabary, and of both Sumerian and Hittite on the basis of related Akkadian (Zender 2013:103). From a comparative perspective, biscripts, bilinguals, iconically-transparent signs, and script relationships have always provided the most critical constraints, foundational to all convincing decipherments. Yet helpful constraints are in fact "quite varied and cannot be classified under rigid, inflexible rules" (Friedrich 1957:154). The grammatologist Peter Daniels (1996:143) provides a similar perspective, referring to the potential for "an external linguistic object that might plausibly be represented" in an undeciphered script, something which "may be called a *virtual bilingual*." One such would be Grotefend's (1815) assumption, absent a bilingual, that the names, titles, and known genealogical relationships of Hystaspes, Darius I, and Xerxes I should be reflected in the Achaemenid Persian inscriptions of Persepolis (see also Zender 2013:125-127). However, as Daniels also

[4] www.peabody.harvard.edu/cmhi

[5] Even those few exceptional decipherments achieved without biscripts show the value of their eventual discovery, or of the presence of kindred constraints. Although the first steps in understanding Anatolian hieroglyphs began without a biscript, it "was later confirmed by a subsequently discovered bilingual text" (Friedrich 1957:153) published by Helmut Bossert in several installments during the 1940s and 1950s. As a result, the initially proposed sign values and even the linguistic affiliations of Anatolian hieroglyphs saw considerable revision (Hawkins et al. 1974). Similarly, too much has been made of Michael Ventris' decipherment of Linear B without the assistance of a bilingual (e.g., Robinson 2002:98). Many Linear B "ideograms" (i.e., semantic signs), including the famous "horse" (e.g., on Ca 895) and "tripod" (e.g., on Ta 641), are iconically-transparent (Ventris and Chadwick 1953:85), and the script shares at least six syllabic signs of identical form and value with the related classical Cypriotic syllabary (Chadwick 1970:22-23, 33-34, 45). Further, absent a biscript, Linear B "still remains obscure in many details. There are a number of signs which are still not certainly identified" and "[a] number of the less common ideograms are still unknown or very doubtful" (Chadwick 1970:135-136; see also Zender 2013:137). Finally, the proposed decipherment of Isthmian (Justeson and Kaufman 1993), without biscript, ample corpus, or proper names, nonetheless relies crucially on calendrical conventions widely shared in the region, and on at least a few signs shared with the contemporary Maya script. Justeson and Kaufman (1993:1703) assert that Isthmian is "more closely related to Mayan hieroglyphic writing than to other early Mesoamerican scripts." As outlined by them, their decipherment proceeded largely on the basis of "reconstructed patterns of grammatical affixation" and "reconstructed vocabularies" in an assumed underlying language (Justeson and Kaufman 1993:1707). This has struck some scholars as insufficiently constrained (Houston and Coe 2003), a criticism not sufficiently addressed by claimed consensus among those most familiar with the evidence (Kaufman and Justeson 2004:1075, 2009:228). Absent a bilingual or similar constraint, there must always remain some doubt about the accuracy of a decipherment, though it should be noted that the proposed Isthmian syllabary contains at least eight signs which are formally identical to Maya signs of similar value—e.g., **kʉ**, 7**i**, 7**u**, **ji**, **jo**, **na**, **ye**, and **yʉ** (see Kaufman and Justeson 2004:1076).

cautions, "[p]oor choice of a virtual bilingual is what most commonly dooms a failed decipherment" (Daniels 1996:143). In other words, absent later verification from an *actual bilingual* or similar constraint, a *virtual bilingual* cannot constitute primary evidence in support of the correctness of a decipherment.

It can readily be seen that some pillars are more important than others, but also that pillars are mutually reinforcing. For instance, it is practically impossible to decipher a writing system on the basis of only a small handful of texts. Not only is a biscript less likely in a small corpus, but script typology itself may be unclear. And even in the case of a large corpus, monotous subject matter, inexpert recording, or inaccessibility to scholarship can all delay progress. A robust corpus of texts thus emerges as a critical starting condition for any decipherment. If, on the other hand, all of the pillars apart from language are present, the results of decipherment might allow one to read aloud many of the signs of an ancient inscription, as with the Etruscan alphabet and Meroïtic abugida, but with little understanding as to how they collaborate to produce meaning (Zender 2013:166-173). Note, too, that language provides a qualitative rather than purely quantitative measure of the strength of a decipherment. Thus, an ancient language with only one very distant descendant (such as Old Egyptian of ca. 2700 BC compared with Coptic), will never be understood to the same degree as a younger language with many close relatives and descendants (such as Classic Mayan of ca. AD 600 compared to some thirty extant Mayan languages).

Considered in this way, the five pillars are not merely preconditions potentiating decipherment: they are measures of the amount that can be learned from a script. Just as multiple bilinguals with multiple writing systems increase our certainty of the sound values of an ancient script, so too does the presence of each additional pillar add substantially to the foundational strength of a decipherment. The best-known scripts are those supported by all five pillars, such as Maya hieroglyphs (Houston and Coe 2003:151-152). Writing systems without such support remain undeciphered, such as the Indus script (Coe 1995). In between is a spectrum of scripts varying in intelligibility. Understanding the importance of these pillars largely explains why some writing systems were deciphered relatively quickly (e.g., Cypriotic and Ugaritic), while others took generations of effort by numerous scholars (e.g., Anatolian hieroglyphs), and still others remain unreadable.

Naturally this discussion presupposes that all writing systems encode an objectively discoverable relationship with some underlying language. Does this assume too much? Matthew Watson contends that the Maya script has not in fact been deciphered, and that epigraphers' readings of Maya texts are little more than "ventriloquist acts steeped in ideological projection and cultural appropriation" (Watson 2014:151). Specifically, Watson alleges that "decipherment [i]s a set of processes that has depended integrally on historically-specific public collaborations and imaging practices that abstract hieroglyphs from their material contexts" (Watson 2010:13).[6] Yet Watson is simply in error that "public collaborations" have any bearing on the truth claims of decipherment.[7] And while signs are indeed often extricated from their contexts to facilitate comparison and recognition of diagnostic elements—"imaging practices" that Watson labels cutting or reduction[8]—concerned readers may relax, secure in the knowledge that ancient inscriptions persist unmarked by the scholar's shears. The sad irony is that Watson would be hard pressed to find a field more mindful of context than decipherment, which has specialized in the study of sign form, function, and distribution for more than two centuries. In all candor, there is nothing of merit in these criticisms, which emerge fully formed from Watson's (2010:13) avowedly Latourian philosophy that scientific facts are mere social constructs (e.g., Latour and Woolgar 1979:178). Such solipsism is logically self-defeating, and therefore safely ignored. If all accounts have equal claim on truth, why prefer Watson's? Or, for that matter, Latour's?

Realists will instead take notice that decipherments show the same epistemological developments that characterize all scientific theories, including long stable periods of cumulative growth of knowledge punctuated

[6] Watson's view of decipherment is rather less guarded elsewhere: "'Decipherment'—yuck! I've never liked that metaphor much. Maya hieroglyphs aren't ciphers. They're not codes. They're complex aesthetic forms and material objects with no unified mode of signification. Their reduction to modernist texts has come at significant cost" (Watson 2014:133). But it is an etymological trap to privilege the *cipher* in *decipherment* at the expense of this word's well-established meaning in context as a *term of art* for the interpretation of inscriptions of all kinds (OED, 3rd ed, 2015). Further, Watson provides no evidence supporting his assertion that glyphs were not a "unified mode of signification" nor any indication as to what "cost" he imagines is paid by transliterating them. Pritius's dictum therefore applies: "*quod gratis afferitur, gratis etiam negatur* (that which is freely asserted may also be freely rejected)" (Pritius 1764:219).

[7] Watson fixates on the Austin Maya Meetings held annually since the late 1970s, asserting that they "cultivated assent through highly regulated practices enabling participants to imagine that they independendly confirmed decipherments" (Watson 2012:282). But he puts the cart squarely before the horse. Conferences are not loci of knowledge production, but of dissemination. Regardless of how they were presented, decipherments take their probative value from traditional scientific criteria (see e.g., Zender 2013:59-60) and are logically independent of any context in which they are presented.

[8] For instance, Watson asserts that the decipherment of T539 **WAY** was "an aesthetic and material reduction of a multiplicity of distinct and very real objects into a categorical type" (Watson 2010:357) and that "[w]hile 'T539' supposedly denotes a sign's 'essence,' it is cut from its conditions of cultural use" (Watson 2013:184).

Figure 1. Detail of Late Classic cylindrical vase depicting animal scribes, each with its own identifying caption. Private Collection (detail of rollout photograph courtesy of BAMW Photography; all drawings by the author except where noted).

by episodes of classically Kuhnian paradigm shift (Kuhn 1962), while still other developments reflect multiple lines of branching and yet not wholly independent paths of discovery (Houston et al. 2001:4-5). Further, the convergence of independent lines of inquiry on the same conclusions will continue to convince those who value empirical evidence. As noted above, biscripts have occasionally appeared only *after* decipherment began—as was the case with Achaemenid Persian, Anatolian hieroglyphs, and Ugaritic—usefully providing independent confirmation of its results with, to be sure, equally useful corrections and significant new leads. Other kinds of confirming evidence can also appear long after a decipherment has become reasonably far advanced. This not infrequently happens in the Maya case, as numerous archaeological projects (and, sadly, equally numerous illicit excavations) continually discover new inscriptions, a significant subset of which feature constrained pairings of text and image. One recent example is a Late Classic Maya ceramic from the Motul de San José region of Peten, Guatemala, and its realistic albeit whimsical depictions of a dog, an opossum, and a vulture dressed as scribes (Figure 1). In front of each animal is a short caption text of two or three glyph blocks whose final block provides the descriptive labels: **OOK**-**ki**, *ook*, 'dog'; **u**-**chu**, *uch*, 'opossum'; and **u**-**su**, *us*, 'vulture' (Boot 2008:6; Coe and Houston 2015:191). Is this mere coincidence? That would be incredible, given that one of these signs, the vulture's T1 **u**, is already glossed <u> in *Relación de las cosas de Yucatán*, an important sixteenth-century source explored in detail below. Another is common in constrained calendrical contexts (T765 **OOK** 'dog'), where it appears in substitution for a cursive variant glossed <Oc> in the same sixteenth-century source. As for the rest, all of them were deciphered and published by at least 1990 on the basis of entirely independent patterns of evidence.[9] A better test case could hardly be devised, and this is only one of hundreds of similar constraints against which the Maya decipherment has been and will continue to be measured. These and kindred consiliences provide considerable evidence that there are indeed relationships between writing and language which are independent of our thoughts and representations of them, and which are discoverable by us, both in principle and in practice.

Methods of Decipherment

Given a robust theory of decipherment, an adequate methodology should logically follow, yet there have been more than a few false starts and insufficiently rigorous approaches to the decipherment of Maya writing, even in the years following Knorozov's breakthrough publications of the 1950s. One such approach was consistently championed by J. Eric S. Thompson, who argued that "we shall interpret the glyphs only by relying heavily on the beliefs, the religious symbolism,

[9] The cursive variant of T765 **OOK** is glossed <Oc> nineteen times in the *Relación* calendars (f. 28r, 34v-40r, 41r-43v); this led to a reading of the Classic head variant as **OK** (e.g., Stuart 1987:40-41), although its long vowel was not recognized until the 1990s (Houston et al. 1998). T102 **ki** was defined by Fox and Justeson (1984:29). T1 **u** is glossed <u> in the *Relación* abecedary (f. 45r), productively documented in other contexts by Knorozov (1952:115-116). ZV9 **chu** was also deciphered by Knorozov (1967:99, Item 286). T513/YG2 **u** was demonstrated by Stuart (1990). T216 **su** was initially recognized as either **so** or **su** by Justeson (1984:343), refined to **su** by Stuart (1987:47).

the mythology, and, to a lesser extent, the everyday activities of the Maya, because such concepts surely are embedded in the structure of each glyph" (Thompson 1950:35). Still more poetically, Thompson (1966:183) claimed that Maya hieroglyphs are "meaningful only to those who have soaked themselves in Maya culture and seek to know and follow Maya thought processes." In other words, Thompson's *associative methodology*, to borrow David Stuart's (1995:46) apposite phrase, eschews phonetic decipherment in favor of a reliance on symbolism and sign iconicity as guides to interpretation. One particularly illuminating example of the contrast between Thompson's and Knorozov's approaches is offered by a scene and its accompanying hieroglyphs from Dresden 13c (Figure 2), depicting a distraught female vulture kneeling before an excited hound. Léon de Rosny (1876:34) was the first to recognize the depiction of the dog, and likewise to isolate the third glyph block (A2) above the scene as referring to this animal.[10] Thompson (1950:78) fully accepted De Rosny's reasoning, but his interpretation was that "[t]he glyph for the dog in the Maya codices is a symbol ... representing the animal's ribs, combined with a death sign ... probably indicat[ing] a connection with the underworld." Almost a decade later, Thompson (1959:359) maintained this view, noting that "[t]he glyph for dog has two elements. ... the first, widely thought to depict the thorax, ... [t]he second ... a symbol of sacrifice." As always, Thompson supported his glyphic observations by associative criteria, noting that "[i]n Mexican belief the dog, sacrificed at the death of his master, conducted the deceased to Mictlan, the land of the dead" (Thompson 1950:78). As Knorozov (1958:288) correctly observed, however, "such a 'decipherment' cannot help us make sense out of any other hieroglyph."

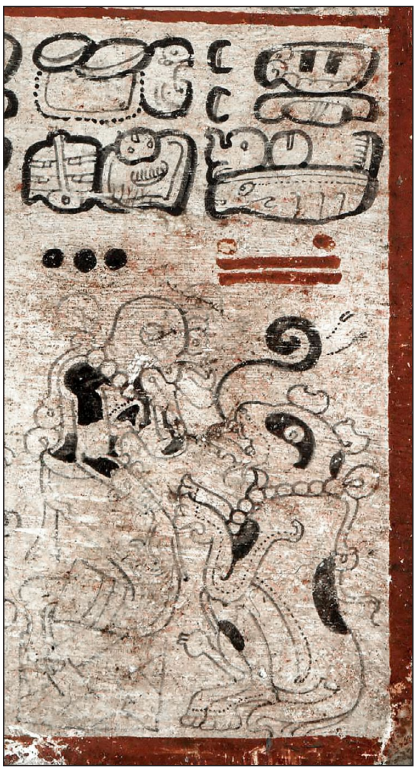

Figure 2. Detail of Dresden Codex, 13c (photograph courtesy of Sächsische Landesbibliothek, Staats- und Universitätsbibliothek, Dresden, digital.slub-dresden.de).

By contrast, Knorozov's (1952:112-114) own work shows with admirable clarity and concision that the two elements in question are merely the phonetic signs **tzu** and **lu** (see also Knorozov 1958:288). Not only do these signs combine to spell the word *tzul* 'dog' (attested in Colonial Yucatec, e.g., Barrera et al. 1980:867), but each also appears productively in other contexts, equally constrained, either by calendrics or by associated images, as in **bu**-**lu**-**ku** for *buluk* 'eleven' (Dresden 19a) and **ku**-**tzu** for *kutz* 'turkey' (Madrid 91a), respectively. As Knorozov (1958:289) notes, "these are cross-readings ... sustained also by the Landa alphabet and by the indirect determination of the meaning by way of arithmetical computation or by the comparison of text and drawings." We will return to the question of the so-called "Landa alphabet" (a critical biscript) shortly, but for now it is enough to highlight Knorozov's cross-readings and constrained contexts, including pictorial references and calendrics, which remain key aspects of decipherment methodology.

While Thompson's associative approach now has few adherents, there nonetheless remains a considerable degree of confusion in the literature with respect to what, precisely, constitutes a well-supported decipherment, and consequently more than a few proposed decipherments and interpretations which fall short of acceptable standards of evidence.[11] For these reasons—but also given the profound implications of authentic voices from the Pre-Columbian past for our study of the origins and development of Maya culture, civilization, and literature—non-specialists cannot afford to dismiss the results of decipherment out of hand, nor to trust them without informed critical reflection. Stephen Houston and Alfonso Lacadena (2004:108) have recently urged colleagues to recognize that "Maya texts are central to understanding past worldviews and dispositions" and "[t]his means

[10] This is a classic example of a *pictorial reference* (Coe 1992:44) or *virtual bilingual* (Daniels 1996:143). Having established that dogs were depicted on Dresden 7a, 13c, 21b, and 43b, De Rosny further noted that each of these contexts had one further commonality: its association with the noted glyph block (Figure 2, A2). He reasoned that, if the glyphs explained the image in any way, the glyph block in question must somehow signify "dog."

[11] James B. Porter (1999:133) provides a sketch of what he believes to be, following Thompson, "the more rigorous and reliable Iconographic method": "the epigrapher begins by identifying in Maya art the object from which a glyph is visually derived ... Maya lexica for the object or its known qualities are then sought. These Maya terms are examined for homophonous (rebus) or semantic (logographic) relationships to concepts which fit both the image and the context. Finally, Maya terms exhibiting such relationships are proposed as glyph translations." As detailed below, every one of Porter's proposed procedures is problematic—e.g., the iconic assumption, the lack of concern with respect to which languages provide relevant "lexica," and the imprecise understanding of sign function reflected in his conflation of semantic (meaning-based) and logographic (word-based) categories. Porter's approach is neither rigorous nor reliable, for it leads to no generalizations and its results cannot be tested (see Popper 1963). As such, "*das ist nicht nur nicht richtig, es ist nicht einmal falsch* (it's not only incorrect, it's not even wrong)" (Wolfgang Pauli, in Peierls 1960:186).

that *all* Mayanists should understand something about hieroglyphs, their possibilities for study, their limitations, [and] their linkages to other features of ancient life." This echoes a similar observation made more than twenty years ago by David Stuart (1995:42), who argued that "[i]t is vital ... for the student of the Maya to understand the methods and assumptions behind the newer brand of epigraphic analysis, and how it derives and differs from other approaches used until only very recently."

So what are the methods and assumptions behind this newer brand of epigraphic analysis? Foundationally, the assumptions derive precisely from those theories originated by Champollion in the early nineteenth century, developed and extended by Friedrich and others, and encapsulated in the five pillars of decipherment detailed above. As for the methods, they are largely comprised of tried and tested elaborations of Champollion's theories into practical procedures for decipherment, largely during the second half of the twentieth century. For Mayanists, these procedures began with Knorozov, but "[t]he act of synthesis, the crowning integration of approach and method, accords with David Stuart ... [whose] contributions correspond to a disproportionate number of post-Knorozov readings of syllables and numerous word signs, [and whose] expansive vision has forged the current standard" (Houston and Martin 2016:446).

First and foremost among the new approaches to Maya epigraphy is the explicit rejection of Thompson's preferred iconic, symbolic, and ideographic approaches in favor of a methodological focus on sign function and distribution (see Knorozov 1952:108-109). Consider the following passage from David Stuart's *A Study of Maya Inscriptions*:

> Modern methods of decipherment ... pay less attention at first to the imagery of an unknown sign, concentrating instead on possible clues provided by signs with which it interacts. When confronted with an unknown sign, the first step towards its decipherment should be a consideration of whether it works as a logograph or a syllable. The sign's "range of behavior" must be determined by compiling all cases where it is found, and analyzing the signs with which it associates. Particular attention should be paid to the identification of the associated signs as logographs or syllables. From a single context it may well be impossible to determine the sign's function, yet as examples accumulate it should be easier to opt for one or the other type. (Stuart 1995:47-48)

Of primary importance in decipherment, then, is the behavior and contexts of signs, not their forms, and still less any natural or cultural associations of those forms. Given the centrality of context to Knorozov's and Stuart's methodology, Watson's (2010, 2012) oft-stated criticism that epigraphic study somehow decontextualizes Maya signs reveals only his own misunderstandings of principles of decipherment that have been rigorously tested in numerous contexts in the two centuries since Champollion. Similarly, a recent proposal by Chase et al. (2008:15, Fig. 6) that multiple distinct groups of elites at Calakmul, Copan, and Lacanha all shared the same emblem glyph involving a "bat" must be rejected on the grounds that each of these emblems groups the "bat" with entirely different elements. That is, the contexts are in fact quite different. Further, it is by no means certain that we are dealing with the same sign in all three of these contexts.[12] But even were this the case, it would be equally as relevant as the shared letter "C" in the modern site names of Calakmul, Copan, and Lacanha.

Another important aspect of Stuart's account is the minimal role accorded to sign imagery in decipherment. From this perspective, recent criticisms of the epigraphic consensus regarding the T764 **KAAN** 'snake' sign—and its role in a dynastic title relevant to the political history of Early Classic Dzibanche and Late Classic Calakmul (see Martin and Velásquez 2016:26-27 for the consensus view)—simply miss the point when they argue that T764 seems "closer in shape to a toad or possibly a stylized bat" (Harrison 2006:11) or even that it "might be a conflation of several animals" (Savage 2007:3). These observations might be relevant had the hieroglyph been deciphered on the basis of its appearance, but it was not.[13] The **KAAN** value of T764 rests on phonetic complementation (e.g., **ka**-**KAAN**, **ka**-**KAAN**-**nu**, and **KAAN**-**nu**) and, on at least two occasions, full phonetic substitution with the syllables **ka**-**nu** (see Helmke and Kupprat 2017:101-103 for the forms in context). Considered in tandem with Houston et al.'s (1998, 2004) proposal that disharmonic

[12] See Thompson (1966), Boot (2009a), and Stone and Zender (2011:177) for indications of multiple distinct "bat" signs in the Maya script.

[13] It is important to avoid the potential for confusion. Of course a sign's appearance (its iconicity) is significant, and worthy of study in its own right. But a priori interpretations of sign form are unreliable guides to decipherment. First and foremost, they are notoriously subjective. Consider that while T764 represents an obvious snake to some observers, it evidently looks like a toad or even a bat to others. Second, scholars have recognized since Champollion that a sign's iconic origin does not determine its function within a script. For instance, our letter A derives from a depiction of an ox's head (Gardiner 1916:6), yet it is no logogram for "ox" but rather a phonetic sign originally conveying a glottal stop consonant [ʔ] and now, depending on context, the vowels [a], [æ], [ə], and [e]. Similarly, while the T751 'jaguar' sign in Maya writing clearly functions as the logogram **BAHLAM** "jaguar," the T45.843 'stairway' conveys not a noun but rather the verb **T'AB** "to ascend," and the T748 'rat' operates only as the phonetic sign **ch'o**. Studies of sign origins are therefore on secure foundations only *after* decipherment has been achieved on other grounds, for only then can a sign's origins be assessed absent the twin dangers of pareidolia and mistaken sign function. Seen in this light, Porter's (1999:134) description of an "Iconographic method" which "extracts intrinsic meaning through the evocative content of a character's *imagery*" reveals itself not as the "rigorous and reliable" (Porter 1999:133) procedure he imagines, but rather as a hopelessly subjective return to the ideographic approaches wisely left behind by Champollion, Knorozov, and Stuart.

syllabic spellings and complements cue long or otherwise complex vowels, we arrive at the value *kaan*. At this point, "subsequent work is no longer decipherment, but the study of Maya philology" (Knorozov 1952:117, my translation). That is, either a decipherment can be supported by historical linguistic evidence or it cannot. In this case, note the following terms for "snake" from relevant Mayan languages:

Ch'orti'	*chan*	(Hull 2016:88)
Ch'ol	*chan*	(Hopkins et al. 2011:31)
Chontal	*chan*	(Knowles 1984:408)
Yucatec	*kàan*	(Bricker et al. 1998:122)
Lacandon	*kaan*	(Hofling 2014:179)
Mopan	*kan*	(Hofling 2011:229)
Itzaj	*kan*	(Hofling 1997:336)

Proto-Mayan **aa* is recognized to have the regular reflexes: Ch'orti' *a*, Ch'ol *a*, Chontal *a*, Yucatec *àa*, Lacandon *aa*, Mopan *a*, and Itzaj *a*. As such, Kaufman (2017:81) reconstructs Proto-Mayan **kaan* 'snake.' Although we might have expected the Classic Maya script to have a form like *chan* given the Ch'olan terms above, Houston et al. (2004:99) and Wichmann (2006:183) present substantial evidence that Maya script is archaizing, often with unexpectedly early forms (see also Stone and Zender 2011:236 n. 86). Moreover, philological evidence now indicates that the loss of long vowels took place as late as AD 750–850 (Houston et al. 2004:91-92), and that a protracted change of **k* > *ch* and **k'* > *ch'* diffused from word to word, initially colonizing environments with front vowels (e.g., *chihj* 'deer,' *ch'een* 'cave') before spreading to other contexts (e.g., *chan* 'snake,' *ch'am* 'take'), beginning as early as the sixth century and continuing into at least the ninth century (Law et al. 2014). As such, Classic Mayan *kaan* 'snake' is also defensible on philological grounds, at least in contexts predating the phonological changes of *VV > V and **k* > *ch*. Given a decipherment of T764 **KAAN** and a defensible connection to Classic Mayan *kaan* 'snake,' we may at last begin to investigate the sign's origin, in which connection it bears noting that specialists in Maya iconography uniformly accept the sign as a reasonably naturalistic representation of a snake (e.g., Houston and Martin 2012:Fig. 1d; Stone and Zender 2011:200-201), particularly given the representational conventions of Maya hieroglyphic writing, which privilege the rounded contours of glyph blocks and the depiction of mythic exemplars. The larger point is that decipherment focuses in the first instance not on sign appearance nor on the natural and cultural associations of objects chosen as signs, but rather on sign behavior and context.

Continuing our exploration of decipherment methodology, David Stuart has made two key observations with regard to sign behavior in the Maya script: (1) "if a sign tends to be associated directly with other syllables, there is a good chance that it too is a syllable, particularly if the associated syllables all have the same vowel" (Stuart 1995:49), and, further; (2) "[i]f an unknown syllable substitutes for a syllable of known value, then it may be an allograph that is freely interchangeable with the established sign, or, when in final position, it may be a different syllable sharing the same initial consonant" (Stuart 1995:49). The recognition and consistent application of these insights were almost single-handedly responsible for the principal epigraphic breakthroughs of the mid to late 1980s, among them several classic studies of Maya decipherment which first saw the decipherment of the phonetic signs **hi**/**ji**, **lo**, **pi**, **tzi**, **tz'i**, **wi**, **xa**, **xi**, **yi**, and **yo** (Stuart 1987a), **ch'o**, **ho**/**jo**, and **to** (Houston 1988), as well as a surprisingly large list of allographs for phonetic **u** (Stuart 1990). Given their associations and occasional substitutions for these and other phonetic signs, the logograms **ICH'AAK**, **K'AWIIL**, **OOK**, **OTOOT**, **SUUTZ'**, **TZ'I'**, **TZ'IHB**, **UUN**, **WAAJ**, and **WITZ** were also first deciphered during this same period (Stuart 1987a), more than three decades after Knorozov's (1952) initial decipherments discussed above. Nor are these productive principles played out. The author and two colleagues have recently employed them in the recognition of the phonetic syllable **we** (Zender et al. 2016). The identification was first suggested due to substitutions between **wa** and **we** in word-final position (which argued for the new sign providing at least the consonantal value *w*), and then extended to additional contexts in which the new syllable was frequently associated with C**e** signs in initial, medial, and final positions (which argued for the new sign also providing the vowel *e*). Only a **we** value could satisfy both observations. Further, remembering Stuart's (1995:56) dictum that "the most convincing readings of signs are demonstrable in at least three independent contexts of usage," we explored five contexts in depth, and a thorough survey of the corpus disclosed at least half a dozen other promising contexts still under investigation (Zender et al. 2016:50-52). This study also disclosed a remarkable degree of sign plasticity from Early Classic through Late Classic contexts. This indicates that in addition to paying close attention to sign behavior, the corpus must also be thoroughly scrutinized for evidence of paleographic developments predicated on both spatial and chronological distribution.

More recently, decipherment methodologies have also been expanded into the domain of patterned spellings predicated on grammatical categories that Classic scribes clearly recognized and respected. Thus, in his decipherment of the syllable **tz'e**, Stuart (2002:2) notes that the sign frequently appears with other C**e** syllables, such as **ye**, **he**, and **e**. In one context, the spelling **ha**-**i**-**u**-**tz'e**-**he** likely provides the antipassive voice of a transitive verb, and Stuart (2002:3) observes that "[p]arallel constructions suggest that the syllables

spelling the transitive verb ought to be synharmonic in their vowels." In another context, the spelling **e-tz'e-wa-ni** clearly represents an intransitive positional in *-waan*, and Stuart (2002:3) notes that "parallel spellings of *-wan* positionals indicate that their roots are regularly spelled synharmonically (cf. **pa-ta-wa-ni**, **CHUM-mu-wa-ni**, **wa-a-wa-ni**, **he-ke-wa-ni**, etc.)." Still more recently, in his tentative identification of the **tzo** syllable, Stuart (2008) again observes that the sign typically associates with C**o** signs, including **lo**, **mo**, and **no**. Even more importantly, in the context of an active transitive verb (**u**-?**tzo**-**lo**-**wa**), he observes that "[t]his context is key, for all transitive verb roots are spelled synharmonically (CV_1-CV_1)." The recognition that C**e** and C**o** signs cluster with syllables of like vowels because they tend to spell positional and transitive roots synharmonically thus provides a method by which unknown C**e** and C**o** signs can be both identified and deciphered. In their recent decipherment of the syllable **we**, Zender et al. (2016:39) build on Stuart's principle by observing that "syllables of the shape C**e** and C**o**, being outside the framework of the C**i**, C**a**, and C**u** signs employed to indicate vowel complexity..., tend to spell lexical roots and suffixes synharmonically. That is, all else being equal, C**e** and C**o** syllables have a strong tendency to congregate with syllabic signs and logographs with which they share vowel quality." (For the role of disharmonic spellings with C**i**, C**a**, and C**u** signs as indicators of vowel complexity see Houston et al. 2004 and Lacadena and Wichmann 2004.) These observations bear directly on the recognition of the **me** syllable (to be discussed presently), yet they also help to explain why so many of the most recently deciphered Maya signs have been phonetic syllables of the form C**o** and C**e**—e.g., **t'o** (Zender 2004a:260, n. 95), ?**so** (Zender 2005b), **tzo** (Stuart 2008), **pe** (Beliaev and Davletshin n.d.; Houston 2014a), **we** (Zender et al. 2016), **k'o** (Stuart 2017), and **tze** (Davletshin and Vepretskij 2017).

Biscripts

Having outlined the key principles and procedures of decipherment, I now turn to a case study of Maya decipherment, beginning with a thorough investigation of an invaluable biscript, long overdue. Discovered by Brasseur de Bourbourg in 1863, and published the following year in a partial French translation (Brasseur de Bourbourg 1864), there is arguably no manuscript more central to Maya studies than the *Relación* long attributed to bishop Diego de Landa. And yet, Landa's claim on the work is more tenuous than is often assumed, and romantic notions that the bishop "wrote his *Relación*" sometime in the year 1566 "in the quiet of a Spanish monastery" (Clendinnen 1987:125) must be revised in light of a recent reevaluation of the manuscript by historians Matthew Restall and John Chuchiak (2002). As these scholars have noted, the manuscript's title is in fact equivocal: *Relacion de las cofas de Yucatan sacada de lo que escrivio el padre fray Diego de Landa* (account of the things of Yucatan taken from that which father fray Diego de Landa wrote) leaves the exact source (or sources) of the manuscript in some question apart from the consideration that it draws from at least some of Landa's writings (Restall and Chuchiak 2002:660). Nor is it certain that this title belongs to the entirety of the manuscript, for close analysis reveals that it was "written by different hands at different times and put together between the late seventeenth and late eighteenth centuries" (Restall and Chuchiak 2002:655). In sum, "the *Relación* that is so widely read and cited is not the authentic, coherent work it is taken to be"; "scholars cannot take for granted the authorship and dating of particular passages," and they can "no longer be certain that every word is Landa's" (Restall and Chuchiak 2002:664). Importantly, however, Restall and Chuchiak (2002:664) are also quick to note that the *Relación* is "nevertheless an authentic product of lost or as-yet-undiscovered late-sixteenth-century observations and writings by Landa" and that it therefore "remains an invaluable source on sixteenth-century Yucatán and on Maya civilization."

These caveats are relevant to any use of the *Relación*, but they are particularly critical to the analysis of its invaluable biscripts, which gloss no less than four hundred and forty-seven individual Maya signs and twenty-one hieroglyphic compounds in the Roman alphabet, directly relating them to contemporary Maya words and sentences in some instances, and to Colonial Spanish and Maya letter names in others. The best known of these biscripts is the abecedary provided on folio 45r, which also includes three glyphic compounds purporting to provide the words "noose" and "water," as well as the complete sentence *ma' ink'áati'* or "I don't want to." But in many ways equally useful are the eighteen glyphic compounds recording the Colonial Yucatec month names on folios 34r-43v, all provided with Roman glosses giving their names in Colonial Yucatec.[14] What makes these compounds particularly important is that they are essentially written in the same manner as month glyphs found hundreds of years earlier on monuments from across the Maya lowlands. These months all had Classic Ch'olan names that in all but six instances diverge considerably from those of Colonial Yucatec

[14] The month glyphs on folios 34r-43v are accompanied by three hundred and sixty iterations of the twenty day signs (i.e., eighteen examples of each), all glossed in the Roman alphabet with their Colonial Yucatec names. Additionally, twenty glossed day signs appear on f. 28r, thirteen glossed <Ahau> signs on f. 44r, two sets of glossed year-bearers on f. 28r-28v, and a lone glossed <imix> on f. 28v. Although highly repetitive, the multiple examples of each sign are invaluable in highlighting diagnostic elements and revealing permissible stylistic variations.

(cf. Thompson 1950:106, Table 8). To provide a bridge between the original orthography of these months and their Colonial Yucatec glosses, an unknown northern scribe appended phonetic signs indicating the Yucatec pronunciation of seven of the more divergent names. Thus, on folio 39r, the first month of the Maya calendar is glyphically written as [**K'AN**]**JAL**-**wa** for K'anjalaw, reflecting the Classic Ch'olan name, but prefixed to it are the syllables **po**-**po**, providing a unique spelling of the Colonial Yucatec name Póop, in agreement with the associated Roman gloss <Pop> (Lounsbury 1973:99-101). Other examples provide only the initial syllable as a phonetic complement, as is the case with the **wo** prefixed to **IHK'**-**AT**, where the Yucatec name was Wooh and the Ch'olan Ihk'at (Stuart 1987b). The internal consistency of this bilingual biscript, its coherence with monumental and codical representations of the same months, and our considerable success in motivating its departures from earlier convention have not only proven instrumental in the decipherment of numerous Maya signs—e.g., T41 **K'UH** (Ringle 1988:7; Stuart et al. 1999:41), T74 **ma** (Knorozov 1967:84, Item 69), T520 **se** (Kelley 1962:32; Knorozov 1967:100, Item 315), and T67 **wo** (Stuart 1987b)—but they also go a considerable way towards assuaging any lingering doubts as to the accuracy of these hieroglyphs in the light of the *Relación*'s uncertain provenance. Thus, while all of the folios with hieroglyphs were written in a seventeenth-century hand (Restall and Chuchiak 2002:655, Table I), the hieroglyphs themselves were evidently copied from one or more authoritative but otherwise unknown sixteenth-century sources.[15]

Unfortunately, published editions of the *Relación* have often been incomplete with respect to both the text and the illustrations. As George Stuart (1988:27) has noted, "[v]irtually all the editions ... have, to varying extents, re-arranged the textual material or the sequence of the calendrical glyphs, often adding 'chapter' headings; always using second-generation renderings of most of the glyphs; and, more often than not, editing the number of drawings." For these reasons, I follow Stuart in reproducing a late nineteenth-century photograph of the abecedary on folio 45r (Figure 3). Beginning with the first complete sentence on line 2, the text accompanying the abecedary can be read as follows (with elipses indicating where glyphs are interpolated in the manuscript):

> *Le, quiere dezir laço y caçar con el, para escrivir le con sus carateres aniendo les nosotros hecho entender que son dos letras lo escriviā ellos con tres puniendo a la aspiracion de la L, la vocal, e, que antes de si trae, y en esto no hierran aunq̄ usen e si quisieren ellos de su curiosidad. Exemplo. ... despues al cabo le pegan la parte junta. Ha. que quiere dezir agua porq̄ la hache tiene a · h · ante de si lo ponen ellos al principio con · a · y al cabo desta manera ... Tambiē lo escriven a partes pero de la una y otra manera yo no pusiera aqui ni tratara dello sino por dar cuenta entera de las cosas desta gente. Mainkati quiere dezir no quiero, ellos lo escriven a partes desta manera. ... Siguese su a, b, c. ... De las letras que aqui faltan carece esta lengua y tiene otras añadidas de la nuestra para otras cosas q̄ las ha menester, y ya no usan para nada destos sus carateres especialmente la gente moça q̄ an aprendido los nr̄os.*[16]
>
> *Le* means "noose" and "to hunt with one." To write *le* with their characters—we having made them understand that it has but two letters—they wrote it with three, putting as the voicing of *ele* the vowel *e*, which it carries in front of it. And in this they do not err, even should they employ [another] *e* out of curiosity. Example: ... Then afterwards they join the parts together. *Ha* means "water," and because *hache* has an *a* in front of it,[17] they first set down *a* and then add *a* again at the end in this way: ... They also write in parts, but in several complicated ways that I would not attempt to set down nor treat at all were I not providing a full account of these peoples' affairs. *Ma in kati* means "I don't want to," and they write it in parts in this fashion: ... Their ABC follows: ... This language lacks those letters not given here, and it has others added from ours where it has the need. And they no longer use their characters at all, particularly the young people who have learned ours. (author's translation)

Full understanding of this passage has been slow to develop. For Brasseur de Bourbourg (1864), the manuscript he had discovered provided nothing less

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[15] Note, in this connection, the nature of the corrected errors in the manuscript, many of which do not suggest reconsidered composition but rather mistaken copying. Thus, there are several instances of sign lists with items added in the margins, a caret (^) indicating whence they were inadvertently omitted—e.g., <Muluc> on f. 38r, <chuē> on f. 42r, and the well-known <p> on f. 45r (Tozzer 1941:170). There are also several instances of corrections in situ—e.g., **AHK'AB** accidentally drawn for <Ik> on f. 28r before being scratched out but left in place, with correct **IK'** and <Ik> gloss following; **AJAW** accidentally repeated on f. 34v and the diagnostic elements of <Ymix> supplied over it in palimpsest; and <Chicchā> accidentally drawn for <Kan> on f. 39v before it was scratched out and the correct <Kan> drawn after it. Importantly, the same kinds of errors appear also in the Roman text—e.g., <de> is carelessly repeated across the break between f. 44v and 45r; <e> is accidentally written on f. 45r, l. 5, crossed out, and then followed by the wanted <L>, the next clause indicating whence <e> was likely borrowed; and, finally, <pero> is inadvertently omitted on f. 45r, l. 11, and then reinserted above the line with the use of another caret. These and kindred errors offer considerable support for Restall and Chuchiak's (2002:660-661) conclusion that the *Relación* is "a late seventeenth century copy of some Landa material."

[16] As a further indication of the sixteenth-century provenance of the original text(s) of the *Relación*, note the abbreviations <aunq̄>, <nr̄os>, <porq̄> and <q̄> for *aunque*, *nuestros*, *porque* and *que*, respectively, all characteristic of that period (Carlin 2003:93-95, 122). Note also the occasional use of an overbar to represent an omitted final nasal in <escriviā> for *escribian* and <Tambiē> for *Tambien*, a practice already noted in <Chicchā> for *Chicchan* on f. 39v and <chuē> for *chwen* on f. 42r. This was a widespread sixteenth-century convention frequently employed elsewhere in Mexico (e.g., Lockhart 2001:107-108) and stemming from the medieval manuscript tradition (Clemens and Graham 2007:90).

[17] Here I have extracted an out-of-place <h>. This most likely pertained to the nearby glyphs, as the missing gloss for the second of three signs, which appears to have been accidentally inserted into the midst of the textual sequence <la hache tiene a · h · ante de si>.

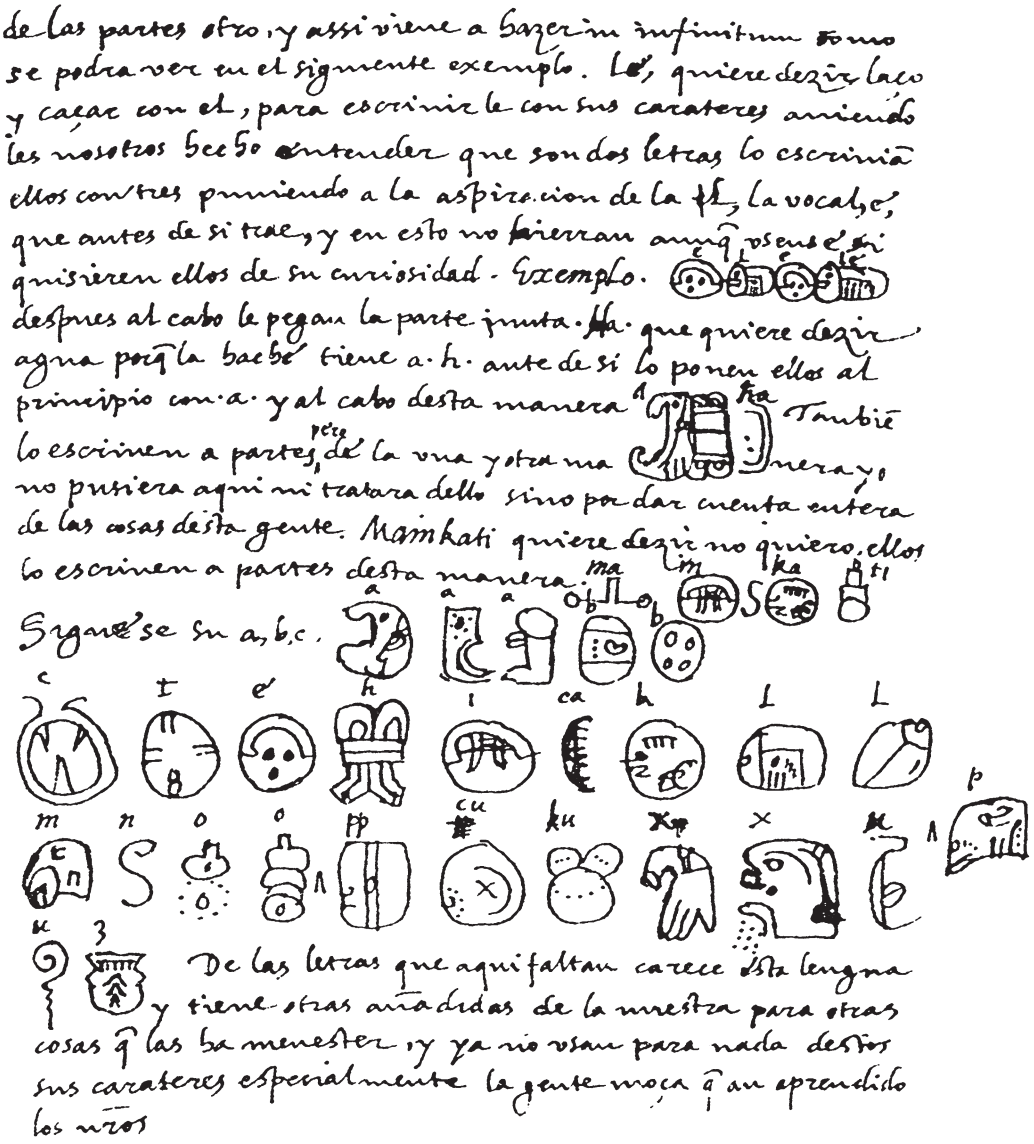

Figure 3. The *Relación* abecedary. Detail of *Relacion de las cosas de Yucatan*, folio 45r, Real Academia de la Historia, Madrid, ms. no. 12-24-3.B-68 (photograph by Juan de Dios de la Rada y Delgado, ca. 1882, after G. Stuart 1988:25).

than an authentic ancient Maya alphabet, whereas to his contemporary Philipp Valentini (1880:71-75) it represented an equally obvious Spanish imposture. The problem in both cases was a naive interpretation of the manuscript's sign list as an alphabet along the familiar Semitic, Greek, and Roman lines. In the midst of their heated debate on the nature of phoneticism during the 1950s, Thompson and Knorozov were the first scholars to explicitly call attention to what now seems obvious: that the *Relación*'s abecedary "consists of 27 signs corresponding to the *Spanish names* of such letters of the alphabet as represent sounds present also in Maya, for it is abundantly clear ... that Landa pronounced the letters *name* by *name*" (Thompson 1959:349; his emphasis)—i.e., that he "was naming, not pronouncing, the letters of the Spanish alphabet" (Thompson 1959:355). Knorozov made essentially the same observation, but he also fully recognized its implications:

> The reading of Landa's Maya signs usually corresponds not to the reading of the Spanish letters but to their names. In cases when the name of the letter has two syllables [e.g., *hache, ele, eme, ene*] the Maya sign conveys one of these syllables. In two cases [*ca* and *cu*] Landa writes the name of the letter directly instead of the letter itself. ... Two more signs (*ha, ma*) not found in the list are found in Landa's examples. The first two examples and Landa's obscure commentary on them have been studied by virtually no one, and until recently were not explained. ... Actually, Landa's first two examples and his commentary on them are the result of a

> misunderstanding. Landa, following the European custom, dictated by letters ..., and then pronounced the whole word: *ele-e-le, hache-a-ha*. The Maya scribe, being unaccustomed to such dictation, wrote down precisely what he heard... (Knorozov 1967:52-53; contents of square brackets added)

This sheds considerable light on the commentary accompanying the abecedary. In retrospect, it now makes perfect sense that the "two letters" in *le'* were elicited by naming them—i.e., as *ele* and *e*—and that this naming of letters likewise motivated the digression regarding the letter names *ele* and *hache* beginning with the sounds *e* and *a*, respectively, as the author(s) of the *Relación* sought to make sense of the large grouping of characters somehow elicited by asking for "*ele, e, le'*" and "*hache, a, ha'*." We can take Knorozov's insight still further, however, if we recognize that the abecedary comes to us from a remarkable and complex time in the history of the Spanish language and its orthography, and that it already reflects several adaptations of the Roman alphabet for recording the Colonial Yucatec language. Thus, the abecedary would have been elicited not only by naming the Spanish letters (in their sixteenth century forms), but also by the elimination of the digraphs <ch>, <ll>, <ñ>, and <rr>, which were not yet considered to be separate letters of the Spanish alphabet (Nebrija [1492]1926:23-25). Roman letters not employed in writing Yucatec are unlikely to have been elicited, except in error, such as <d>, <f>, <g>, <j>, <r> and <v>. But several novel letters and digraphs which had already been developed to record Yucatec clearly were elicited, such as <k> for /k'/ and <pp> for /p'/, while still others seem not to have been asked for, such as <th> for /t'/, <tz> for /ts/, and <ɔ> for /ts'/, perhaps because all but <ɔ> were digraphs, omitted for the same reasons as the Spanish digraphs (see Durbin 1969:176-178), and because <ɔ>, which was not replaced by <dz> until the late nineteenth century, had no place in the model alphabet. Given these considerations, we can now tentatively reconstruct the elicited letter names of the abecedary, comparing them to the known or surmised pronunciations of those names, the provided glosses, and the known or suspected values of the associated Maya signs (Table 1).

Note that a few of the forms in Table 1 are conjectural or uncertain and therefore queried. Mid-sixteenth

Letter name	**Pronunciation of name**	**Gloss(es)**	**Glyph(s)**
a	[a]	a, a, a	**a**, **a**, **a**
be	[be]	b, b	**be** or **bi**, ?**bi**
çe	[se]	c	**se**
de	[de]	t	**te**
e	[e]	e	**e**
hache	[ˈa.tʃe]	h	**che**
i	[i]	i	**i**
ca	[ka]	ca	**ka**
?*ka*	?[kʼa]	k	**kʼa**
ele	[ˈe.le]	l, l	**le**, ?**lu**
eme	[ˈe.me]	m	?**me**
ene	[ˈe.ne]	n	**ne**
o	[o]	o, o	**o**, **o**
pe	[pe]	p	**pe**
?*ppe*	?[pʼe]	pp	?**pʼe**
qu	[ku]	cu	**ku**
?*ku*	?[kʼu]	ku	**kʼu**
ere	[ˈe.ɾe]	y	**ye**
ese	[ˈe.ʂe]	x	?**xe**
u	[u]	u, u	**u**, ?**u**
dze, *tse*, or *se*	[dze], [tse], or [ʂe]	ʒ	?**tse**, ?**se**

Table 1. Letter names of the abecedary compared to known or surmised pronunciations, provided glosses, and known or suspected values of associated Maya signs.

century Spanish phonology and orthography were both in a considerable state of flux (Penny 2002:8-30), and at least three of the Maya signs are still unattested in sources outside the *Relación*. Regarding discrepancies between what was elicited and what was provided, note that XGC **te** clearly appears where only *de* could have been elicited. As Marshall Durbin was the first to recognize, "[w]hile Landa was reciting the alphabet to his informant he remembered to leave out most non-Maya sounds except [de]. ... As soon as the informant wrote the sign Landa must have recognized that the informant heard [te] instead of [de] and made a mental note not to elicit *t* farther on its proper place and to refrain from eliciting other non-Maya sounds" (Durbin 1969:175).[18] Durbin is surely correct about Spanish *d* being heard as Maya [te], and yet I suspect the non-Maya letter *r* (*ere*) was accidentally elicited as well, in its predicted position between *q* and *s*, and that this was what prompted the presence of **ye**, glossed <y>, and therefore seemingly displaced from its customary position as the penultimate letter.[19] Similarly, the presence of *x* before *u* also seems odd at first, but it should be remembered that the sixteenth-century Spanish *s* was an apico-alveolar [s̻]. When Spanish words containing this sound were borrowed into Mesoamerican languages, [s̻] was routinely transformed into [ʃ] (Lockhart 2001:119, Campbell 2013:88-90). Thus, while the intention was almost certainly to elicit *ese*, this would have been pronounced [ˈe.s̻e] and apprehended by the Maya informant as [ˈe.ʃe], prompting him to write **xe** instead (see Durbin 1969:177 for a similar account). Finally, note the remarkable provision of three distinct signs for *a* and two for *b.* Would that such profligacy had continued! Sadly, this seems instead to have prompted a request that no more than one glyph appear per letter. This helps to explain why Spanish letter-names with two syllables prompted only the second syllable as a sign. That is, upon hearing [ˈa.tʃe], [ˈe.le], [ˈe.me], [ˈe.ne], [ˈe.ɾe], and [ˈe.s̻e], and having been admonished to write no more than one sign per letter, and also recognizing that he had in fact already given several signs for the sounds [a] and [e], the Maya informant wrote only **che** [tʃe], **le**, ?**me**, **ne**, **ye** [je], and ?**xe** [ʃe].

There are numerous important implications of the *Relación* abecedary that I have no space to pursue here.[20] But one particularly significant one is the potential phonetic sign **me** which emerges from new understandings of the biscript. Outside of the *Relación*'s abecedary the sign is relatively rare (Figure 4), with only fifteen reasonably secure Late Classic contexts spanning from ca. AD 680–803 (Table 2). Note, however, its broad spatial distribution, in texts from at least half a dozen sites across the southern Maya lowlands, including Caracol, Copan, La Mar, Palenque, Piedras Negras, and Yaxchilan. Like many better known signs, it is presently unattested in Late Preclassic and Early Classic inscriptions. While this may indicate its invention during a documented surge in sign development in ca. AD 650–700 (Grube 1994:178-179), it must also be remembered that our corpus of early texts is significantly smaller and less diverse than those of the Late Classic period (Zender 2004a:387-391, Table 10), and the sign may simply fail to appear in those few early texts which have survived. Unfortunately, the sign is also unattested in the Postclassic codices. Nonetheless, its appearance in the *Relación* obviously indicates that it survived the vicissitudes of the ninth-century collapse alongside a considerable portion of the Late Classic signary (Grube 1994:179). Given its overall rarity and its absence from the codices, the sign does not appear in Thompson's *Catalog* (1962). Macri and Looper (2003:278) capture it under the designation 1SE, their type example coming from Palenque's Tablet of the 96 Glyphs (Figure 4e). They also note that the sign remains undeciphered, but cite various tentative identifications in the literature, including **BUCH** by Linda Schele, **bu** by Michel Davoust, and **me** (Martin, Zender, and Grube 2002:16). I first proposed the latter in 2001, in an email sent to colleagues (cited in MacLeod 2004:299), but while I have since presented the evidence at several international meetings (Lacadena and Zender 2001; Zender 2003, 2005b), other projects have thus far prevented its formal publication. As a result, the **me** reading has now

[18] Earlier scholars had seen the <t> in the abecedary as the result of eliciting *ch* (Zimmerman 1956:15) or even *k* (Knorozov 1967:23). Yet the position of this sign between *c* and *e* strongly suggests that *d* was indeed elicited. Further, hearing unvoiced [t] for voiced [d] in a language without voiced consonants is a well-known phenomenon; see Lockhart (2001:119) for the representation of Spanish *d* by <t> in Classical Nahuatl texts.

[19] The sounds in question, an alveolar tap [ɾ] and a palatal approximant [j], are not as different as they seem. Several languages of Mesoamerica have actually undergone the sound change **r* > *y*, including intervocalically either before or after a high vowel in Uto-Aztecan (Dakin 2007:298-299) and in all known environments in two or more branches of Mayan (Campbell 1977:97-100).

[20] Briefly, it would be nice to attest ?**p'e** and ?**xe**, and to resolve the sign given for <ɜ>. (In note 27 below, I propose a Classic antecedent for the second <u>.) Additionally, we do not know why ?**bi** and ?**lu** were provided as second examples of <b> and <l>, respectively. It is possible that the former was actually read **be** or even **BE**(**H**) in the Yucatec language of the informant(s), but this requires demonstration. Similarly, the sign long read ?**lu** lacks diagnostic elements present in other examples; it may prove to be something else. Finally, there is much to be done in relating iconic and lexical origins of signs. Valentini (1880:80-85) linked **be**/**bi** to Yucatec *beh* 'path' and **ne** to *neh* 'tail,' but he also derived **a** from *ahk* 'turtle,' a misidentification now commonplace (e.g., Knorozov 1967:98, Item 273; Thompson 1950:116, 1962:324-326; Tozzer 1941:170 n. 893; Tozzer and Allen 1910:321-323). By contrast, I believe Brinton (1870:5) was correct to see **a** as "the head of a bird with a long curved beak, probably a species of parrot," even though we have yet to discover a candidate lexeme with initial *a*. Nonetheless, "parrot" neatly explains the occasional wings (e.g., MQL Str. 4 Blocks, F, and TIK MT-38A). The sign is ancient, already present in the Late Preclassic Ixim murals of San Bartolo, Guatemala (David Stuart, personal communication 2015), perhaps sufficiently early to confound the identification of its source lexeme.

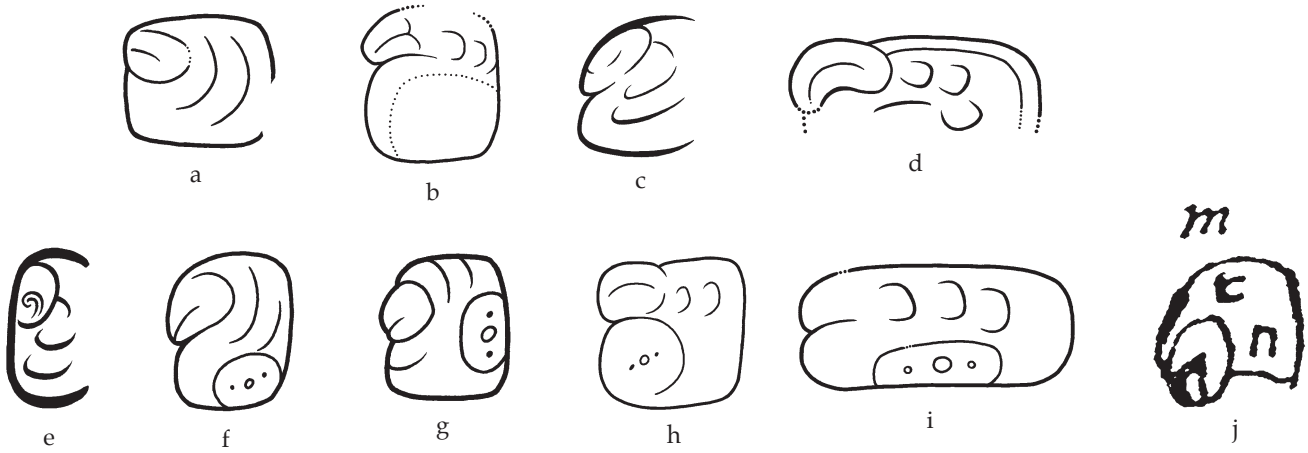

Figure 4. A selection of 1SE **me** signs, cross-referenced to Table 2: (a) PAL-area panel, item 3; (b) CPN HS, item 4; (c) COL K8885, item 6; (d) CPN St A, item 7; (e) PAL 96, item 10 (drawing courtesy of Simon Martin); (f) PNG St 12, item 11; (g) PNG St 12, item 13; (h) MAR St 3, item 14; (i) CRC, BCM 3, item 15; (j) COL *Relación* f. 45r, item 16.

been widely adopted in the literature even though the evidence in its favor has yet to be made widely available.[21] The remainder of this paper seeks to remedy that lack by exploring the contexts and behavior of the **me** sign in light of the perspectives and principles set forth above, as a case study in decipherment, underscoring in particular the extent to which this reading both satisfies and exemplifies the importance of the distributional and evidentiary criteria set forth above.[22]

Distributional Criteria

In order to pursue the investigation of 1SE as a phonetic sign—let alone a C**e** sign, or one with the specific value **me**—we must first establish that it meets the distributional criteria for such signs. Regarding its identification as a CV syllable rather than a logogram, we may recall that those signs which most frequently associate with phonetic signs are likely to be phonetic signs themselves, particularly if the other signs frequently share a vowel (Stuart 1995:49). From Table 2, we can confirm that 1SE appears alongside the phonetic signs **ke**, **k'e**, **se**, and **te** in all but two examples (items 8 and 16). This supports its tentative identification as another phonetic sign. With respect to its identity as a C**e** sign, recent refinements in our understanding of Classic Maya orthography reveal that word-final C**e** and C**o** signs do not participate in the disharmonic rule which indicates vowel complexity (Zender et al. 2016:39). As such, the appearance of 1SE immediately before other C**e** signs (items 1-2, 4-7, 10) provides additional support for a C**e** value.[23] Further than this we cannot go on the basis of orthographic distribution alone, and we must turn to more detailed contextual analyses of the morphological and semantic

[21] Since my initial proposal in 2001, the **me** sign has been incorporated into several syllabaries (e.g., Johnson 2013:39; Kettunen and Helmke 2005:50; Stuart 2013) and its better-known contexts have also appeared in several dictionaries and sign lists (e.g., Boot 2009a:129; Johnson 2013:298, 314; Kaufman and Justeson 2003:953; Mathews 2004; Mathews and Bíró 2005). More recently, the sign and a few of its contexts have also entered the specialist literature (Bíró and Reents-Budet 2010:78; Gronemeyer 2014:608; Grube and Gaida 2006:208-211; Helmke et al. 2006:18, n.15; Hull 2003:492 n.83; Law and Stuart 2017:165; Prager and Wagner 2016:12; Robertson et al. 2007:29, 52).

[22] I follow Houston et al. (2001:8) in making little distinction between "primary decipherment" and the ongoing investigation of sign values, orthographic practices, abbreviational conventions, paleographic developments and grammar of an ancient script (see also Houston and Martin 2016:444; Zender 2013:59). Thus, while Champollion (1822) is properly credited with initiating the decipherment of Egyptian, Lepsius (1837) nonetheless made key contributions to its systematization, particularly in his recognition of new formal categories of Egyptian signs (the biliterals and triliterals), and Gardiner (1957) established the first authoritative sign list and reference grammar. Further, as Loprieno (2001:227) has noted, there remain "considerable differences among specialists (especially in the area of syntactic analysis)" and continuing "uncertainties [regarding] the exact phonological value of several consonants." The work of Egyptian decipherment is not complete even today.

[23] The principle is not infallible. Occasionally, C**e** and C**o** signs are found in final position after signs with which they do *not* share vowel quality. These apparent exceptions to the general rule are usually due to abbreviation. Thus, on Copan Altar Q, **o**-**ke** spells *oke[l]*, "feet" (Stuart 2003:238) and **ya**-**k'o** spells *ya[h]k'o[l]*, "above him" (Stuart 2017:3). In both cases, the scribe has suspended final *-l* (Zender 2014a:8). Similarly, on Yaxchilan Lintel 8, A2, **ka**-**se** spells *Kase[w],* with suspension of final *-w* (Justeson 1978:229-231). These spellings appear a priori disharmonic, whereas they are merely telegraphic: the exceptions that prove the rule. Similarly, all signs in Maya writing are subject to haplographic abbreviation, where a sign written once is nonetheless intended to be read twice, as where **u**-**ne** provides *une[n]* 'baby' (Zender 1999:98-130, 2010:4-5, 2014a:8). Were the **u** syllable undeciphered, we would want to avoid simply assuming that it was a C**e** syllable.

#	Context	Spelling	Date[24]	Reference(s)
1.	Copan, Altar H', north, P2	**u-<u>me</u>-k'e**	27 July 680	Schele et al. 1994
2.	Copan, Altar I', west, A'1	**u-<u>me</u>-k'e**	9 Oct 680	Schele et al. 1994
3.	COL, Palenque-area panel, caption	**AJ-se-me-?TAL-la**	ca. 684-702	Miller and Martin 2004:85; Schaffer 1997
4.	Copan, Hieroglyphic Stairway, G1b	**[te]me-ke** or **me[te]-ke**	26 Nov 710	Gordon 1902:Plate 12; Houston et al. 2015:20
5.	Palenque, T.XXI fragment, B1-B2	**u me-k'e**	2 Dec 711	Bernal Romero 2006
6.	COL, Ethnological Museum, Berlin, IV Ca 50468 (K8885), Blocks 2-3a	**ti-ni**-T650-**la me-te**	ca. 700-725	Grube and Gaida 2006: 208-211; Zender 2005
7.	Copan, Stela A, back, C8b	**u-me-k'e-ji-ya**	31 Jan 731	Bíró and Reents-Budet 2010:78
8.	Yaxchilan, Throne 2, west, Block 7	?**u-me**-...	ca. 760	Mathews 1988:150, Fig. 5.8
9.	Copan, Str 10L-11, WN panel, C4-C5	**u-TUN-nu te-me**	26 Dec 775	Schele 1987; Schele et al. 1989; Stuart 1987
10.	Palenque, 96 Glyphs, E6	**u-me-k'e-ji-ya**	21 Nov 783	Zender 2014b:8-9
11.	Piedras Negras, Stela 12, W1	**<u>k'e</u>-<u>se</u>-me-TOOK'**	12 Sept 795	Stuart and Graham 2003:62, 63
12.	Piedras Negras, Stela 12, C4	**<u>k'e</u>-<u>se</u>-<u>me</u>-<u>TOOK'</u>**	12 Sept 795	Stuart and Graham 2003:62
13.	Piedras Negras, Stela 12, D15	**AJ-k'e-se-me-TOOK'**	12 Sept 795	Stuart and Graham 2003:62
14.	La Mar, Stela 3, C2-C3	**AJ-k'e[se] me-TOOK'**	12 Sept 795	Zender 2002:179-181; Golden and Scherer 2015
15.	Caracol, Ballcourt Marker 3, C6	**u**-?2-**su-lu me-cha**/**se**	23 Nov 803	Chase et al. 1991:Fig. 3; Helmke et al 2006:18 n. 15
16.	COL, *Relación* biscript, f.45r	**me** (glossed <*m*>)	ca. 1566-1579	Restall and Chuchiak 2002:655, Table 1; Stuart 1988:25, Fig. 1

Table 2. Known contexts of 1SE **me** in chronological order (queried signs uncertain, underlined signs reconstructed).[25]

[24] European equivalents of Maya dates are given in the Martin and Skidmore (2012) correlation.

[25] The following 1SE candidates were closely scrutinized before being rejected on the basis of formal, contextual, or preservational criteria. I reference them here to indicate that they were taken into consideration, underlining the element in question and providing what I take to be the more likely identification, where that can be determined: (1) COL K635, Z1, ?**<u>le</u>-TI'-[i]tz'a-ta**; (2) COL K732, A1, ?**<u>le</u>-k'e**; (3) COL K1250, ?**<u>le</u>-ti-i**; (4) CRC St. 16, D13, **IX**-<u>?</u>-T703; (5) PAL House C, Eaves, NE Corner, A2, 1-**na-ta**-?**la** [<u>?</u>]T703; (6) PAL Palace Tablet, F13, **IX**-[<u>?</u>]T703-**AJAW**; (7) ETZ HS 1, Blocks 73-74, <u>?</u>-ZY9; (8) PMB Jade Earflare, K2913, **yo**-?**<u>o</u>**; (9) TNA "War Panel," pA5, AD 564, ?**<u>le</u>-TI'**; and (10) YAX L. 35, D1, **K'AN-te**-?**<u>le</u>-a**. Nonetheless, some of these contexts merit further investigation (e.g., items 4-6, where imperfect records of an Early Classic unconflated context presently thwart a confident identification).

contexts in which the sign appears. As will shortly be demonstrated, the sign is found to participate in the spelling of a CVC root transitive verb in at least two contexts (items 7 and 10), and such verbs are invariably spelled synharmonically in the Maya script (Stuart 2002, 2008). Since the other sign in these contexts is the phonetic syllable **k'e**, this gives us every reason to pursue the possibility that 1SE encodes a different C**e** syllable. The *Relación* biscript and its <*m*> gloss suggests that its value was **me** (item 16), and this is the hypothesis we will pursue.

Given David Stuart's (1995:56) useful rule of thumb that "the most convincing readings are demonstrable in *at least three independent contexts*" (my emphasis), we now turn to an investigation of *all known contexts of the sign*, drawing on whatever pictorial, contextual, and grammatical evidence we can find in the hopes of encountering *at least two additional environments* with sufficiently strong constraints to secure the decipherment suggested by our biscript.[26] Not all contexts are equally robust, and at least five of our sixteen examples of 1SE are insufficiently probative to merit close contextual investigation (items 3–4, 8, 12, 15). Two of them provide otherwise unique and in any case unconstrained names or titles (items 3 and 4). One of those involves infixation of **te** into 1SE (item 4), invoking a non-predictive reading order further confounding analysis. Another, as highlighted by Helmke et al. (2006), provides an unclear context, two equivocal sign values, and a late orthography departing from earlier norms (item 15). Two final contexts are simply too badly damaged to allow confident contextual assessment (items 8 and 12). Despite this catalog of uncertainties, it should be noted that the identification of 1SE in these contexts is not in doubt. As such, all five contexts still provide crucial information about the sign's behavior, not least its association with other C**e** syllables. They are also informative with respect to paleography, including the evident eighth-century development of an infixed oval enclosing three or more dots (Figure 4, f–i), a marker of rough surface texture (Houston et al. 2006:16). Plainly these contexts may not be ignored. And yet we must recognize them for what they are: insufficiently constrained to be of use in decipherment as such. These contexts will be explained only once the **me** decipherment has been achieved on other grounds, to which we may now turn.

Pictorial References and Virtual Bilinguals

On display in the Berlin Ethnological Museum is a fragmentary Late Classic incised marine shell (Figure 5). The remarkable artistry of this miniature object has to be seen up close and in person to be believed. At only 5.4 cm in height, the seven finely-incised glyph blocks adorning its surface average slightly less than 1 cm^2. The incised image is equally delicate and depicts a lively macaw perched on a window sill, its beak open and squawking in evident delight at the seeds or similar provender offered up in someone's hand. Taken together, thirty-five signs distributed over seven blocks and an associated image provide a degree of contextual information strikingly belied by this object's diminutive proportions, incomplete nature, and lack of provenience. Although first published in a catalog of the museum's collections in 2006 (Grube and Gaida 2006:208-211), a photograph by Justin Kerr had been circulated a year or more previously, and the text was quickly recognized as containing one of the earliest constrained contexts of 1SE (Zender 2005a). Since then, it has been discussed by several colleagues, each contributing valuable perspectives (Davletshin 2013:87; Law et al. 2013:47; Mathews 2005). The analysis offered here is in substantial agreement with their interpretations, but also departs from them in several ways:

Blocks 1–5a

a-?**u**[27]-**le**-**li**-**ya** **ti**-**ni**-T650[28]-**la** **me**-**te**-**ya**-**a**-**la**-**ni** ?**o**[29]-**po**-**ya**-**a**[**la**]-**ji**[**ya**] **hu**-**bi**

a[w]uleliiy ti ni...[a]nal met ya'laan[30] *oop ya'lajiiy*[31] *hub*[32]

aw-(h)ul-el-iiy ti ni-...an-al met y-a'l-aa-n-Ø oop y-a'l-aaj-iiy-Ø hub

2sA-ARRIVE-nom.-deic. prep. 1sA-?-adj. NEST 3sA-SAY-them.-inc.-3sB GREEN-WINGED.MACAW[33] 3sA-SAY-them.-prf.-deic.-3sB SEASHELL

"Green-winged Macaw says 'this is your arrival at my ? nest'," said the Seashell

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[26] It is worth considering this number briefly. Having more than one context is obviously critical for, as Szemerényi (1996:328 n. 7) reminds us, "*unus testis nullus testis* (one witness is no witness)." Some take issue with this traditional wisdom, arguing that "what really matters ... is not the quantity but the quality of the attested examples" (Barðdal and Eythórsson 2006:167) or that a single robust counterexample can be more valuable than many supporting examples (Pappas 2000:175-176). Yet hapax legomena are not easily generalized, and it can be difficult if not impossible to discount the possibility that they were produced in error. Two contexts are an improvement, but any discrepancies will be difficult to generalize. A *minimum* of three examples is therefore best, offering a "majority wins" decision in the advent of discrepancy, at least as an operating principle, if not as a conclusion.

[27] This sign resembles T278/32R **sa** but is clearly distinct, as reflected in its frequent association with C**u** syllables (e.g., **bu**, **ju**, **lu**, **su**, **tu**, and **xu**). Although often entertained as a **wu** sign (e.g., Davletshin 2013:87; Grube and Gaida 2006:208-211; Law et al. 2013:47; Polyukhovych 2007), Alfonso Lacadena (2013:12) has drawn attention to its appearance as a final complement to T1016 **K'U**(**H**) (e.g., CHN Monjas L. 2A, A1). Further, it seems to provide initial **u**- in the "carving" compound (e.g., Emiliano Zapata Panel, D1; K9092, B2), and an **u** value would also be appropriate in frequent contexts where it prefixes T618 **UT** 'eye' (e.g, K1811; K3395; CML Urn 26, Pend. 1B & 9B). In light of this, a tentative ?**u** value seems warranted; indeed, I consider it likely that this is the Classic antecedent of the *Relación* biscript's second <u> (Figure 3).

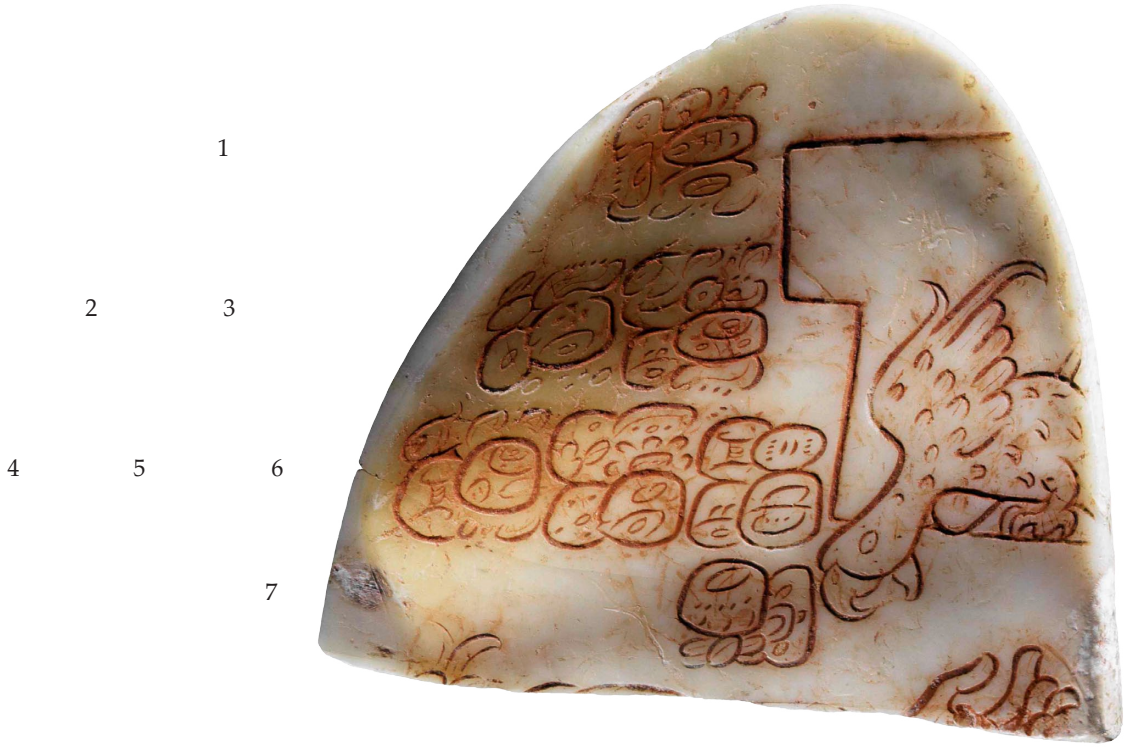

Figure 5. Inscribed marine shell, Ethnologisches Museum der Staatlichen Museen zu Berlin, IV Ca 50468 (photograph by the author).

[28] T650 is not altogether rare, but remains frustratingly opaque. Polyukhovych (2007) proposes to read it as **ch'e**, but the sign's behavior rather suggests a logogram, as here, where it likely provides a noun derived as an adjective with -V_1l. Coupled with a complementary -**na** in one context (TNA Casa del Ciempiés, Mural 1, A8), this perhaps gets us as far as (CV)C**AN**. Otherwise, as Simon Martin (personal communication 2017) reminds me, the sign almost exclusively occurs in one poorly-understood Yaxchilan-area theonym (e.g., Site R, L.1, B5-B6; YAX HS 3, Step V, D9; YAX St. 18, A13-B1; YAX L. 23, N3) and in the complex name of Dzibanche Ruler 17 (Martin 2017:Fig. 2, n. 4).

[29] Although plainly representing a feather, this sign resembles the T99 **o** "feather" rather less than one would like. But given the following **po**, and the aforementioned likelihood that any sign preceding a C**o** syllable should share its vowel, there are few reasonable alternatives.

[30] I follow colleagues in seeing the initial **ya**-**a**-**la** as providing the inflected verbal stem *-a'l(a),* 'to say,' but would add that this is rather more like Ch'orti' *a're* (Hull 2016:57) than reconstructed Proto-Ch'olan **(h)äl* (Kaufman and Norman 1984:116, Item 21), suggesting an Eastern Ch'olan innovation. Further, while Grube and Gaida (2006:211) see this form as a nominalization, and Polyukhovych (2007) as a completive, I follow Lacadena's (2013:47, 50) recent suggestion that *-n* indicates the incompletive aspect of a non-CVC transitive verb, hence **ya**-**a**-**la**-**ni**, *y-a'l-aa-n-Ø*, "he says it."

[31] Although unique, **ya**-**a**[**la**]-**ji**[**ya**] is contextually identical to and only minimally different in spelling from the widespread **ya**-**la**-**ji**[**ya**], *yal'llajiiy ~ yaljiiy*, "he said it," which Lacadena (2013:54) and Law and Stuart (2017:164-165) have recently interpreted as a relational noun with "quotative" meaning. I agree with their functional analysis of this and similar forms, but also find MacLeod's (2004) reconstruction of -VV_1j as the perfect (i.e., the anterior) etymologically compelling. I think these two positions may be reconcilable, insofar as anteriors are inherently relational (Bybee et al. 1994:54, 61-63).

[32] For **hu**-**bi**, *huub*, "seashell, conch" see Grube and Gaida (2006:211, n. 4), Stone and Zender (2011:91), and Houston (2014b:264, Fig. 13.7c). Colonial Tzeltal <hub> 'corneta (trumpet), bocina (conch shell instrument)' (Ara 1986:302[f.47v]) establishes the initial glottal *h-* (as opposed to velar *j-*, which this source indicates with <gh>), while Modern Yucatec *hub* 'shell' (Bricker et al. 1998:113) suggests a short vowel. As such, I am tempted by Kaufman's (2003:28-34) suggestion that **hu**-**bi** may provide a "patterned spelling" selected to minimize orthographic variation in possessed contexts (e.g., as *uhubi[l]*). For broader semantics note Colonial Yucatec <hub> 'caracol marino, trompeta o bocina del caracol (marine mollusk, trumpet or conch shell instrument of mollusk)' (Barrera Vásquez et al. 1980:238).

[33] For **o**-**po**, *oop*, "green-winged macaw" note Colonial Yucatec <op> 'a parrot of Honduras' (Vienna f. 351v, in Andrews Heath 1980:419) and Yucatec *š ʔòop* 'parrot' (Bricker et al. 1998:18). These and other entries were independently noted by several scholars (Barbara MacLeod, personal communication 2007; Polyukhovych 2007; Zender 2005b), but the term seems to be more specific than previously recognized. Santiago Pacheco Cruz (1958:301) specifically identified <oop> as a "guacamayo rojo" (i.e., *Ara chloropterus*, the red-and-green macaw, now better known as the green-winged macaw) and noted elsewhere that "in Yucatán and Campeche one cannot find any of these birds" (Pacheco Cruz 1939:121, my translation). Similarly, in his 1746 *arte*, fray Pedro Beltrán de Santa Rosa María cited <kan-dzul-op> as "a short-tailed macaw abounding in Tabasco" (cited by Roys 1965:135). The green-winged macaw is one of the largest members of the parrot family, and although presently restricted to eastern Panama and northern and central South America, it may have enjoyed a more northerly range in the past (Abramson et al. 1996:Fig. 1.7). The beak and periorbital dots of the Berlin parrot both suggest a macaw, and its large size (relative to the hand) also supports this identification (Peter Stuart, personal communication 2014).

Blocks 5b–7
u-ju-chi ²po-lo-?tz'i-i ba-che-bu
uju[h]chi[l] po[h]pol tz'i' ba[']chehb
u-juhch-il-Ø pohp-ol tz'i' ba(ah)-(aj)-chehb[34]
3sA-SHELL[35]-rel.-3sB *PETATE*-adj. DOG HEAD-agn.-PAINT.BRUSH
(on) the shell of Pohpol Tz'i', Chief Scribe.

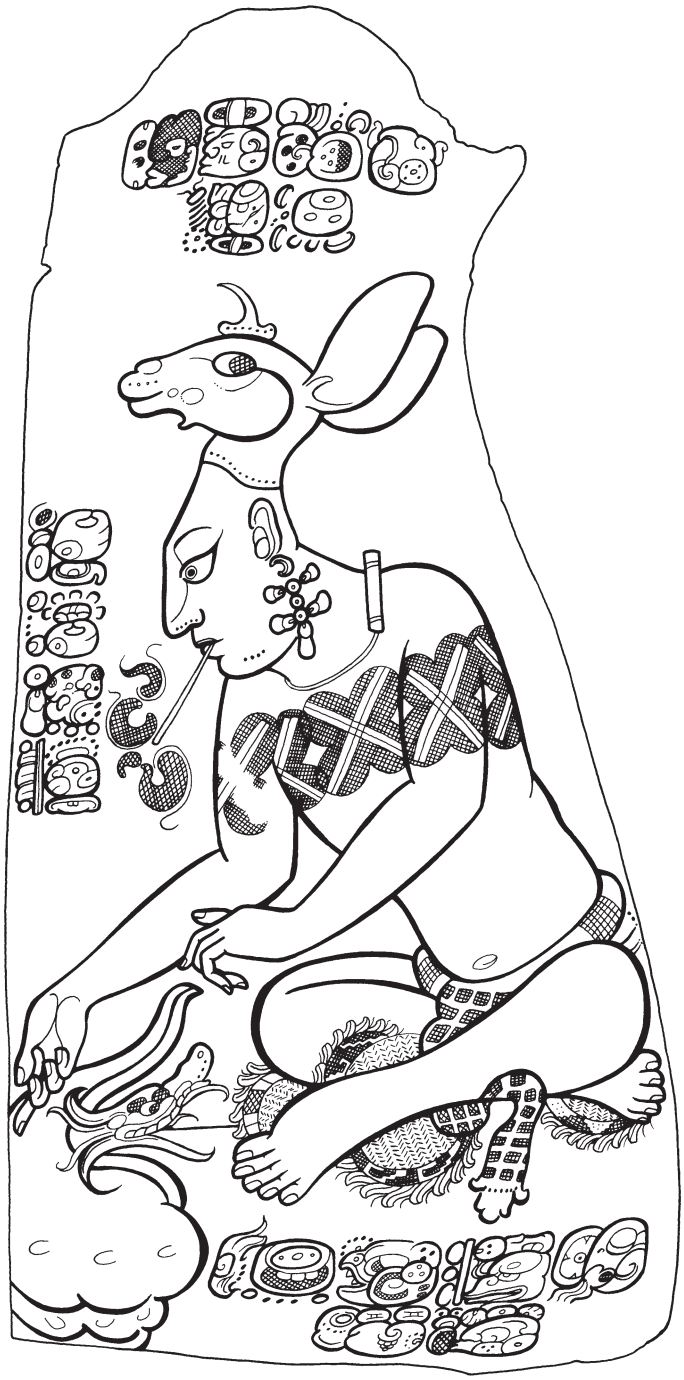

Figure 6. Inscribed marine shell, Cleveland Museum of Art, Norweb Collection, 1965.550.

As David Stuart (personal communication 2017) suggests to me, this text seems to be entirely self-referential. That is, the object itself is speaking to us through its inscription. The Cleveland Shell (Figure 6) provides additional support for Stuart's suggestion, given its parallel account of quoted speech followed by **ya-la-ji[ya] hu[bi] ti-chi-ji u-ju-chi ?IXIIM-BAHLAM-ma**, *ya[']lajiiy hub ti chi[h]j uju[h]chi[l] ixiim bahlam*, "said (the) seashell to (the) deer (on) the shell of Ixiim Bahlam" (Zender 2004a:330-331, 2011:83-85). The marine mollusk emerging from a large conch shell would seem to be the same one called out in the text, and he certainly does seem to be engaged in active conversation with a "deer," at least inasmuch as the seated male figure is wearing a deer headdress.

To return to the Berlin Shell, note the constraints provided by the conjoined text and image. The large macaw provides an important *pictorial reference* (Coe 1992:44), greatly clarifying the somewhat equivocal and still unique ?**o-po** spelling. Similarly, the quotation and incorporated first person possession serve to relate the macaw directly to the referenced nest, and this provides a reasonably strong *virtual bilingual* as well (Daniels 1996:143). Given that the **me-te** spelling is unique to this context, however, we must establish its bona fides before concluding that it mutually supports and is supported by the pictorial and contextual evidence.

At first glance, the Ch'olan languages have a rather heterogeneous group of nouns corresponding to *met*:

Ch'olti'	<met>	corona (crown) (Morán 1935:15)
	<met tix>	corona de espinas (crown of thorns) (Morán 1935:15)
	<met>	*yagual* (cloth head ring) (Morán 1935:38)

[34] That **ba-che-bu** is a scribal title (Coe and Kerr 1997:98) containing the lexemes *baah* 'head, foremost, chief' (Houston and Stuart 1998:79) and *chehb* 'paintbrush' (Boot 1997) is not in doubt. But *chehb* is not itself a title and requires an agentive prefix to be derived as one: *aj-chehb* 'painter, calligrapher.' Etymologically, then, "head painter" would be *baah-aj-chehb*. The unstressed vowels separated by a glottal fricative would likely undergo morphophonemic reduction to *ba'chehb*, as in Ch'orti' *a'n* 'green ear of corn' (Hull 2016:57) from earlier *ajan* (Zender 2014b:7-8). I suspect that it is these morphophonemic processes which motivate the **ba-che-bu** spelling.

[35] For **ju-chi**, *juuch*, "shell" see Houston et al. (1998:279, 2004:87), Grube and Gaida (2006:211 n. 5), and Boot (2009a:87). The initial velar is clear in Colonial Tzeltal <ghuch> 'ostión (oyster, mollusk)' (Ara 1986:296[f. 43v]), whereas Ch'ol *jujch* '(mussel) shell' (Hopkins et al. 2011:88-89) indicates the internal *h*. Given that the Classic term is presently attested only in possessed contexts, it seems unlikely that **chi** here indicates a complex vowel (pace Houston et al. 2004:87; Lacadena and Wichmann 2004:144). Rather, I suspect it provides the vowel of the relational suffix *-il*, with final *-l* merely suspended (Zender 2014a:8; see also Kaufman 2003:28-34).

Ch'ol	*met*	nest (Aulie 1948:19; Whittaker and Warkentin 1965:163; Attinasi 1973:294; Torres and Gebhardt 1973:15; Aulie and Aulie 1978:79)
Chontal	*met*	bracelet (Knowles 1984:439)

On the basis of these forms, Kaufman and Norman (1984:125) proposed the Proto-Ch'olan reconstruction **met* 'crown.' Somewhat more tentatively, and factoring in Mopan *met* '*yagual* (cloth head ring)' (Hofling 2011:305), Kaufman proposes Proto-Mayan **meeT 'yagual'* (Kaufman and Norman 1984:125; Kaufman 2003:1031), where the *-T* indicates some uncertainty as to whether the final consonant would have been plain or palatalized. Yet it must be admitted that, even with the supportive gloss from Mopan (a Yukatekan language), a semantic reconstruction of 'cloth head ring' seems on somewhat shaky ground. Thankfully, however, there are now indications that *met* is not quite so isolated as previously assumed:

Wastek	*mēch*	rodete en que se puede asentar una olla (roll on which one may set down a pot) (Larsen 1955:37)
Yucatec	*met*	bend, twist (Bricker et al. 1998:184)
	méʔet	trivet, circular base, stand (Bricker et al. 1998:184)
Col. Yuc.	<met>	ruedo, rodete, o rodilla sobre que sea asienta qualquier vasija (circle, roll, or small wheel upon which one sets any vessel) (Motul I, f.305v)
	<metpolbil>	hair plaited and put in a circle on the head (Vienna, f. 305v, Andrews Heath 1980:371)
Ch'orti'	*met-e*	cruzar los pies, torcer (cross one's legs, twist) (Pérez Martínez et al. 1996:139; Hull 2016:279)
	mejt-a	ser torcido (be twisted) (Pérez Martínez et al. 1996:139)
	met-er	estar con pies cruzados (be cross-legged) (Hull 2016:279)
Ch'olti'	<metel>	redondo (round) (Morán 1935:58)

There is much of interest here. To begin with, the final *-ch* of the San Luis Potosí Wastek form allows us to propose a more narrow reconstruction of Proto-Mayan **meet* (see Campbell 2017:49 for the relevant Wastekan correspondences). Second, note that the Yucatec transitive verbal root *met* 'bend, twist' serves as the source of the passive noun *me'et* 'trivet, circular base, stand,' as well as the Colonial Yucatec form <met> 'circle, roll, or small wheel upon which one sets any vessel.' That is, a *me'et* is something which has been bent or twisted into a circular shape. In this connection, note also the Ch'orti' verb *met* 'cross one's legs, twist,' from which most likely derives both the positional stative/adjective *met-er* (earlier Ch'olti' *met-el*) 'be cross-legged, twisted, round' and the Ch'olti' noun <met> 'crown' or 'cloth head ring.' Indeed, despite their seeming heterogeneity, all of the nouns glossed above—including 'crown,' 'cloth head ring,' 'nest,' 'bracelet,' 'circle,' 'roll,' 'small wheel,' 'plaited bun,' and 'circular base'—fit the description of objects bent or twisted into circular shapes. Given these connections, we can propose some additional nuances to Kaufman's Proto-Mayan reconstruction, beginning with an original verbal root **met-* 'to bend/twist (into a circle)' and one or more nominal derivations (i.e., **me'et* and/or **meet*), though these could have followed later, perhaps even independently in two or more branches of the family, signifying 'an object bent/twisted into a circle (e.g., *yagual*, nest, bracelet, hair bun).'

If such a set of developments seems unlikely, consider the term *yagual* itself, thus far glossed as 'cloth head ring.' *Yagual* is a Mexicanism derived from Nahuatl *yahualli*, which Molina ([1571]1970, II:31v) defined as "assentadero de olla, o de tinaja hecho desparto o de cosa semejante (a support for pots or jars made out of woven grass or a similar substance)" and Siméon ([1885]1992:163) as "[a]lmohadilla de marmita, de cántaro, etc. (a seat cushion for a sealed jar, amphora, etc.)." The source semantics adequately capture the sense of the Mexicanism, as can be seen in Santamaría's definition of *yagual* in his invaluable *Diccionario de mejicanismos* as a "rodete, generalmente tejido de fibras, de mimbre o de bejuco, que sirve para cargar a la cabeza y para sentar la jícara o vasijas de fondo combado (a roll, generally woven of fibers, wicker, or liana, which assists in carrying items on the head and in supporting gourds or vessels with round bottoms)" (Santamaría 1974:1128). Thus, while I follow Hofling's (2011:305) parsimonious translation of *yagual* as "cloth head ring," it should nonetheless be kept in mind that the object in question is really just a twisted circle of pliant material intended to support round-bottomed vessels (whether carried on the head or not). Etymologically, the Nahuatl term *yahualli* literally means 'something round or circular, a circle, an encirclement' (Bierhorst 1985:403). It is transparently a passive noun derived from the same root as the verb *yahualoā* 'to encircle, go around something' (Karttunen 1983:334) and its reflexive stem *moyahualoā* 'to become coiled (of a snake)' (Bierhorst 1985:403). Although evidently lexicalized in Classical Nahuatl as a specific term for *yagual*, it nonetheless continues to refer generally to 'round things' in the Chicontepec Nahuatl dialect of the Huasteca (Sabina

Cruz, personal communication 2015). In the pueblo of Tlamacazapa, Guerrero, the cognate *yowal* means "*rueda* (wheel)" (Aburto and Mason 2005:179), whereas in the municipalities of Mecayapan and Tatahuicapan, Juárez, Veracruz, the compound *ma̲tayáhual* (< **matla-yahual-li*, lit. 'net circle') means "red circular para pescar (circular net for fishing)" (Wolgemuth et al. 2002:205). It would seem, then, that a pre-Nahuatl verb root **yahua* 'make round/circular' generated distinct nouns meaning not only *yagual* proper, but also circle, coil, and wheel, in a pattern strikingly like that which I suggest for Proto-Mayan **met* and its nominal derivatives.[36]

In light of these interesting semantic patterns, the consideration that *met* 'nest' only survives in Ch'ol need not be taken as evidence that the Berlin shell was authored by a Western Ch'olan speaker, nor even necessarily that the specific sense of "nest" had a much wider currency during the Classic period. Rather, the visual appearance of a bird's nest would have been sufficiently striking to promote the occasional use of a generic term *met* "object bent/twisted into a circle" to refer to nests as needed. Taboo avoidance may also have played a role, occasionally prompting the use of a generic circumlocution in place of the more narrow, regionalized, and occasionally species-linked terms for nest, such as *k'u'* (Western Mayan), *pech(ech)* (Tzeltalan), *sihk* (Ch'orti'), and *sok*/*sook* (Ch'olti' and Eastern Mayan). To judge from modern Mayan languages, additional generic descriptors for "nest" would surely have included *naah* 'structure' and perhaps also *wayib* 'bed, sleeping place.'[37]

The larger point is that *met* would seem to have been a widespread generic descriptor in Ch'olan and Yukatekan languages, and would therefore have been available during Classic times to refer to nests or indeed any other object bent or twisted into a circle. The Classic Mayan terms *met* 'object bent/twisted into a circle (i.e., nest)' and *oop* 'green-winged macaw' thus provide significant support to, and are in turn supported by, the *pictorial reference* of the depicted macaw and the *virtual bilingual* provided by the quotation indicating to whom the nest belonged.

Orthography, Morphology, and Semantics

We now pass on to contexts that, while less constrained in and of themselves, nonetheless provide crucially independent environments in which to test the hypothesis that 1SE functions as the phonetic sign **me**. Not only must the new reading prove productive in these new contexts (that is, it must "make sense") but it will also need to agree with increasingly refined understandings of Classic Maya orthography (including abbreviational conventions) and glyphic grammar. At every turn, we will have the opportunity to either refine or reject the **me** value should it fail to meet any of these criteria.

Umek'jiiy Sak Nuhkul Naah

In 1935, the Tablet of the 96 Glyphs (Figure 7) was encountered in rubble between the base of the Tower and House E of Palenque's Palace by Miguel Ángel Fernández (1985). It seems to have comprised part of a still uncertain arrangement of finely engraved panels associated with the blind stairway on the tower's south side, including the famous Creation tablet, the Orator and Scribe tablets, the Palace Intaglio in the Museo Nacional, and a close cousin to the latter in the San Diego Museum of Man (Porter 1994; but cf. Stuart and Stuart 2008:257 n. 15). A badly deteriorated stucco scene above the steps may have provided a frame for the composition (Robertson 1985:78). Epigraphic analysis of the Tablet of the 96 Glyphs is thoroughly intertwined with the history of Maya decipherment: its dates were first worked out by J. Eric S. Thompson (1950:Fig. 55), the rulers it cites were first isolated by Heinrich Berlin (1968), and the first tentative phonetic readings of those rulers' names were achieved by Mathews and Schele (1974). Today, after almost seventy years of ongoing study, this text is among the best understood monuments of the late eighth century (see, e.g., Martin and Grube 2000:174-175; Stuart and Stuart 2008:203-205). Its contents may be summarized as follows: opening with a reference to the end of the eleventh katun under K'inich Janaab Pakal I (in AD 652), it then turns to his dedication of House E of the Palace (654), following which it takes us through the accessions of his second son K'inich K'an Joy Chitam II

[36] For substantially the same process in Germanic languages, consider English *bagel* "a hard ring-shaped salty roll of bread" (OED, 2nd ed, 1989). This word was borrowed into English from Yiddish בייגל (*beygl*), which in turn had adapted it from Middle High German *böugel* 'ring, bracelet.' In origin, the term was the diminutive of Proto-Germanic **baug-az* nom.s. "ring, bracelet, wreath, crown, collar" (Kroonen 2013). Old English *bēag* "a ring or torque of metal, usually meant for the arm or neck; but in one case at least used of a finger-ring" (OED, 2nd ed, 1989) was once its direct descendent. The English term developed into *bee* before passing out of use in the nineteenth century, but not before leaving us a wonderfully alliterative albeit somewhat redundant passage in the anonymous *Morte Arthur* of ca. 1440: "*There on he satte, Rychely crownyd, / W*[t] *many A besaunte, broche, And be.* (There he sat, richly crown'd, with many a Byzantine coin, brooch, and crown)" (Ponton 1819:101 [BM ms. Harley 2252], ll. 3178-3179). Now, as noted, the root of all of these terms is Proto-Germanic **baug-az*, and it in turn stems from the Proto-Indo-European verb **bʰeŭgʰ*- 'to bend' (Kroonen 2013; Watkins 2000:12). Thus, once again, from a verb meaning 'to bend' we have the development of numerous descendent nouns broadly meaning 'thing bent into a circle,' but lexicalized into a host of specific senses including ring, bracelet, wreath, crown, collar, and even the humble bagel.

[37] For *naah*, note Tzeltal *snah k'ubule* 'nido de la oropéndola (oropendola nest)" (Polian 2017a:445) and Colonial Tzotzil *na mut* 'bird nest' (Laughlin 1988:265). For *wayib*, note Mocho *x-waach-bal tz'ikin* 'chicken coop' and Q'anjob'al *way-ub* 'nido (nest)' (both from Kaufman 2003:1261).

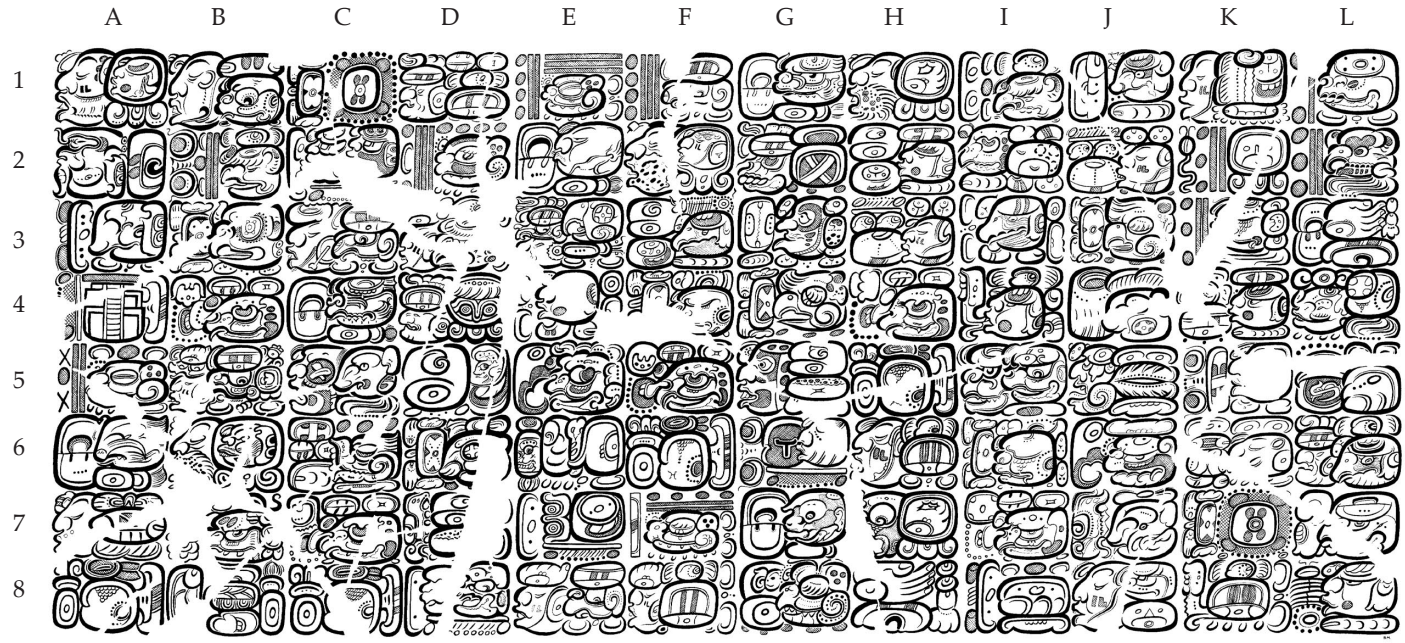

Figure 7. The Tablet of the 96 Glyphs, Palenque, Chiapas, Mexico (drawing courtesy of Simon Martin).

(702), his grandson K'inich Ahkal Mo' Nahb III (721), and his great grandson K'inich K'uk' Bahlam II (764), before concluding with the one katun anniversary of the latter's accession (783), which evidently occasioned the carving of the text.

One of the most remarkable features of this masterwork is the way that it repeatedly refers to House E as both a locus of ritual action and as an active agent in its own right. Indeed, House E is the only entity present for nearly all of the narrated events, spanning some one hundred and thirty years. The name of this long-lived building was **SAK-nu-ku-NAAH**, *sak nu[h]ku[l] naah*, "white skinned house" (Figure 7, A8), likely because House E was "the only structure in the palace painted white, the others being a uniform red" (Martin and Grube 2000:163).[38] The text describes the initial dedication of this structure in 654 as *ochi k'ahk' sak nuhkul naah ta yotoot k'inich janaab pakal*, or "fire entered the white skinned house (with)in the dwelling of K'inich Janaab Pakal" (Figure 7, B7-C1). Thus right from the outset we are meant to recognize that this building is embedded within the royal residence and is also a key topic of the inscription. Almost fifty years later, the accession of K'an Joy Chitam II in 702 is described in typical fashion as *chumlaj ta ajawlel*, or "he sat in kingship" (Figure 7, D5-C6a). But this is immediately followed by the passage **u-CHUM[mu]-TZ'AM-ji-ya SAK-nu-ku-NAAH**, *uchumtz'amjiiy sak nuhkul naah*, perhaps meaning something like "he was enthroned by the white skinned house" (Figure 7, D7-C8).[39] Compound nouns like Ch'orti' *ch'amnar* 'harvest' (Hull 2016:116), transparently fashioned from *ch'am* 'take' and *nar* 'maize,' provide a template against which we can perhaps consider *chumtz'am* as a similar compound, formed from the positional verb *chum* 'to sit' and the noun *tz'am* 'throne.' As noted previously with respect to the **ya-la-ji-ya** quotatives, the **u**-...-**ji-ya** construct might then be interpreted as providing either a derived relational noun with the sense "enthroned by" (following Lacadena, Law, and Stuart) or a derived transitive verb in the anterior, with the sense "it had enthroned him" (following MacLeod). Additional contexts and parallel constructions will be needed to secure these assumptions and grammatical considerations, but it is in any case striking to find the name of a building in this kind of context. Whether a grammatical possessor or grammatical agent, the White Skinned House is apparently granted some animacy or agency here, perhaps as an indication that K'inich Janaab Pakal I's ritual actions continue to resonate in the accession of his son, as facilitated by the structure he built almost fifty years earlier. Passing over the next

[38] For the internal *h* and suspended final *-l* of the central term see Tzeltal *nuhkul* 'skin, pelt' (Zender, in Lacadena and Wichmann 2004:151-152). Lacadena and Wichmann (2004:151-152) have also noted Q'anjob'al *nuqul* 'cypress bark,' suggesting a Western Mayan provenance and potentially broader semantics encompassing skin, bark, and perhaps other outer surfaces.

[39] I've considered that T644a **CHUM** 'sit' and T609a **TZ'AM** 'throne' might provide a conceptual logogram here, plausibly with a different reading unrelated to either *chum* or *tz'am*. Yet the careful infixation of the **mu** syllable in the former argues for intentional complementation, so I proceed on the assumption that both signs have their usual values. For T609a **TZ'AM** see Stone and Zender (2011:97, 234 n. 34); for 'throne' see Barrera Vásquez et al. (1980:875).

Figure 8. Detail of the Tablet of the 96 Glyphs, E6-F6 (drawing courtesy of Simon Martin).

event for the moment, we see that K'inich K'uk' Bahlam II is also said to have been "enthroned by the white-skinned house" fully one hundred and ten years after his great grandfather constructed it (Figure 7, G5-H5).

Let's now return to the previously-skipped passage (Figure 7, F3-F6) which records the accession of Ahkal Mo' Nahb III. As with the accessions of his uncle and son, the primary clause (F3-F5) is followed by an oblique clause (E6-F6), but this time the predicate is somewhat different (Figure 8). Assuming we are correct in identifying the second sign as 1SE, the clause can be read as **u-me-k'e-ji[ya] SAK-nu-ku-NAAH**, *umek'jiiy sak nuhkul naah*, or "he was embraced by the white skinned house." On a literal level, House E was almost certainly the actual locus of the king's accession, in which case it could perhaps be said to have "embraced" him in the sense of surrounding and encompassing the ceremony (Law and Stuart 2017:165, Fig. 6.8b). On a deeper semantic level, however, it is worth considering what a term like *embrace* really means, and whether *mek'* is directly comparable. This is a point to which I will return momentarily.

First, from the point of view of script orthography, note that this is a highly favorable context for a **me** sign, for it precedes **k'e** directly before a closed syllable, strongly suggesting that it should also be identified as a C**e** phonetic sign. As we have already seen, parallel **u**-....-**ji-ya** constructions can incorporate either nouns or CVC root transitive verbs (Lacadena 2013:54; Law and Stuart 2017:164-165; MacLeod 2004), and the latter are always spelled synharmonically in the script. This in mind, consider the following glosses for *mek'* and its derivatives in Ch'olan languages:

Ch'olti'	<meque>	tv.	abrasar (to hug, embrace) (Morán 1935:5)
Ch'orti'	*mek'e*	tv.	embrace, hug (Hull 2016:277)
	mek'e	tv.	abrazar, cargar en los brazos, chinear (hug, carry in arms, cradle a child in one's arms) (Pérez Martínez et al. 1996:139)
	mek'e uyar	tv.phr.	carry one's child (on the hip) (Wisdom 1950:527b)
Ch'ol	*mek'*	tv.	embrace (Hopkins et al. 2011:146)
	mek'	tv.	to hug, to hold (a baby) (Vázquez Álvarez 2011:502)
Chontal	*mek'*	tv.	to hug, embrace (Knowles 1984:439)
	<meq'ue'>	tv.	abrazar, achichiguar (to hug, to nurse a child) (Keller and Luciano 1997:159)
	<meq'ue'>	tv.	abrigar, proteger (to shelter, to protect (Keller and Luciano 1997:159)

These glosses leave no doubt that Proto-Ch'olan had a CVC transitive verbal root **mek'* meaning "embrace, hug" (see Kaufman and Norman 1984:125).[40] However, the semantics of the Ch'olan forms include several nuances not captured in Kaufman and Norman's perfunctory gloss. While many of the Spanish verbs used to gloss *mek'* have to do with taking someone or something in one's arms, still others focus on the significance of this act as one of care-taking and protection, with a preferential use in contexts involving the holding of infants. Thus, Keller and Luciano (1997:159) give the Chontal sentences <mu' cä meq'ue' ch'oc>, "estoy achichiguando al niño (I'm suckling the boy)" and <na' piyo' u meq'ue' u ch'oc> "la gallina abriga a sus pollitos (the hen shelters her chicks)." Mothers embrace, cradle, carry, support and suckle their infants, while hens shelter and protect their chicks (no arms involved), and all of these actions are encompassed by the term *mek'*. Given these observations, we might reconsider the significance of the *umek'jiiy sak nuhkul naah* clause on the Tablet of the 96 Glyphs (Figure 8) as indicating that House E, here in a role parallel to that of the mother and the hen of the Chontal sentences, "supported" or even "sheltered" the new king during his accession ceremony.

At this point, we might reasonably wonder why the king would need such support and, not least, why this would be worthy of mention on a monument some sixty-two years after the event. An answer comes from Redfield and Villa Rojas' account of baptismal rites in the Yucatec village of Chan Kom:

> Up to the age of three or four months infants are carried lying across the mother's arm. Thereafter, and until the child walks well enough to keep up with adults, it is carried

[40] Additional cognates in the Yukatekan and Chujean-Q'anjob'alan branches suggest WM+LL **meq'* (Kaufman 2003:891). Diffusion seems certain given the unexpected *-ch'* in Tzeltal *mech'* "embrace" (Polian 2017a:427-428; Slocum et al. 1999:75), but even more mysterious is the *-y* in wider Tzeltalan *mey* "embrace," with cognates in Colonial Tzeltal (Ara 1986:333[f.67v]), Colonial Tzotzil (Laughlin 1988:259), Tzeltal (Polian 2017a:430), and Tzotzil (Laughlin 1975:236). It seems scarcely credible that these forms are entirely unrelated, but they are admittedly difficult to explain.

> astride the left hip of its mother or older sister, whose left arm supports it in this position. The first time the child is placed in this position is the occasion of a domestic ceremony known by the phrase describing this manner of carrying a child: "to make *hetzmek* (*hetzmek tah*)." (Redfield and Villa Rojas 1964:188)

The Yucatec term *héetzméek'* is a diphrastic compound of *héetz* 'to straddle' and *méek'* 'to embrace' (Bricker et al. 1998:183), the latter clearly cognate with the term under investigation here. Redfield and Villa Rojas (1964:183-190) go on to indicate that the *héetzméek'* marked an important rite of passage during which the child made its social debut and received a new name (see also Tozzer 1941:128). From a comparative perspective, as defined by Van Gennep (1909) and other social anthropologists (Gluckman 1962; Turner 1967), rites of passage involve profound social transitions such as baptism, marriage, assumption of high office, and even death, all of which include a marked liminal period of adjustment and, often, the adoption of a new name to indicate the enormity of the transformation. Several scholars have profitably applied this perspective to Classic Maya accession rituals, which also seem to have involved a liminal period of transition and the adoption of a new *k'alhuunil k'aba'* or "headband-holding name" (see Bonavides 1992; Colas 2001; Eberl and Graña-Behrens 2004; Le Fort 2000). To return once more to the Tablet of the 96 Glyphs then, it seems to have been of paramount importance for K'inich K'uk' Bahlam II to establish that the house built by K'inich Janaab Pakal I in 654 continued to fulfill its designed function of providing support and care-taking for the accessions of his descendants in 702, 721, and 764, and moreover that K'inich K'uk' Bahlam II sought to perpetuate his great grandfather's continuing legacy by adorning the Tower Court in front of House E with additional monuments recognizing and extending those accomplishments. These observations resonate with the penultimate passage of the Tablet (Figure 7, K6-K7), which highlights K'uk' Bahlam's role as the one who *ukoboow ukabjiiy jo' winikhaab ajaw k'inich janaab pakal*, "perpetuated the ritual oversight of the five katun lord K'inich Janaab Pakal" (Law and Stuart 2014:165), actions evidently accomplished in the completion of his first katun on the throne (Figure 7, L7-L8).

Other contexts of **me-k'e** are less clear, but none of them invalidate the suggestions made above. The first two are provided by Copan Altars H' and I' (Table 2, items 1 and 2), both dedicated late in the long reign of Ruler 12 (see Schele et al. 1994 for images and analysis). In these contexts, **u-me-k'e** most likely provides a possessed derived noun, perhaps of the form *mehk'* "carrier, support," for it appears between the dedicatory verb, the proper name of the altar, and **u-K'ABA'-a** (*uk'aba'*, "its name"), in turn followed by the name of Ruler 12. That is, although erosion frustrates detailed analysis, both altars contain dedicatory passages which can be loosely rendered as "[such and such], which is the name of the carrier/support of the four katun lord K'ahk' Uti' Witz' K'awiil, holy lord of Copan, was fashioned/made." Another nominalized context appears on an unpublished panel fragment discovered by Arnoldo González in the fill of Palenque Temple XXI (item 5). According to project epigrapher Guillermo Bernal (2006), the panel opens with the end of the fourteenth katun on December 2nd, 711. This is followed by a dedicatory passage **T'AB-yi u-me-k'e**, *t'abaay ume[h]k'*, perhaps for "his carrier/support went up," and the lengthy name phrase of a ritual office holder that breaks off just prior to providing his overlord's identity. This comes at a fascinating time in the history of Palenque, just a few months after the capture by Tonina of K'an Joy Chitam II, and we may hope that a forthcoming monograph on the Temple XXI finds will resolve many lingering questions about this period (Guillermo Bernal, personal communication 2017). A final context comes from Copan Stela A (item 7), dedicated by Waxaklajuun Ubaah K'awiil in 731 (see Bíró and Reents-Budet 2010:65-86 for images and detailed analysis). Like many Copan monuments, the text is long and complicated, opening on its north side with the Long Count and stela dedication, before moving to the west side, which references the dedication of Stela H only sixty days earlier. A complex and poorly understood passage follows, some of which seems to involve Ruler 11 and a mortuary rite "presumably involving relics drawn from his tomb" (Martin and Grube 2000:200). Immediately following this reference we encounter **u-me-k'e-ji-ya u-la-ka-ma-TUUN-ni**, *umek'jiiy ulakamtuun*, "the stela of [Waxaklajuun Ubaah K'awiil] embraced/carried him (i.e., Ruler 11)" (Figure 9). It is intriguing to note that, as with House E at Palenque, Copan Stela H would appear to be the hinge of this oblique clause. One interesting difference is the stela's grammatical possession by Waxaklajuun Ubaah K'awiil, indicating that, although the stela is given proximal credit for these actions of ritual oversight, it was the king who set them in motion. Essentially the same implication is made on the Tablet of the 96 Glyphs, of course, since K'inich Janaab Pakal is credited with the dedication of House E at its introduction.

Figure 9. Detail of Copan Stela A, back, C4-C5 (photograph by the author).

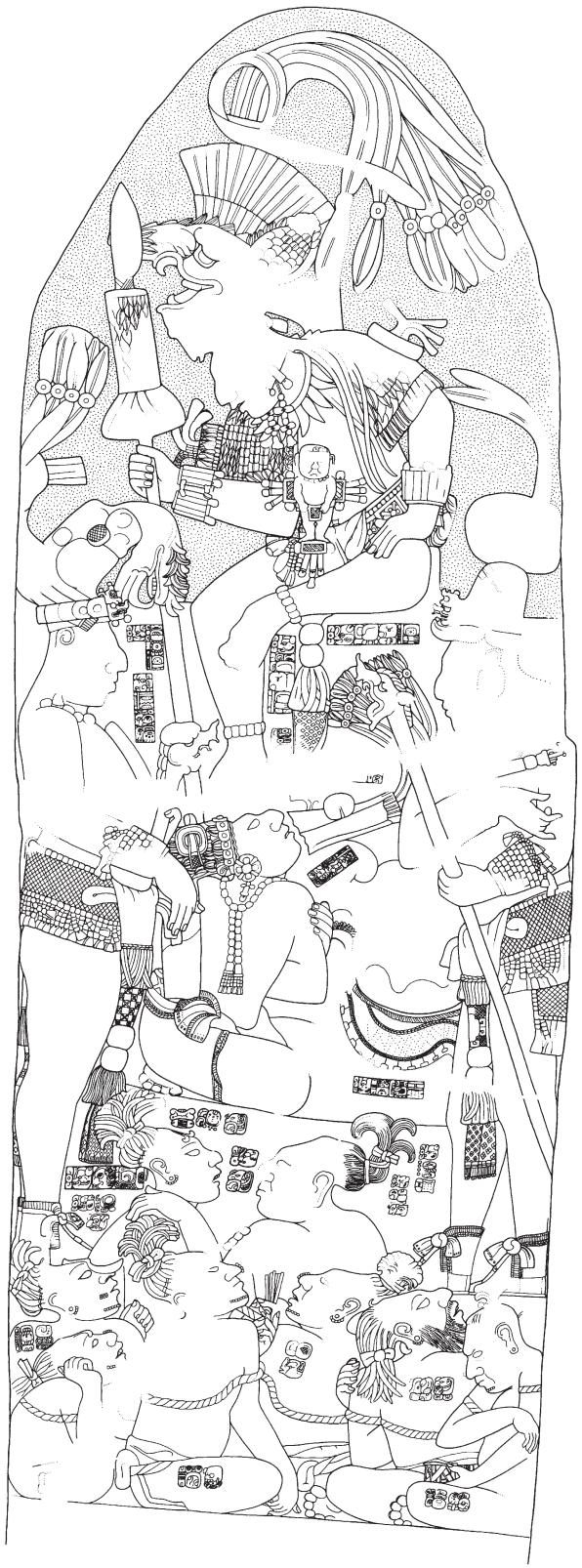

Figure 10. Piedras Negras Stela 12, front (drawing by David Stuart © President and Fellows of Harvard College, Peabody Museum of Archaeology and Ethnology, PM# 2004.15.6.19.38).

(Aj) K'esem Took'

Four of our sixteen contexts of 1SE come from two monuments dedicated on the same day, September 12, AD 795, and within a mere 17 km of one another (Table 2, Items 11-14).[41] Originally towering more than three meters above the upper terrace of Structure O-13 at Piedras Negras, Stela 12 had toppled into four large fragments by the time of its discovery by Teobert Maler in 1899. Now on display at the Museo Nacional de Arqueología y Etnología in Guatemala, the monument (Figure 10) overawes the visitor with its grandiose depiction of the enthroned K'inich Yat Ahk II (Ruler 7), holding court before two standing lieutenants with batons who ride roughshod over a jumble of nine diminutive and pathetic captives, their faces beaten and bloodied, their limbs fettered with ropes. As we know from the somewhat battered texts on the sides of this impressive monument—as well as a better preserved parallel account on La Mar Stela 3 (Schele and Grube 1994)—this gory scene depicts the appalling aftermath of a military engagement between K'inich Yat Ahk II of Piedras Negras and his ill-fated rival K'ooch Bahlam of Pomona (Martin and Grube 2000:152-153). According to the texts, Yat Ahk II of Piedras Negras and his chief lieutenant, Parrot Chahk of La Mar, claimed a victory over Pomona on January 19, 794, taking at least nine high-ranking captives from the Pomona king. It is these poor unfortunates who are depicted in perpetually humbled posture on the front of Stela 12. One of them, the distinctively bearded individual second from the edge at bottom right, sports a glyphic caption on his right shoulder blade identifying him as ?**k'e**-?-**me**-**TOOK'** [**sa**]**ja**-**la**. Intriguingly, La Mar Stela 3 (Figure 11) depicts Parrot Chahk attired in the same military costume as he wears on Stela 12, menacingly brandishing a spear as he grasps a bearded and sprawling captive by the forelock (Schele and Grube 1994; see also Thompson 1962:Pl. 11). Three glyphs above the captive provide the short sentence **chu**[**ku**]-**ja AJ**-**k'e**[**se**] **me**-**TOOK'**, *chu[h]k[a]j ajk'esem took'*, "Aj K'esem Took' was captured" (Figure 11, C1-C3). The shared date, shared nominal elements, and shared beard—the latter a notably rare trait in Maya art—leave no doubt that this is the same individual depicted and named on Stela 12. Moreover, two additional examples of his name, from the lengthy account of the "Pomona wars" on the left side of Stela 12, provide a total of four contemporary versions of his name for

[41] The literature on Piedras Negras Stela 12 and La Mar Stela 3 and their interrelated texts and imagery is now substantial, and the account here is fortunate to be able to draw on a number of recent publications that have contextualized both monuments and convincingly related them to larger sociopolitical events (e.g., Golden and Scherer 2015; Houston 2004; Martin and Grube 2000:152-153; O'Neill 2012:84-86; Schele and Grube 1994; Stuart and Graham 2003:60-63; Zender 2002:177-181).

Figure 11. La Mar Stela 3, front (modified after photograph in Golden and Scherer 2015 and © Los Angeles County Museum of Art, www.lacma.org).

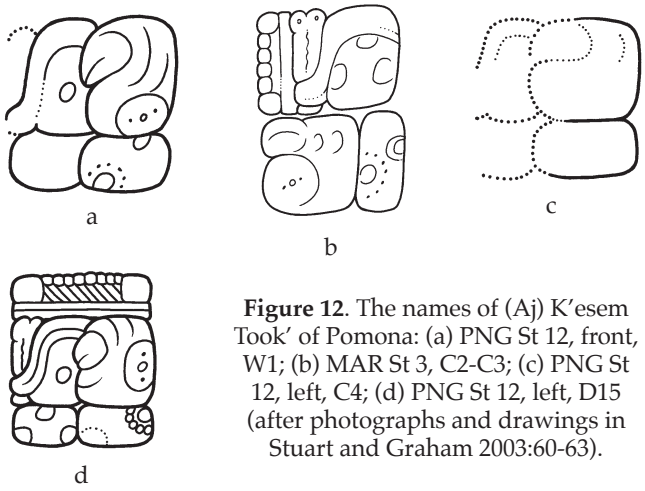

Figure 12. The names of (Aj) K'esem Took' of Pomona: (a) PNG St 12, front, W1; (b) MAR St 3, C2-C3; (c) PNG St 12, left, C4; (d) PNG St 12, left, D15 (after photographs and drawings in Stuart and Graham 2003:60-63).

comparison (Figure 12). Although not all of the contexts are equally well preserved, and the **AJ** element (to which we will return) seems to come and go, we can render the name as (**AJ**)-**k'e**-**se**-**me**-**TOOK'**, *(aj) k'esem took'*, for (Aj) K'esem Took'.[42] But what does the name mean, and do its orthography, morphology, and semantics provide any constraints in favor of the **me** reading?

To begin with, it can be noted that the optionality of agentive *aj-* has precedent in other personal names in this region.[43] Moving past this, we appear to have the well-known noun, *took'*, 'flint' (i.e., common chert), qualified in some fashion by the preceding *k'esem*.[44] Most meaningful Maya roots are CVC in shape, and most derivational suffixes are -VC, indicating that the form should probably be segmented as *k'es-em*.[45] This is immediately suggestive of the widespread Ch'olan perfect participle suffix *-em*. Kaufman and Norman (1984:93) trace this suffix back to a proto-Greater Tzeltalan perfect participle **-em* for intransitive verbal roots, and further argue that this restriction of **-em* to intransitives was retained into Proto-Ch'olan and even into its descendants in both branches (Kaufman and Norman 1984:102-103). This is certainly true of Western Ch'olan languages like Ch'ol, where perfect participles in *-em* continue to be formed from intransitive verb roots only:

jil-em	'finished'	<	*jil-el*	iv.	'finish' (Hopkins et al. 2011:79)
letz-em	'raised'	<	*letz-el*	iv.	'rise' (Hopkins et al. 2011:128)
majl-em	'gone, far'	<	*majl-el*	iv.	'go' (Attinasi 1973:225, 292)
kol-em	'big'	<	*kol-el*	iv.	'grow' (Hopkins et al. 2011:100)
jub-em	'lowered'	<	*jub-el*	iv.	'go down' (Hopkins et al. 2011:87)

And yet, this state of affairs is clearly not true of Ch'orti', where many perfect participles in *-em* can be formed from transitive verbs:

xijb-em	'combed'	<	*xijb-a*	tv.	'comb, scratch' (Becquey 2014:854)
wejr-em	'ripped, torn'	<	*wejr-u*	tv.	'rip apart, tear open' (Hull 2016:485)
kach-em	'tied'	<	*kach-i*	tv.	'tie, tie up' (Hull 2016:158-159)
bonem	'painted'	<	*bon-i*	tv.	'paint' (Hull 2016:75-76)
susem	'shaved, carved'	<	*sus-i*	tv.	'plane wood, peel' (Hull 2016:378-379)

In his invaluable survey of Ch'orti' morphology, Wichmann (1999:24) demonstrates that Ch'orti' *-em* "is attested with every single root type, transitive as well as intransitives, except positionals." Similarly, while Becquey (2014:853-854, 978) follows Kaufman and

[42] This individual has had several names in the literature, reflecting the development of epigraphic methodology (including increasing precision in our understanding of sign values, orthographic practices, and glyphic grammar) and the importance of access to accurate images. Schele and Grube (1994) identified him as "Aj K'ech-At," the key discrepancies being: (1) interpretation of polyvalent T530 **se**/**cha** as **cha**; (2) misidentification of 1SE **me** as T761 **AAT**, a sign which it rather resembles in late eighth-century examples; and (3) misidentification of T257 **TOOK'** as T103 **ta**, due to the unclear renderings then available. Things had improved marginally when I identified him as Aj K'eech Aat Took' (Zender 2002:179-181), recognizing the final **TOOK'** element on La Mar Stela 3. But misidentification of 1SE **me** as T257 **AAT** persisted due to its paleographic divergence from earlier examples. It was not until later that I recognized the probable **se** value of T530 (Zender 2005b), which eventually prompted a paleographic reassessment of the preceding sign as a late form of 1SE (Zender, in Golden and Scherer 2015).

[43] Note the name of (Aj) Pohpol Chay of Lacanha, a captive of Yaxchilan's Shield Jaguar III in AD 729 (Martin and Grube 2000:124), which is recorded as **a**-**po**-**lo**-**cha**-**ya** (YAX St. 18, F1-2), **AJ**-**po**-**lo**-**cha**-**ya** (YAX St. 18, A5), **po**-**po**-**lo cha**-**ya** (YAX H.S. 3, Step 1, caption), and **ʔpo**-**lo**-**cha**-**ya** (YAX H.S. 3, Step 1, D6). The optional agentive is clear. Other variations are the result of abbreviational conventions including: (1) suspension of *-j* at a syllable closure in the first example; (2) haplography in the second; and (3) haplography with an auxiliary sign indicating abbreviation in the fourth (see Zender 2014a for additional examples and discussion).

[44] See Houston (1984) for **TOOK'** ~ **to**-**k'a**, *took'*, 'flint.' Kaufman and Norman (1984:132, item 528) reconstruct LL **took'* 'flint,' and Yucatec *tòok'* 'flint' retains the long vowel (Bricker et al. 1998:279).

[45] There are other possibilities, to be sure, but none of them likely, nor preferable unless CVC-VC is first contraindicated in some fashion (e.g., by phonology, morphology, or semantics). In any case, I have pursued a potential **k'e-sem* before discounting it. There are no compatible prefixes of the shape *q'e-* or *k'e-*, and no likely roots of the form *sem.*

Norman in reconstructing Proto-Ch'olan *-*eem* as the perfect participle of root intransitive verbs, he also observes that "[i]n the Eastern [Ch'olan] languages ... *-eem* remained productive not only in association with intransitive bases but also with transitive bases CV(*h*)C to become essentially a free variant of the suffix *-b'iil*" (Becquey 2014:853, my translation).[46]

Assuming that Kaufman and Norman are correct that proto-Greater Tzeltalan restricted *-*em* to intransitives—a restriction supported by Tzeltalan evidence (Kaufman 1972:142)—then the fact that Western Ch'olan languages still restrict *-em* to intransitives whereas Eastern Ch'olan languages have productively extended its contexts to transitives and other root types indicates that this represents an Eastern Ch'olan innovation. Were this innovation present in the script it would constitute another point of evidence in favor of Houston et al.'s (2000) view that Classic Mayan was a language of the Eastern Ch'olan branch (Classic Ch'olti'an). Be that as it may, we are now one step closer to identifying the meaning of the name (Aj) K'esem Took'. In Mayan languages, perfect participles are deverbal adjectives conveying a state resulting from completed action (e.g., *tied, painted, carved* in the Ch'orti' examples above), and frequently function as prenominal attributives (Polian 2017b:216) in contexts such as (the purely illustrative) *tied captive, painted wall,* and *carved monument*. Attributives of all kinds canonically precede the nouns they modify in Ch'olan languages. Syntactically, then, we are on solid ground in contemplating *k'esem* as a perfect participle, presumably derived from a verbal root *k'es*, and here modifying *took'* in some manner. The question now becomes: is there an appropriate verbal root of the shape *k'es* that, derived as a perfect participle, would make a semantically suitable descriptor for chert? Unfortunately, *k'es* is not a particularly common form in Mayan languages, but the results are nonetheless encouraging:

Ch'orti'	*k'es ~ k'estun*	n.	obsidian (Hull 2016:231)
	k'es	n.	vidrio, espejo (glass, mirror) (Pérez Martínez et al. 1996:113)
	k'es	adj.	tieso (stiff, rigid) (Pérez Martínez et al. 1996:113)
Mopan	*k'e'es*	actv.[47]	sharpen (Hofling 2011:269)
	k'e'es	adj.	sharp (Hofling 2011:269)
	k'e'esa'an	part.	sharpened (Hofling 2011:269)
	k'e'esbeeb	instr.	a file (Hofling 2011:269)
	k'e'estik	dtv.	to sharpen s.th. (Hofling 2011:269)
Q'eqchi'	*q'es*	adj.	afilado, filudo (sharp) (Tema Bautista and Cuz Mucú 2004:150)

These are strikingly similar and surely related.[48] Even by the most stringent distributional criteria (Brown and Wichmann 2004:164-166), the presence of roots of such similar form and meaning in three of the five major Mayan subgroups (i.e., Ch'olan-Tzeltalan, Yukatekan, and Eastern Mayan) permits reconstruction back to Proto-Mayan. Equally importantly, their phonological details adhere to what we know about developments from Proto-Mayan into all three of these branches. Thus, Proto-Mayan **q'* is conserved as *q'* in Eastern Mayan languages (such as Q'eqchi'), but develops into *k'* in both Ch'olan-Tzeltalan (Ch'orti') and Yukatekan (Mopan). Similarly, Proto-Mayan **ra'x* 'green, unripe' provides a paradigmatic example illustrating the outcome of Proto-Mayan *CV'C forms in Ch'orti' *yax-*, Mopan *ya'ax*, and Q'eqchi' *rax* (Brown and Wichmann 2004:178). Note that this is precisely what we see in the potential development of Proto-Mayan **q'e's* into Ch'orti' *k'es*, Mopan *k'e'es*, and Q'eqchi' *q'es*. Taken together, we are on firm and uncontroversial ground in considering a reconstruction of Proto-Mayan **q'e's* 'sharp(en), hard(en).' The root identification would most likely have been either an adjective with the sense "sharp, hard," or an active verbal noun with the sense "sharpen, harden," if not both. Nor are "sharp" and "hard" all that remote from one another semantically, particularly if the preparation of tools is taken into consideration. Stone adzes, blades, and dart points are sharpened, whereas wooden digging sticks, spears, and darts were typically ground to a point and then fire-hardened (Hassig 1992:71, 205 n. 48). The precise sense of *q'e's*, then, may have depended on what kind of object it was qualifying.

That said, it must be acknowledged that Ch'orti', Mopan, and Q'eqchi' share a remarkable number of diffused lexical items almost certainly indicating

[46] Although Becquey reconstructs these forms with long vowels, I follow Kaufman and Norman's (1984:93) reconstruction of proto-Greater Tzeltalan **-em* and **-bil*. The latter is also attested in the Classic Maya script (Zender 2010:12-13).

[47] This is Hofling's (2011:16, 65) abbreviation for an "active verb," which he defines as an intransitive verb derived from an active verbal noun root with an antipassive voice value. That the root does have a core verbal meaning is also indicated by the derivation of the root *k'e'es* (rather than the derived transitive stem *k'e'es-t-*) with participial *-a'an* and instrumental *-beeb*.

[48] Here it is a pleasure to acknowledge the collegial kindness of Kerry Hull and Danny Law (personal communications 2015) in bringing the Ch'orti' and Q'eqchi' examples respectively to my attention

sustained contact over hundreds of years (e.g., Justeson et al. 1985:9-17; Kaufman 1976:109-111; Wichmann and Brown 2003:68; Zender 2004b:206-209). Indeed, as Wichmann and Brown (2009:890) have recently demonstrated with respect to Q'eqchi', "[f]rom its birth as an emerging dialect, the language appears to have received a significant number of loanwords from neighboring speakers of Lowland Mayan languages who were instrumental in developing Classic Maya civilization, famed for its impressive architectural remains and elaborate writing system. The 'civilizing' impact of the lowlanders is clearly felt in borrowed vocabulary." In light of the growing evidence for the importance of diffusion in the historical development of Mayan languages (e.g., Law 2014; Zender 2015), we may have to reconsider our distributional criteria with respect to reconstruction. That is, while the "three branch" principle remains invaluable, Q'eqchi' and Mopan emerge as equivocal exemplars of the independence of their branches. Could the term in question also be found in K'ichee' or Yucatec that would be a different matter, but absent such corroborating evidence we must at least consider the possibility that this represents a diffused form.

Nonetheless, I very much doubt that it does. Once again, the forms covary in highly patterned ways, such as the *q'*/*k'* distinction, the varied outcomes of *CV'C, and the shared adjectival grammatical role. One of the hallmarks of diffused forms is that they tend to be recognizable precisely because they thwart such patterns. Given what we have managed to reconstruct of the phonological history of Eastern Ch'olan on the basis of both comparative linguistic and epigraphic evidence, an inherited **q'e's* would have changed *CV'C to *CVVC in Greater Tzeltalan (Kaufman and Norman 1984:83-84), long before the advent of hieroglyphic writing, and the resultant **q'ees* would remain a relatively stable form until about the early eighth century, when it would have undergone the changes of *VV > V (Houston et al. 1998, 2004) and then **q'* > *k'* in quick succession (Law et al. 2014), thereby producing Ch'orti' *k'es*. The question then becomes: at what point along this continuum could a prestigious early Ch'olan form have diffused into ancestral Mopan and Q'eqchi' and produced the forms we observe there today? And the answer is: at no point. Q'eqchi' *q'*- sets up a minimum expectation that its source would have still had *q'*, and while Ch'olti'an likely preserved *q'* into the late eighth century (Law et al. 2014), the ancestor of Q'eqchi' was still isolated in the Alta Verapaz at this time. Similarly, Mopan *k'e'es* sets up the minimal expectation that its source was also of the form **k'e'es* or, at least, **k'e's*. Such a form would have been much earlier, preceding even Greater Tzeltalan by an unknown span, at which time Mopan's pre-Proto-Yukatekan ancestor was likely located far to the north. We might entertain the idea that Q'eqchi' innovated the form, and there can be no gainsaying the mobility of Q'eqchi' speakers, but there is no model by which Q'eqchi' could have given CV'VC to Mopan *and* CVC to Ch'orti'. The same holds true, *mutatis mutandis*, for a Mopan origin.

These considerations—coupled with the permissible derivation of the perfect participle *k'e'esa'an* 'sharpened' from Mopan *k'e'es* 'sharpen' and the aforementioned broader contexts of *-em* in Ch'orti'—all provide strong support for an interpretation of the late eighth century name (Aj) K'esem Took' as "(Mr.) Sharpened Flint." The semantic fit between the qualifier and the substantive is encouragingly supportive of the **me** decipherment, as is its morphological role in spelling a perfect participle suffix, and its syntactic role in modifier position before the noun. Further, and perhaps not fortuitously, the name seems singularly appropriate for a **sa**-**ja**-**la** titleholder, whose duties included border defense and military assistance to an *ajaw* who would have placed him in office (Jackson 2013; Jackson and Stuart 2001:225; Martin and Grube 2000:150; Scherer and Golden 2009; Zender and Kelly 2015). As we have seen, kings took new names on their coronations—a continuing practice with long roots in Maya tradition—and there are some indications that non-royal officeholders did so as well (Zender 2004a:301, n. 117). As such, the name of the hapless (Aj) K'esem Took' can be seen to provide a reasonably strong set of constraints in support of the **me** decipherment. Finally, there is a further implication relevant to our understanding of Classic Mayan morphology. The apparently broad role of Classic *-em* in deriving a perfect participle from an active verbal noun (rather than a CVC root intransitive) indicates that the characteristically Eastern Ch'olan innovation of a broader role for *-em* was already active during the late eighth century, providing additional support for the Classic Ch'olti'an hypothesis (Houston et al. 2000).

U Tuntem Ch'ahoom

A final context of 1SE **me** appears in a series of eight carved entryway inscriptions in the upper temple of Copan Structure 10L-11. These important but fragmentary texts were first encountered during the Carnegie Institution of Washington excavations of the late 1930s, which documented many of them in situ and even tested several fits between scattered elements, but only those courses which had fallen largely intact were consolidated (Schele et al. 1989:1). Remaining fragments, of which there were many, "were left laying in the corridors of the newly restored building" (Schele et al. 1989:2). Things remained this way until 1977, when Berthold Riese and Barbara W. Fash initiated a program of detailed field recording and hypothetical fits for the first phase of the Proyecto Arqueológico de Copan, directed by Claude F. Baudez (see Baudez 1994:166-183; Riese and

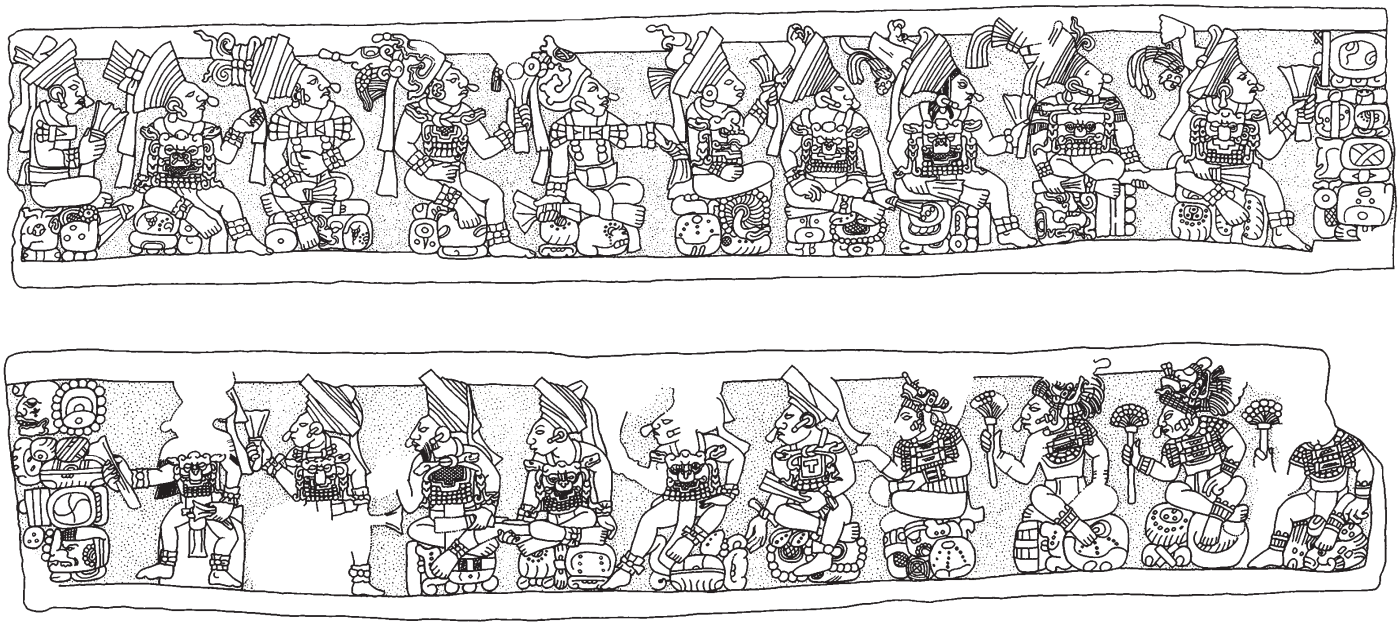

Figure 13. Copan Structure 10L-11 carved masonry bench (drawing by Linda Schele, SD-1049).

Riese 1991:209; Schele 1987b:10, Fig. 7). This eventually developed into the systematic analysis and reconstruction of the inscriptions during the mid to late 1980s by David Stuart and Linda Schele for the Copán Mosaics Project, directed by William L. Fash (see Schele 1987a, 1987b; Schele et al. 1989). Thanks to the meticulous work of all three projects, we now know that the upper temple housed a complex program of architectural sculpture including the entryway texts, a six-and-a-half-meter long sculpted bench adorned with portraits of seated gods and rulers identified by brief caption texts (Figure 13), and figural carvings flanking the ends of the bench, the interior doorways, and the cornice. As described by Linda Schele and Mary Ellen Miller:

> The upper temple is penetrated by four corridors that enter from each of the cardinal directions converging in a cruciform plan. Carved into the corridor walls on either side of the four entry points are two texts of twenty-four glyphs each. Each pair of texts is drawn so that one half of the pair reads in normal left to right orientation, and the other in mirror image, or right to left. ... The four corridors of the temple converge on a raised platform in the center of the structure... The north side of the platform... was fronted by a long horizontal bench panel sculpted with twenty seated figures... divided into two groups of ten who face a center text. ... [T]he ten glyphs on the left are drawn in mirror-image [see Figure 13 top], while the nine on the right are in the standard orientation [see Figure 13 bottom]. (Schele and Miller 1986:113-124, figure callouts in square brackets added)

That is, the flanking figures and their associated captions all face the central text, which records the accession of Yax Pasaj Chan Yopaat (Ruler 16) on June 29, AD 769 (Schele and Miller 1986:124). As the closest figure to the central text on the right side, Yax Pasaj himself is not associated with a caption; instead he reaches out and playfully indicates his name glyphs with his torch (Figure 13 bottom, leftmost portrait). There is no doubt that Yas Pasaj was responsible for commissioning these sculptures, for his accession is employed as a benchmark in several of the doorway inscriptions and, as first demonstrated by David Stuart (in Schele 1987a:4), he is credited with the dedication of the structure housing them on September 23, 773, in a fire entering ritual recorded on the South doorway, West panel (hereafter SW). Further, both the Reviewing Stand (RS), on the lower south façade of Structure 11, and another doorway inscription (NW) reference the "fashioning" (*patwan*) of an earlier phase of Structure 11 on March 24, 769, most likely covering the mortuary shrine and tomb of the king's predecessor, K'ahk' Yipyaj Chan K'awiil (Schele et al. 1989:3-6). Importantly this also hints at the span between the construction of the lower and upper temples: just over four and a half years (Schele 1987a:4).

Yet there seems to be at least one more dedicatory phase relevant to the upper temple (Schele et al. 1989:14). In its final passage, the WN panel (Figure 14, A6) plainly references the period ending 9.17.5.0.0 6 Ahau 13 Kayab, or December 26, 775.[49] Hitherto, due to its poor state of preservation, with two missing glyph blocks, but also because of several rare spellings, one of them unique (i.e., C5), this passage has always been

[49] As Linda Schele has noted (1987b:4 n. 5; Schele et al. 1989:14, n. 9), the carving of the Haab position is 14-[***K'AN**]**a-si**, but the coefficient is clearly in error for 13.

a mystery.[50] Nonetheless, Schele et al. (1989:14) perceptively noted that "[t]his event is not marked as a future event so we presume that this west panel had not yet been carved when that period ending occurred." Here, I think, is the beginning of a solution, for other sculptural elements of the upper temple may likewise have remained unfinished between the dedication of the structure in 773 and the record of the period ending on this panel, presumably carved some time after the close of 775. Below, I suggest that it is Structure 11's famous carved bench itself that is the subject of this passage.

Immediately after the Calendar Round for the period ending, at A6, we have **yi-la-ji**, *yilaaj*, "attended/witnessed by," at B6. While this has been taken as the main verb associated with this date (Schele 1987b:4, Schele et al. 1989:13), it now seems more likely that its role here is parallel to that of the relational nouns (or perfects) examined earlier in initiating an oblique clause pointing backwards rather than forwards. As such, I take it that the preceding 6-**AJAW** *14-[***K'AN**]**a**-**si** calendar round is the main clause, or at least the end of the primary clause, and that it is the period ending itself which was attended/witnessed by whomever was named in the missing blocks at C1-C2. This brings us to the problematic and incomplete C3, which appears to provide ?**u**-?-**ni**, of doubtful transcription. Whether this continues the name(s) in the missing blocks, provides a dedicatory verb for what follows, or instead initiates a possessed nominal phrase unfortunately depends on the identity of its first two elements. Thankfully we are on much firmer ground with the final three blocks, which we may transliterate and analyze as follows:

u-**TUN-nu te**-**me ch'a**-**ho**[51]-**ma**
utuntem ch'ahoom
u-tun=tem(-Ø) ch'ah-oom
3sA-STONE.BENCH(-3sB) SMOKE-agn.
(it is) the stone bench of the Censer

It is unclear whether the absolutive suffix is intended or not, for we cannot know how this noun phrase stands in relation to the missing signs above. If they provided a new verb, then this would be one of its arguments, and would therefore lack the absolutive (e.g., 'the stone bench of the Censer was fashioned'). If they did not, then we might consider a more complex sentence beginning at A4 and continuing through to the close of the panel (e.g., "... was seen at the (?)outset of 6 Ahau 13 Kayab, attended by ... , which is the stone bench of the Censer").[52] For the latter possibility, given the many portraits of gods and royal ancestors decorating the bench, it is intriguing to speculate that it is these portraits (and the finished bench) which were understood to be the witnesses of this period ending. Support comes from the text facing this one across the corridor. In association with an unclear sequence of events surrounding the 9.17.0.0.0 period ending in late January and early February, 771, the WS Panel records the 'summoning' (*upehkaj*) of three of the same gods named and depicted on the bench—i.e., K'uy Sakil Ajaw, Mo' Witz Ajaw, and Tun Witz Ajaw—and summarizes their function as follows:

ha-**o**-**bo ko**-**ko**-**no**-**ma** 3-**wi**-**ti**-**ki**
ha'ob ko[h]knoom uhxwi[n]tik
ha'-ob kohk-n-oom-Ø uhx-win-tik
dem.pro.-pl. GUARD-apass.-agn.-3B PLACE.NAME
They are the guardians of Copan[53]

However we understand the specifics of the final

[50] For instance, Schele (1987b:4) interpreted the signs at C3 as "*na hotun*, 'first five-tun,' confirming the CR as a period ending" and further suggested that the last two signs might reflect "something involving censers." Later, Schele et al. (1989:14) saw C4 as the sign "confirming ... the ... period-ending," though by this time they had clearly recognized C6 as the *ch'ahoom* title frequently carried by Yax Pasaj Chan Yopaat.

[51] There is some debate concerning the canonical value of T672. Until fairly recently, the sign has been read **ho** on the basis of two suggestions by Grube (2004:77). First, there is an early separation with T607 **jo**, collapsing only in the eighth century. T672 appears in all early forms of this title, from the early fifth century onwards (e.g., CPN St. 63), whereas T607 does not make its appearance in this context before the late seventh century (e.g., EDZ HS 2, ppD; K1453; YAX L.3, J1-J2; QRG A, D7; CHN Monjas, L. 4, Z1a). Second, Grube suggested a link between the "shell-fist" title and the lexeme *ch'a(a)h* 'smoke' instead of with *ch'aaj* 'drops' < *pM *ty'aj* 'dripping, splattered' (Barrera Vásquez et al. 1980:121; Kaufman 2003:540), as had long been assumed. The lexemes are certainly distinct. Tzendal <chahil> 'humo' (Ara 1986:263[f.20v]) and Tzeltal *ch'ahil* 'smoke' (Slocum et al. 1999:35) firmly establish the final *-h*, whereas Ch'ol *ch'ahtan* 'fumigate with incense' (Attinasi 1973:257) and Colonial Tzotzil *ch'atay* 'sahumar (to cense)' (Laughlin 1988:94) neatly establish the semantics. Nonetheless, the near restriction of T672 to the "shell-fist" title, where final **ma** is routinely omitted—e.g., K635 (twice); Chicago altar, side, F1; QRG P, C7b; Nim Li Punit jade pectoral, E3 (Prager and Braswell 2016:273, Table 1)—is occasionally taken as evidence in favor of a logographic value. Yet this seems unlikely in other contexts, such as the name of an early eighth-century El Cayo woman (compare **IX**-T607-**bi**, El Cayo Lintel 1, A14 with **IX**-T672-**bi**, Cleveland Panel, C5). Here, in keeping with Grube's (2004) suggestion, only **jo** ceding to later **ho** really makes sense. In light of this, the frequent lack of final **ma** in the *ch'ahoom* 'censer' title is best seen as an example of suspension (see Zender 1999:139-140, 2014a:8-9).

[52] The **tu**-**na**-**ja OK**-**ko** construction is unique and admittedly uncertain (hence the query in the translation), yet I suggest that it might plausibly be understood as a prepositional phrase including a possessed relational noun: *t-u-naj-ok*, prep.-3sE-FIRST-FOOT, "on/at the first foot(steps) of," that is, "at its outset."

[53] Note Ch'orti' *kojko* tv. 'guard, protect' (Hull 2016:201) and see Zender (2010:13, n. 22) for this analysis of *kohknoom*, building on Lacadena's (2000) recognition of the *-(oo)n* antipassive of non-CVC root transitives, syncopated in this context due to the following *-oom* agentive.

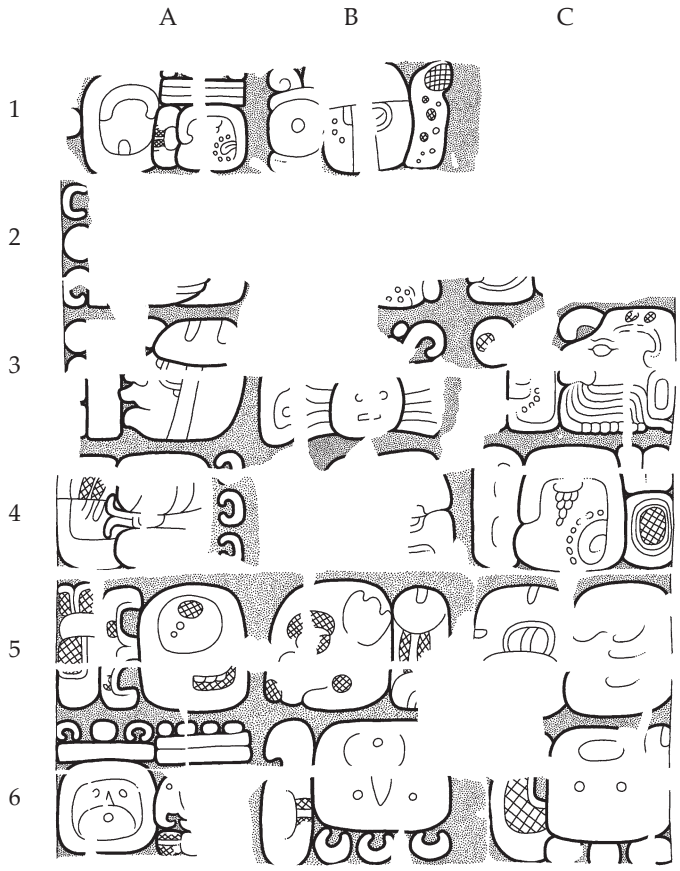

Figure 14. Copan Structure 10L-11 entryway inscription, west door, north panel (after photographs by Linda Schele, research.famsi.org/schele_photos.html, #s 34042-34044 and 34036, with reference to field drawings in Schele 1987b, and to a drawing by Berthold Riese in Riese and Riese 1991:251, Fig. 17).

passage on the WN Panel (Figure 14, C4-C6), it thus seems reasonable to pursue the possibility that it refers to the 10L-11 bench as a **TUN**-**nu**-**te**-**me**, *tuntem*, "stone bench." This is striking for at least two reasons. First, while not unprecedented, the synharmonic spelling of **TUN**-**nu**, *tun*, is uncommon, as this lexeme usually appears as **TUUN-ni**, *tuun*, reflecting the long vowel of its origin in Western Mayan **tooŋ* (Kaufman 2003:436). And yet, as first observed by Houston et al. (1998:274), "[t]he spellings from Temple 11, Copan, are especially noteworthy. In half-jest, we have considered labeling this structure 'Temple of the Short Vowel,' given its pronounced (and temporally precocious) tendency to employ synharmonic spellings in place of the expected disharmonic ones." Indeed, Houston et al. (2004:91-92) listed five distinct synharmonic spellings from the Temple 11 inscriptions, including the Reviewing Stand. With the discovery of additional contexts and growing understandings of script orthography during the past twenty years we can now more than triple that number to seventeen distinct contexts in the Temple 11 texts alone.[54] Further, other inscriptions from the reign of Yax Pasaj Chan Yopat are particularly known for this tendency (Zender et al. 2016:43-44). It is in light of this strikingly innovative set of spelling practices that the present text must be understood, and it should also be highlighted that it provides a particularly strong set of constraints for the 1SE sign, which here follows **te** in a text otherwise replete with synharmonic spellings. As for **te**-**me**, *tem*, as a late eighth-century term for 'bench,' note that this lexeme too is otherwise known only from substantially earlier disharmonic **te**-**mu** and **te**-**ma** spellings (see Houston 2008; Houston et al. 1998:284; Houston et al. 2004:90).[55] But note the term's distribution, form, and meaning in Mayan languages:

Ch'olti'	<tem>	n.	banco (bench) (Morán 1935:10)
Ch'ol	*tem*	n.	seat, bench (Hopkins et al. 2011:221)
Chontal	*tem*	n.	banquillo, banquito (small bench) (Keller and Luciano 1997:233)
Col. Tzl.	<tencab>	n.	poyo p[ar]a sentarse (masonry bench for sitting)[56] (De Ara 1986:380[98v])

[54] The five contexts noted by Houston et al. were: (1) **-ni**-**yi** (deictic clitic), EN, C3; (2) **YOP**-**AT**-**ta** (theonym), NE, C4; (3) **YOPAT**-**ta**, RS, D'1; (4) **ha**-**o**-**bo** (dem.pro.-pl.), WS, C4; (5) **yo**-**ko**, *y-ok*, "its foot," ES, A2. To these can now be added: (6) **pa**-**ta**-**wa**-**na**, *patwan* (positional), NW, B3; (7) **pa**-**ta**-**wa**-**na**, *patwan*, RS, B'1; (8) **YOPAT**-**ta**, SW, C5; (9) **i**-**u**-**tu**, *i-u[h]t* (root intransitive), SW, D6; (10) **tu**-**na**-**ja**, *t-u-nah*, "in his house," WN, A5; (11) **OK**-**ko**, *ok*, "foot," WN, B5; (12) **TUN**-**nu**, *tun*, "stone," WN, C4; (13) **te**-**me**, *tem*, "bench," WN, C5; (14) **tu**-**TUN**-**nu**, *tun*, "stone," WS, C2; (15) **tu**-**TUN**-**nu**, *tun*, "stone," Bench, left, 7; (16) **YOP**-**AT**-**ta**, Bench, center, A3; and (17) **YOP**-**a**-**AT**-**ta**, Cornice, A4.

[55] In chronological order, the seven known epigraphic contexts of 'bench' are as follows: (1) **u**-**te**-**mu**, CLK Str. XX bench, E, c. AD 550 (Martin 2008); (2) **u te**-**ma**, PAL House C, West, Pier C, AD 662 (Robertson 1985:Pls. 225-227); (3) **u**-**te**-**ma**, Str. C4, Room B, San José, Belize (Thompson 1939:Pls. 6e, 9), Late Classic; (4) **u te mu**, K1524, 3-5, Late Classic (Kerr 1989:94); (5) **u**-**CH'AM**-**wa**-**te**-**mu**, PNG St. 3, E3b, AD 711; (6) **ba**-**te**-**mu**, PNG St. 5, front, pA2, AD 716; (7) **te**-**me**, CPN T. 11, WN, C5, AD 775. The centuries of oscillation between **mu** and **ma** are difficult to reconcile with a suggestion of carefully calibrated orthographic evolution (Lacadena and Wichmann 2004). The relatively small number of examples of most Classic Mayan lexemes is probably insufficient to generalize about many features of orthographic variation and reform. Note, however, that the same cannot be said of the late eighth century development to **te**-**me**, which seems strongly motivated by its context amidst numerous contemporary synharmonic innovations.

[56] Note the remarkable divergence between such Colonial glosses as *masonry bench* and *step*, and modern *seat* and *chair*. This provides a suggestive indication of the original scope and significance of the word *teem* as referring primarily to structural benches (i.e., Latin *podium*, Spanish *poyo*), and may also explain the apparent semantic broadening in Eastern Mayan, where it can refer to other parts of a structure, including its *pillars* and *beams*. It is also a useful reminder of the profound semantic shifts which many Mayan terms experienced during and after the disastrous collapse and *conquista*.

Col. Yuc.	<tem>	n.	poyo o grada (masonry bench or step) (Barrera Vásquez et al. 1980:783)
	<tem>	n.	grada o escalón para subir (step or large stair for climbing) (Barrera Vásquez et al. 1980:783)
K'ichee'	*teem*	n.	banco para sentarse, silla (bench for sitting, chair) (Kaufman 2003:953)
	<tem>	n.	asiento, banca, silla; viga de casa (seat, bench, chair; beam or rafter of house) (Henne Pontious 1980:145)
Kaqchikel	*tem*	n.	asiento sin patas, banco (seat without legs, bench) (Kaufman 2003:954)
	tem	n.	column, pillar (McKenna Brown et al. 2006:252)
	tem	n.	viga (beam, rafter, plank) (Munson 1991:218)

As expected, the Ch'olan-Tzeltalan languages all have short vowels, but the K'ichee' long vowel and Kaqchikel tense vowel both attest to an earlier long vowel, indicating that all of these forms hail from SM **teem* 'seat, bench' (Kaufman 2017:101).[57] Colonial Yucatec surely would have had a long vowel as well.

Thus, the philological evidence is supportive both of ancestry from an old long vowel (captured in the earlier **te**-**mu** and **te**-**ma** spellings) and of the later loss of long vowels (captured in this one late eighth century text). It is perhaps also fitting to observe that this remarkably constrained context, with **te** and **me** giving a late reduced vowel in the word *tem* 'masonry bench,' contains the same two signs glossed as <t> and <m> in the sixteenth-century *Relación* biscript (Figure 3). This brings us back full circle to the observations which began this study.

Iconic Origin

Now that we have thoroughly considered the corpus and established that the proposed decipherment of 1SE **me** receives strong support from biscripts and other constraints—but that it also meets all of the distributional criteria for a sign with this value and can be seen to be productive as **me** in all of the orthographic, morphological, and semantic contexts which we have considered—we can at last consider a potential iconic origin for the sign. As noted earlier, iconographic analysis of Maya art and writing is on shaky ground absent phonetic evidence and corresponding lexical equations, for Classic Maya representational conventions and paleographic developments are complex and still not thoroughly understood. In particular, "Maya hieroglyphs have been characterized as *calculiform,* or pebble-shaped. But they could just as easily be described as amoeba-like, for their outlines are less codified than is apparent at first glance and display a striking readiness to compress, bend, stretch and distort. Such adjustable contours allowed signs of radically different shape to combine into a single glyph block" (Stone and Zender 2011:17). This striking plasticity of sign form is only one dimension of potential confusion in determining sign origins. Complex and dynamic orthographic conventions—such as the "property indicators" which label signs in order to indicate conceptual categories such as material composition (stone, wood, bone, shell, water), natural and cultural associations (amphibians, nocturnal animals, deities, parts of a larger whole), and even color and texture (Houston et al. 2006:13-14; Stone and Zender 2011:13-15)—can all obscure the pictorial origins of signs. Yet every sign in Maya writing is a picture of something. In those cases where we are able to comprehend the representational conventions, and should sufficient phonetic and linguistic evidence survive to establish a connection to contemporary Mayan lexemes and their semantic significance, we may be able to divine the source of a Maya sign.

As is now well understood, a significant portion of the Maya syllabary was evidently derived from an early Ch'olan language by the process of acrophony, whereby the initial CV of a CVC source lexeme was retained and subsequently employed for its sound alone, without regard for any previous semantic associations (for recent discussion and references, see Houston et al. 2000:328; Zender 1999:38-41). The principle is remarkably common in the world's scripts and, as mentioned earlier, in fact accounts for the origins of our own ABC in pictorial signs for an ox, a house, and a cattle goad (Gardiner 1916). A paradigmatic Mayan example is T711 **ke**, a hand sign emphasizing the distance from index finger to thumb, and surely derived from a Ch'olan cognate of Tzeltalan *kej* 'measure/span between forefinger and thumb' (B. Berlin 1968:228; see Zender 1999:38). In another clear case, T757 **BAAH** pictorially represents the *baah* 'pocket gopher' (*Orthogeomys spp.*), as revealed by contemporaneous depictions of the animal in art, as well as by "the **K'AN** (yellow) infix on the creature's cheek, no doubt employed to reference the color of the pocket gopher's hide: invariably tan to light yellow-brown" (Stone and Zender 2011:193). Importantly, the sign is employed exclusively as a logogram until the eighth century, when the collapse of the *j*/*h* distinction and the loss of vowel

[57] "SM" is Kaufman's (2017:65) recent label for proto-Mayan minus Wastekan. In this same paper, Kaufman (2017:101) teases apart the SM etyma **tyem* 'canoe, raft' and **teem* 'seat, bench,' which previous studies have tended to consider as related forms (e.g., Kaufman 2003:953-954; Wichmann and Brown 2004:179). This returns to a much earlier view by Kaufman (1964:112-113), albeit with a more sophisticated phonological reconstruction.

length saw the word for "gopher" develop from *baah* to *baa* to *ba.* At this point, T757 began to substitute for T501 **ba**, indicating that it had come to be regarded as a phonetic sign (Stephen Houston, in Stone and Zender 2011:11). This useful example reveals that the acrophonic process was not limited to the initial development of the system, but could also result from phonological changes experienced during its many centuries of use.

But a subjective hunt for potential lexemes of the shape *me*C that merely "look like" 1SE is not a sufficiently rigorous method for discovering sign origins. Rather, we must closely examine the sign and its development in all of the available examples. As David Stuart cautions in his discussion of the ZY5 **OTOOT** 'house' sign, the "iconic origin of the glyph is most clear in early examples, for by Late Classic times the form of the glyph came to be less naturalistically rendered and ultimately reanalyzed into rather abstract-looking elements" (Stuart 1998:377; see also Stuart 1987a:34-35, Fig. 46). If we carefully study the formal development of 1SE **me** (Figure 4), we notice that what appear to be fairly naturalistic radiating curved lines in some of the earliest examples (Figure 4a, c) sporadically but surely develop into more conventionalized U-shapes in the later examples (Figure 4d, h–j). The sharp angles and reverse directionality of the U-shapes in Figure 4j may or may not be relevant, since the span between it and the previous example is more than seven hundred years, and because we do not know how often or under what conditions the *Relación* biscript was copied. As noted earlier, an infixed oval enclosing three or more dots first appears in the late eighth century (Figure 4f–i). It is absent from the sixteenth-century example, but it is once again difficult to know whether this reflects development from a pre-oval "school" of Northern Yucatan, a mere space-saving device, or actual changes in sign paleography in the considerable interval between the last two examples. The most stable feature of the sign in all of its contexts is an aperture or oblate spheroid nearly always appearing at the upper left. Once again the *Relación* example is the most divergent, as though the sign had rotated 90° counter-clockwise in the intervening centuries, though it does at least continue to carry the element in question. Nearly all examples seem to show a bifurcation or similar dividing marker in this element, and this even seems to "protrude" out of the confines of the glyph block in a few examples (Figure 4b, d, h, j). Uniquely, the example from the Tablet of the 96 Glyphs (Figure 4e) shows an internal spiral.

Our first real clue as to what 1SE depicts comes from the recognition of the U-shapes as a conventional surface indicator for items made of shell. Thus, in the scene on the Cleveland shell discussed above (Figure 15a), the large conch shell carries six of the U-shaped

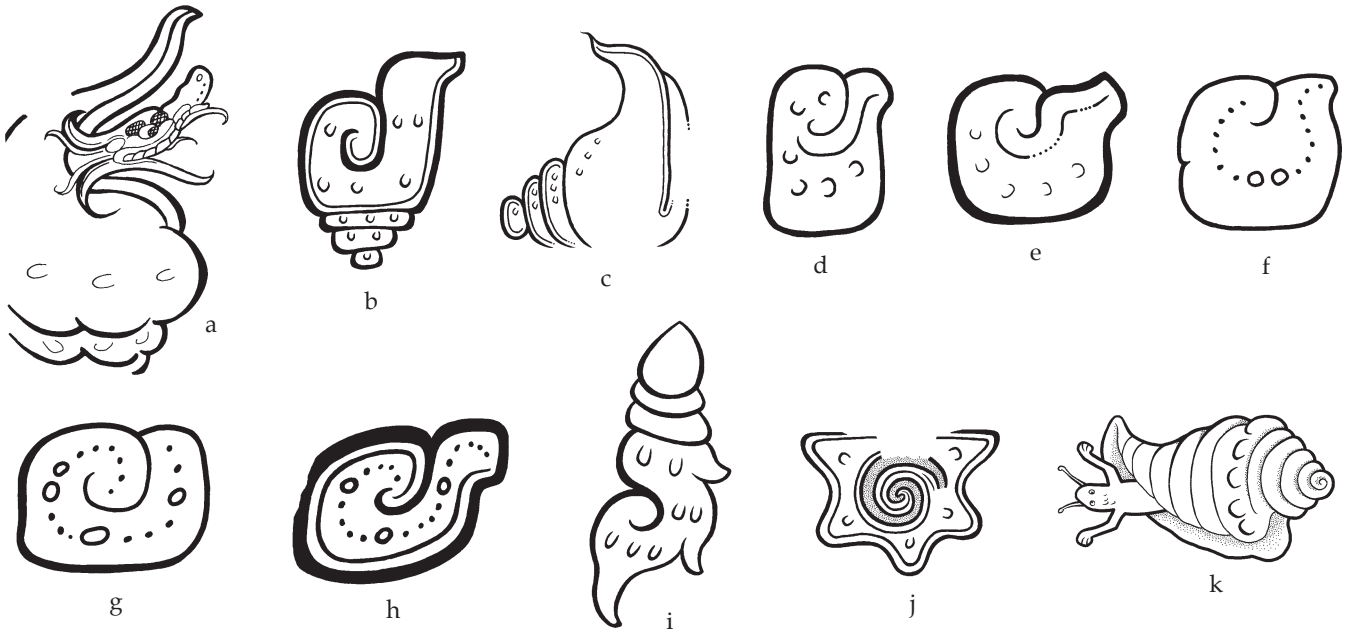

Figure 15. Shell iconography in Mesoamerican art and writing: (a) conch shell and marine mollusk, detail of Figure 6; (b) conch shell, K6665; (c) sea shell from mythological scene, K6434; (d) T210a snail shell, YAX HS 2, Step VIII, XI (after Graham 1982:160, with amendments based on photographs); (e) T210a snail shell, MSJ Stela 4, front, caption (after a photograph courtesy of Ian Graham); (f) T210a snail shell, COL Brussels Stela, E4 (after Stone and Zender 2011:202); (g) T210a snail shell, PNG St 12, S2 (after Stuart and Graham 2003:63); (h) T210a snail shell, El Jobillo sherd (after a photograph courtesy of PRALC); (i) Mixtec **T**(**Y**)**EHE** 'conch' sign from *yúkú' t(y)èhè* "hill of the conch" toponym, Codex Egerton 2895, British Museum, London, folio 25; (j) Aztec *Ehēcacōzcatl* "(shell) wind jewel," Codex Magliabechiano, Biblioteca Nazionale Centrale, Florence, folio 3v; (k) Aztec *Tēcciztli* "conch," Florentine Codex, Biblioteca Medicea Laurenziana, Florence, vol 3, folio 64r.

Figure 16. Waterbands with infixed shells, detail of the Tablet of Temple XIV, Palenque (photograph by Linda Schele, research.famsi.org/schele_photos.html, # 20049). Note traces of blue pigment in the aquatic imagery.

elements in and around its whorls, as do numerous other marine shells in Maya art (Figure 15b–c). Similarly, T210a ?**so**—which clearly represents a snail shell, and may itself derive from the word *sok* 'snail'—carries the same U-shaped elements in several examples (Figure 15d–e).[58] Marine shells also appear quite frequently in the so-called water bands qualifying aquatic environments in art, and these too carry the conventional shell markings. On the Tablet of Palenque Temple XIV (Figure 16), for instance, the foot of the young K'inich Kaan Bahlam II treads on a water band, directly above a probable marine shell marked with the U-shaped qualifiers. Below is an embedded place name reading **TI'-K'AHK'-NAHB**, *ti' k'ahk'nahb*, "(at) the edge of the ocean," where the **NAHB** hieroglyph, long known to represent a body of water, incorporates a curving water band infixed with its own U-marked shell (Stone and Zender 2011:173). Finally, 1G5 **ju**, long thought to represent some kind of shell given internal details shared with the T110 **ko** 'turtle shell' (e.g., Houston et al. 2000:328), is canonically ringed with the U-shaped elements as well.[59] These observations strongly suggest that 1SE **me** also represents a shell of some kind. The late eighth century development of the rough texture marker may also be relevant to this identification, inasmuch as several T210a snail shells carry similar markings, frequently alternating larger and smaller dots, as in the texture marker on 1SE (Figure 15f–h). Perhaps these two markers are in free variation, or perhaps they cue slightly different textures or associations. In either case, both are clearly found on shells. The U-shapes, it should be noted, are also common markers of shells in the Late Postclassic art and writing of Oaxaca and Central Mexico (Figure 15i–k).[60]

Taken together, the above observations provide us with a welcome footing in investigating the iconic origin of 1SE. As constraints, we have managed to stipulate that it should derive from a word of the form *me*C, which should in turn carry the meaning 'shell,' or at least depict something made of shell. With this in mind, note the following Ch'orti' lexical items:

mech	n.	shell, hard covering, any kind of shellfish (Wisdom 1950:527b)
mech chay	c.n.	shell fish (Wisdom 1950:527b)
mechir	d.adj.	having a shell, of the shell variety (Wisdom 1950:527b)
mechirih	d.iv.	grow a shell (Wisdom 1950:527b)
pere	tv.	suck in (Hull 2016:330)
pere	tv.	draw in, pull in, suck (Wisdom 1950:563)
pere uhor	phr.	draw in its head (as a snail) (Wisdom 1950:563)
perem	part.	drawn in, sucked in (Wisdom 1950:563)
perem mech	c.n.	snail (Wisdom 1950:563)
peremech	c.n.	snail shell (Hull 2016:330)
suri umech	phr.	shed its shell (Wisdom 1950:642)

In Ch'orti' as spoken today, *mech* no longer survives apart from the fossilized form *peremech* 'snail shell' (William Marcos García, personal communication 2017). Yet it is clear from Wisdom's data, gathered in the early 1930s (Hull 2016:3), that this derives from *perem mech* 'snail (lit. drawn-in shellfish).' Further, *mech* itself was

[58] I proposed T210a **so** in the context of Eastern Mayan ?**so-tz'i**, *sootz'*, "bat," on the Nebaj-style Fenton Vase (Zender 2005b). Its frequent occurrence with C**o** syllables suggested the value (e.g., **AJ**-?**so-to**, YAX L.35, A6; ?**so-ko**, K2787; **AJ-u-tzi-li**-?**so-to**, PNG St. 12, S1-2; and ?**so-no** spellings in contexts referencing dwarfs, first noted by Houston 1992). More recently, Polyukhovych (2009) notes a **mi**-?**so-na** spelling on K1811, and Albert Davletshin (personal communication 2011) a parallel **K'AHK'-mi**-?**so-no** on Dresden 71a. These are welcome developments, yet absent firm constraints or substitutions with other **s**V signs the value must remain tentative. Nonetheless, should **so** prove correct, Yucatec *sok* "snail species of Cozumel" (Barrera Vásquez et al. 1980:736) provides a potential source.

[59] Compare the following examples of 1G5 **ju**: (1) **u-ju-chi**, Figure 5, 5b; (2) **u-ju-chi**, Figure 6, E2; (3) **IX-sa-**[**la**]**ja-²ju**, Figure 7, K1. The sign likely derives from *juhch* 'shell' (see note 35).

[60] These "shell" markings are quite similar to an equally widespread convention for marking "cotton," as in T595 ?**TINAM**/**no** (Dienhart 1986; Stuart and Houston 2018; Thompson 1962:221-222). Differences include the strict regimentation of U-shapes in the latter, always disposed in rows and sharing the same orientation.

clearly a fairly common word only eighty-five years ago, with productive adjectival, verbal, and compound uses. This is all the more significant since there are no cognates for *mech* in other Mayan languages.[61] In other words, Eastern Ch'olan (or even pre-Ch'orti') seems on present evidence to have innovated the term. Thus, if *mech* is accepted as the source of 1SE **me**, it would further suggest that the sign was developed in an Eastern Ch'olan context.

Given the fairly general glosses, it is difficult to know what kinds of shellfish and snails *mech* might have represented. However, the vivid description of the Ch'orti' *perem mech* as a snail that draws its head all the way into its shell suggests a freshwater snail with an operculum: a hard anatomical structure attached to the pseudopod, which the snail can close firmly behind it to keep out dirt and water. An obvious candidate is the well-known *jute* snail (*Pachychilus spp.*), a widespread genus of aquatic gastropod mollusks, widely exploited in Classic times for both food and lime production (Healy et al. 1990). Allowing for the general plasticity of Maya signs, as well as the prerequisite that they must fit into glyph blocks of frequently varying dimensions, the *jute* snail seems to provide a reasonable model for 1SE **me** (Figure 17). Note especially the sutures marking each of the whorl margins down the length of the spire. Coupled with the pronounced vertical ribbing, these may well be the models in nature of the early radiating curved lines which eventually developed into the conventionalized U-shaped infixes discussed above. Pachychilids have a multispiral operculum (Fischer and Crosse 1900:326), and this may be what the Palenque scribe was indicating with the unique spiral detail he included within the aperture at the upper left (Figure 4e). Yet other scribes may have been attempting to indicate the emerging tentacles or eye stalks of the snail itself (Figure 4b, d, h). Finally, the distinctive rough surface of some Pachychilidae, such as *P. glaphyrus* and *P. largillierti*, both documented at archaeological sites in the Peten and in Belize (Healy et al. 1990:173, Table 1), may also have played a role in the late eighth-century addition of the texture marker to 1SE (Figure 4f–i). In light of this welcome consilience of epigraphic, linguistic, and iconographic evidence, it can therefore be reasonably concluded that 1SE **me** depicts a snail shell, having been acrophonically derived from the Eastern Ch'olan lexeme *mech*.

Figure 17. *Pachychilus largillierti* (Phillipi, 1843). Type collection of the Rijksmuseum van Natuurlijke Historie, Leiden, RMNH.MOL.17227 (photograph courtesy of the Naturalis Biodiversity Center / Wikimedia Commons, naturalis.nl).

Conclusions

At this point we may regard a phonetic **me** value for 1SE as firmly established according to the best principles of archaeological decipherment. Our investigation began with observations of an invaluable sixteenth-century biscript suggesting the sign's equation with the sound [me]. Although the biscript is not presently known to contain any logograms, several signs are of uncertain identification, and so the question of whether 1SE represented a phonetic sign or a logogram remained unsettled. The corpus of Maya hieroglyphic writing was then canvassed to locate all potential examples of the sign, which were then closely scrutinized for distributional criteria that would reveal its function within the writing system. The sign's frequent association with known C**e** syllables was noted, as were certain orthographic patterns suggesting the likelihood that any sign routinely appearing in such contexts was not merely a phonetic sign, but a C**e** sign in its own right. Although all reasonably likely examples were tabulated and closely compared, those which were deemed too eroded or otherwise equivocal to provide probative contexts were not investigated further, though several remain promising and will be pursued in future work. Of the remainder, one provided particularly strong constraints in the form of both a pictorial reference and a virtual biscript. Several other examples provided internal orthographic, morphological, and semantic constraints, all of which proved mutually reinforcing, with the result that the **me** value has proven demonstrable in at least five distinct script settings—i.e., not including the repetition of the evidently common

[61] It is tempting to see some connection with pM **meek'*, 'seashell,' with cognates including Q'anjob'al *mich'*, Awakateko *xh-meek'*, Sipakapense *mek'* (Kaufman 2003:655), and Ixhil *mech'* (Jewett and Willis 1996:135). Yet Ch'orti' regularly reflects pM **k'* with *ch'*, and these are most likely unrelated. Kaufman (2003:657) connects Ch'orti' *peremech* with *pemech*, a widespread term for 'seashell'—e.g., Ch'olti' <pemehc> 'concha (seashell)' (Morán 1935:18); Ch'ol <bejmech> 'Muscheln (mussels, shells)' (Sapper 1907:452); Mopan *(ix)pemech* 'clam' (Hofling 2011:193, 350), and Itzaj *(ix)pemech* 'almeja, concha (shellfish, seashell)' (Hofling 1998:275, 510). Equivalent Kaqchikel, Poqomchi' and Q'eqchi' forms led Kaufman (2003:657) to propose pM *#pemech*. If so, then something like *#peC=mech* may indeed have had a long history, and perhaps *mech* was once more widespread. But the *pemech* forms all seem too close to *tepemech(ín)* 'mountain mullet,' a trout-like fish (< Nahuatl *tepē-mich-in*, Karttunen 1992:146, 230). There have been stranger semantic shifts than "mountain fish" becoming "shellfish." Absent an explanation for the initial *pe-* of *#pemech*, then, it seems safer to consider these late loanwords from Mexicanized Spanish.

Classic Maya lexemes *mek'* and *k'esem* in different contexts. Only once this conclusion had been reached were the sign's iconography and paleographic development investigated with the goal of discovering a potential iconic origin. The conclusion reached on the basis of close consideration of the earliest available forms, in tandem with the labelling of 1SE with markings of "shell" and "rough texture," and the critical constraint offered by the sign's phonetic value, is that 1SE derives from an early Eastern Ch'olan word *mech* 'shell, shellfish, snail,' with its proximate model having been either the *jute* snail (*Pachychilus spp.*) or a kindred genus.

In addition to documenting the origins and development of the 1SE **me** syllable, this study has had several important implications for the study of Classic Maya language, writing, and art. First and foremost, we now have a vastly improved understanding of the context in which the *Relación* biscript was elicited and provided. Several promising avenues of investigation were offered for the remaining undeciphered signs in this important document, and it is hoped that they will stimulate future research. Second, several new Classic Mayan lexemes have now been attested and their semantic and grammatical functions noted, including: the verb *mek'* 'to embrace, carry in the arms'; the derived noun *mehk'* 'carrier, support'; the derived noun *met* 'object bent/twisted into a circle (i.e., nest)'; the active verbal noun *k'es* 'sharpen'; and the noun *mech* 'shell, shellfish, snail.' Third, new information and nuance has been added to several previously-identified lexemes, such as *oop* 'green-winged macaw' (earlier read *op* 'parrot') and *tem* 'masonry bench' (now attested in a late eighth-century compound showing loss of vowel length), the latter with an improved understanding of its core architectural meaning. Fourth, new details have been added to our understanding of Classic Mayan grammatical morphology, including the first clear attestation of the *-em* perfect participle. Strikingly, the context of this participle on the active verbal noun *k'es* reflects a characteristically Eastern Ch'olan innovation and thereby provides further support for the Classic Ch'olti'an hypothesis. Fifth, and finally, the identification of the U-shaped 'shell markings' considered above are a welcome development, and they may have the potential to explain the origins of several other signs besides 1G5 **ju**, 1SE **me**, and T210a ?**so**. Thus, although T188 **le** is frequently identified as representing a leaf (largely on the basis of Yukatekan **le'*, 'leaf'), its striking similarity to 1SE, as well as to the 'marine shell' frequently incorporated into waterbands in Maya art and writing, strongly suggest that it too represents some kind of shellfish. Further, the promise of this new feature is not exhausted with these epigraphic contexts, for the U-shaped elements are also common in art, providing material labels for many items fashioned of shell.

Beyond the minutia of decipherment, grammar, and art—beyond even the challenging but infinitely rewarding task of reconstructing the sound and sense of a language that has not been written for more than twelve hundred years—this paper has attempted to demonstrate how it is that we are able to read this remarkably complex script in the first place. That is: what counts as a convincing decipherment? What is the basis of epigraphers' readings of the names of Maya kings, queens, and dynastic houses? And if the script is so securely deciphered, why do the names change so frequently (Chase et al. 2008:10)? By providing a thorough review of the principal assumptions, theoretical orientations, and working methodologies of archaeological decipherment, with numerous examples of both successful and unsuccessful decipherments, I hope to have answered these questions by demonstrating that decipherment is nothing more (and nothing less) than the application of the empirical method to an essentially linguistic problem. Like all historical sciences, decipherment considers the available evidence, forms testable hypotheses that are continually revised and rejected, and then awaits additional data (see e.g., Popper 1963). In a field as energetic as Maya studies, where significant new inscriptions are unearthed every year, is it any wonder that such revisions and rejections are so frequent? There's an old joke, common among historical linguists, which observes that "during the past two centuries, no language has changed more than Proto-Indo-European." The point of the joke is that the language is long dead, and shouldn't be changing at all; but if so, why do Indo-Europeanists keep changing their reconstructions of Proto-Indo-European grammar? As Mayanists, we should be delighted rather than suspicious that we no longer read the name of Jasaw Chan K'awiil of Tikal as 'Ah Cacau' (Jones 1985:24), while at the same time recognizing that the earlier reading was a necessary step on the road to achieving the new. That name will not change again, by the way, for there has always been a stable core at the center of Maya decipherment: knowledge as sure as the fact that Grimm's Law operated in early Germanic, ratified by application of the principles and methods of decipherment set out above. Of the twenty phonetic signs and words proposed by Knorozov (1958:285) almost sixty years ago, all but one still holds the values he assigned them today. Of the twenty phonetic syllables and logograms proposed by Stuart (1987a) thirty years ago, each and every one remains correct in its essentials, with the sole proviso that we now know a great deal more about the early distinction between *j*/*h* in Mayan languages and the loss of ancient vowel length than anyone did in the 1980s.

But more important than convincing doubtful colleagues of the firm foundation of Maya epigraphy is to highlight that archaeological decipherment is no longer just the province of Near Eastern studies departments. Yes, the great decipherments of the early

nineteenth century were undertaken in the Old World, and that is where the philological and grammatological tradition began. But these practices are now the intellectual inheritance of all humanistic scholarship, and they belong equally to the study of New World scripts and languages. This review of the core principles and methodologies of archaeological decipherment, coupled with a detailed case study of Maya writing, is therefore especially offered in the hope that it will stimulate students to apply these tools to those Mesoamerican writing systems which still elude detailed linguistic understanding. Who shall read them?

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