DISHARMONY IN MAYA HIEROGLYPHIC WRITING: LINGUISTIC CHANGE AND CONTINUITY IN CLASSIC SOCIETY

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Some forty-five years ago Yuri Knorosov discovered the existence of phonetic syllables in Maya writing (1952, 1958, 1965, 1967). Despite strong opposition, Knorosov made an excellent case that Maya script recorded signs of consonant + vowel form. When combined in groupings of two or more glyphs these signs spelled words like **ma** + **ma** → *mam* or **ku** + **tsu** → *kuts*. In each instance the final vowel of the second syllable —a superfluous, 'dead' vowel— could be safely detached once the two syllables were joined into a CVC (or CVCVC) root, the most common configuration in Mayan languages. Knorosov's insight has been discussed elsewhere, either as an issue in intellectual history (Houston 1988; Coe 1992) or as a topic in decipherment (Justeson and Campbell 1984). Today, few epigraphers question the singular importance of Knorosov's contribution. Working in near-total isolation from other Mayanists, he succeeded in achieving a breakthrough that fundamentally changed modern views of Maya writing.

Yet Knorosov could not explain one feature of syllabic signs: What, precisely, determined the final sign in such groupings? Knorosov detected a default arrangement, which he labeled 'synharmony,' by which the vowel of the second sign duplicated that of the first (Knorosov 1965:174-175). As Kelley pointed out, this pattern explained a large number of spellings (Kelley 1976:18). Lounsbury, too, found that synharmony accorded with morphophonemic processes in Mayan languages (1973:100), especially the 'echo' syllable, a 'voiceless ... repeat of the root-final consonant and vowel' (Hopkins 1988:2). But, to a puzzling extent, the 'rule' did not operate 'systematically' (Knorosov 1965:183). Some of Knorosov's most convincing decipherments (e.g., **mu** + **ti** → *mut*, 'bird') blatantly violated the expectation of shared vowels. For epigraphers this was a crucial point, since the premise of synharmony had facilitated the decipherment of second syllables with unknown vowels (Kelley 1976:246). The unexplained 'dishar-

mony' —which we define as the presence of vocalic discordance in syllabic spellings— remained a source of concern to Knorosov's followers and a point of weakness to be exploited by his detractors.

So far, attempts to explain disharmony have proved somewhat tentative. Kelley hypothesized a possible relation to 'presumed cognates in the Penutian languages,' which happened to have a tendency to CVCV roots (Kelley 1976:180). The silent vowel reflected some earlier root form that typically ended in vowels (Kelley 1976:167), a line of reasoning building on Whorf's supposed, and highly dubious, linkage of Mayan to Penutian languages (Campbell 1979:964). Unfortunately, neither the Penutian-Maya connection nor the existence of such roots can be reconstructed in a persuasive manner. Justeson proposed another argument for the 'fictitious V', suggesting that '(s)pecial phonological and grammatical conditions appear to have affected vowel selection in regular ways' (Justeson 1989:35). Syllable-closing consonants had predictable associations with disharmonic selection, so that, for example, 'when a dental or alveolar stop ... or alveolar affricate ... followed *o* or *u* the vowel was normally *i*' (Justeson 1989:35). Knorosov's *mut* spelling illustrated this nicely. Bricker discerned a different pattern. In her opinion medial vowels of logographs correlated with complements containing «neutral vowels» (Bricker 1986:7; see also Justeson 1978:291). These vowels could be used flexibly with logographs containing different vowels.

As an alternative explanation Justeson highlighted possible grammatical reasons for disharmony. Spellings of transitive and intransitive verbs favored different vowels in closing syllables. On occasion, such syllables may have recorded the 'initial vowel of the suffix' (Justeson 1989:35). In unpublished work Houston and Stuart independently considered such an explanation for a spelling of 'his/her/its bone' as **U-ba-ki** → *u-bak-i***l*, with the word-final *-l* implicit in the **ki** syllable. (We no longer advocate this interpretation.) Similarly, Hopkins observed that final, silent vowels in syllabic spellings should be explained before they are ignored (1988:2). He too hypothesized that the 'echo vowel' of certain consonants determined the selection of spelling-final syllables (ibid.).

While plausible, these explanations have yet to gain wide acceptance, nor have they effectively explained all occurrences of disharmony (e.g., Justeson 1989:35). We propose another view, (1) that synharmonic spellings yield CVC or, more rarely, CVCVC roots, and (2) that disharmony marks additional, medial elements within roots: CV:C (which preserved Common Mayan *CV:C or *CV'C > CV:C) or CVhC (which preserved Common Mayan *CVhC). To put this another way, disharmony registers what we call 'complex vowels': those with vowel length, a feature formerly thought to have been ignored in Maya script (Justeson 1989:33), or vowel plus *h*. Disharmony provides an important clue to the history of Mayan languages. It enlarges the number of vowels attested in Classic Maya times (cf. Kaufman and Norman 1984:85) and reflects conservative elements in the lan-

guage that was recorded hieroglyphically. We concur with Hopkins that orthographic variation is more likely to reveal, not so much arbitrary caprice on the part of scribes, as unsuspected subtleties of ancient language.

PRESENTATION OF DATA

Our approach involves several steps and methodological assumptions. First, we have gathered all known disharmonic spellings, or at least those that have come to our attention through a thorough search of the corpus of Maya texts. Second, these data have been compared to lexical reconstructions by Kaufman and Norman (1984). In this paper Robertson supplies evidence for these reconstructions, information that tends to be absent in Kaufman and Norman's list (1984). We believe it is not enough to assert a particular reconstruction; rather, one must show explicitly why one form is more likely than another. Some terms, though present in script, could not be studied for want of comparative data from attested Mayan languages. For example, the INTRANSITIVE POSITIONAL ending, *-wan* (*-wa:n* in glyphs), is attestable only in those languages where all vestiges of Common Mayan vowel length have been lost. For such morphemes we despair of confirming vowel length outside the script. Moreover, we have eliminated words with morphological suffixes because such stems could not be plumbed for evidence of root quality. Disharmony can only affect the final vocalic element in glyphic spellings; suffixed roots effectively obliterate such evidence (although see footnote 5). Another problem is that some signs possess phonetically transparent readings yet utterly elude interpretation of their meaning. For example, **u-si**, a term recently revealed in the Bonampak murals by means of infrared imaging, may spell the word for 'mosquito,' but we have no textual confirmation that this meaning was intended by the Maya.

A note on the search for cognates: We have scavenged broadly to diminish any possible ambiguity. Prior experience tells us that stray examples can fatally mislead the researcher who ignores the vagaries of linguistic history. A case in point is glyphic **ba-ki** 'bone', which, according to our hypothesis, indicates *ba:k* or *bahk,* forms that automatically presuppose Common Mayan **ba:q/*ba'q* or **bahk* respectively (CM **q* turns to *k* in the language of the Classic inscriptions). But the comparative data must be investigated carefully before this descent can be assumed. Despite the fact that Cunén Quiché preserves Common Mayan long vowels, for example, it is misleading to cite Cunén Quiché V: as a reflex of Common Mayan *V:, since the modern V: came not only from Common Mayan *V:, but also from *V' and *Vh. To establish that a given V: in Cunén is a true reflex of *V:, and not of *V' or of *Vh, a cognate form must be retrieved from languages that preserve both *V' and *Vh. Mam happens to preserve *V' (cf. *k'i'ʂ* < CM **k'i'ʂ*), a feature showing that *ba:q* cannot derive from**ba'q*, since CV' is

conserved in Mam. This leaves the possibility of **ba:q* or **bahq*, however, since Common Mayan *CVhC and *CV:C both became CV:C in Mam. By citing Chortí *bak*, we eliminate the possibility of Common Mayan **bahq* leading to *ba:q*, since Chortí preserves Common Mayan *Vh, as, for example, *k'ahk'* < CM**q'ahq'*, 'fire.' Finally, we can confirm the reconstruction by citing Yucatec *ba:k*. Yucatec preserves *Vh, which becomes V: (*k'áak'* 'fire' < CM **q'ahq'*) and V'C in Yucatec *k'i'iš* < CM **k'i'š*. (Hironymous 1982, for laryngeal *h* causing high tone in Yucatec Maya). Triangulation, then, helps establish Common Mayan **ba:q*. This proves that glyphic **ba-ki**, *ba:k*, accurately reflects its ancestor. (See below for a full elaboration of vocalic history in the Mayan languages, particularly as this development applies to Southern Classic Mayan.)

A third step is our insistence that reconstructible vowel length and other root qualities be checked with *synharmonic* spellings, since this comparison supplies a necessary control for testing our hypothesis. Presumably, should our proposal be correct, the overwhelming number of synharmonic spellings would bear evidence of short vowels and unembellished CVC roots in earlier, reconstructible forms. (Such contrasts are especially striking for terms that we had previously regarded as homophones, such as **pa-ta**, *pat*, 'form, acquire shape', and **pa-ti**, *pa:t*, 'back'). Finally, as subsequent discussions will hopefully show, we believe it useful to consider script chronology, especially in examples where disharmonic spellings of known lexemes shifted to synharmonic ones. Our principal concern has been with texts of the Classic period, which vastly outnumber the four Postclassic codices. These texts have the added advantage, not shared with the codices, of being datable (in general) and more firmly fixed in provenience (excepting looted pieces). They also record a sample that is vastly larger than our inventory of codical lexemes.

The following tabulation records disharmonic spellings by frequency, beginning with spellings ending in **-i** (by far the most common) and continuing through **-a** and the more ambiguous examples of **-u**. Interspersed in alternating lists are synharmonic spellings employing the same ending vowel. Order within these classes is alphabetic. We also furnish the number of examples in which certain vowels are combined in **CV + CV** conjunctures, so that there are, to our knowledge, 23 examples of **Ca + Ci** syllables. Most of these spellings are common in Maya script; when rare, their provenience or place of publication is indicated within parentheses. Note that, with a few exceptions (e.g., **TU:N-ni** on Tikal Stela 8, at 9.3.2.0.0, Justeson and Mathews 1983:590), most date to the Late Classic period, especially after 9.11.0.0.0, when fully syllabic or phonetically complemented spellings became more common (Grube 1994:179, fig. 2). Conventions save space: 'CM' means 'Common Mayan,' a language reconstructible from Mayan daughter languages (Robertson, 1992: 4-5), 'WM' = 'Western Mayan,' 'LL' = 'Lowland Language,' 'TZ' = 'Tzeltalan,' 'GTz' = 'Greater Tzeltalan,' 'PCh' = 'proto-Cholan,' 'CH' = 'Chol,' 'CHR' = 'Chortí' 'YUC' = 'Yucatec Maya,'

'MO' = 'Mochó,' 'CU' = 'Cunén Quiché,' 'POQ' = 'Poqomchi,' 'TOJ' = 'Tojolabal' [1]. The reconstructions are Kaufman and Norman's (1984) unless otherwise marked.

GROUP I

Disharmonic Spellings Ending in -i

(Sample: **Ca + Ci** = 23; **Cu + Ci** = 9; **Co + Ci** = 4)

ʔa-ni, ahn?, 'run' (Kerr 1398 [CM: **ahn*; CH: *ajñ*; CHR: *ahn*])
A:T-ti, *a:t*, 'penis' (CM: **aaty*; MO: *a:t*)
ba-ki, *ba:k*, 'bone' (CM: **b'a:q*; YUC: *baak*; Chol: *bac*; CU: *baaq*; Mam: *baaq*; MO: *ba:q*; POQ: *ba:q*; TOJ: *bak*)
cha-bi, *cha:b*, 'honey'? (Copan Peccary Skull, [CM: **ka:b'*; YUC:*kaab*; CU: *kaab*; Mam: *kaab*; MO: *kaab'*])
cha-chi, *cha:ch*, 'basket' (Kerr 2914; YUC: *cháachab*? [colador, seive]?)
cha-ki/CHA:K-ki, *cha:k*, 'rain god' (YUC: *cháak* [rains, verb], CH: *chajc* [thunder] [2])
ch'a-hi, *ch'a:h*, 'smoke, incense'
CHAN-na-ni, *chan-a:n*, ? (Quirigua Stela I)
ch'a-ti, *ch'a:t*, 'dwarf' (Yaxchilan HS. 2, VII:W1)
hu-li, *hu:l*, 'arrive' (CM: **hu:l*; YUC: *huul*; Mam: *u:l*)
hu-li-ya, *hul-i:y*, 'arrived' (uncertain whether vowel length is retained in root)
HA:B-bi, *ha:b*, 'year' (Naranjo HS. 1, Nimli Punit St. 14 [CM: **ha'b*]; YUC: *ha'ab*; CU: *jnaab* [*jun aab*]; MO: *hab'il* [*año*], *ju:n-a'b-e:h* 'last year'; TOJ: *ha'b-il*)
i-ka-tsi, *ika:ts*, 'bundle, cargo, burden'
i-ts'a-ti, *its'a:t*, 'wise man'
ja-yi, *ja:i*, 'thin?' (CM: **ja:y*, note that we believe the Classic Maya distinguished orthographically between *h* and *j*; YUC: *jaay*; CU: *jaar*, [intransitive verb, 'wear out']; CH: *jay*)
ju-chi, *ju:ch*, 'shell'
ju-bi, *ju:b*, 'conch, trumpet'

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[1] Our linguistic data come for the following sources: *Mocho*, Terrence S. Kaufman n.d.; *Yucatec*, Robert W. Blair 1997; *Chol*, Wilbur H. and Evelyn W. Aulie 1978; *Mam*, John S. Robertson, field notes; *Quiché Cunén*, John S. Robertson and Sixta Canto Rodríguez 1992; *Pokomchí*, John S. Robertson, field notes; *Huastec*, Barbara Edmonson, personal communication 1991; *Tojolabal*, John S. Robertson, field notes; *Teco*, John S. Robertson, field notes; *Chortí*, Wisdom 1940.

[2] This probably comes from **ka:hoq*, which is the nineteenth day name in the twenty-day cycle (Robertson 1984:372).

yi-cha-ni, *y-icha:n*, 'his mother's brother' (Yaxchilan L. 58:C1; CM: **ika:n*; Huastec: *iȼa:m*; CH: *ichan*)
yi-ch'a-ki, *y-ich'a:k*, 'his paw' (CM: *ix-k'aq [John Robertson]; YUC: *íich'ak*; CU: *išk'yaq*; Mam:[3] *Šky'aq-baj*, *Šky'aq*; MO: *isk'aq*)
MAN-ni, *ma:n*, part of Emblem Glyph (Yaxchilan L. 45:C4)
ma-xi, *ma:x* (CM: **ma'x*; Mam: *Šmaaš*; CH: *max*)
mi-ya-tsi, *miya:ts*, 'wise man' (unprovenanced pot, Robicsek and Hales 1981:100)
mu-chi, *mu:ch*, 'toad' (YUC: *muuch*; CHR: *much*)
mu-ku-yi, *muku:y*, 'dove' (Coe 1973:85, U1 [presumed descendant of **muu-kuur*]; MO: *mu:ku:'*)
mu-ti, *mu:t*, 'bird' (WM: **mu:t*; CH: *mut*; CHR: *mut*)
mu-wa-ni, *muwa:n*, 'bird' (probably from **mu-way-a:n*, 'shadow-sleep')
na-bi, *nahb?*, 'pool' (CM: **nahb*; YUC: *náab*; CH: *ñajb*)
na-hi, *na:h* (Justeson 1982:9, CM: **ŋa:h*; YUC: *naj* 'house' *a naajila'* 'your house'; CU: *jaaj*; MO: *ŋaah*; Mam: *jaa*)
na-li, *na:l*, 'native?' (Dos Pilas HS 4, Step III:E1)
ʔo-chi, *o:ch*, 'enter' (CM: **o:k*; YUC: *ook/ok*; Mam: *ook*; MO: *o(')k*)
ʔo-chi-ya, *och-i:y*, 'entered'
OK-ki, *o:k*, 'foot' (CM: **o:q*; YUC: *ook*; MO: *o:q*)
-OTOT-ti, *-oto:t*, 'home' (CM: **-atyo:ty*; rendered glyphically as **ya-ATO:T-ti** at Río Azul in the late Early Classic period, as at Oxkintok; YUC: *-otoch*; Quiché: *-acho:ch*)
pa-chi, *pahch*, 'trap?' (CHR: *pahč*)
pa-ti, *pa:t*, 'back' (CM: **pa:ty*; CH: *pat; YUC: paach*)
pa-xi, *pa:x*, month name
su-ts'i, *su:ts'*, 'bat' (CM: **so'ts'*; CH: *suts'*; San Fransisco [YUC]: *sooȼ* [*so'oȼ'*]; CU: *sootz'*; Teco: *sootz'*; MO: *so:ȼ'*)
ta-hi, *ta:h*, 'obsidian' (Copan Mon. 60:A3; see Justeson 1982:6, CM: **tya:h*, and proto-Quichean **cha:h*)
ta-li, *ta:l*, 'arrive' (CM:**ta:l*; YUC: *taal/tal*; CH: *tal/təl*)
TU:N-ni, **tu-ni**, *tu:n*, 'stone' (CM: **to:ŋ;* YUC: *tuunich*; MO: *to:ŋ*)
U-si, *u:s*, 'mosquito?' (but note CM: **us*, although Mixe-Zoquean **zuusu*; lexical context highly uncertain)
u-ti, *uht*, 'happen' (or *uht*, a form spelled by **UH-ti**; YUC: *úuch*; CH: *ujt*)
u-ti-ya, *ut-i:y*, 'happened»
-wa-ni, *-wa:n*, positional ending
wa-WA:H-hi, *wa:h*, 'tamale' (WM: **wa:j*[4]; YUC: *waaj*; CH: *waj*)

[3] We will use *Š* to signal the Mamean retroflexed, alveopalatal, strident fricative.

[4] In its various forms phonetic **hi** poses severe problems of interpretation. Generally, we suspect it functions as glottal *h*, easily dropped in speech and, indeed, in script. Its use in **chi-hi** is more problematic, since this would seem to have ended in a velar *j*. We have speculated that synharmonic **CV-hV** indicates

wo-hi, *wo:h*, *wo:j*?, month name
xo-ki, *xo:k*, 'shark'?/'count'?
ya-AJAW-MAN?-ni, *y-ajaw-ma:n*?, ? (new Calakmul fragment)

Synharmonic Spellings Ending in **-i**

bi-xi, *bix*, 'go away' (Choltí: *uix*)
chi-hi, *chi:h*, 'deer' (CM: **ke:hj*; CU: *kyeej;* Mam: *če:j*)
K'IN-ni, *k'in*, 'day, sun' (CM: **q'iiŋ*; PCh **k'in*; TZ **k'in*; YUC: *k'iin*; CU: *q'iij*)
K'IN-ni-chi, *k'in-ich*, 'sun-faced'
ni-chi, *nich*, 'flower' (PCh: **nich*; CH: *nichim*; Chortí: *nich*)
pi-ki, *pik*, numerical classifier, units of 8,000
pi-si, *pis*, numerical classifier
pi-tsi, *pits*, 'play ball'
ti-IL-li, *til*, 'burn' (CM: **til*)
ti-li, *til*, 'tapir' (CM: **tixl*; PCh: **tihl*)
ti-si, *tis*, 'flatulence' (Kerr 4692, A5; PCh: **tis*; CHR: *tis*)
ts'i-bi, *ts'ib*, 'writing, paint' (CM: **¢'ihb'*; PCh: **ts'ihb'*; MO: *ts'ijb*; YUC: *ts'íib*)[5]
wi-ni-ki, *winik*, 'man' (CM: **winaq;* PCH: **winik*; CU: *winaq*
wi-tsi, *wits*, 'hill' (CM: **wits*; YUC: *wits*; Mam: *wi¢*)
yi-chi, *y-ich*, ?

GROUP II

Disharmonic Spellings Ending in **-a**

(Sample: **Ci** + **Ca** = 7; **Co** + **Ca** = 6; **Cu** + **Ca** = 4; **Ce** + **Ca** = 2)

AYIN-na, *ayi:n*, 'cayman' (CM: **ayhi:n*; YUC: *áayin* [Robert Blair])
ha-ʔo-ba, *haʔ-o:b*, deictic with plural suffix (see YUC: *-oʔob'*, perhaps a diffused LL word)

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both simple vowel and word-final *j*, although this explanation does not fully satisfy us. Alternatively, the Classic term may simply have been *chih*, a spelling consistent with the frequent absence of syllabic **hi**.

[5] The spelling **ts'i-bi** presents a special difficulty, since the word it records, *ts'ihb*, would seem to compell disharmony. When disharmony occurs with this term, it is in a highly consistent manner: **U-ts'i-bi**, but almost always **U-ts'i-ba-IL**. Clearly, the presence of *-il* conditions the spelling of the root it qualifies. At the moment we do not understand this pattern. Possibly it represents a means of lengthening vowels in logographs (hence, *u-ts'ib-i:l*), or it may reflect a pattern in Chol, in which *ERG-CVhC-il* characterizes possessed nouns derived from transitive verbs.

bu-la, *bu'l*, 'bean' (LL: **bu'ul*; CH: *bu'ul*; Chortí: *bu'r*; YUC: *bu'ul* [borrowed word])
hu-na, *hu:n*, 'book' (CM: **hu'η*; YUC: *ju'un*; Mam: *u'j*; CH: *jun*)
yi-ts'i-na, *y-its'i:n*, 'his younger brother' (CM: **ihtsi:n*; Mam: *itz'iin-baj*; YUC: *íits'in*)
ka-se?-wa, *kase:w*, month name
ke-le-ma, *kele:m*, 'youth' (WM: **kele:m*; YUC: *táankelem*; MO: *kele:m* 'gallo,' *kere:m* 'muchacho')
ki-ta, *ki:t*, ?
ko-ko-ma, *koko:m*, Yucatecan family name (Chichen Itza) (YUC: *kokoom* [family name, Robert Blair])
K'AWI:L-la, *k'awi:l*, deity name
k'u-ti-ma, *k'uti:m*, name connected with El Cayo
ni-la, *ni:l*, (in *yax-ni:l*, place name connected with El Cayo)
-Co-ma, agentive *-o:m* (CM: **-o:m*; CU: *elq'oom* [robber], *ki-banoom* [they have done it]; MO: *elq'o:m*)
SIHO:M-ma, *siho:m*, 'flower'
si-ya, *si:y*, ?
to-k'a, *to:k'*, 'flint' (LL: **to:k'*; CH: *toc'*; CHR: *tok'* 'a chipping from flint')
u-to-ma, *ut-o:m*, 'will happen' [6]
tu-pa, *tu:p*, 'earspool' (YUC: *tuup* [Robert Blair])
yu-ha, *y-u:h*, 'his necklace' (CM: **u:h*; CU: *uw*; Mam: *uuw-aj*, *-uuw*; MO: *u:h*)

Synharmonic Spellings Ending in ***-a***

ʔa-ja-wa/AJAW-wa, *ajaw*, 'lord' (CM: **aajaaw*; TZ **äjäw*; CH: *ajaw*)
ʔa-k'a-ba, *ak'ab*, 'night' (Palenque Throne Back, CM: **ahq'ab'*; PCh: **ahk'äb'*; YUC: *áak'ab*; Chortí: *ahk'ap'*; CU: *chaq'ab*)
ba-la-ma, *balam*, 'jaguar' (CM: **b'ahlam*; PCh: **b'ahläm*)
CHAN-na, *chan*, 'snake' (CM: **kaan*; TZ: **chän*; PCh **chan* [see also terms for 'four' and 'sky,' both with loss of long vowel]; YUC: *kaan* but CH: *chən* ['small living animals' < snake])
ch'a-ba, *ch'ab*, 'penance?' (CH: *ch'əbtesan* 'consolar')

[6] The 'futuro en ruz' *-o:m* ending is puzzling, since it can only be attested in Yucatecan languages yet certainly formed an important component of Southern Classic Mayan, an Eastern Cholan language (Houston, Robertson, and Stuart 1997). Nonetheless, *-om* (*-um* if the root vowel is *u*) does occur in Colonial Kekchi as an imperative/optative, as does *-m* in Mam. It is not uncommon for optative markers to become future markers in Mayan languages (Robertson 1992:67ff). We do not yet have any convincing explanation of its long vowel, which also marks the agentive *-o:m*. It is possible that the agentive has a verbal orgin, as in *kay-o:m*, 'he will fish/fisherman.'

CH'AM-ma, *ch'am*, 'take, receive' (CM: **k'am*; PCh: **ch'äm*; YUC: *k'am*; CU: *k'am*; CH: *ch'əm*)
KAB-ba, *kab*, 'earth' (CM: **kab' -kaab'*)
ka-cha, *kach*, 'knot, tie' (Copan Temple 18; PCh: **käch;* CH: *cəch*)
ka-ka-wa, *kakaw*, 'cacao' (PCh: **käkäw*; CH: *cəcəw*)

k'a-ba, *k'ab*, 'hand, arm' (CM: *q'ab*; YUC: *k'ab*; CH: *c'əb*; CU: *q'ab*)
k'a-ba-za, *k'abaz*, 'name' (LL: **k'aab'aaz*; PCh: **k'ab'az*; CH: *c'aba'*)
K'AK'-k'a, *k'ak*, 'fire' (CM: **q'ahq'*; PCh: **k'ahk*; CH: *c'ajc*; YUC: *káak*; Mam:*q'a:q'*)
K'AN-na, *k'an*, 'yellow' (CM: **q'an*; PCh: **k'än*; CH: *c'ən*; CU: *q'an*; Mam: *q'an*; YUC: *k'aank'an*)
la-ka, *lak*, 'plate' (CM: **laq*; CU: *laq*; Mam: *laq*)
la-ka-ma, *lakam*, 'big, banner'
la-ta, *lat*, suffix to elapsed time periods
MAK-ka, *mak*, month name
na-ba, *nab'*, 'hand measure' (PCh: **näb'* as in **näb' = te'*, 'staff')
NAL-la/na-la, *nal*, 'mazorca' (CM: **ŋal*; PCh: **näl*; Mam: *jal*; CU: *jal*)
pa-ka, *pak*, 'face down, bend over' (CM: **paq*; CH: *pəc-əl*)
pa-ka-la, *pak*, 'shield'
pa-ta, *pat*, 'acquire shape' (CM: **pat*; PCh: **pät*; CH: *pət*)
SAK-ka, *sak*, 'white' (in month name at Naj Tunich, CM: **saq*; CH: *səc-*; Mam: *saq*; CU: *saq*; YUC: *sak*)
ta-ja, *taj*, 'pine' (CM: **tyaj*; CH: *taj*; CU: *chaj*; Mam: *ɕaj*)
ta-la, *tal*, ordinal suffix
TAN-na, 'within, chest' (LL, GTz: **tahn*; CH: *tajn*)
to-ka-la, *tokal*, 'cloud' (CM: **tyooq(-al)*; PCh: **tokal*; CH: *tocal*)
ts'a-ka, *ts'ak*, 'whole, complete' (CM: **ts'aq*; CH: *ts'əc əl*)
wa-ya, *way*, 'sleep, companion spirit' (CM: **war*; PCh: **way*; CH: *wəy*; CU: *war*)
ya-la, *y-al*, 'child of mother' (CM: **aal*; PCh: **al*; Mam: *-a:l*; CU: *a:l*)

GROUP III

Disharmonic Spellings Ending in -u

(Sample: **Ca + Cu** = 4; **Ce + Cu** = 3; **Ci + Cu** = 1)

a-ku, *ahk*, 'turtle' (PCh:**ahc*; YUC: *áak*; CH: *ajc*)
a-nu, *a:n,* ? (connected to deity impersonation)
ba-ts'u, *ba'ts'*, 'howler monkey' (CM:**ba'ts'*; CU: *baatz'*; Chuj: *ba'atz* [day name, Judy Maxwell, personal communication, 1990])

che-bu, *chehb*, 'brush' (also spelled **che-'e-bu** *cheʔe:b*) on unprovenanced pot; CH: *chejb* [bamboo]; YUC [San Francisco]: *cheb*)
chi-ku, *chihk*, 'coati'
e-bu, *ehb*, 'stairway' (CM: **ehb*)
ma-su, *ma:s*, reference to dwarf
te-mu, *te:m*, 'throne' (Kerr 1524, San José, Belize, Room B, C4; CM: **te:m)*

Synharmonic Spellings Ending in ***-u***

bu-ku, *buk*, 'clothes' (CM: **b'uhq - b'u'q*; Chortí*: p'uhk*; CH: *bujc-əl*)
bu-t'u, *but'*, 'bury' (YUC: *but'* 'cover nose' [Robert Blair])
chu-ku, *chuk*, 'seize' (PCh: **chuk*; YUC: *chuk*; CH: *chuc*)
CHUM-mu, *chum*, 'seated' (LL: **kyum*)
JUL-lu, *jul*, 'shoot arrow, spear' (GTz: **jul*; Chortí*: hu*)
k'u-k'u, *k'uk'*, 'quetzal (CM: **q'u'q'*; CH: *xmanc'uc'*)
ku-chu, *kuch*, 'burden, load' (YUC: *kuch* [Robert Blair])
ku-nu, *kun*, 'oven?'
ku-yu, *kuy*, 'owl'
mu-ku, *muk*, 'bury' (El Cayo Panel 1:C13; CM: **muq*; YUC: *muk*; CU: *muq*; Mam: *muq*)
su-ju-yu, *sujuy*, 'pure' (Xcalumkin) (YUC: *suhuy* [Robert Blair])
tu-ku, *tuk*, 'pile in groups of 20?' (common at Tonina)
tsu-tsu, 'end, finish'
t'u-lu, *t'ul*, 'rabbit' (PCh: **tuhl*; YUC: *t'u'ul*; Chortí: *t'ur*; CH: *t'ujr*)
ts'u-nu-nu, *ts'unun*, 'hummingbird' (CM: **tsuunu'n*; PCh: **ts'unun*; YUC: *ts'u-nu'un*; Mam: *¢'uu'nin*; CU: *tz'uunun*)
u-bu-TE, *ub-te*, 'tribute cloth' (Piedras Negras St. 14, secondary text)
u-lu, *ul*, 'atole' (CM: **uul*)
yu-mu, *yum*, 'boss' (Río Azul 'chocolate vessel'; LL: **yuum*; PCh: **yum*;YUC: *yuum*)

Not all evidence, however, conforms smoothly to these patterns. Violations of disharmony —instances where expected disharmonic spellings appear in *synharmonic* form— occur in a number of inscriptions, listed here with their dates and find-spots. Later we suggest that these violations are, in a sense, the exceptions that prove the rule.

?	**ʔa-ka-OK-CIMI**, *ak ok cimi*, 'turtle foot, death god'	Tonina stucco ornament
?	**pa-xa**, *pax*, month name (elsewhere **pa-xi**, *pa:x*)	Naj Tunich, Drawing 66

?	**yi-ts'i-ni**, *y-its'in*, 'his younger brother'	Naj Tunich, Drawing 29
9.15.15.12.16	**-wa-ni-yi**,*-wan-iy*, POSITIONAL	Copan Temple 11, East Doorway, North Panel:C3
9.16.10.5.2	**AH-ba-ka**, *a-bak*, 'he of the captive'	Naj Tunich, Drawing 24:B2
9.16.12.5.17	**-AT-ta**, *at*, 'penis'/God name	Copan Temple 11, North Doorway, East Panel:C4
9.17.0.0.0	**-AT-ta**, *at*, 'penis'/God name	Copan Temple 11, Reviewing Stand:D'1
9.17.0.0.16	**ha-ʔo-bo**, *haʔ-ob*, deictic with plural suffix?	Copan Temple 11, West Door, South Panel: A4
9.17.2.0.4	**ya-AJAW-MAN?-na**,*y-ajaw-man*,?	Cancuen, new panel:D5
9.17.2.11.16	**yo-ko**, *y-ok*, 'foot'	Copan Temple 11, East Doorway, South Panel:A2
9.17.4.10.18	**-AT-ta**, *at*, 'penis'/God name	La Entrada, stone vessel:Q1
9.17.9.7.13	**i-u-tu**, *i-ut*, 'then, it happens'	Ixkun St. 2:C8
9.18.8.3.9	**MUWAN-na**, *muwan*, month name	Caracol BM. 3:D3
9.18.10.0.0	**ba-ka,** *bak*, 'captive'	Caracol Alt. 23:C3
9.18.10.0.0	**K'AWIL-li**, *k'awil*, deity name	Caracol Alt. 23:C1, B6
9.18.10.0.0	**K'AWIL-li**, *k'awil*, deity name	Naranjo St. 11:B5
9.18.10.0.0	**K'AWIL-li**, *k'awil*, deity name	Naranjo St. 8:B6
9.18.10.0.0	**SIHOM-mo**, *sihom*, 'flower'	Ixkun St. 5:J1
9.19.0.3.0	**K'AWIL-li**, *k'awil*, deity name	Naranjo St. 10:A3 (but note tha same monument has **K'AWI:L-la** spelling, at A11)
9.19.10.0.0	**K'AWIL-li**, *k'awil*, deity name	Naranjo St. 32:P2, Q4, U3, W9
9.19.10.0.0	**ch'a-ha**, *ch'ah*, 'incense, smoke'	Caracol Alt. 12:H3
10.0.0.0.0	**u-to-mo**, *ut-om*, 'it will have happened'	Caracol Alt. 13:W3
10.1.0.0.0	**ch'a-ja**, *ch'ah*?, 'incense, smoke'	Caracol St. 17:C5
10.1.0.0.0	**K'AWIL-li**, *k'awil*, deity name	Seibal St. 10:A8

The spellings from Temple 11, Copan, are especially noteworthy. In half-jest, we have considered labelling this structure the 'Temple of the Short Vowel,' given its pronounced (and temporally precocious) tendency to employ synharmonic spellings in place of the expected disharmonic ones.

ANALYSIS OF DATA

Figure 1 is a refined classification of the data presented above. It gives an exhaustive listing of the root or spoken vowel as these cooccur with the so-called silent, final vowels of the script[7]. It also provides the number of occurrences attes-

[7] It is important to clarify, following a suggestion by Alfonso Lacadena, that these spellings pertain to *syllabic* rather than *morphemic* forms. Glyph morphology makes use of syllables such as **wa** (active transitives) and **yi** (*-Vy* verbs) that seem to invoke vowel harmony, not vowel length, although this point is still under review.

	i		a		u	
i	i...i	5	i...a		i...u	
	i:...i	*3*	i:...a	1	i:...u	
	ih...i	*2*	ih...a		ih...u	1
	i'...i		i'...a		i'...u	
e	e...i		e...a		e...u	
	e:...i		e:...a	1	e:...u	1
	eh...i		eh...a		eh...u	1
	e'...i		e'...a		e'...u	
a	*a...i*	*1*	a...a	18	a...u	
	a:...i	13	*a:...a*	*4*	a:...u	
	ah...i	3	*ah...a*	*2*	ah...u	1
	a'...i	2	*a'...a*		a'...u	1
o	o...i		o...a		ø...u	
	o:...i	3	o:...a	4	o:...u	
	oh...i		oh...a		oh...u	
	o...i		o'...a		o'...u	
u	u...i		u...a		u...u	7
	u:...i	7	u:...a	1	*u:...u*	*2*
	uh...i	1	uh...a		*uh...u*	*2*
	u'...i		u'...a	2	*u'...u*	*2*

FIG. 1.

ted for each combination of spoken versus silent vowel; the numbers include *only* those lexical items for which we are able to reconstruct the antecedent, Common Mayan form. The figure distinguishes between simple (V) and complex (V:, Vh, V') spoken vowels by boxing the complex vowels within each cell, outlining in black the synharmonic vowel cells, and leaving the disharmonic cells unmarked. It also italicizes the exceptions: i.e., examples where our theory would expect only simple vowels in synharmonic cells and complex vowels in disharmonic cells (Fig. 1).

A single example will explain the chart. In the uppermost left cell one finds i ... i **5**. This means that there are five examples of the spoken vowel and the silent vowel both being *i,* which has a Common Mayan antecedent (e.g., **wi-tsi** 'hill' < CM **wiȼ*). It also shows that there are five examples of disharmony, three of the type i: ... i (**K'IN-ni** 'sun' < CM **q'i:η*) and two of the type *ih ... i* (**ts'i-bi** 'write' < CM **ȼ'ihb*).

The figure yields some interesting observations. The three (highlighted) synharmonic cells have a total of 47 attested forms; the remaining twelve disharmonic cells have a total of 44 attested forms for a total of 91. Based on our hypothesis, we expect the simple vowels (V) to coincide with the synharmonic configuration and the complex vowels (V:, V' and Vh) to occur with the disharmonic. Verification of our prediction regarding the disharmonic cells reveals only a single, possible exception to our expectation: **yi-ch'a-ki**, *y-ich'a:k*, 'his claw,' where we might have expected ***yi-ch'a-ka**, *y-ich'ak*, based on the data from Common Mayan. But, since the form **yi-ch'a-ki** refers not to a claw, but functions rather as a proper noun, it is plausible that the semantic difference between 'claw' and 'name of someone' allows for a concomitant formal difference. The synharmonic configuration, on the other hand, has more exceptions. Of the 47 attested forms, 30 are simple vowels and 17 are complex.

We take this to be a matter of markedness. Synharmony is unmarked and therefore has wider variation, whereas disharmony is more marked and therefore only allows complex vowels. In linguistic terms, markedness means that given a paired opposition (for example, *tiger* verus *tigress*), one of the terms is marked with more interpretable information (for example, *tigress* is marked for [+female]) than the other. One of the consequences of this additional information is that the marked term (*tigress*) is more retricted in its range of reference. It can only identify females, whereas the unmarked term is less restricted in its potential reference, since it can specify males or females or any combination thereof.

Although markedness is readily found in all aspects of spoken language, it also applies to written language. For example, in English orthography the letter «c» can signal the phoneme /s/ or /k/ (e.g., *bicycle*), but the more marked «ck» only refers to /k/ (*tick*). Or the letter *o* by itself can refer to the tense /o/ or lax /a/, as *post, most, host, ghost* as well as *lost, cost,* and *frost.* But when another, silent vowel is added, it can only refer to the tense phoneme /o/, as *roast, toast, boast,* or *coast.* Thus, the unmarked *o* has a wider range of reference (it can refer to /o/ or /a/), while the more marked *oa* has a smaller range of reference (it can only refer to /o/).

Thus, for our data, the disharmonic spellings are marked, so we would expect such spellings only to record complex vowels, whereas the harmonic spellings are unmarked, so that we would expect them to record both the simple and complex vowels. The data bear this out nicely. Thus, we find a nearly perfect referencing of dysharmony to complex vowels —98% (43 of 44)— while the unmarked syn-

harmonic spelling has only a 64% chance (30 of 47) of referencing a simple vowel. But it is still true that even the synharmonic odds favor a short vowel. Conceivably, such synharmonies reflect differential vowel-shortening during the Classic period—that is, some words retained long vowels, other did not. What we can be sure of is that vowel reduction took place between Classic times and the present. It is also worth noting that not all silent vowels are equal. The chances of the configuration ... *a* giving the 'correct' reading (simple with synharmonic and complex with disharmonic) is 27 of 33 (81%); for ... *i* it is 34 of 40 (85%), and ... *u* is merely 12 of 18 (66%). If the spoken root vowel is *i*, there is only 58% (7 of 12) chance of correct spelling; if *a*, 85% (38 of 45); if *u*, the chances are 18 of 24 or 75%. But if the root vowel is not a primary vowel (*e* or *o*), the spelling is 100% correct: if *e* then (3 of 3); if *o*, (6 of 6). Note that the *u* and *i* are somewhat less predictable, while the *a* is more liable to be regular.

These data suggest that the ancient Mayan writers devised a remarkable means of distinguishing between simple and complex vowels. Although it was not a «perfect», exceptionless system, it worked efficiently, finding good use for the so-called «silent vowel». And like almost all human systems it successfully reflected the complexities of its internal parts, particularly when looked at in its marked/unmarked status.

LINGUISTIC IMPLICATIONS

Our tabulations raise two complex topics. One pertains to phonology in Mayan languages, the other to the morphology of aspect in Southern Classic Mayan, our label for the language of the Classic inscriptions (Houston, Robertson and Stuart 1997).

THE SCRIPT AND ITS VOWEL SYSTEM

Common Mayan had a ten-vowel system that consisted of five vowels (*i, e, a, o, u*) with corresponding long counterparts (*i:, e:, a:, o:, u:*). In the history of Mayan vocalic change the long vowels were intimately linked with the 'laryngeal vowels,' *Vh* and *V'*. The careful comparatist must take into account the 'complex' vowels of the script (V:, Vh) astutely marked by the ancient scribes through disharmonic silent vowels. All daughter languages ultimately diverged from the Common Mayan system of long, short, and laryngeal vowels, but the divergeance was constrained by the following linguistic law: The laryngeal vowels (Vh and V') had to pass through a long vowel stage (V:) before becoming short vowels (V). We have, therefore, three possiblities of change: (a) V' > V:; (b) Vh > V:; and V: > V.

Examples of these possiblities and their logical combinations are shown in Figure 2. Note that Yucatec preserves the four types of vowels by changing the Vh to a long vowel with moving tone. In contrast, Tzotzil has lost all the distinctions of the complex vowels. Thus, Yucatec and Tzotzil possess «complementary» systems, as do Poqomchi and Chuj, Mam and Chortí, Tojolabal and Cakchiquel. For example, whereas Mam lost the Vh, and retains all other distinctions, Chortí lost all other distinctions but preserves Vh. Tojolabal lost the distinction between long and short vowels, but retains all other features; its complement, Quiché, maintains the separation between long and short vowels, but has misplaced the other (laryngeal) elements. (Parenthetically, Figure 2 focuses on four terms, **saq* means 'white,' **ba:q* 'bone,' **ɕ'ihb* 'write,' and **k'i'ʂ* 'thorn' (Fig. 2).

Figure 2 clarifies the possible disharmonies recorded in script, allowing for two possibilities. Either the script conserves the four Common Mayan configuration *V, *V:, *Vh, and V', or the Common Mayan system was already reduced to three, *V, *V:, *Vh, the Common Mayan *V' having become V:. The second possibility is most likely for Southern Classic Mayan: (a) the script signals the long/short vowel distinction; (b) no Cholan language preserves the laryngeal

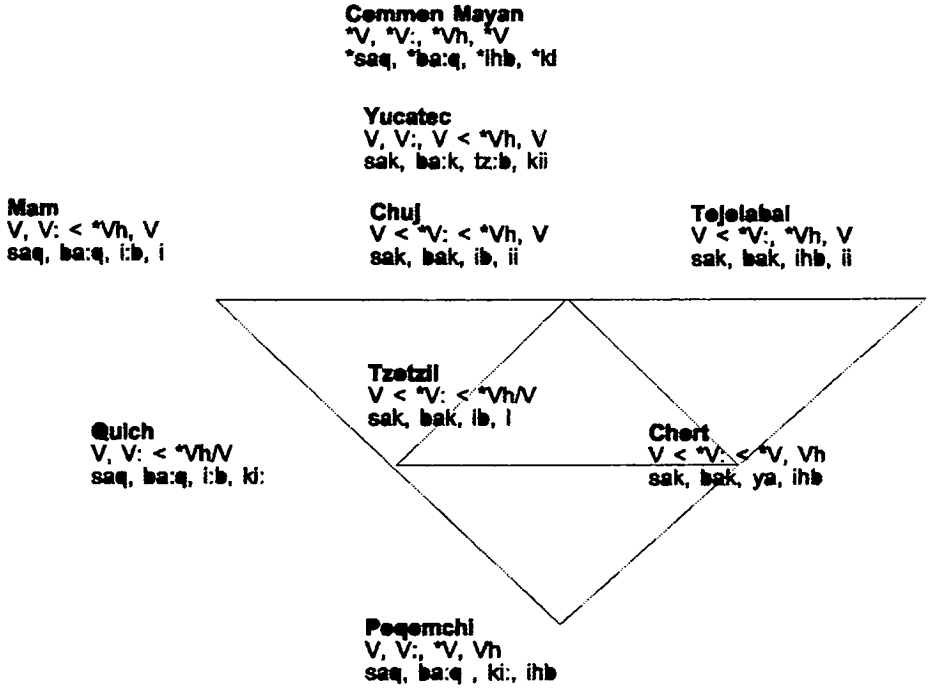

FIG. 2.

stop (see Chol, Chortí *chan* < **ka'η*, for example); and (c) every Cholan language preserves the laryngeal fricative (see Chol, Chortí *¢'ihb* < **¢'ihb*, 'write'). Since Southern Classic Mayan makes no distinction between 'paper' < CM **hu'η* and 'one' < CM **hu:n*, we are inclined to believe that no distinction is being made orthographically.

Another compelling piece of evidence that V' became V: by Classic Maya times is the fact that the word for 'bat' is **su-ts'i**. The San Francisco (Yucatec) dictionary has *soo¢* [so'o¢']. Because long **o:* became *u:* in Cholan, it follows that **so'tz'* would have had to have become long **so:¢''* before becoming *su:ts'* ← **su-ts'i**, in the script. Similarly, the word for 'hair' in Yucatec is ¢o'o¢; in Chol and Chortí it is *¢u¢*, which suggests that same scenario: that *V' became *V: as Cholan was separating from Greater Tzeltalan. For these reasons, we believe that Southern Classic Mayan had already undergone the shift from V' to V:, putting it in the Poqomchí typology (V, V: < V', Vh). Here we are left to admire the perception of the scribes, since their disharmonic vowels represent a real and vital aspect of the language. This is independently born out by the language shifts represented in Figure 2, which leaves no doubt that Common Mayan *V:, *Vh, and *V' are all intimately and structurally related.

Figure 2, it should be understood, does not exhaust all possible typologies. It is feasible for a language to lose the distinction between long and short vowels, and then renew the vowel length by Vh > V: or V'C > V:, as shown in the innovative Tila Chol dialect where all Vh became V: (Attinasi 1973). An even more noteworthy example of this is the Coban dialect of Kekchi: *b'aq* < CM **b'a:q*, 'bone', but *q'o:q'* < CM **q'ohq'*, 'type of squash,' and *k':iš* < CM **k'i'š*, 'thorn.'

Another typology can be found in those languages that conserved only a fraction of the original Common Mayan long-short vocalic distinctions. The Tecpan dialect of Cakchiquel indirectly preserved the Common Mayan **a* versus **a:*. All long and short vowels merged except final *a:* and *a*, where the *a* became a sixth vowel *ə* and the long **a:* became *a*. This explains why the Tecpan dialect employs *chəj*, 'pitch pine' and *nu-chaj*, 'my pitch pine' from Common Mayan **tyaj* and **nu-tya:j* [8].

Nonetheless, the view proposed in this paper that Southern Classic Mayan preserved the ten Common Mayan vowels runs counter to other proposals. Kaufman and Norman postulate a six-, not a ten-vowel system, stating that «long vowels normally merged with their short counterparts, except for **aa* and **a*. The contrast between **aa* and **a* was maintained by a process in which **a* become **ä [schwa]*, and **aa* became **a,*» resulting in «a six-vowel system in Proto-Cholan,» where the sixth vowel *ä* eventually merged with *a* in Eastern Cholan (Kaufman

[8] Note that in Common Mayan and some descendant languages certain nouns undergo vowel lengthening when possessed.

and Norman 1984:85)[9]. They then claim that this merger «should not lead one to conclude that the /a/ : /ä/ contrast is a Western Cholan innovation rather than a common Cholan one» (Kaufman and Norman 1984:85-86). However, their reasoning is circular. Supposedly, the six-vowel system of Common Cholan «depends on the existence of a contrast between long **aa* and short **a*, a distinction that was present in Greater Tzeltalan but *had been lost* by the time Western Cholan split off from common Cholan» (Kaufman and Norman 1984:86, emphasis ours). In other words, Kaufman and Norman's claim of vowel loss would seem to rest purely on assertion rather than proof. There is no independent confirmation of their proposed sequence of vowel change.

We do not believe there is any compelling reason to postulate a six-vowel system for Common Cholan. Indeed, the glyphic evidence points strongly to an opposing conclusion—that Common Cholan preserved the ten-vowel system of Common Mayan as it was transmitted through Greater Tzeltalan. Only by the end of the first millennium A.D. was there any regionally specific evidence of vowel loss or vowel shortening (see above). Such trends account economically for the six-vowel system of Western Cholan and the ten-vowel system that we believe existed in the script. If so, the vowels of Common Cholan reconstructions in Kaufman and Norman must be revised to accord with Greater Tzeltalan and, ultimately, Common Mayan patterns.

Other features of our tables need to be discussed. To an impressive extent the primary vowels, *i, a,* and *u*, are the only ones serving as «silent» or «fictitious» vowels. The secondary vowels *e* and *o* seem never to be used in this manner. Such spelling practices reflect the well-known linguistic observation that languages of the world tend to regard *i, a,* and *u* as primary (Jakobson 1990:294). Children unfailingly learn the primary vowels before, say, *e, o, ɔ*, etc. Languages frequently lose *e, o, ɔ* to the primary vowels (e.g., in Western American English *ɔ* becomes *a*, as in 'cot,' 'caught' = /kat/), and, in general, if languages have only three vowels, they tend to be *i, e,* and *a*).

The late occurrences of synharmony in previously disharmonic contexts raise intriguing questions. All examples come from the Late to Terminal Classic periods; most occur in Copan or on the western flanks of the Maya mountains, with extensions into the Pasión river drainage, perhaps as part of an ancient dialect zone. Synharmonic spellings in formerly disharmonic contexts indicate one of two things: (1) a sound change from complex to simple vowels, as expected by Cholan linguistic history (see below); or (2) an orthographic adjustment of a conservative or retardataire written language to correspond with patterns in spoken language. On present evidence the first explanation has more to recommend it, involving a conservative sound system innovating into one with a reduced number of vowels. That these changes occurred during a time of known societal tumult concei-

[9] We denote vowel length with a colon rather than a doubled vowel.

vably reflects acute demographic stresses on speech communities or other, less well-understood processes [10]. Nonetheless, the hypothesized reduction of complex vowels during the Late to Terminal Classic period fails to explain the presence of disharmonies in the Postclassic codices where Knorosov first noted them. Perhaps the codices bore relatively little relation to contemporary vernaculars, a possibility supported by evident bilingualism in the screenfolds (Wald 1994; Lacadena 1996). By the time of their composition the Postclassic codices might have been archaic or otherwise disjunctive with local vernaculars in matters of spelling and phrasing, a conventionalized artifact of ancient, time-honored practice.

The Morphology of Aspect

A productive feature of our theory of disharmony is that it independently confirms the etymology of the so-called Cholan completive, which Kaufman and Norman (1984:96, 103) identify as **-i* for transitive and intransitives. Instead, a strong argument can be made that the Classic Maya suffix for intransitives in the completive aspect (i.e., completed vs. ongoing action) was *-i:(y)*. Glyphically, the Maya rendered the completive as **-Ci-ya** (Stuart 1987; Houston 1997). According to our theory of disharmony, this would render a complex vowel —and more precisely *-i:y*— as the completive suffix.

Comparative evidence comes to an identical conclusion. The suffix probably descended from the Common Mayan **-e:r* or **-i:r*, originally attached to numbers, and signalling the completion of days, months, years, etc. The following data confirm this pattern [11]:

Days ago:	two	three	four	five	six	seven
Cunén:	*kab-j-iir*					
Martínez:	*cabab-ir*	*oxib-ir*	*coh-eh-er*	*ob-ix-ir*	*va3-eh-er*	*vukub-ix-ir*
Mam:	*kab-j-eeo*	*oš-ej-ee*	*kʸaj-aj-ee*			
Tzendal:		*ox-egh-ey*	*chon-egh-ey*			
Tzotzil:	*ča'b-h-e*	*oš-h-e*	*čon-h-e*	*vo'-h-e*	*vak-h-e*	
Mochó:	*ka'b'-eh-e:*	*o:š-eh-e:*	*ko:ŋ-eh-e:*			
S. Frans:	*cab-h-e*	*ox-h-e*	*can-h-e*	*hob-ix-i*	*uac-h-e*	*uucb-ix-i*

[10] However, synharmonies at Copan show a high degree of volatility. The spelling of 'penis' as **-AT-ta**, *at*, clusters in the twenty-year span after 9.17.0.0.0. Nonetheless, Altar Q, dating to 9.17.5.3.4, retains disharmonic **-AT-ti**, *a:t*, as do even later monuments, such as Copan Altar G2:A4, or 22A Stone:D2, dating to 9.18.5.0.0. The latest spellings at Copan favor the early, disharmonic spelling. We have no immediate explanation for this reversion, other than that it represents an attempt by scribes to recall prior conventions. Such conventionalization may signal the beginning of a process resulting in the archaic spellings of the codices (e.g, **mu-ti**, *mu:t*), written at a time when the long vowels had probably been lost.

[11] These data come from the following sources: *Cunén Quiché*, Robertson and Canto 1992; *Quiché* (colonial), Martínez n.d.; *Mam*, Robertson, field notes; *Tzotzil*, Robertson, field notes; *Mochó*, Kaufman 1967; *Colonial Yucatec*, Michelon 1976.

Futur.days:	two	three	four	five	six	seven
Cunén:						
Martínez:	*cab-ih*	*ox-ih*	*coh-eh*	*ob-ix*	*vak-eh*	*vukub-ix*
Mam:	*kaa'-jo*	*oŠ-j*	*kˇoj*			
Tzendal:						
Tzotzil:	*ča'-eh*	*oš-ehˇ*	*čon-eh*	*vak-eh*		
Mochó:	*ka'b'-i:h*					

In Common Mayan, *numeral + *e:j* suffix referred to future time; with the added completive suffix *-*e:r*, it referred to past time. It was not suffixed to verbs in Common Mayan. Nonetheless, Greater Tzeltalan innovated by moving *-*e:y* < *-*e:r* to verbs, a shift demonstrated by the fact that its reflex served as a verbal suffix not only in Cholan (-*i:y* in the script and elsewhere), but also in Tzeltalan (-*ey*), as seen in the Ara grammar of Tzendal (Gates Collection 65:2): *x-paz-on-ey*, 'yo hacía,' contrasting with *x-paz-on*, 'yo me hago'; or *x-paz-at-ey*, 'tu hacías,' versus *x-paz-at*, 'tu te haces.' These verbs are clearly used as anti-passives: the appearance of the absolutive on the verb and the translation 'yo me hago' indicates as much. The Ara grammar characterizes the incompletive *x-* prefix, cognate with Quichean **ka-* (Robertson 1992:129-130, 186), as the «IMPERFECTO,» which has the effect of thrusting on-going action back in time, just as the suffixing of Common Mayan *-*e:r* reflected the same when attached to numbers. Cholti also has a form *on-i* that is cognate with Cunén *j-e:r*. Both derive from Common Mayan *$o\eta$-*e:r*, 'long ago' [12]. Thus, the proposed derivation is: Common Mayan *-*e:r* > Greater Tzeltalan *-*e:y* > Cholan *-*i:y* -that is, precisely the form spelled by disharmony in Classic Maya texts.

CONCLUSION

In this paper we have proposed a solution to a problem left unanswered by Knorosov in his formulation of phoneticism in Maya script. Synharmony represents an unmarked convention for rendering simple vowels, disharmony a marked feature that records complex vowels. Violations of such conventions in the Late to Terminal Classic periods probably reflect the beginnings of vowel reduction in the late first millennium A.D., especially in the eastern and southeastern portions of the Maya Lowlands. If our case for disharmony is persuasive, then current ideas about the Classic vowel system must be radically altered to include a ten-vowel pattern. The prediction of Classic Mayan -*i:y* as the completive suffix, with independent confirmation by disarmonic spelling, lends considerable support to our hypothesis.

[12] The Common Mayan *η goes to *j* in Mamean-Quichean and *n* in the majority of other Mayan languages, while the initial *o* is syncopated in Cunén Quiché.

In this and other features, such as the nominal absolutizer *-aj* (Houston, Robertson, and Stuart, in preparation), Southern Classic Mayan retains an archaicism or conservatism that begs explanation. Our present perspective is that the language of the script is essentially a sacred, prestigious writing, as much an index of elite status and esoteric training as any other feature employed for this purpose by the Classic Maya. Local vernaculars, sometimes of far distant languages, such as Yucatec Maya, percolated upwards to express themselves in this script, either through regionally distinct phrasings or through lexical items. It is probably significant that the places where sound changes register in script, in a wide arc embracing the southern and eastern area of Classic writing, is the area where the likely descendants of Southern Classic Mayan, Choltí and Chortí, survived into the historical period and beyond. By the Terminal Classic and Postclassic periods orthographic conventionalization reflected forms unlikely to have been spoken (and perhaps only dimly understood phonically) by scribes responsible for late glyphic texts. This essay has also made a broader methodological assertion: that Classic script cannot be studied, or understood, without the perspective of historical linguistics, which situates a dead language, the glory of an equally glorious civilization, within the lush branches of the Mayan linguistic tree.

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