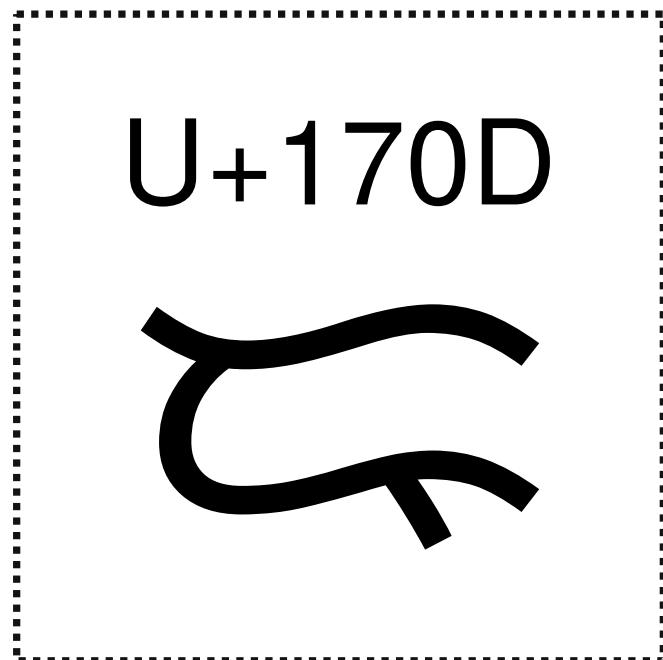


The *baybayin* “ra”—ꝝ

its origins and a plea for its formal recognition

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browse their Filipiniana archives*



See with what large letters I am writing to you with
my own hand! Galatians 6:11

*Script Encoding Initiative/Universal Scripts Project, UC Berkeley

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Introduction

Baybayin is the local name for what the Unicode Standard calls the Tagalog block of the Basic Multilingual Plane (BMP). Proposed in 1998 by Michael Everson, four scripts were encoded at once: Tagalog, Hanunó'o, Buhid and Tagbanwa.

At the time of encoding, only ancient documents were considered for the Tagalog script. As a result, the Tagalog ‘ra’ was not encoded.

However, as Hanunó'o and Buhid included a ‘ra’, and because all four scripts were encoded due to the same proposal, a spot was, in a splendid twist of fate, left open for a ‘ra’ in Tagalog as well; although it was seemingly never intended for the use the community gave it.

This spot, U+170D, has become a *de facto* standard among *baybayin* writers in the Philippines and the Filipino diaspora. Several modern fonts, including the one that appears on Philippine currency to write the word *Pilipino*, use U+170D as a ‘ra’. (See §0.12) Software, if it can output \approx , uses U+170D. (See §0.13) Documents online, if they include \approx , most often have it encoded as U+170D.

This proposal is at once an extensive study on the *baybayin* ‘ra’ and a plea for the Unicode consortium to recognize the *de facto* standard of the user community, and to legitimize U+170D as ‘ra’, because some large tech companies, such as Google, patron of the Noto fonts, refuse to encode characters that the Unicode Standard does not recognize, hindering the development of *baybayin* and the community in using its script.

0.1 Linguistic details

The letter ‘da’, \approx , in Old Tagalog was known as *dara*. In his thesis,¹ Joseph G. Lapallargas writes: “Contact with the Spanish and English and the consequent numerous borrowings have brought about some changes in the phonetic and phonemic structure of Tagalog. [...] If formerly there were no prevocalic clusters in Tagalog, now they are of frequent occurrence. If [d] and [r] were submembers of a single phoneme, now the two are separate phonemes.” \approx , ‘ra’, is required to write modern Tagalog or Filipino in the Tagalog (*baybayin*)

¹A study of the ancient Philippine syllabary with particular attention to its Tagalog version, Joseph G. Lapallargas, Ateneo de Manila University, 1974, Z 115.5 T2 E76

Introduction

script without introducing ambiguity into the text. This became apparent very early in the revival of the Tagalog script in the Philippines; the first known appearance of the Tagalog ‘ra’ (Zambales form) appears in print in 1922.

Some contemporary users of the script are okay with the ambiguity introduced by the lack of a \approx using \approx for Tagalog words and \mathfrak{r} for Spanish words. However, in my examination of the evidence, the majority of the contemporary *baybayin* user community prefers to use \approx , and even if some users find it distasteful and would prefer only to use the original seventeen *baybayin* letters, they are free to do so. After all, I am not trying to prescribe the use of \approx to anyone, but merely to describe that \approx is being used frequently and therefore needs a codepoint.

Unicode considerations

0.2 Characters

I propose to encode only one character to cover all the variants discussed in this paper, to be encoded at U+170D and named TAGALOG LETTER RA.

The Zambales form of the \approx , β , is only found in historical texts and can be encoded as U+170D and selected in a font by using the OpenType feature hist, Historical Forms, as I've done in the OpenBaybayin font that I made to typeset this document. In *baybayin* text, β has exactly the same meaning as \approx , and I found no texts where both were in use except the one I'm writing.

The variants of the marked \approx form of the letter \approx are mere stylistic choices with equivalent meaning and can all be encoded in the same letter in the same way that Q, \mathfrak{Q} , \mathbb{Q} , \mathcal{Q} , and \mathscr{Q} can all be represented by LATIN CAPITAL LETTER Q, U+0051, with the style chosen being based on font. Indeed, as *baybayin* fonts are primarily made based on handwriting, it is unsurprising that there are so many variants; in the samples I observed, other letters had many variants as well; for example, at times \mathfrak{B} would have a straight center line instead of the standard squiggly one in the \mathfrak{B} used in this sentence.

I am aware of the following stylistic variants of the modern \approx :

1. Generic — \approx ([§0.13.3](#); [§0.7.3](#))
2. Generic, longer stroke — \approx ([§0.8.1](#))
3. Rizaleo — \approx ([§0.6.2](#))
4. Bikol — \approx ([§0.6.1](#))
5. Applied to a cursive \approx — \approx ([§0.9.1](#))
6. Double cursive loop — \approx ([§0.7.2](#))

This is not meant to be an exhaustive listing, there are definitely variants beyond those that I have listed; rather it is meant to be a list of the major stylistic variants I've seen in reviewing works written in the *baybayin* script.

Some of these, especially №6, are caused by attempting to write the *baybayin* script in a cursive form on pen and paper, which is not how it was traditionally written.

0.3 Properties

The proposed General Category properties for TAGALOG LETTER RA are:

170D;TAGALOG LETTER RA;Lo;0;L;;N;;;

0.3.1 NamesList.txt character remark

So end users and font designers better understand this glyph and its use, I propose that TAGALOG LETTER RA receive the following character note in NamesList.txt:

Not used to write Old Tagalog.

0.4 Collation

In the original proposal, Everson writes on pages three to four:

UTR#3 states: “The alphabetical order of Tagalog is known from Tagbanwa speakers and is described in folktales. This order is used in the accompanying charts. The two vowel signs are added at the end of the alphabet.” The names list in UTR#3, however, is (except for the vowel signs) given in Latin alphabetical order (*a, i, u, ba, da, ga, ha, ka, la, ma, na, nga, pa, sa, ta, wa, ya, -i, -u*). Daniels & Bright give another ordering, “based on the 16th-century Tagalog sequence” (*a, i, u, ha, pa, ka, sa, la, ra, ta, na, ba, ma, ga, da, ya, nga, wa*). This proposal gives the characters in the traditional Brahmic order (*a, i, u, ka, ga, nga, ta, da, na, pa, ba, ma, ya, ra, la, wa, sa, ha*), which is followed in many sources, including Santos 1994 and 1995.

This having been the standard for more than twenty years, I see no reason to change it; this Brahmic Unicode order is used by software such as the JavaScript input method Lexilogos (§Lexilogos) and is the order that Norman de los Santos (§0.12.3) presents his fonts in. While some writers, such as Lloyd Zapantas (§0.12.4), use a Spanish-influenced collation,² there is no reason in my opinion to change the standard collation to match.

Therefore, I request for the collation to be as follows, matching Hanunó'o and Buhid:

✓ >  > 

That is to say, ✓ comes before  comes before .

²That is to say, in order:          (placement of   may vary)

History

0.5 The Zambales 'ra', β

The first form of the *baybayin* 'ra' is the Zambales 'ra'. Its main source is the 1895 book *Estudio de los antiguos alfabetos Filipinos* by Cipriano Marcilla y Martin where it appears on page 23.

23

Núm. 7.

*Alfabeto de Zambales por un P. Agustino manuscrito
de 1601.*

ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ
a	y	y	o	u		
ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ
ba	ca	da	pa	ga	ha	la
ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ
ma	na	ra	sa	ta	i	n̄g

On page 34, its origin is explained thus (emphasis mine):

En la pág 23. y con el núm. 7 damos el alfabeto de Zambales escrito por un Agustino. En el archivo de S. Agustín hemos registrado este precioso documento del que por falta de medios no hemos podido sacar unfacsimile de las firmas que contiene. **Según la portada se escribió el 1601** y se lee en la última página en letra clara y escrita con tinta encarnada «Este arte hallé tirado en el pueblo de Bolinao, quando estuve allí el año de 1780. Fr. Agustin Maria.»

Translated quite literally:

On page 23, in figure №7, we reproduce the Zambales alphabet as written by an Agustinian [monk]. In the archive of San Agustin we've inspected to this precious document, which through lack of means we were unable to make a facsimile of its signatures. According to the cover page, it was written in 1601 by an Agustinian [monk], and on the last page one can read in letters written clearly in red ink: "I found this art in the town of Bolinao when I was there in the year 1780. Signed Fr. Agustin Maria."³

In the latter years of the Spanish Empire's presence in the Philippines, interest in restoring *baybayin*, which had been suppressed by the Spanish and now lay only in history books, returned. Indeed, some revolutionary flags contained the *baybayin* letter 'ka', ⚩, which stood for both *kalayaan* (freedom) and *katipunan* (the revolutionaries).³

In 1922, Ignacio Borbon Villamor took an interest in the restoration of the *baybayin* script, but quickly realized that the Tagalog language had changed too much due to Spanish influence, in his book, *La antigua escritura filipina*, he recommends using the Zambales 'ra':

— 12 —

Pero en el alfabeto de Zambales, tomado, según el P. Marcilla, de un manuscrito de 1601, encontramos la letra R así ⚩, de modo que, para escribir correctamente "América", pondríamos así: ⚩ ⚩ ⚩ ⚩.

Translated into English:

In the alphabet of Zambales, taken, according to P. Marcilla, from a 1601 manuscript, we find the letter R written as ⚩, so that, if we wish to correctly write "America", we would write it as ⚩ ⚩ ⚩ ⚩.

The community of *baybayin*/Tagalog script revivalists happily received this advice mid-century—most documents of the era which include 'ra' use the Zambales 'ra'. Many of these publications are hard to come by as they had limited production runs and before the internet were costly to produce, but I was able to find some in the Ateneo de Manila University's Rizal Library:

³Alvarez, S.V., 1992, Recalling the Revolution, Madison: Center for Southeast Asia Studies, University of Wisconsin-Madison, ISBN 1-881261-05-0, p. 105

0.5.1 Mariano Dario Canseco's *Palatitikan kayumanggi* (1966)

β can be seen clearly in the words νββ̄—sarili, νβν̄β—kurukuro and νβν—araw.

PAKATITIKANG KAYUMANGGI

(ang tunay na sulat ng lahi)

BUNGAD: ANG MATANDANG BAYBAYIN

νβν βνν ν βν ν βν ν ννννν

TALATINIGANG PILIPINO-INGLES

ντν δν δν ν νν ν νν ν νν

na may salin sa titik baybayin

ν ν ν ν ν ν ν ν ν ν ν ν ν ν

PANUTUHAN NG PAGSULAT SA

ν ? δ ν ν ν ν ν ν ν ν ν ν

SARILING MGA TITIK

νδ δ ν ν ν ν ν ν ν ν ν ν ν

SULAT SARILI SA BISAYA AT IBANG WIKA

ν ν ν ν ν ν ν ν ν ν ν ν ν ν

MAKALUMA AT MAKABAGO

ν ν ν ν ν ν ν ν ν ν ν ν ν

Kurukuro ng dalawang dalubwika sa pagkakasulat ng

νννν ν ν ν ν ν ν ν ν ν ν ν ν

"ADA NA MANILA" — — ARAW NG MAYNILA.

ν ν ν ν ν ν ν ν ν ν ν ν ν ν

History

Includes some dictionary entries that show β

barnis	$\textcircled{w}\beta\textcircled{p}\textcircled{p}$	varnis
baro	$\textcircled{w}\beta$	clothes, dress
basa	$\textcircled{w}\beta$	wet
basagin	$\textcircled{w}\beta\beta\textcircled{f}$	to break
bata	$\textcircled{w}\alpha$	child
batak	$\textcircled{w}\alpha\textcircled{s}$	pull
batas	$\textcircled{w}\alpha\textcircled{p}$	law
bayaran	$\textcircled{w}\gamma\beta\textcircled{f}$	to pay
baybay	$\textcircled{w}\gamma\alpha\textcircled{y}$	to spell
baywang	$\textcircled{w}\gamma\beta\textcircled{w}$	waist

In the edition in the archives of the Rizal Library, the following handwritten note can be found which uses β :

$\textcircled{s}\beta\textcircled{t}\textcircled{z}\textcircled{v} \textcircled{z} \textcircled{v}\textcircled{v} \textcircled{v}\textcircled{v}$

$\textcircled{B} \textcircled{v}\textcircled{g}\textcircled{g}\textcircled{z} \textcircled{v}\textcircled{v}\textcircled{z} \textcircled{s}\beta\textcircled{p}\textcircled{f}\textcircled{f}\textcircled{p}$

• Hunyo 2, 1966

— $\textcircled{m}\textcircled{d}\textcircled{z}\textcircled{v}$ $\textcircled{v}\textcircled{v} \textcircled{v}\textcircled{v} \textcircled{v}\textcircled{v} \textcircled{v}\textcircled{v}$ $\textcircled{v}\textcircled{v}\textcircled{v}\textcircled{v}$ — $\textcircled{m}\textcircled{d}\textcircled{z}\textcircled{v}$ Hunyo 2, 1966

Handog ng may akda sa makatang Amado Hernandez. Hunyo 2, 1966

This is a gift from the author to the poet Amado Hernandez. June 2, 1966

0.5.2 *Panitik Silangan*, September 1963



ß can be seen in many words in this short-lived newsletter, for example, *ɛdɪtɔrɪβl̩*, *editoryal* and *nɜːθɪŋθə*, *sariling*.

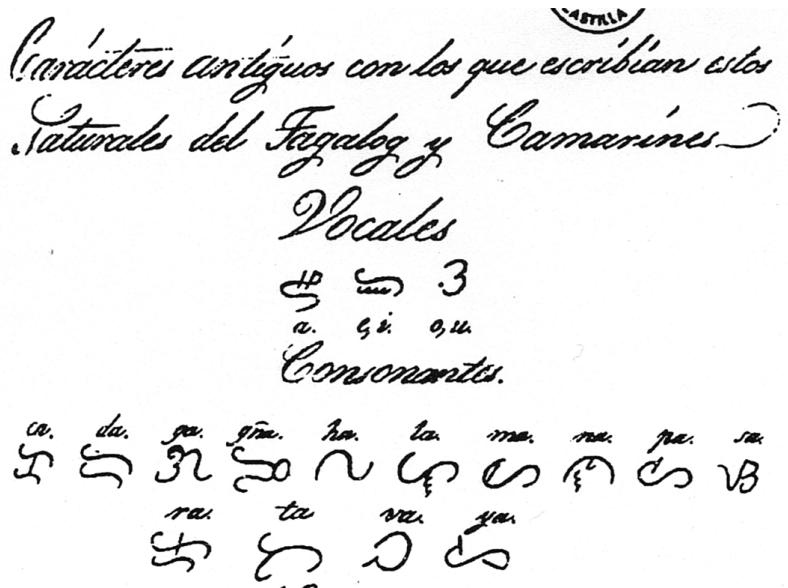
0.6 The modern 'ra', ↞

0.6.1 The Bikol 'ra', ↞

Bikol–English Dictionary, 1986

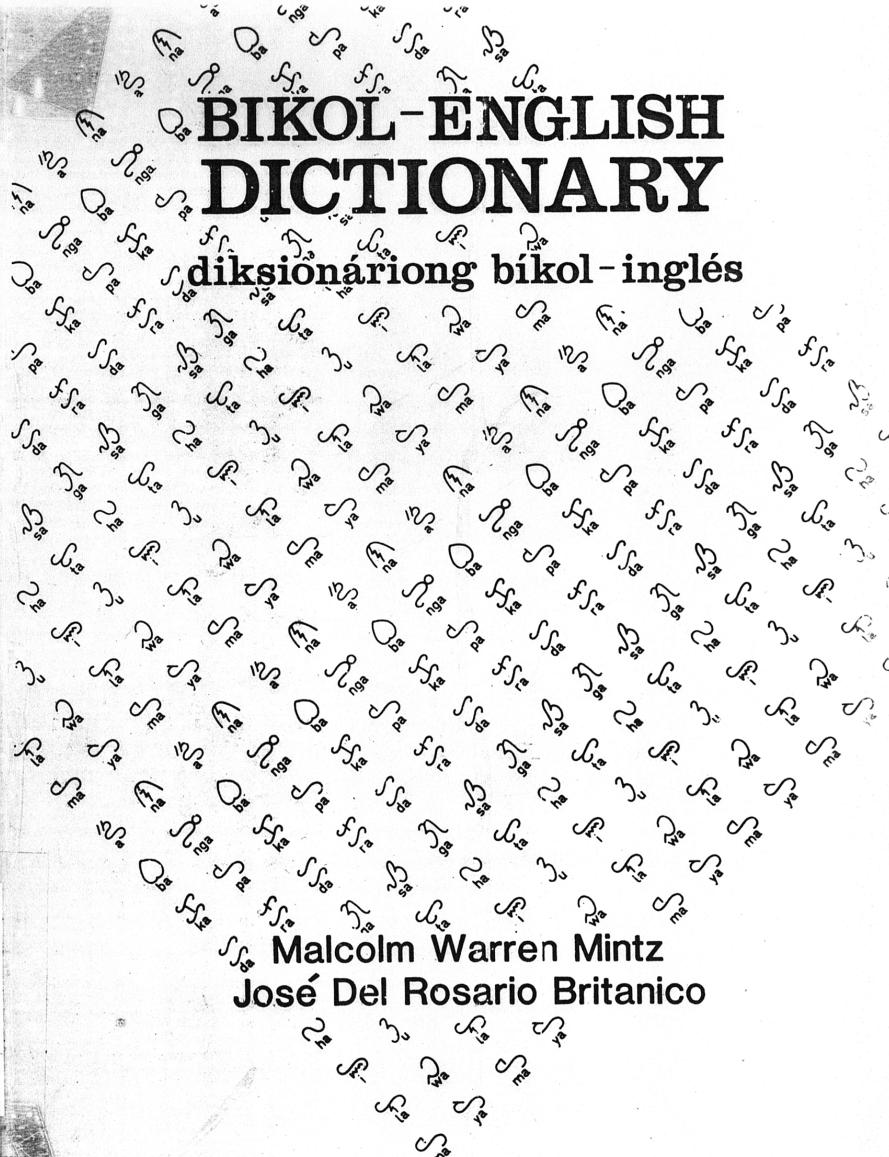
Besides the Zambales 'ra', there is another 'ra' with a long pedigree, the so-called "Bikol" 'ra'. This form of 'ra' is so similar to the modern form that it could be called a minor variant form; in the same way the tail of the letter Q moves about depending on the style of the writer, the marked form of the ↞ moves about, finding itself sometimes as ↞ and other times ↚, but for completeness I include it anyway.

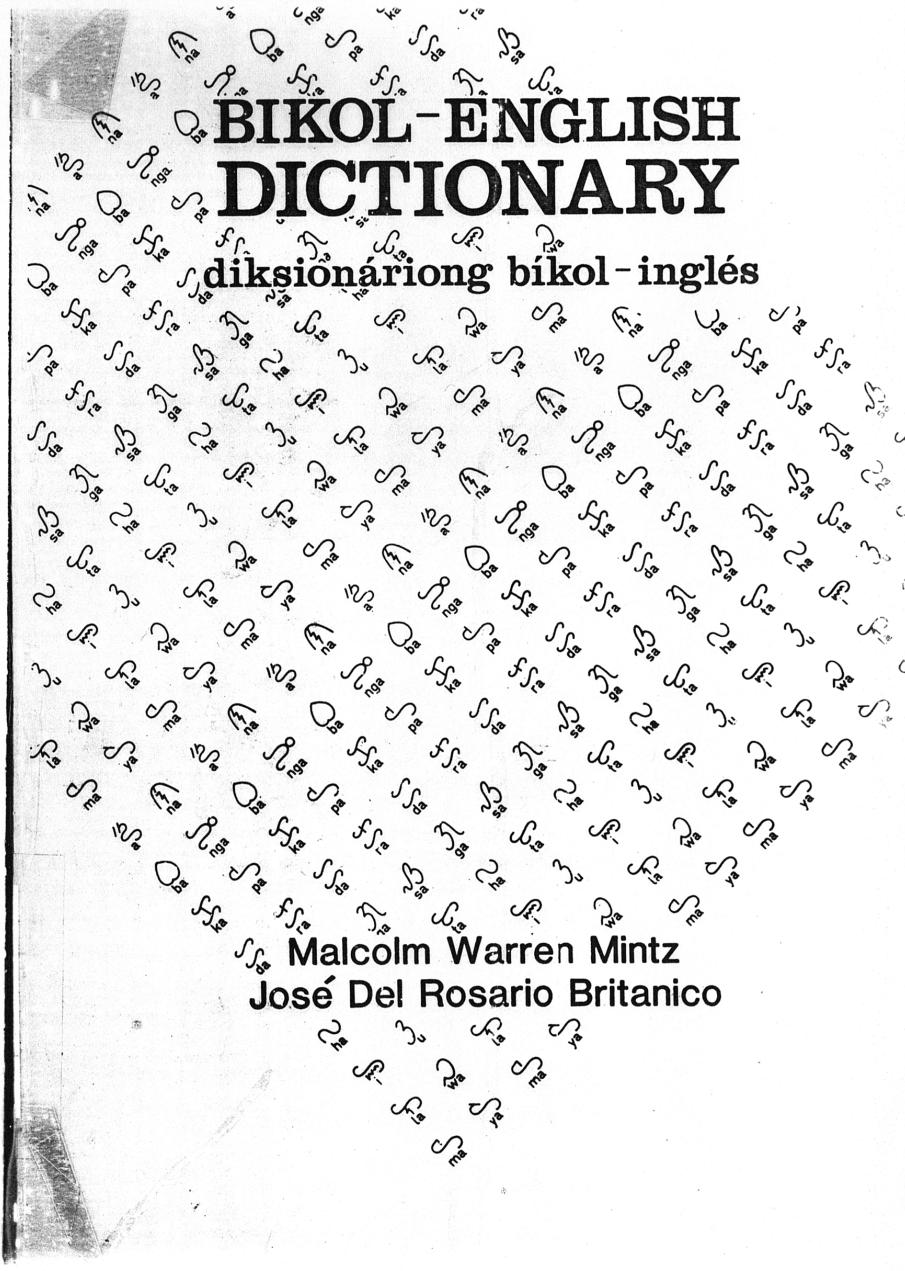
Despite being called by the word Bikol, which is an area of Luzon, the original chart which shows this form of the *baybayin* 'ra' doesn't mention Bikol at all, (although it should be noted that Camarines is in the Bicol region), and is found in an old Tagalog–English dictionary held by the Madrid National Library. It's marked *Carácteres antiguos con los que escribían estos naturales del Tagalog y Camarines*, "Ancient characters with which these natives of the Tagalogs and Camarines used to write".⁴ The version shown below is as reprinted in the 2004 edition of Malcolm Warren Mintz's *Bikol–English Dictionary*.



⁴The full text of the work can be seen at <http://bdh.bne.es/bnesearch/detalle/bdh0000044798>

History

The 1986 edition of the *Bikol-English Dictionary* features a stylized Bikol  on its cover.

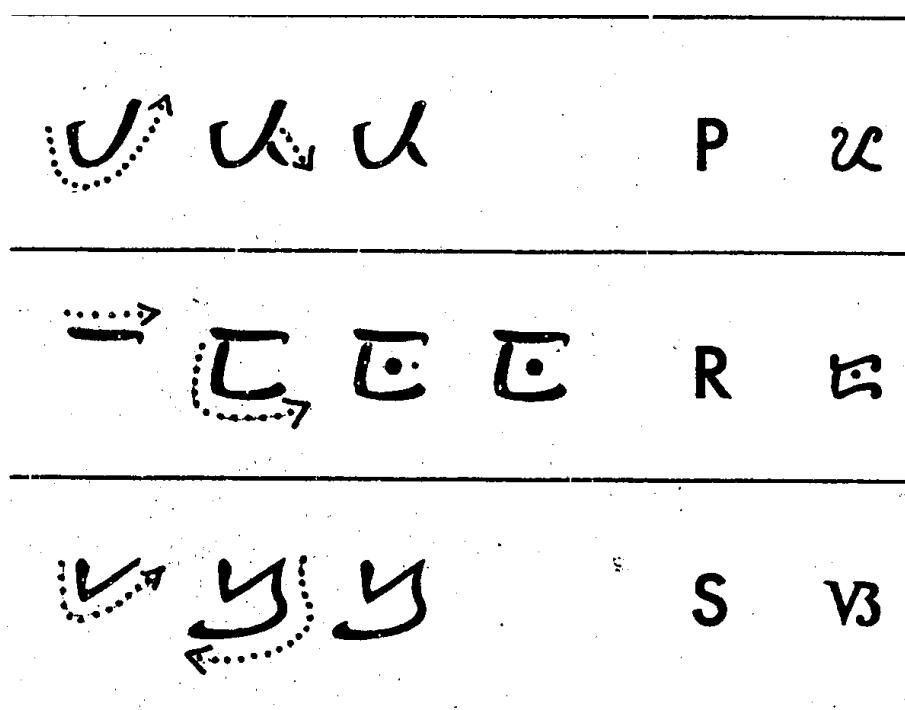


Computers and the internet brought the *baybayin* community closer together, making it much easier and cheaper to print *baybayin* materials.

0.6.2 *Rizaleo* ‘ra’—ꝝ

Marius V. Diaz’s *Aklat Sanayan ng Abakadang Rizaleo*, 1994

The first truly modern ‘ra’ appears in the book *Aklat Sanayan ng Abakadang Rizaleo* (Exercise Book for the Rizal Alphabet) by Marius V. Diaz. This work details a slightly stylized *baybayin* alphabet and shows off several Type 1 computer fonts⁵ made by Diaz to write (his slightly modified version of) *baybayin*.



⁵According to the book’s text, all the font styles shown in the book were available as Type 1 fonts in 1994, but due to the age of the work, the obsolescence of the format, and the existence of better Unicode fonts, the fonts no longer seem to be distributed online.

All the styles in the book are named after José Rizal, so the \approx can be clearly seen in all of them:⁶

ରିଜାଲାହି Rizalahi

ରିଜାଲ୍ୟା Rizalaya

ରିଜାଲ୍ୟାନିହାନ Rizalyanihan

ରିଜାଲୋ Rizaleo

ରିଜାଉଲୋ Rizauleo

ରିଜାନାଯାନ Rizanayan

ରିଜାନାଉନ୍ଡା Rizinauna

ରିଜାତାଳ Riztaal

⁶Except in the words *Rizauleo* and *Rizanayan*, which are misprinted—the beginning \approx is missing.

Diaz was also a calligrapher, and included this calligraphy in the book. It is almost the same as typical modern *baybayin*, except Diaz marks the vowel 'a' with a line above, which to my knowledge no other *baybayin* does.



The calligraphy, a quote by José Rizal, reads:

ጀጀ ቦጀጀ ዴጀጀ ርጀጀ እጀጀ ትጀጀ መጀጀ ኣጀጀ ጥጀጀ ኤጀጀ //

Ang hindi lumingon sa pinanggalingan ay hindi makakarating sa patutunguhan.

He who does not look back to where he came from will never reach his destination.

Further evidence

The modern Baybayin ‘ra’, ⚶, is disseminated widely as of this writing in 2019. I will outline multiple lines of evidence for its existence and usage by the contemporary community as an argument for its encoding:

- Printed materials;
- News articles;
- Tattoos;
- Signs;
- Art;
- Fonts;
- Software.

0.7 Printed materials

As the modern ‘ra’ is contemporary to the internet and the spread of Facebook in the Philippines, there is not as much printed material as may be expected. However, with the gracious help of the community, I was able to find a number of examples which will hopefully satisfy the Consortium.

0.7.1 Jean-Paul G. Potet’s *Baybáyin: L’Alphabet Syllabique des Tagals*, 2012 (French edition)

The modern ⚶ can be found on page 181 in a rather unusual example. It is an English sentence written semi-phonetically in *baybayin*. ⚶ can be seen in the word ⚶, are.

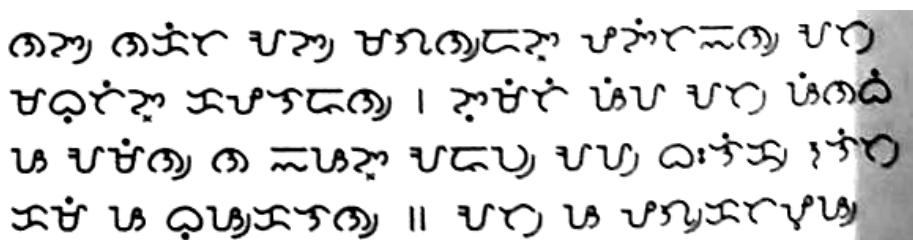
Tagalog: Hindi ko alam kung bakit tayo narito sa daigdig ng mga tao, kung bakit dito tayo pinadala ni Detinos. Ngunit habang narito tayo, maglalaro ako.

English: I don't know why we're here on this Earth of the humans, or why Detinos brought us here. But as long as we're here, I'll play around.

0.7.3 Kristian Kabuay's *Surat Magazine*, №1, December 2018

The publication of this magazine was funded by a Kickstarter⁷ and was billed as "The first of its kind in over 50 years."

The magazine is multilingual, however there is a long section written in the Tagalog *baybayin* script which includes our friend, the letter , in numerous instances. I will transcribe a line found on page 58 just as an example.



Transcription: *Nang naka-kita ang magandang pangitain at mabuting kapalaran, ngumiti siya at sinabi sa amin na isang araw at babalik ulit kami sa Biskalan. At sa pagkatapos ...*

Tagalog: Nang nakita ang magandang pangitain at mabuting kapalaran, ngumiti siya at sinabi sa amin na isang araw at babalik ulit kami sa Biskalan. At sa pagkatapos ...

English: When she saw a beautiful vision and a good fortune, she smiled and said to us that one day we would again return to Biskalan. After that ...

0.7.4 Wikipedia

While perhaps not counted as printed material (despite routinely being printed,⁸ and distributed on CD⁹; there's even a convenient "book creator" which you can either print at home or have printed professionally¹⁰), the Wikipedia article about *baybayin*, revision 903489992, uses  in nine places;¹¹ first:

⁷<https://www.kickstarter.com/projects/baybayin/surat-1st-magazine-using-an-endangered-script-in-5-posts/2342594>—Kabuay rose \$3,136 and wrote of the magazine: *The inaugural Surat (to write) Magazine will be mainly written using indigenous writing systems in the Philippines in multiple languages covering topics from culture, art, poetry, food, fashion, travel, etc.*

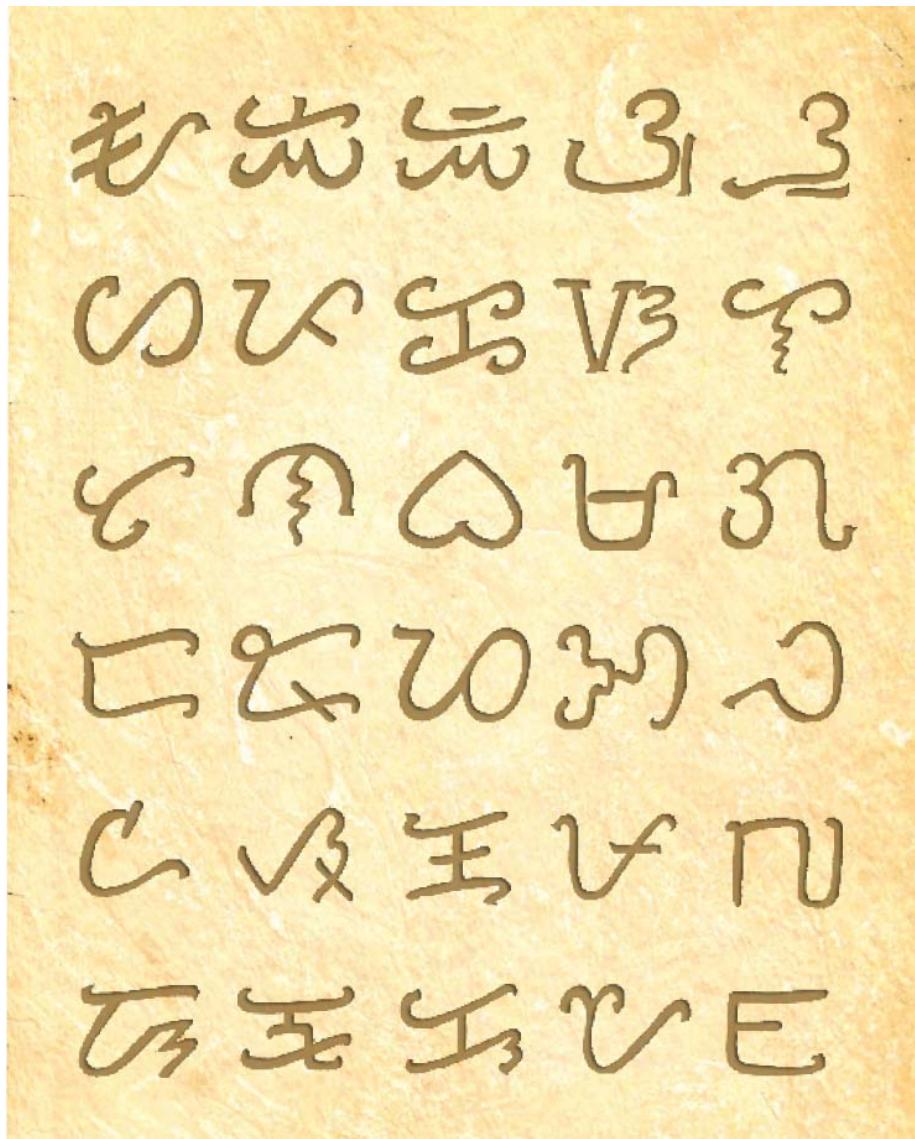
⁸https://en.wikipedia.org/wiki/Print_Wikipedia

⁹https://meta.wikimedia.org/wiki/Wikipedia_on_CD/DVD

¹⁰https://en.wikipedia.org/wiki/Help:Books#Printed_books_from_PediaPress

¹¹According to WikiBlame,  has existed in at least one place in the *baybayin* Wikipedia page since 2006.

0.8.2 Jayson R. Mangalus' *Decoding Baybayin*, Manila Bulletin, 2017



The *baybayin*  can be seen in the 2nd column and 4th row. The chart is a heavily modified *baybayin*, one of Jayson Villaruz's versions of the script,¹² however being in a national newspaper lends more proof to the existence of  even among those stretching the script far beyond this modest proposal to encode only .

The article's text, a quick *baybayin* lesson, refers only to the rules for the traditional 17-character script, known in the community as *B17*, for *baybayin-17*;¹³ thus it states "Characters "r" and "d" are interchangeable."

¹²Jayson Villaruz's self-styled *Modern Baybayin* is to my knowledge the version of the script with the most glyphs. Having reviewed the evidence, it does not seem to have caught on as universally as the more modest proposal in this paper, just to encode .

¹³Often used to differentiate it from *B18*, or the original 17 *baybayin titik* (letters) plus . For examples of the community's use of these terms, see [here](#) or [here](#).

0.9 Tattoos

Plenty of tattoos including the Ⓜ can be easily found on the web; how tragic it is indeed that in order to tell someone in an electronic format the message that was so dear to their heart they had to ink it on their body breaks the Unicode Standard by using the unassigned codepoint U+170D.

Three examples are shown below, others may be seen at the website of the “*Ang Muling Paglaganap ng Baybayin script ng Pilipinas*” (Reform of the Philippines’ *baybayin* script) at <<https://baybayinipalaganap.blogspot.com/2015/06/baybayin-script-sa-mga-tattoo.html>> and across Facebook and Twitter.

0.9.1 *Maharlika*, Ⓜ—Ⓜ, October 2018



0.9.2 *Randy*, የኢትዮጵያ [sic], May 2018



0.9.3 *de la Torre*, ኢትዮጵያ, March 2016

Per <https://twitter.com/ariannarenae/status/708102179672825858>



0.10 Signs

0.10.1 *Sinagbayan* protest, June 12 2019

One interesting contemporary use of *baybayin* is in these anti-capitalist protest signs painted by *Sinagbayan*, “*Sining na Naglilingkod sa Bayan*” (Art in Service of the Community). The  can be seen in the word  , meaning bureaucrat.¹⁴

Source: <https://www.facebook.com/sinagbayan.org>

¹⁴The inclusion of this sign should not be interpreted as advertisement, support or allegiance of the author to the mentioned group.



0.11 Art

0.11.1 Lloyd Zapanta, *Baybayin logos, 2015–2017*

In this art collection, Zapanta asks the question, “What if the Philippines is using its own native alphasyllabary...today?” through corporate branding, resulting in some really quite stunning logos, and plenty of ⚭ to go around.

For our purposes, I selected only the logos containing ⚭, the rest may be seen at: <https://www.behance.net/lloydzapanta>



From top: មេត្របាយការណ៍ (Metrobank), ព្រះ (Royal), បុរីកុង សំគាល់ (Burger King), មេរាលុ (Meralco)

0.11.2 Mural of Archie Oclos near Whang Od's Village, Kalinga

The ន can be seen on the right-hand side near the center of this mural in Kalinga, Cordillera Administrative Region, Luzon, Philippines.



Per <<https://baybayininipalaganap.blogspot.com/2019/03/baybayin-sa-sining.html>>, the photo above was taken by Mario Alvaro Limos.

0.12 Fonts

Since the encoding of the Tagalog block, but especially after, there have been a multitude of *baybayin* fonts online, with the most popular ones within the community being made, in historical order, by Paul Morrow and Norman de los Santos. All of the most popular fonts put a glyph in U+170D—against the standard, in an unencoded codepoint—usually ⚡, but in some fonts meant to be “traditional”, ⚡.

Large corporations have also contributed *baybayin* fonts, such as Google’s (Monotype’s) Noto Sans Tagalog, however due to its missing ⚡ this font is not normally used to create *baybayin* publications in modern Tagalog.

0.12.1 Paul Morrow’s *Doctrina Christiana*

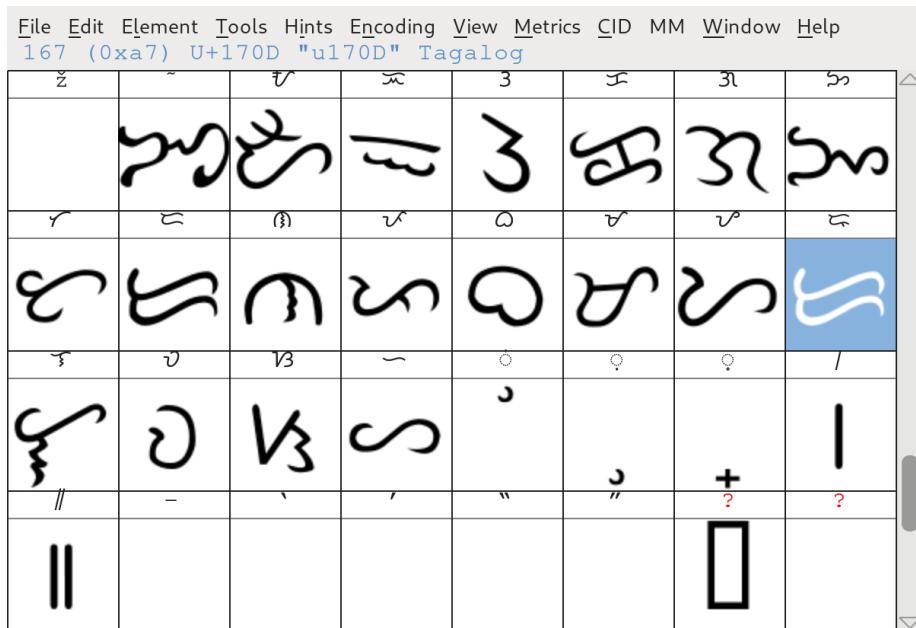
This font is meant to reproduce digitally the style in the first printed¹⁵ *baybayin* work, the *Doctrina Christiana* of 1593.

Despite—or, perhaps, because of—this pedigree, this font is quite popular for writing *baybayin*; the *baybayin* script which appears on Philippine currency and the Philippine passport uses this font.¹⁶

¹⁵Prior to the Spanish conquest, Philippine scripts were not written on paper, but rather leaves and/or bamboo depending on regional traditions; the Mangyan script in large part is still written the traditional way.

¹⁶Kabuay, Kristian, *The man behind the Baybayin on the new Peso bills*, December 16 2010, “The Baybayin community is quite excited with the new Peso bills just announced. [...] The moment I saw it, I knew it was one of Paul

This font puts a \approx at U+170D; the revision of the font shown below is the 2003 revision.



0.12.2 Paul Morrow's *Bikol Mintz*

This font is meant to reproduce the style on the cover of the *Bikol–English Dictionary*, see §0.6.1.

Although the pre-Hispanic cultures of the people of Bikol and Camarines were similar to those of the Tagalogs of Maynila, they were not the same, and their alphabets also differed. However, as can be seen, almost all of the glyphs are mutually intelligible, and this font is used to write text in the Tagalog language as well as in the Bikol language.

The Bikol 'ra' (§0.6.1) is placed at U+170D.



Morrow's fonts."

0.12.3 Norman de los Santos' fonts

De los Santos, who also goes by the screen name nordenx, is an internationally recognized expert on the *baybayin* script and author of, by my count, thirty-one different Unicode *baybayin* font styles, mostly created between 2006 and 2011, and all of which include the letter  encoded at U+170D.

His many fonts are summarized in the following table.

No	Font name	မာမိန္ဒ
1	Baybayin_Ale.ttf	မာမိယံုင်
2	Baybayin_Alp.ttf	မာမိယံုင်
3	Baybayin_Ber.ttf	ဟန္တဝါဒ
4	Baybayin_Bloc.ttf	မာမိဂုဏ်ပါယ
5	Baybayin_Br1.ttf	မာမိဂုဏ်ပါယ
6	Baybayin_Clu.ttf	မာမိဂုဏ်ပါယ
7	Baybayin_Div.ttf	မာမိယံုင်
8	Baybayin_Dmo.ttf	မာမိယံုင်
9	Baybayin_Doc.ttf	မာမိဂုဏ်ပါယ
10	Baybayin_Gan.ttf	မာမိခံုင်
11	Baybayin_Jep.ttf	မာမိဂုဏ်ပါယ
12	Baybayin_Kan.ttf	မာမိဂုဏ်ပါယ
13	Baybayin_Ku1.ttf	မာမိဂုဏ်ပါယ
14	Baybayin_Loc.otf	မာမိဂုဏ်ပါယ
15	Baybayin_Mdo.ttf	မာမိယံုင်
16	Baybayin_Mod.ttf	မာမိဂုဏ်ပါယ
17	Baybayin_Mon.ttf	မာမိဂုဏ်ပါယ
18	Baybayin_Pnt.ttf	မာမိဂုဏ်ပါယ
19	Baybayin_Rnd.ttf	မာမိဂုဏ်ပါယ
20	Baybayin_Rng.ttf	မာမိဂုဏ်ပါယ
21	Baybayin_Sin.ttf	မာမိယံုင်
22	Baybayin_Sul.ttf	မာမိယံုင်
23	Baybayin_Tso.ttf	မာမိယံုင်
24	baybayin_modern_bolats.ttf	မာမိယံုင်
25	baybayin_modern_impen.ttf	မာမိယံုင်
26	baybayin_modern_laso.ttf	မာမိယံုင်
27	baybayin_modern_leets.ttf	မာမိယံုင်
28	baybayin_modern_mckudlit.ttf	မာမိယံုင်
29	baybayin_modern_tulsok.ttf	မာမိယံုင်
30	baybayin_modern_varsitita.ttf	မာမိယံုင်
31	baybayin_modern_varsitito.ttf	မာမိယံုင်

0.12.4 Lloyd Zapantas' fonts

Lloyd Zapantas offers Unicode fonts on Behance, all of which include ⚡.

From left to right:

Robotika, Chochin, Sarimanok, Bayani.



0.13 Software

As another line of evidence of the existence of \approx and its use by the community, we can look at software that supports it.

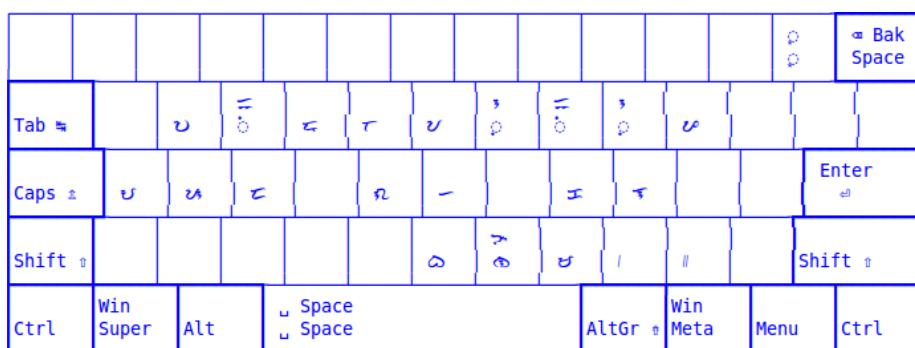
0.13.1 JC John Sese Cuneta's *Paninap Unicode Keyboard Layouts* (2010)

In 2010, JC John Sese Cuneta released *baybayin* keyboard layouts for Windows and Linux through his company, [techmagus™](#). According to Cuneta, the release of this project was a joint project of his company and the [Ubuntu Local Community for the Philippines](#).

The keyboard layout is implemented using X.Org's XKB. \approx is typed, predictably, by typing R, which XKB calls key <AD04>. A snippet of the code, lines 183 through 188, follows:

```
// D row; QWERTY row, left side
key <AD01> { [ VoidSymbol, VoidSymbol, VoidSymbol, VoidSymbol ] }; // 
key <AD02> { [ U170F, VoidSymbol, VoidSymbol, VoidSymbol ] }; // ᜂ (Wa)
key <AD03> { [ U1712, U1701, VoidSymbol, VoidSymbol ] }; // ᜃ (e/i) ≈ (E/I)
key <AD04> { [ U170D, VoidSymbol, VoidSymbol, VoidSymbol ] }; // ≈ (Ra)
key <AD05> { [ U1706, VoidSymbol, VoidSymbol, VoidSymbol ] }; // ᜅ (Ta)
```

Despite not being in Unicode, U+170D once again is being used for \approx .

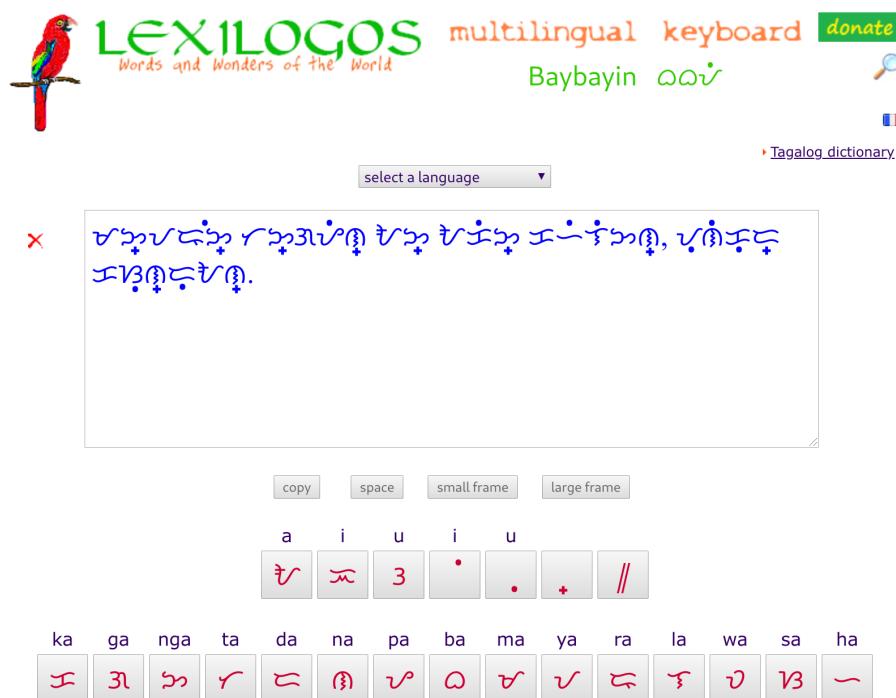


0.13.2 Xavier Nègre's Lexilogos

Lexilogos is a JavaScript input method that either runs in most web browsers, either from Nègre's website, Lexilogos.com, or by downloading the related page, in this case baybayin.html.

The *baybayin* snippets in this paper, especially the longer ones, are courtesy of Lexilogos.

While originally (2009) Lexilogos did not support ጀ, according to the Wayback Machine,¹⁷ the letter ጀ was added some time between October 19, 2018 and May 5, 2019.



¹⁷<http://web.archive.org/web/20190505073424/https://www.lexilogos.com/keyboard/baybayin.htm>

0.13.3 Android apps

Craig Miralles's *Learn Baybayin*

Learn Baybayin is an Android application, which according to Google has been installed over ten thousand times.¹⁸

The repertoire the app teaches includes ⚭.



Team Three Bits' *Alamin Baybayin*

Alamin Baybayin is another Android application which aims to teach the user *baybayin*. The repertoire the app teaches includes ⚭.

¹⁸<https://play.google.com/store/apps/details?id=learn.baybayin>

Further evidence

