# Revisiting an imperfection in Mayan orthography

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Despite the many technical advances to date in speech coding, the most important discrete representation of speech is still old fashioned writing, and this is especially true of the languages of economically marginal minority speech communities.  In 1995, Q'eqchi' began to emerge as a model language for Mayan orthography standardization.  This was possible in part because of the relative dialectal homogeneity of Q'eqchi' dialects.  Still, even for Q'eqchi', the orthography policy instituted in the 1990s was not perfect, the representation of ejective stops and affricates pitting champions of aesthetics, elitism, and linguistic adequacy against each other.  This paper reviews the situation, originally described for a Spanish-speaking audience (DeChicchis 1996), in English for the benefit of Japanese and other international students of orthographic reform.  In addition, current policy recommendations, as well as examples of a short text written according to different orthographic rules, are provided.

**Key Words :** Q'eqchi', Mayan, orthography, apostrophe, saltillo

## 1. A brief history

Since its inception, the Academia de las Lenguas Mayas de Guatemala (ALMG) has worked admirably to promote Mayan language usage and to generally promote a more egalitarian language policy in Guatemala.  Moreover, the ALMG has been a positive force in the improvement of orthographic and educational practices.  Notwithstanding its excellent track record, the ALMG has at times, and only in minor details, erred in its policy formulation.  Such was the case with the orthographic use of the apostrophe, and the shortcomings of the ALMG's pan-Mayan apostrophe-writing policy vis-à-vis the Mayan language Q'eqchi' were discussed in 1995.  After summarizing the 1995 arguments, the present work reviews unicode options for Q'eqchi' orthography.

From the perspective of linguistic adequacy, as characterized by the mid-20th-Century's seminal authors of biunique script design, the only real blemish on the otherwise lovely complexion of current Q'eqchi' orthography in Guatemala involves the use of the apostrophe.  Linguists working on Mayan orthographic reform had long been aware of the problem, but it remained unresolved as the ALMG tackled more pressing reforms, such as the proper way to write the uvular consonants.  Eventually, with the basic Latin character inventory having been defined by Guatemalan law, it was time to turn attention to the combinatoric dilemma of apostrophe usage.  At the Primer Congresso de los Estudios Mayas, the Q'eqchi' apostrophe problem was described in great detail, but that presentation and its subsequent published text (DeChicchis 1996) has been inaccessible to most Japanese students of orthographic reform.  The present work, therefore, aims to bring an awareness of this particular issue, as well as a more general understanding of modern Mayan orthography, to an English-language readership.

The eradication of the indigenous Mayan writing system began in the 16th Century, and the indigenous system ceased to be used by the end of the 17th

Century (Coe 1992). Spanish missionaries developed Latin character writing systems which evolved into the official Guatemalan Mayan orthographies of the mid-20th Century. Although the Guatemalan government's first Mayan orthography was primarily intended for writing toponyms, this early orthography was disliked by linguists and educators, and various revisions were unofficially adopted. As the political voice of the ethnic Maya grew louder in the 1980s, Guatemala was forced to reconsider its Mayan orthographies. New laws specified the basic character inventories (*alfabetos*), and the ALMG was entrusted to formulate the orthographic details for the various Mayan languages.

In working out the orthographic details for the Mayan languages of Guatemala, the ALMG has proceeded with care, inviting opinions from the community of Mayan language writers. Consultation with linguists has been important, and consensus among educators has been cultivated. In the spirit of coöperation which the ALMG has fostered, a minor change in the writing of apostrophes is here suggested for the language Q'eqchi'. Mayan orthography continues to develop, and, without a doubt, there is no modification of the Mayan orthographic system that is perfect, but some changes are better than others. In order to evaluate the relative merits of the proposed change, one must understand the history of usage of the apostrophe and other symbols. Moreover, especially with the increase of e-mail writing in recent years, it is important to heed the constraints of technology as well as the traditions of handwriting. Contrast neutralizations can often occur in handwriting, though they might be unacceptable in computer writing, and certainly unacceptable in most typesetting. Because of this, at least for the language Q'eqchi', and particularly when writing with a computer, we recommended in 1995 a manner of apostrophe usage which is linguistically adequate, yet which is also unobjectionable from a typesetting, calligraphic, computer science, or aesthetic point of view.

## 2. Alphabetical versus diacritical

In the writing of the Q'eqchi' language, the apostrophe has four traditional shape forms and two traditional functions. The basic forms of the attested shapes are (1) a curled form, (2) a slanted or inclined form, (3) a straight form, and (4) an angular form (Table 1). The size and the position of the written apostrophes vary much from one hand to another and from one typographer to another. Linguistically, the

two functions of the apostrophe are a diacritical use and an alphabetical use (Table 2). The diacritical use is in the digraphs and trigraphs that consist of a single alphabetic character or an alphabetical digraph (i.e., T, K, Q, CH, TZ, or sometimes B and P) followed by a diacritical apostrophe, to indicate the ejective segmental phonemes (or implosive, in the case of B). The other use is as a single letter, which represents the glottal plosive segmental phoneme. Examination of handwritten documents indicates that the two uses of the apostrophe correspond to two graphemically distinct representations. In the hands of careful writers, when the apostrophe almost always is written, it is written smaller as a diacritical sign than it is in the positions where it represents a distinct segmental phoneme. Another difference that is frequently seen in handwriting is in the form of the apostrophe. Attributable without a doubt to the tradition of the Proyecto Lingüístico Francisco Marroquín (PLFM), we often see a large apostrophe written in an angular form that looks like the numeral 7. Indeed, writers still use the word *siete* to refer to the letter so used to write the glottal plosive, for PLFM writers used the 7 to write the glottal stop in typewritten documents. Of course, some people also use an angular form of apostrophe in the digraphs and trigraphs, but the angular form is much more common when the large alphabetical apostrophe is written than when the small diacritical apostrophe is written. Whatever its calligraphic form, it matters most that the diacritical apostrophe and the alphabetical apostrophe, for phonological reasons, be clearly distinguished, and the two handwritten forms are always clearly distinguished by careful writers.

Table 1: apostrophe styles

*curved apostrophes:*
t' a' t' k' k' q' q' o'

*slanted apostrophes:*
t' a´ k' k' q´ o'

*straight apostrophes:*
t' a� k' k' q' o'

*angled apostrophes:*
a⁷ aᶻ eꞁ i⁷ o⁷ o' u⁷

In distinguishing two apostrophes, the phonological distinction is one of phonotactic importance. The language Q'eqchi' allows that an occlusive supraglottal plosive (e.g., [t], [k]) can be followed by the occlusive glottal plosive [ʔ]. For example, when, in a typewritten or typeset text which does not distinguish two kinds of apostrophe, a reader sees written an unfamiliar word with T' (i.e., a T followed by an apostrophe), the reader cannot be sure if this T' represents a single occlusive ejective or represents a succession of two occlusive plosives. Clearly, the fact that the ejectives are more common than the plosive combinations in Q'eqchi' allows for educated guesses, but this ambiguity is nevertheless a defect of the ALMG orthographic system. How could such an obvious defect have come about?

Table 2: ALMG usage

*alphabetic apostrophe:*
' *is written for IPA* [ʔ]

*diacritical apostrophes:*
b' *is written for IPA* [ɓ],
t' *for* [t'], tz' *for* [ts'],
ch' *for* [tʃ'], k' *for* [k'],
q' *for* [q']

For many years, PLFM and other linguists used the numeral 7 to write the Q'eqchi' glottal plosive (cf. Kaufman 1970). But, in 1987, Guatemala, quite rightly, decided not to write the glottal plosive with the 7, and spelling has since conformed with this resolution (ALMG 1990a). Most everyone has accepted the simple argument that it is not proper to write a phoneme with a numeral. Instead of the 7, the ALMG advocated using the apostrophe to write the glottal plosive, but, unfortunately, this decision was not further qualified, despite ALMG's awareness of potential difficulty (cf., ALMG 1996b: 5). PLFM had used the apostrophe strictly as a diacritic in digraphs and trigraphs for the ejective obstruents. By changing the PLFM numeral 7 to an apostrophe, ALMG was conflating the two functions into a single orthographic symbol. Since the typewritten and typeset forms of the alphabetical apostrophe and the digraphic apostrophe are usually the same graphemes, one must now distinguish the two uses in certain ambiguous contexts.

In order to distinguish the digraphs and trigraphs for ejectives from the combinations of plosives, ALMG advocated the use of the hyphen for the plosive combinations (ALMG 1996b: 10-11). For example, T' (T with an apostrophe) is written to indicate the occlusive apical ejective in the word [t'il], an imperative verb formation meaning "work it" or "block it". In contrast, T- (T with a hyphen) is written to indicate the combination of occlusive apical plosive followed by the glottal plosive in the word [tʔil], a future tense verb formation that means "(he) will see it" or "(he) will cure it". Without a doubt, it is possible to distinguish the two cases this way using the hyphen. However, even though there are many people who advocate this practice, there are reasons for not writing Q'eqchi' in this way. In order to best understand the reasons reviewed here, one must remember the types of graphical signs that constitute an orthographic system. Mainly, for alphabetic systems, there are simple letters that indicate segmental phonemes. Then, as much to limit the inventory of signs as to represent phonetic similarities, there are both diacritical signs which combine with simple letters to form digraphic letters that also indicate segmental phonemes. In Q'eqchi' spelling, for example, the letter K is a simple letter that corresponds to the occlusive velar plosive, whereas the K' letter is a digraph, formed of the letter K plus the diacritical apostrophe, a digraphic letter that corresponds to the occlusive velar ejective. The apostrophe is not the only diacritical mark in the Q'eqchi' spelling. For example, the alphabetical TZ is a digraph made of the letter T and the diacritical letter Z. We call Z a *diacritical letter* because, under the current ALMG orthography, Z does not itself correspond to any segmental phoneme in Q'eqchi', and because Z is written merely to disambiguate the uses of the letter T. Similarly, the alphabetical unit TZ' is a trigraph that consists of the simple letter T, the diacritical letter Z, and the diacritical apostrophe, and this trigraph corresponds to the occlusive alveolar ejective affricate. In any orthographic system, the simple letters and the other alphabetical digraphs and trigraphs are the important signs, used especially to write isolated words. However, when longer texts are written, there are also punctuation signs that are very important. Q'eqchi' writing uses the period, the comma, the hyphen, the dash, and sometimes the colon, the semicolon, quotation marks, the question mark, and the exclamation point; and there are already rules for properly using these signs of punctuation (although there is certainly

variation, as seen too for other Mayan languages; cf. Brody 2004). As noted in these rules, it is important to clearly distinguish the letters and their diacritical marks from the signs of punctuation so as not to confuse young students and other people who are beginning to read Q'eqchi'. Though we may acknowledge that there may be limitations in typewriting that may make certain adjustments necessary, we must insist that, when texts are written by hand, or when they are printed in a typography without graphical limitations, it is bad practice to use the same graphic sign both as a letter for writing words and as a sign of punctuation in longer texts.

### 3. No hyphens

It is clear that the hyphen is well used as a sign of punctuation. It has been much used to join words and to separate the parts of words. A long tradition exists to write hyphens to separate morphemes. The concept of the hyphen as a punctuation mark is so well established that the hyphen is not listed in any of Guatemala's 1987 official lists of letters for Mayan languages. The documents of the ALMG indicate clearly that the hyphen is neither a simple alphabetical letter nor an alphabetical diacritic. Since there is this tradition of the use of hyphen as a punctuation mark, it is best not to use the hyphen to write the glottal plosive. The worst aspect of the orthographic proposal to write XIN'OK for [ʃinʔok] but XAT-OK for [ʃatʔok] (cf. ALMG 1996b: 10) is that two different graphemic signs (i.e., the apostrophe and the hyphen) are used to write the same segmental phoneme (i.e., the glottal plosive). Considering that the pre-1987 practice of sometimes writing the occlusive velars with C and sometimes with the digraph QU is now recognized as having been an error, it is similarly wrong to write the glottal plosive with two diverse signs.

There are several proposals to use the hyphen, but there is only one use of the hyphen in this context that has any merit, and that is the proposal to write T-'ILOQ for the future [tʔiloq] and to write XAT-'OK for the past [ʃatʔok]. This remedy uses a hyphen to disambiguate both cases. World-wide, there is good precedent for using special signs to disambiguate otherwise ambiguous spellings. For example, in the spelling of Spanish, the dieresis is used to disambiguate the silent U from the sonorous U after the letter G. Another example is the roman spelling of Japanese, that sometimes must disambiguate the two uses of the letter N. Unlike the dieresis, the hyphen is much used as a sign to join words and

to separate morphemes in grammar books and in other texts about linguistic forms. Nevertheless, we can accept a proposal to use the hyphen as a sign of disambiguation in Q'eqchi', but this disambiguating usage is very little followed. In particular, the ALMG does not follow this practice. Thus, we propose here a remedy that does not use the hyphen.

### 4. Two styles of apostrophe

We proposed in 1995 that we write [tʔil], with a straight or angular apostrophe, to mark the succession of two plosives, whereas we write [t'il] with a curly or slanted apostrophe as the diacritic which marks an ejective. To carefully write the two different apostrophes in printed documents can give emphasis to the difference between the ejective consonants and the glotal plosive; and this can help students to learn the Q'eqchi' spelling. Another advantage, especially when the uses of the apostrophes with the uses of the quotation marks on a computer are coördinated, is that such two-apostrophe writing facilitates the formulation of algorithms for list alphabetization and spellchecking. The curly and straight apostrophes, because they are in conflict neither with the diacritics of the Spanish of Guatemala nor with the double quotes of the English of Belize, can easily be used in multilingual documents. Another consideration is that the use of two different apostrophes is very common in other famous spelling systems (for example, the spelling of Hawai'i, where the glottal plosive is written with the *'okina,* an apostrophe-like character which is best encoded with Unicode *modifier letter turned comma,* U+02BB, although the *left single quotation mark,* U+2018 is routinely used), especially to distinguish a diacritical apostrophe from an alphabetical (or letter-like) apostrophe. In short, we propose that a practice of writing two forms of the apostrophe, one alphabetical form and one diacritical form, can remedy the orthography of the ALMG in a way that respects the essence of its published Mayan alphabets and other norms of script design, and in a way that concords with important extralinguistic considerations.

In fact, there are relatively few contexts in which one might not know the pronunciation of something written with apostrophe. These almost always involve cases of verbs that include markers of the future or the second person absolutive, and such cases are normally distinguished by markers of the greater linguistic context. Thus, in common handwriting, we might not have to insist on the careful distinction of the two apostrophes (although, as mentioned above, careful

writers do make the distinction). Q'eqchi' apostrophe writing would then resemble the situation with Italian handwriting, which does not accurately distinguish the types of accents on vowels, even when these represent different phonemes (e.g., È versus É). It is normal to introduce some ambiguity when writing quickly. Nevertheless, when writing with care, by hand or with typography, it is very important to establish very good examples for our students of the Q'eqchi' language. It does not seem very important perhaps that we distinguish two types of apostrophe (for example, a curled apostrophe in contrast to a straight apostrophe). Clearly, it is not as important as the decision of how to write, say, the uvular occlusive. However, Q'eqchi' orthography is now well beyond the selection of the simple letters. We must now think about the norms of writing and the aesthetic style of the Q'eqchi' spellings. In Hawai'i, for example, a left-hand single quotation mark, which represents the glottal occlusive, is distinguished from a right-hand apostrophe that is a punctuation mark. Similarly in Italian, as already mentioned, there are two types of diacritic accent marks on vowels. There are other languages with orthographic traditions that distinguish several apostrophes and accent marks. Frequently, people may not observe all distinctions when writing by hand or when writing with old machines or old software. But, when printing books in typography, or when writing with good computer software, or when writing carefully by hand for the benefit of a student, it is normal that we carefully distinguish the several apostrophes and other symbols. Therefore, we may recommend this practice be adopted for the printing and other careful writing of Q'eqchi'. We can write two apostrophes: a diacritical form to indicate the ejectives, and an alphabetical form to indicate the glottal plosive.

## 5. Policy suggestions

The earlier generation of Q'eqchi' handwriting in Guatemala and Belize informed our 1995 recommendation to use a curled or slanting apostrophe as a diacritic and a large straight or angular apostrophe as a letter. However, the current ease with which Q'eqchi' writers can now compose and send e-mail under the UTF-8 encoding warrants refining this policy. Given the convenience of writing a distinct letter for the glottal plosive when using Unicode, we recommend that the glottal plosive be encoded using the appropriate Unicode form, reserving a true apostrophe for the ejective diacritic. Certainly, an angular, rather than rounded, glyph shape for the glottal plosive (i.e., for Unicode code point U+0294) should probably be made available via a dedicated Guatemalan font. Alternatively, the *Latin small letter saltillo* (U+A78C) and the *Latin capital letter saltillo* (U+A78B) could be used. Creating an appropriate *saltillo* shape using a dedicated Guatemalan font is also advisable.

The word *saltillo* was traditionally used by Meso-American linguists to describe the glottal stop, and it was often written as a straight apostrophe or, on a typewriter, as a dotless exclamation mark. By metonymy, especially among the Q'eqchi' Maya, it often refers to the apostrophe, and this can sometimes result in minor confusion, especially for those writers who use the *siete* (i.e., a mark resembling the numeral 7) to write the glottal plosive and the *saltillo* (i.e., a regular apostrophe) to write the ejectives. For example, in handwriting, some older Q'eqchi' continue to use a large angular *siete* to write the glottal plossive. Nevertheless, the long *saltillo* tradition explains the extension of Unicode to include the *saltillo* as a character.

Similarly, current Unicode standards provide good options for writing the apostrophes used in ejectives. The *modifier letter apostrophe* (U+02BC) has been designed precisely for writing ejectives. In a dedicated Guatemalan font, proper kerning can be assured to reinforce the visual association of letter and apostrophe, for the digraphs currently being taught for the writing of ejectives, e.g., K'.

Incidentally, the use of C and Z, instead of CH and TZ, to write the affricates (cf. DeChicchis 1989) is probably not a good idea any more, even for the Q'eqchi' of Belize. During the past two decades, many Q'eqchi' have become literate in, and comfortable with, the official Guatemalan orthography, and they are happy to write the redundant H and T. Although the CH and TZ digraphs are not linguistically elegant, the use of them will facilitate the future borrowing of foreign spellings, such as ZEBRA and COMPUTER, for non-affricate pronunciations.

## 6. Passions and examples

Reaction to the 1996 presentation at the Primer Congreso de los Estudios Mayas in Guatemala City showed that the use of the apostrophe in Mayan orthography can be an emotional issue. During the question period following the presentation, a woman from Spain naïvely asked why we should worry about such a small thing. She then seemed rather surprised when, immediately thereafter, a heated exchange

of shouting broke out between two groups of ethnic Mayan linguists. A spokesman for OKMA (Asociaciòn Oxlajuuj Keej Maya Ajtziib) was elegant in his defense of the two-glyph proposal advocated here, but there were also staunch advocates of the status quo.

Quite simply, the two-glyph policy permits the following disambiguation:

T'IL "work it"
T'IL "(he) will see it"

As another illustration of the two-glyph solution, let us can compare the Q'eqchi' abstract, first written as it was in 1996 according to the ALMG guidelines, and afterwards with the two types of apostrophes distinguished as here recommended.

The original abstract with ambiguous apostrophes:

xtz'iibankil li nat'leb yaab sa' li aatinobaal q'eqchi'

kwan nake' yehok re naq li roksinkil li xtziibul re li nat'leb yaab li naxbeeres li xmolamil li aatinobaal maay re watemaal (ALMG) muku us ta cho'q reheb chi xjunileb li aatinobaal. sa' li tz'aqonk a'in nasik'aman xyaalal ut jo'kan nach'olobaman naq li roksinkil li ch'ina juch' muku jwal naxk'uluban ta. naraj xyeebal naq li xk'ublal li xtz'iibankileb li aatinobaal maay toj kwan naraj. aban kwankeb jwal chaabileb chi ru junqaq chik. nakeeman reetal naq sa' li roksinkil li nat'leb yaab ut eb li xkomon chik li tz'iib na'oksiman sa' li tz'iibak na'ilman aj kwi' chan ru naru najala li xk'ublal li tz'iib a' yaal chan ru li xtz'iibankil (qayehaq chi uq'mej malaj sa' li ululch'iich'). jo'kan naq arin nayeeman naq kwiib paay raj ru li roksinkil li reetalil li nat'leb yaab sa' li aatinobaal q'eqchi' (aban ka'aj kwi' naq tz'iibamanq chi ru li ululch'iich'). cho'q re xtz'iibankil sa' li xninqal ru ch'iich', chi uq'mej chi ru li ululch'iich' ut sa' li xnawbal ru li tz'iibak.

Using the Unicode modifier apostrophe for the digraphs, and using the Unicode *saltillo* (U+A78C) for the glottal plosive:

xtz'iibankil li nat'leb yaab sa' li aatinobaal q'eqchi'

kwan nake' yehok re naq li roksinkil li xtziibul re li nat'leb yaab li naxbeeres li xmolamil li aatinobaal maay re watemaal (ALMG) muku us ta cho'q reheb chi xjunileb li aatinobaal. sa' li tz'aqonk a'in nasik'aman xyaalal ut jo'kan nach'olobaman naq li roksinkil li ch'ina juch' muku jwal naxk'uluban ta. naraj xyeebal naq li xk'ublal li xtz'iibankileb li aatinobaal maay toj kwan naraj. aban kwankeb jwal chaabileb chi ru junqaq chik. nakeeman reetal naq sa' li roksinkil li nat'leb yaab ut eb li xkomon chik li tz'iib na'oksiman sa' li tz'iibak na'ilman aj kwi' chan ru naru najala li xk'ublal li tz'iib a' yaal chan ru li xtz'iibankil (qayehaq chi uq'mej malaj sa' li ululch'iich'). jo'kan naq arin nayeeman naq kwiib paay raj ru li roksinkil li reetalil li nat'leb yaab sa' li aatinobaal q'eqchi' (aban ka'aj kwi' naq tz'iibamanq chi ru li ululch'iich'). cho'q re xtz'iibankil sa' li xninqal ru ch'iich', chi uq'mej chi ru li ululch'iich' ut sa' li xnawbal ru li tz'iibak.

Using the Unicode modifier apostrophe for the digraphs, and using the Unicode modifier letter glottal stop (U+02C0) for the glottal plosive:

xtz'iibankil li nat'leb yaab saʔ li aatinobaal q'eqchiʔ

kwan nakeʔ yehok re naq li roksinkil li xtziibul re li nat'leb yaab li naxbeeres li xmolamil li aatinobaal maay re watemaal (ALMG) muku us ta choʔq reheb chi xjunileb li aatinobaal. saʔ li tz'aqonk aʔin nasik'aman xyaalal ut joʔkan nach'olobaman naq li roksinkil li ch'ina juch' muku jwal naxk'uluban ta. naraj xyeebal naq li xk'ublal li xtz'iibankileb li aatinobaal maay toj kwan naraj. aban kwankeb jwal chaabileb chi ru junqaq chik. nakeeman reetal naq saʔ li roksinkil li nat'leb yaab ut eb li xkomon chik li tz'iib naʔoksiman saʔ li tz'iibak naʔilman aj kwiʔ chan ru naru najala li xk'ublal li tz'iib aʔ yaal chan ru li xtz'iibankil (qayehaq chi uq'mej malaj saʔ li ululch'iich'). joʔkan naq arin nayeeman naq kwiib paay raj ru li roksinkil li reetalil li nat'leb yaab saʔ li aatinobaal q'eqchiʔ (aban ka'aj kwiʔ naq tz'iibamanq chi ru li ululch'iich'). choʔq re xtz'iibankil saʔ li xninqal ru ch'iich', chi uq'mej chi ru li ululch'iich' ut saʔ li xnawbal ru li tz'iibak.

## 7. Conclusion

As always, the orthography of Q'eqchi' remains the choice of the writer.  Some writers will never give up the now discredited Spanish-style orthography of Eachus and Carlson, other writers have embraced the pan-Mayan orthographies of ALMG, and still others will use various idiosyncratic more IPA-like systems. There is no doubt that the ALMG orthography for Q'eqchi' will continue to be the primary system used in Guatemalan primary schools and adult Q'eqchi' literacy programs, and the ALMG system will continue to inform Q'eqchi' literacy in Belize.  We continue to hope that improvements in digital text creation will standardize the use of two apostrophes throughout the Q'eqchi' community.

## 8. References

ALMG 1996a.  La normalización lingüística de los idiomas Mayas.  Guatemala City: Academia de Lenguas Mayas de Guatemala, Programa de Estudios Lingüísticos, May 1996.

ALMG 1996b.  Norma del alfabeto del idioma Maya Q'eqchi'.  Guatemala City: Academia de Lenguas Mayas de Guatemala, Programa de Estudios Lingüísticos, June 1996.

D. Anderson & Unicode 2005.  Unicode Technical Note #19: Recommendation for Creating New Orthographies.  Mountain View, CA: The Unicode Consortium, "http://www.unicode.org/notes/tn19/tn19-1.html", accessed 31 January 2011.

M. Brody 2004.  The fixed word, the moving tongue: Variation in written Yucatec Maya and the meandering evolution toward unified norms.  Austin: University of Texas doctoral dissertation.

M. D. Coe 1992.  Breaking the Maya Code.  London: Thames & Hudson.

J. DeChicchis 1989.  Q'eqchi' (Kekchi Mayan) Variation in Guatemala and Belize.  Philadelphia: University of Pennsylvania doctoral dissertation.

J. DeChicchis 1996.  Escribiendo el saltillo: el caso del Q'eqchi'.  Primer Congreso de Estudios Mayas, August 1996.  Guatemala: Universidad de Rafael Landívar, Cultura de Guatemala, año 18, 2, Mayo 1997, pp. 235-246.

F. Eachus & R. Carlson 1980.  Aprendamos Kekchí: Gramática pedagógica popular de Kekchí. Guatemala: Instituto Lingüístico de Verano.

T. Kaufman 1970.  Proyecto de alfabetos y ortografías para escribir las lenguas mayances.  Guatemala City: Ministerio de Educacíon; Editorial José de Pineda Ibarra, fifth edition, August 1975.

The Unicode Consortium 2011.  The Unicode Standard, Version 6.0.0.  Mountain View, CA: The Unicode Consortium, "http://www.unicode.org/versions/Unicode6.0.0/", accessed 31 January 2011.

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