

Affixation Conventionalization Hypothesis: Explanation of Conventionalized Spellings in Mayan Writing

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1. Introduction.

(1) Classic Lowland Mayan script (ca. A.D. 200-900) represented a standard Ch'olan language (but was used by speakers of Ch'olan and Yukatekan vernaculars):

- a. Basic root shape CV(G)C (G = /h j : ' /)
- b. Syllabification CV(G)C, CV(G)\$CV(G)C (e.g. *ah\$'k'ot*, *ahk'\$t-aj*)
- c. Most common suffix shape: -VC, followed by -CVC

(2) The script is pictorial (hieroglyphic) and logosyllabic:

- a. CVC and CVCVC logograms (e.g. T544 **K'IN** for **k'in* 'sun, day', **B'ALAM** for **b'ahläm*)
- b. CV syllabograms (e.g. T25 **ka**, T130 **wa**, as in T25.25:130 **ka-ka-w(a)**)
- c. Semantograms (determinatives, classifiers)
- d. Logosyllabic spellings typically for roots and their suffixes (e.g. **CHOK-wi** for *chok-w-i* 'throw.down-AP-IV.ST' 's/he threw down', **CHUM-wa-ni** for *chum-wan-i* 'sit-IVZR-CMP' 's/he sat down')

The prototypical logosyllabic or purely phonetic spelling of a CVC root (e.g. **chahk*) or a CVC root plus a -VC suffix (e.g. *chahk-il*) would often result in a silent vowel that could either be "synharmonic" (i.e. ...CV₁-C(V₁), as in (3a) or "disharmonic" (...C₁V-C(V₂), as in (3b) with respect to the vowel of the preceding syllable:

- (3) a. **b'u-k(u)**, CVhC, *b'uhk* 'clothes'
- b. **cha-k(i)**, CVhC, *chahk* 'lightning, thunder'
- u-cha-ki-l(i)**, CVhC-VC, *u-chahk-il* 'his lightning(?)'

(4) How did scribes determine which strategy, whether synharmonic or disharmonic, to use in any given situation?

Following Knorozov (1955, 1958, 1962), most scholars have assumed the synharmonic approach is the default (Principle of Synharmony). But the abundance

of disharmonic spellings has prompted a variety of proposals, most of which try to account for disharmony as the marked strategy, while regarding synharmony as the unmarked strategy.

(5) Goals of this paper:

- a. Test a recent proposal by Houston et al. (1998, 2004), which I dub here the Disharmony Hypothesis (DH), by assessing whether alternative approaches that have not been properly tested before can account for the same data.
- b. Assess whether synharmonic spellings are really unmarked or default, or whether they follow their own rules.
- c. Arrive at a definition of “conventionalization” in terms of what it meant in the practical everyday use of the script.

As I will show, phonological and morphological conditioning process, together with the convention of underrepresentation of final consonants (consonant deletion), can account for both disharmonic and synharmonic spellings. Most importantly, when conventionalized spellings can be proven to exist, they can be explained by typical suffixes the roots in question take in other morphosyntactic environments in the texts. I call this this approach to understanding conventional spellings that are not the result of phonological conditions the Affixation Conventionalization Hypothesis (ACH).

2. The Disharmony Hypothesis.

Houston et al.’s (1998, 2004) Disharmony Hypothesis:

- (6) Disharmonic word-closing syllabograms indicate vowel complexity of the preceding syllable (i.e. CV:C, CV’C, CVhC, as opposed to plain CVC).
 - a. **b’a-ki** > **b’a-k(i)** for *b’a:k* ‘bone’, from Proto-Mayan **b’a:q*
 - b. **cha-ki** > **cha-k(i)** for *chahk* ‘lightning, thunder’, from Proto-Ch’olan **chahuk*

Thus, counter to Kaufman and Norman (1984), who reconstruct Proto-Ch’olan without vowel length distinctions (i.e. **b’ak* ‘bone’), vowel length distinctions were still present during Proto-Ch’olan times (and in fact, subsequently, according to Houston et al. 1998, 2004), even though none of the modern Ch’olan languages has preserved such a feature.

Additional claims:

- (7) Synharmonic spellings are unmarked/default.

- a. **wi-tz(i)** for Proto-Ch'olan **witz* 'mountain' from Proto-Mayan **witz*
 b. **tz'i-b'(i)** for Proto-Ch'olan **tz'ihb'* 'writing' from Proto-Mayan **tz'ihb'*

- (8) There are no exceptions (cases where a disharmonic spelling yields a simple syllable nucleus)
- (9) Whenever a disharmonic syllabogram is used to represent vowel complexity, but the root it is found with requires a suffix of some sort, an additional sign or sequence of signs, called “morphosyllables” (Houston et al. 2001), is necessary to spell that suffix.
- a. **B'AH-hi-ja** > **B'A:H(-hi)-AJ**, for *b'a:h-aj* head-UNPOSS 'head/face (of someone)' rather than **B'AH-hi-j(a)** for *b'a(:)h-ij*
 b. **u-TUN-ni-li** > **u-TUN(-ni)-IL**, for *u-tu:n-il* 3sERG-stone-POSS 'his/her stone', rather than **u-TUN-(n)i-l(i)** for *u-tu(:)n-il*
- (6) Data set by Houston et al. (2004:93, Figure 5.1)

Key and Corrections:

	i	a	u
i	i...i 3 ii...i 1 ih...i 2 i'...i -	i...a - ii...a 2 ih...a - i'...a -	i...u - ii...u - ih...u 1 i'...u -
e	e...i - ee...i - eh...i - e'...i -	e...a - ee...a 2 eh...a - e'...a -	e...u - ee...u 1 eh...u 1 e'...u -
a	a...i 1 aa...i 8 ah...i 4 a'...i 1	a...a 18 aa...a 2 ah...a 2 a'...a -	a...u - aa...u 1 ah...u 1 a'...u -
o	o...i - oo...i 2 oh...i - o'...i -	o...a - oo...a 5 oh...a - o'...a -	o...u - oo...u - oh...u - o'...u -
u	u...i - uu...i 2 uh...i - u'...i -	u...a - uu...a 3 uh...a - u'...a 1	u...u 5 uu...u 4 uh...u 2 u'...u -

- a. Columns correspond to the (presumed) silent vowel representing the root- or word-closing consonant.
- b. Rows correspond to the vowel of the root, which can be “simple” (i.e. CVC) or “complex” (i.e. CVVC, CVhC, CV'C).
- c. Numbers are the attestations for each subcategory of spelling.
- d. Three synharmonic cells are in bold outline.
- e. Total spellings taken into account: 75.
- f. Total synharmonic spellings: 39.
- g. Total disharmonic spellings: 36 (35).
- h. Appendix to paper presumably shows examples of spellings, but does not provide textual sources for each spelling.
- i. Preliminary Correction: two examples are redundant since they spell same morpheme (i.e. **-Co-ma** and **u-to-ma** for *uht-o(o)m*, which contains same suffix; thus 75 > 74).
- j. Authors do not mention which spellings they used for the **Cu-Ci** cell (i.e. *uu...i*; thus 74 > 72).¹

¹ Although I have removed these tokens from the data set, spellings of Cu(G)C roots can be accounted for very easily through the ACH approach. For example, **u-tzi** for **utz* 'good' is also attested as **yu-tzi-li**, which represents an *-il* suffix that could account for the *i* of the **tzi** syllabogram used to spell **u-tzi**. Likewise, a spelling like **lu-mi** is explained by the fact that it occurs as **lu-mi-li**, with an *-il* suffix, and a spelling like **su-tz'i** can be accounted for by the fact that in two instances when the term appears possessed at Comacalco it appears as **u-su-tz'i-li**.

3. Assessment of DH and Alternative Proposals.

(11) First, there are potential counterexamples:

Spellings²

- a. **yi-ch'a-ki**
- b. **u-tzi**
- c. **ch'a-ji**
- d. **(y)u-k'i-b'a** (~ **u-k'i-b'i**)
- e. **k'o-jo-b'a**
- f. **(ha-'i**
- g. **(wa-ni**
- h. **(la-ji**

Sources

- pC **y-ihch'ak* 'its claw', from pM **iSk'aq*
 pM **utz* 'good'
 pC **ch'aj* 'ground parched corn' from pM **k'aj*
 pM **-a-b'* vtR: **-b'* vtD: **-i-b'* vi
 poss. *-ob'* < pM **-a-b'* vtR: **-b'* vtD: **-i-b'* vi
 pM **ha'* 'pronoun base', possibly with *+i* 'distal')
 pC **-wän(-i)* 'suffix of positionals')
 pC **-lāj(-i)* 'suffix of positionals')

Houston et al. (1998, 2004) acknowledge the case of (11a) but argue its reconstruction is uncertain, i.e. it could be *y-ihch'aak*. Some Mayan languages lengthen the vowel of a noun root when the root is possessed. However, a survey of possessed forms of this particular root in languages that exhibit vowel lengthening with possession suggests this is not the case (Kaufman 2003a)³:

- | | |
|----------|---|
| (12) POP | <i>y-isk'aq</i> |
| MAM | <i>t-xky'aq</i> |
| PQM | <i>ERG-ixk'aq</i> |
| KCH | <i>r-ixk'aq</i> |
| QAN | <i>y-isq'aq chej</i> 'casco de caballo' |

Furthermore, in Chontal the term is attested as *ich'äc* (Keller and Luciano 1997:116), where the *ä* almost certainly came from Proto-Ch'olan **a* (Kaufman and Norman 1984). Interestingly, Ch'ol attests to *iy-ejc'ach-il* 'su uña (his/her fingernail)' (metathesis). Which brings up the next problem with the DH approach: It does not take into account the convention of consonant deletion (C-deletion), which leads to underrepresentation, most commonly of root- and word-final consonants, especially /l/ (Mathews and Justeson 1984; Bricker 1989, 2000; Justeson 1989; Zender 1999).

(13) Consonant Deletion (Bricker 1989; Justeson 1989)⁴:

² Examples in (7f-h) are probably cases where the disharmonic vowel is not silent but represents an actual vowel representing an enclitic or suffix.

³ An example of vowel lengthening upon possession in Mam follows: *xaq* 'rock', *n-xaaq+a* 'my rock'.

⁴ Bricker (personal communication, 2002) has pointed out that consonant deletion is quite common in the spelling of C₁VC₁ sequences (e.g. suffix **-lel* 'abstractive', *käk* of **käkäw* 'cocoa'), whereby a single CV sign could represent the CVC sequence (i.e. **le** or **le-le** for *-lel*; **ka-wa** or **ka-ka-wa** for *käkäw*). Justeson (1989) has pointed out the same process only for

- a. Second consonant of first root in a compound term may be deleted.
 E.g. **ta-ja-MO'(-'o)** ~ **ta-ja-l(a)-MO'** for *taj-a(l)=mo'*
 E.g. **k'u-MO'(-'o)** ~ **k'u-k'u-MO'(-'o)** for *k'uk'=mo'*
- b. Final consonant of a root or word may be deleted.
 E.g. **ka-se** ~ **ka-se-w(a)** for <caseu> 'fifth month'
 E.g. **AJAW-le** ~ **AJAW-le-l(e)** for *ajaw-le(l)* 'ruler-ship'
 E.g. **ch'a-jo** ~ **ch'a-jo-m(a)** for *ch'aj-om* 'dripper'

Could **yi-ch'a-ki** be an underspelling of *y-ihch'ak-il* (cf. Ch'ol *iy-ejc'ach-il*)?

(14) *Test for underrepresentation (C-deletion)*: alternative spellings of same word in identical morphosyntactic environments.

The following spellings, among many others, are found in free variation in identical morphosyntactic environments that require a *-Vl* suffix:

(15) Morphosyntactic Traits

- Possessed noun with *-il* followed by possessor:
 Possessed noun with *-il* followed by possessor:
 Possessed noun with *-il* followed by possessor:
 Possessed title with *-al* followed by possessor:
 Possessed title with *-al* followed by possessor:
 In title *mas-u(l) ajaw*:
 In title *aj+b'ik'-i(l)*:
 As proper name *ahk-ul*:

Spelling Variation

- u-B'AH-hi** ~ **u-B'AH-hi-li**
yu-k'i-b'i ~ **yu-k'i-b'i-li**
u-TUN-ni ~ **u-TUN-ni-li**
ya-ja-wa ~ **ya-ja-wa-la**
u-b'a-ki ~ **u-B'AK-li**
ma-su ~ **ma-su-la**
AJ-b'i-k'i ~ **AJ-b'i-k'i-l(a)**
a-ku ~ **a-ku-l(a)**

(16) TERM FOR 'DRINKING CUP' IN PSS DATABASE OF 555 ENTRIES⁵

- a. **yu-k'i-b'i-l(a)** *y-uk'-ib'-il* 3sERG-drink-INSTR-POSS 'his/her cup' 15/275
 b. **yu-k'i-b'i** *y-uk'-ib'-i(l)* 250/275

Underrepresentation (C-deletion) can account for a large number of so-called disharmonic, as well as synharmonic, spellings in the data set by Houston et al. (2004). However, as I will show, underrepresentation examples are themselves accounted for by the ACH approach I will propose below, so I will return to this point later.

spellings embedded in pictorial scenes as labels substituting for the pictorial depiction of an object. For example, **po** is sometimes substituted for a pictorial depiction of a mat, suggesting it was meant to be read as **po-po** for **pohp* 'mat'.

⁵ In a database of 555 texts on pottery vessels the possessed noun *tz'ihb'* appears as **u-tz'i-b'a-li** on 69 instances, but as **u-tz'i-b'a** on 17 instances. Interestingly, the possessed passive nominalization **u-tz'i-b'(i)-na-ja-l(a)** for *u-tz'ihb'-naj-al* 3sERG-writing-PASS-POSS 'his written/painted thing' was spelled **u-tz'i-b'(i)-na-ja** 19 times and **u-tz'i-b'(i)-na-ja-l(a)** 18 times.

The DH also assumes that synharmonic spellings are unmarked or default. This is not the case. Justeson (1989) demonstrated that two types of phonological contexts call for obligatory synharmony⁶:

- | | |
|--|--|
| <p>(17) <u>C₁VC₁ roots</u>
 k'a-k'a for *<i>k'ahk'</i> 'fire'
 po-po for *<i>pohp</i> 'mat'
 k'u-k'u for *<i>k'uk'</i> (< *<i>q'u'q'</i>)
 ta-ta for *<i>tät</i> 'thick (of liquids)'</p> | <p><u>CV' roots</u>
 mo-'o for *<i>mo'</i> 'macaw'
 te-'e for *<i>te'</i> 'tree'
 ti-'i for *<i>ti'</i> 'mouth; edge'
 tz'i-'i for *<i>tz'i'</i> 'dog'</p> |
|--|--|

Exceptions to this rule can be explained as an anticipated spelling of the initial vowel of a following word, C-deletion, or morphological conditioning:

- (18) EXCEPTIONS ARE MORPHOLOGICALLY CONDITIONED
- a. **k'a-k'u-pa-ka-la**: *k'ahk' u-pakal* fire 3sERG/POSS-shield 'his shield is fire'
 - b. **tz'u-tz'i-j(i)**: *tz'utz' + -ij* suffix⁷
 - c. **u-ne-na**: *u-nehn(-al)* 3sERG/POSS-mirror(-POSS) 'his mirror', cf. Proto-Mayan **nehn*, **nehn-aal* (Kaufman 2003a), Tzotzil *s-nen-al ventana* 'vidrio de la ventana'

This rule, I would argue, can be extended to phonological sequences, not just roots (Mora-Marín 2002, 2003)⁸:

- (19) EXTENSION OF RULE
- | | |
|---|---|
| <p><u>C₁VC₁ sequences</u>
 -le-l(e) for *<i>-lel</i> 'abstractive'
 tz'u-nu-n(u) for *<i>tz'unun</i> (< *<i>tz'uunu'n</i>)
 'hummingbird'
 si-na-n(a) for Yu. <i>síná'an</i> 'scorpion'</p> | <p><u>CV' sequences</u>
 K'AB'A'-'a for *<i>k'a(:)b'a(:)'</i> 'name'</p> |
|---|---|

I have identified two additional contexts that demand obligatory synharmonic vowel insertion:

- (20) ...VCCV... sequences⁹ ...VC-V... sequences¹⁰

⁶ Some of these examples are mentioned in Kaufman (2003b).

⁷ The intended suffix may have been *-il*: Some pottery vases show evidence for the use of T60 **hi** in variation with T24 **li**; perhaps the use of T88 **ji** in the spelling **tz'u-tz'i-ji** could be a case of a similar alternation, but this is for the moment just speculation.

⁸ This regularly applied rule of obligatory synharmonic vowel insertion in the spelling of C₁VC₁ sequences suggests then that the few apparent counterexamples are the result of different processes, such as morphological conditioning, as argued in (18). For example, the spelling **u-K'AWIL-la-li** shows a disharmonic spelling **-la-li**. Thus, we may justifiably speculate about the possibility that the sequence **-la-li** spells two suffixes in sequence: *-al-i(l)*.

⁹ This synharmonic vowel-insertion strategy is analogous to that found in Linear B writing in spellings like **wa-na-ka** for /wanaks/ 'king'.

- | | |
|--|-------------------------------|
| a. a-k'(a)-ta for *ahk'(o)t-a(j) 'to dance' | yi-l(i)-a-ji for y-il-a-ji |
| b. yo-k(o)-b'i-l(i) for y-ok-b'-il
ij | u-PAT(-ta)-(t)i-ji for u-pat- |
| c. jo-ch'(o)-b'i-ya for joch'-b'-i(y)(+a) | |
| d. jo-l(o)-b'i-ya for jol-b'-i(y)(+a) | |
| e. chu[k(u)]-ji-ya for chuk-(a)j-i(y)(+a) | |
| f. ti-l(i)-wa/wi for til-w-a/i | |
| g. cho-k(o)-wa/wi for chok-w-a/i | |
| h. u-pa-k(a)-b'u for u-pak-b'u | |
| i. e-k(e)-li-b'(i) for ek-l-ib' | |
| j. e-k(e)-wa-ni for ek-wan-i | |
| k. CHUM(-mu)-wa-ni for chum-wan-i | |
| l. pa-t(a)-wa-ni for pat-wan-i | |
| m. xi-w(i)-te-i for xiutecuhtli (Nahuatl) | |
| n. ta-wi-s(i)-ka-l(a) for huiz cal (Nahuatl) | |
| o. ka-k(a)-tu-na-l(a) for cactonal (Nahuatl) | |

Accounted for: All positional verb roots (e.g. 15h-l), which typically take either a synharmonic $-V_1l$ 'stative' suffix, or $-CVC$ suffixes such as $-laj(-i)$ and $-wan(-i)$. The use of one of these rules with foreign words (e.g. 15m-o) supports its status as phonologically conditioned. In fact, 12 of the 39 synharmonic spellings in the cited data set can be accounted for in this way. Some synharmonic spellings, in particular those of nouns that do not correspond to roots of C_1VC_1 or CV' shapes, cannot be readily accounted for in this way, and I address those below.

The last process proposed here is *morphological conditioning*. There are two types of evidence for this process: purely epigraphic (Mora-Marín 2001, 2002, 2003) and purely linguistic (Kaufman 2003b). The two almost always reinforce each other, and in some cases one approach can fill in the gaps of the other.

(21) AFFIXATION CONDITIONING

The typical suffix of a root is likely to influence the spelling of a root

Justeson (1989) argued that the typical spelling of intransitive roots with a C_i word-closing syllabogram (e.g. OCH-chi, hu-li) was based on the frequent suffix $-i(h/y)$ 'completive status of intransitives' (i.e. *och-i* 's/he entered', *hul-i* 's/he arrived (here)'), and likewise, that the $b'a$ sign of $tz'i-b'a$ in AJ- $tz'i-b'(a)$ was due to the

¹⁰ This morphophonemic context could be realized orthographically in one of two ways: **yi-l(i)-a-ji** or **yi-la-ji**. The first, which is very rare, recognizes a morpheme boundary, while the second, by far the most common, ignores it. Thus, this spelling convention is of the *morphographic* type attested in other logosyllabic scripts; just as in other scripts this spelling type is rare in Mayan. These are not the same as "morphosyllables" (Houston et al. 2001), since morphographic spellings are purely phonetic. Furthermore, spellings like **yi-l(i)-a-ji** strongly support the contention by some epigraphers (e.g. Bricker 2004) that Mayan had signs for V syllables (i.e. **a**), not just CV syllables (i.e. **'a**).

fact that *tz'ihb'* 'writing' is a noun that requires an applicative suffix *-ä* to be transitivized; thus, its typical spelling as **tz'i-b'a** even in contexts where it was not a transitive verb (e.g. *aj-tz'ihb'* 'writer') could be due to its typical suffixing.

(22) AFFIXATION CONVENTIONALIZATION

The typical suffix of a root is likely to influence the spelling of a root even in contexts where no suffix is required

In other words, a root or CVC sequence could be spelled with a conventionalized CV-CV sequence in which the vowel of the second syllabogram reflects the vowel of the most common *-VC* suffix a root might take:

(23) NO EXPLICIT SUFFIX¹¹

- a. **u-mu-t(i)** **mut* 'bird'
- b. **a-na-b'(i)** *a[jj]+nahb'* 'he of the pool'
- c. **u-to-k'(a)** *u-tok'* 'his flint'
- d. **cha-k(i)** *chahk* 'lightning, thunder'
- e. **yu-ha** *y-uh(-al)* 'his bead'
- f. **u-tu-pa** *u-tuup* 'his earring'
- g. **yo-OL-la** *y-ohl* 'his heart'
- h. **e-b'u** **ehb'* 'step'
- i. **K'IN-n(i)** **k'in* 'sun, day'
- j. **u-WAY(-ya)** *u-way* 'his alter ego'
- k. **chu[k(u)]-ka-j(a)** *chuk-aj*

SUFFIX NEEDED

- CHAK-mu-ti-l(a)** for *chächäk mut-il* 'red bird'¹²
- ya-na-b'i-l(i)** for *y-a[jj]+nahb'-il* 'his aj-nahb''
- AJ-to-k'a-l(a)** for *aj+tok'-al* 'he of the flint'
- u-cha-ki-l(i)** for *u-chahk-il* 'his chahk(?)'
- u-ha-j(a)** for *uh-aj* 'bead (of someone)'
- tu-pa-j(a)** for *tuup-aj* 'earring (of someone)'
- o-la-s(i)** for *ohl-as* 'heart'
- ye-b'u-l(i)** for *y-ehb'-ul* 'his step'¹³
- K'IN-ni-l(i)/l(e)** for *k'in-il* 'by day; special day'
- K'IN-ni-ch(i)** for *k'inich* 'Sun God'
- WAY-ya-l(a)** for *way-al* 'alter ego'
- WAY-ya-s(i)** for *way-as* 'alter ego/sorcerer'
- u-chu-ku-w(a)** for *u-chuk-uw* 's/he seized it'

Clearly, the vowel of the typical *-VC* suffixes of these terms is maintained in spellings where no explicit suffix is apparent or needed. Some of these spellings supplement

¹¹ Example (23k) does have an explicit suffix with a vowel different from that used in the spelling of the noun root, a fact that supports the ACH proposal.

¹² It is possible that **u-mu-ti** itself represented *u-mu(u)t-il*, but to my knowledge all examples of possessed **mu-ti** show up as **u-mu-ti**, never as **u-mu-ti-la**, for example.

¹³ The spelling **ye-b'a-li** is also attested, suggesting a suffix *-al* in some instances.

Kaufman's (2003b) approach. For instance, Kaufman did not find evidence for the use of suffixes with Proto-Mayan **tyo:q'* (Lowland Mayan **to:k'* 'flint'); in CLM texts the term is found possessed as **u-to-k'a** (no explicit suffix) and unpossessed as **aj-to-k'a-la**, a spelling which exhibits a suffix *-al* (cf. 23c). Also, Kaufman reconstructs Proto-Mayan **mu:t* 'bird; omen', and notes it is attested as *mut-al* in Tzotzil. This differs from its spelling in CLM texts as **mu-ti**, as in **u-mu-ti**; however, the phrase **CHAK-mu-ti-la** is also attested, and suggests that the spelling with **ti** may have been motivated by a suffix *-il* (cf. 23a).

In some of these cases we could be dealing with underrepresentation, but it is likely that quite a few of these spellings with no apparent suffix are in fact conventionalizations. This is suggested by cases where it is clear from linguistic evidence that no suffix is necessary:

(24) EPIGRAPHIC EXAMPLES

yi-tz'i-n(a)	<i>y-ihetz'i(i)n</i> 'his younger sibling'
yi-cha-n(i)	<i>y-ihchan</i> 'his maternal uncle'

These kin terms probably did not take a suffix when possessed, as is the case in modern Ch'olan-Tzeltalan languages. However, Kaufman (2003b) has shown that the vowel of the word-closing syllabogram of these terms agrees with the vowel of the suffix that these kin terms take in the modern languages in unpossessed contexts:

(25) EPIGRAPHIC EXAMPLES

a. **yi-cha-ni**

b. **yi-tz'i-na**

c. **i-ka-tzi ~ yi-ka-tzi**

d. **yi-ch'a-ki**

MODERN LANGUAGES

Proto-Tzeltalan **'ichan-il(-ab')* 'tío materno', Tzeltal *y-ichan* 'su primo', Ch'ol *y-ichan* 'su tío'

Tzeltal *ihetz'in-äl* 'younger sibling', *k-ihetz'in-ab'* 'my younger siblings', *y-ihetz'in* 'his younger sibling'

Tzeltal *ihkatz-il* 'carga', *ihkatz-in-el* 'llevar carga', *y-ihkatz* 'su carga'

Proto-Tzeltalan **'ihch'ak-il* 'uña', Ch'ol *ejk'ach* 'uña' *iy-ejk'ach-il* 'su uña'

Thus, morphological conditioning is supported by epigraphic and linguistic evidence, and it explains conventionalized spellings in the hieroglyphic texts. Furthermore, some examples, such as **yi-ch'a-ki** (20d), can be explained as cases of conventionalization (i.e. the **ki** of **yi-ch'a-ki** as based on the unpossessed form **'ihch'ak-il*) or underrepresentation (i.e. the vowel of **ki** as a partial spelling of *-il* of *iy-ejk'ach-il*). The same might be true for **u-ne-na**, a spelling mentioned earlier (13c).

Conventionalization could be speeded up by multiple reinforcement based on different *-VC* suffixes with same vowel:

(26) MULTIPLE REINFORCEMENT

u-B'AH-hi-l(i) with *-il* and **B'AH-hi-j(a)** with *-ij* both reinforce use of **hi**
K'IN-ni-l(i) with *-il* and **K'IN-ni-ch(i)** with *-ich* both reinforce use of **ni**

Interestingly, it is possible that some conflicting spellings may have coexisted for some time, but one was ultimately picked as a result of frequency of associated suffix:

(27) COMPETING MOTIVATIONS

yu-k'i-b'(a) ~ **yu-k'i-b'(i)** for *y-uk'-ib'* 3sERG-drink-INSTR 'his/her cup'
u-k'i-b'a for *uk'-ib'-äl* drink-INSTR-UNPOSS 'cup (of someone)'
yu-k'i-b'i for *y-uk'-ib'(-il)* 3sERG-drink-INSTR(-POSS) 'his/her cup'

The term for 'cup' appears possessed in 91% of its occurrences; this fact probably influenced the preference for the spelling of this term with a word-closing syllabogram **b'i** (i.e. **yu-k'i-b'i**), given that in many of those possessed occurrences an *-il* suffix was likely present after the instrumentalizing suffix *-ib'* (**yu-k'i-b'i-l(a)** for *y-uk'-ib'-il*), though not necessarily all (some cases of **yu-k'i-b'i** were probably for *y-uk'-ib'*).

Also worth discussing is the fact that Houston et al.'s data set contains examples of unique spellings which they have isolated from their morphosyntactic contexts. For example, to my knowledge, the spelling **te-mu** appears in only one text. Although they cite it as **te-mu** the spelling occurs possessed as **u-te-mu-?li**, suggesting that it could simply be a case of *u-tehm-ul*, not unlike the **ye-b'u-li** spelling for *y-ehb'-ul*. Other unique spellings are not provided sources; thus, assuming they occur in isolation, or in other words, as listed by Houston et al., it is impossible for one to test the ACH approach from epigraphic evidence alone. However, the linguistic evidence, following Kaufman's (2003b) approach, does provide answers for some such unique spellings.

(28) UNIQUE SPELLINGS

- a. **wa-WAJ-ji** for **wa(a)j* 'tortilla, food'
- b. **cha-chi** (cf. Yu. *cháach-t* 'to sift, screen')

POSSIBLE MOTIVATIONS

- Col. Yukatek <wahil> 'banquete (banquette)'
- Col. Yukatek <u chachil> 'the part that does not go through the screen or colander'

And last, in the most recent data set there is at least one spelling of unclear etymology, and therefore, unclear phonological shape: **ja-yi**. Houston et al. (2004) themselves gloss it as *jaay* ‘thin?’, suggesting they consider it questionable.

4. Discussion and Revisions

When we take into account the revisions to their data set already mentioned in (6), as well as the spellings that are accounted for by phonological conditioning (C₁VC₁, CV’, ...VCCV..., VC-V) and morphological conditioning, the following data remain out of 72 tokens (see Addendum):

(29) REVISED DATA SET: NOT ACCOUNTED FOR

	i	a	u	Totals
i	3 (syn)	1 (dis)	1 (dis, unique)	4
e	--	0	0	0
a	2 (dish, unique, uncertain)	5 (syn)	1 (dis, unique)	7
o	0	2 (dis)	--	2
u	--	1 (syn)	2 (syn)	3
	3	9	4	18/72

From Houston et al.’s data set, 14 of the 39 synharmonic spellings can be accounted for by ACH. Indeed, 7 of the 14 synharmonic spellings accounted for through ACH are also accounted for by modern linguistic data alone. In addition, the linguistic data accounts for 5 additional synharmonic spellings. Thus, when added to the 12 synharmonic spellings accounted for by phonological conditioning, we get 29 out of 39 synharmonic spellings that are now accounted for (74%). Some of the remaining synharmonic spellings, to my knowledge, are unique or even of uncertain etymologies. Furthermore, 15 out of the 35 disharmonic spellings can be accounted for by ACH too. The modern linguistic data presented by Kaufman (2003b), as well as the handful that I have added myself, account for 15 out of the 35 disharmonic spellings in Houston et al.’s data set, including 12 that were not accounted for by ACH, such as the two unique spellings **cha-chi** and **wa-WAJ-ji**. Together, ACH and modern linguistic data account for 27 of the 35 disharmonic spellings in the data set in question (77%).

Kaufman (2003b:14), who argues specifically that it was the typical *-Vl* suffix of nouns that led to their conventionalization, has found 90.9% consistency with his hypothesis that “when nouns or adjectives end with a consonant, this consonant, if spelled, is spelled with a CV syllabogram that contains the same vowel as would appear in a *-V:l* suffix added to that lexical item.” Kaufman’s data set contains more

examples than those used by Houston et al. (2004), but there are many that do not overlap. I suspect that testing the ACH approach on a larger data set will probably yield a higher rate of consistency for that approach as well.

Of the remaining 8 disharmonic spellings, 6 are unique (i.e. **b'a-tz'u**, **ta-ji**, **chi-ku**, **b'u-la**) or invariant (i.e. **AYIN-na**, **ja-yi**) spellings that cannot be used to test the ACH approach, which requires spelling and contextual variation, and for which the linguistic approach cannot adequately account because those terms do not typically occur with suffixes in the modern languages. In fact, the term spelled by **ja-yi** is of uncertain etymology. This leaves only two frequent disharmonic spellings unaccounted for at this time: **-Co-ma**, and **-'o-b'a**.¹⁴ Thus, if we do not take the unique spellings into account, we can say that morphological conditioning accounts for 90% of the disharmonic spellings remaining.

From another perspective, the disharmonic word-closing syllabograms in **-Ci** (18, 52%) and **-Ca** (12, 34%) significantly outnumber those in **-Cu** (5, 14%); together, **-Ci** and **-Ca** spellings add up to 86% of all disharmonic word-closing syllabograms. This corresponds well with the much higher frequency in the descendant languages of vowel-initial suffixes that begin with *i* or *a*. In Yukatek, for example, of the 44 vowel-initial suffixes listed by Bricker et al. (1998:408), 13 (30%) begin with *i*, 14 (32%) begin with *a*, 8 (18%) begin with *e*, and 3 (7%) with *o*; the remaining 6 (13%) vowel-initial suffixes echo the root vowel, whatever that vowel may be. Together, *i*- and *a*-initial suffixes amount to at least 62% of all suffixes.

5. About Morphosyllables

The DH approach requires the existence of so-called “morphosyllables,” or otherwise certain necessary suffixes would be underrepresented or not represented at all. That is, given a spelling such as **B'AH-hi-ja**, if the **hi** of **B'AH-hi** is needed as a diacritic to mark vowel length of the root *b'a(:)h* ‘head’, then it cannot be used to spell part of the **-VC** suffix that is needed here; instead, T181 **ja** must do this on its own, and must therefore be read as **-AJ** in this context. Likewise, in a spelling like **u-TUN-ni-li**, if the **ni** of **TUN-ni** is needed as a diacritic to mark vowel length of the root *tu(:)n* ‘stone’, then it cannot be used to spell part of the **-VC** suffix needed here; instead T24 **li** must do this on its own, and must therefore be read as **-IL** in this context. Interestingly, in this last case, the suffix rendered would be the same regardless of the spelling principle involved: **u-TUN-(n)i-l(i)** yields a suffix **-il** (simple spelling rules); and **u-TUN(-ni)-IL** yields a suffix **-il** (morphosyllable and disharmony

¹⁴ An approach that suggests a neutral vowel *a* at the end of the spelling of verbs might prove useful in accounting for the first one (Mora-Marín 2002, 2003; Boot 2004), while an approach that suggests that independent pronouns were immediately followed by enclitics such as *+a* ‘relatively near to speaker’, *+i* ‘relatively far from speaker’, and *+o* ‘yonder’, could likewise prove useful in accounting for the latter.

approach). However, in the first case, the suffix rendered will have different shapes depending on the approach: **B'AH-hi-j(a)** yields a suffix $-i(:)j$ (simple spelling rules); and **B'AH(-hi)-AJ** yields a suffix $-a(:)j$ (morphosyllable and disharmony approach). Thus, the approach invoked has substantive consequences for the reconstruction of the grammatical structure of the language represented in the texts.

Interestingly, in spellings like **B'AH-hi-ja** and **tu-pa-ja**, the simple spelling rules adhere to by epigraphers for the past half-century yield two suffix forms: $-i(:)j$ and $-a(:)j$, respectively. This suffix, in either form, would represent a suffix marking 'uncertain possession'. This marker is attested in Mayan languages with both $-i:j$ and $-a:j$ forms. However, it is not preserved in any modern Ch'olan language. Thus, the forms attested in CLM texts could simply reflect a retention of Central Mayan $*-i:j \sim *-a:j$, making it unnecessary to assume, as Houston et al. (2001) do, that only one form, $-a:j$, was represented.

6. Logosyllabic Spellings, Polymorphemic Logography, Phonetic Complementation

If morphosyllables are unnecessary, what can we make of spellings like **B'AH-ja**, found in variation with **B'AH-hi-ja**, and spellings like **u-TUN-li**, found in variation with **u-TUN-ni-li**? In other words, **B'AH-hi-ja** and **B'AH-ja** are somehow spelling the same word; assuming so, and assuming too that **B'AH-hi-ja** was meant to be read **B'AH-hi-j(a)** for $b'a(:)h-i(:)j$, how are we to read **B'AH-ja**?

The answer lies in polymorphemic logography and the practice of phonetic complementation. First, logograms in the script could represent CVC roots or CVC-VC stems. Day signs, for example, often represent polymorphemic words. The day sign for the first day name is not supposed to be read ^{DAY}7AJAW but ^{DAY}7AJWAL, as shown by Mathews and Justeson (1984), and as the occasional phonetic complement suggests (i.e. ^{DAY}7AJWAL(-li/la)). Also, T544 K'IN may be found as K'IN, K'IN-chi, and K'IN-ni-chi in identical contexts, suggesting that T544 by itself could be read as K'INICH. And the same applies to verbs. T710 CHOK 'to throw down', for instance, may be found as an active transitive spelled as **u-CHOK**, **u-CHOK-wa**, or **u-CHOK-ko-wa**, for *u-chok-ow-Ø* 3sERG-throw.down-PL-3sABS 's/he throws/threw it down'. Thus, T710 by itself could stand for *chokow*, i.e. **u-CHOKOW**. And second, given these patterns of alternation in identical contexts, one must reach the conclusion that syllabograms were being used as phonetic complements both on nouns and on verbs: **K'INICH(-chi)** and **K'INICH(-ni-chi)** were both cases of phonetic complementation, and so were **u-CHOKOW(-wa)** and **u-CHOKOW(-ko-wa)**.

Examples of syntactically complex proper names show that polymorphemic logograms were interpretable in terms of syntax alone:

(30) SPELLING

a. yi-ch'a-ki B'ALAM

b. YICH'AK(-ki) B'ALAM(-ma)

c. YICH'AK B'ALAM

GLOSS

y-ihch'ak(-il)

3sERG-claw

'the claw of the jaguar; Jaguar's Claw'

b'ahläm

jaguar

Despite the absence of phonetic signs to make the *y*- '3sERG' marker explicit, as in (30a), the spellings in (30b-c) are not unclear because in Mayan syntax the possessee precedes the possessor, and therefore the Mayan scribe would have known that a sign CLAW preceding a sign JAGUAR was supposed to be read 'Jaguar's Claw'. In other words, syntax (and the fact that the scribes knew who they were writing about) was sufficient in principle for scribes to disambiguate between possible inflectional and derivational stems of a word represented by a given logogram. In fact, from the point of view of a reader, a high percentage of logograms in a text would probably facilitate reading.

An obvious question arises:

(31) If Mayan writing was in principle a logographic script with optional use of syllabograms primarily as phonetic complements, why were syllabograms innovated in the first place?

The question can be answered from the point of view of a writer: It would be perhaps useful to at least make explicit some of the inflectional and derivational endings of nouns and verbs during the composition of a text. A balance between logograms and syllabograms was in fact the norm, and even late in the Classic period when phoneticism became more widespread a very high percentage of logogram use is still attested. This balance between the ease of reading and the ease of writing is what we find in spellings like **B'AH-ja** for *b'ah-ij* 'image (of someone)', which shows that T757 **B'AH** could be read also as **B'AHIJ** (i.e. **B'AHIJ(-ja)**), or spellings like **u-CHOK-wa** for *u-chok-ow-Ø* 's/he throws/threw it down', which shows that T710 could be read also as **CHOKOW** (i.e. **u-CHOKOW(-wa)**). The same logogram could have multiple polymorphemic readings: spellings like **u-B'AH-li**, in alternation with **u-B'AH-hi-l(i)**, both for *u-b'ah-il* 'his/her image', show that T757 could also be read as **B'AHIL** (i.e. **u-B'AHIL(-li)**); while spellings like **CHOK-ja**, in alternation with **CHOK-(k)a-j(a)**, both for *chok-aj-Ø* or *cho[-h-]k-aj-Ø* 'it is/was thrown down', show that T710 could also be read as **CHOKAJ** (i.e. **CHOKAJ(-ja)**).

Thus, polymorphemic logography explains the spellings like **B'AH-ja** and **CHOK-ja** as cases of phonetic complementation, not as cases where otherwise syllabographic signs were used as pseudologograms or morphosyllables.

7. Conclusions

(32) I conclude that:

- a. The DH does not adequately account for spelling conventions, and has as a major flaw in its decontextualization and isolation of glyphic spellings; contextualization is crucial to testing alternative approaches.
- b. Four phonological conditions require obligatory synharmonic silent vowel insertion; therefore, in these contexts, synharmony is clearly not default or unmarked, and this is something that DH does not account for.
- c. Remaining synharmonic spellings, and almost all of the disharmonic spellings can be accounted for in terms of underrepresentation and morphological conditioning; morphological conditioning itself accounts for underrepresentation.
- d. Morphological conditioning can explain conventionalized synharmonic and disharmonic spellings more effectively than DH, particularly when counterexamples to Houston et al.'s proposed DH principle are taken into account.
- e. DH requires existence of morphosyllables; no such sign type is needed if DH is not correct.

So what were the scribes doing, if they were not attending to the complexity of syllable nuclei? Much of the time, scribes were probably using the convention of consonant deletion or underrepresentation of word-final consonants. The rest of the time, when a spelling was maintained across morphosyntactic contexts that differed in whether or not a suffix was required, it seems that the spelling in the context not needing a suffix matched that of the context where a suffix was needed. In other words, conventionalized spellings were due to affixation patterns, or morphological conditioning.

This probably was a practical, efficiency-based convention. But the evidence suggests that there were sometimes competing motivations, based on the need for suffixes with different vowels, that led to contextually differentiated spellings (e.g. **tz'i-b'i** vs. **tz'i-b'a**; **(y)u-k'i-b'i(-li)** vs. **(y)u-k'i-b'a**). Perhaps differential frequency of the suffixes involved led to one spelling, the one reflecting the most frequent suffix in texts, becoming conventionalized in some cases (e.g. **(y)u-k'i-b'i**), whereas in other cases the two spellings remained side by side perhaps because the frequency of the contrasting contexts was comparable (e.g. **tz'i-b'i** vs. **tz'i-b'a**). At the same time, however, the choice for conventional spellings of some words may have been facilitated when those words frequently used suffixes with the same vowel (e.g. **u-B'AH-hi-li**, **B'AH-hi-ja**; **K'IN-ni-li**, **K'IN-ni-chi**), creating a situation of multiple reinforcement of a particular CV syllabogram as the most common word-closing syllabogram for that word even when no suffix was called for.

The truly conventionalized spellings, then, are those for which an underrepresented suffix cannot be proposed because of the morphosyntactic process involved (e.g. possession of kin terms such as **yi-cha-n(i)** for *y-ihchan*, **yi-tz'i-n(a)** for *y-ihzt'in*), or cases where redundancy in the spelling of a suffix is apparently motivated by interference from a typical spelling for a root (e.g. **chu-ku**, as in **u-chu-ku-w(a)**, where *-uw* provides motivation for **chu-ku** spelling) in a context where that spelling was not morphologically motivated (e.g. **chu[ku]-(k)a-j(a)** for *chuk-aj*).¹⁵ Otherwise, epigraphers need to rule out the possibility of underrepresentation before they can assume that a certain spelling is conventionalized; and doing so requires re-contextualizing the spellings that they currently study in isolation. In fact, both disharmonic and synharmonic vowel insertion must be tested on a case-by-case basis for possible underrepresentation, given that both can result from final consonant deletion, as well as for possible conventionalization based on frequency of *-VC* suffixes attested in the hieroglyphic texts and the modern languages. Sadly, what this all means is that we, as linguists, cannot use evidence from disharmonic spellings to make inferences about the phonological shape of a root's syllable nucleus complexity. But at the very least, I think it is just as useful to know that scribes were ignoring such information.

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¹⁵ See Tokovinine and Davletshin (2001) for discussion of more examples of such conventionalizations.

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Addendum: Revised Data Set based on Houston et al. (2004)

Spelling	ACH	C-Deletion	Obl. Synharmony	Linguistic Data
Ci-Ci				
1. pi-ki*				
2. pi-si*				
3. wi-tzi	Yes			Yes
4. chi-ji				
5. tz'i-b'i	Yes			Yes
6. ti-li			Yes	
Ci-Ca				
7. AYIN-na*				
8. yi-tz'i-na				Yes

Co-Ca 54. -Co-ma 55. ha-'o-b'a 56. to-k'a	Yes			
Cu-Ci (not known) 57. u-tzi 58. lu-mi	Yes Yes			
Cu-Ca 59. hu-na 60. tu-pa 61. yu-ha 62. b'u-la*	Yes Yes Yes			
Cu-Cu 63. CHUM-mu 64. chu-ku 65. ku-chu 66. mu-ku 67. k'u-k'u 68. tz'u-nu-nu 69. u-lu 70. yu-mu 71. b'u-ku 72. t'u-lu			Yes Yes Yes Yes Yes Yes	Yes Yes