

## Differences in implementations of Khmer Unicode

The implementation of Khmer Unicode can vary between different systems, different versions of the same system and unfortunately also between fonts, especially when using OS X or the Graphite rendering system.

### Examples for differences in implementation

	Microsoft	Adobe CS5/5.5	OS X	Mondulkiri fonts on OS X
Helping the user to type consistent and cross-platform compatible text by adding dotted circles	Fairly good implementation with some limitations.	Not at all implemented.	Depending on the font, not implemented by most fonts.	Implemented.
Coeng after vowels	Yes, any coeng is permitted after any vowel.	Anything goes.	Depends on the font.	Permitted only where the visual result differs from placing the coeng before the vowel. Not after Po Aa (ព្រ). Not for coeng-Ro.
Examples (order of elements in parenthesis)	ក្រំ (កំរំ្រ) ស្រី (សីរ្រ) ស្រា (សា្រ) ញូ (ញូ្ន) ្រូត (្រូត)	កំរ ស្រី ស្រា ញូ ត្រូត	Depends on the font.	កំរ្រ សីរ្រ សា្រ ញូ្ន ្រូត
Coengs after symbols (Non-spacing or spacing symbols)	Permitted only after non-spacing symbols.	Permitted.	Depends on the font.	Not permitted with the exception of the vowel-symbol combination Aam.

	Microsoft	Adobe CS5/5.5	OS X	Mondulkiri fonts on OS X
Other coengs after coeng-Ro	Permitted.	Permitted.	Depends on the font. Some fonts render such a coeng in a position lower than the coeng-Ro.	Only coeng-Vo is permitted in this position.
Number of non-spacing symbols	Unlimited. The rendering depends on the font. Multiple identical symbols may overstrike. Mondulkiri fonts prevent overstriking and overlapping.	Anything goes.	Depends on the font.	Only one non-spacing symbol per syllable is permitted.
Examples	<p>လံ (လံ ဝံဝံ)</p> <p>လံ (လံ ဝံ)</p>	<p>လံ</p> <p>လံ</p>	Depends on the font.	<p>လံဝံ</p> <p>လံဝံ</p>
Vowel U before Samyok	Permitted.	Permitted.	Depends on the font.	Not permitted.
Examples	ပျံ (ပျံ ဝံ)	ပျံ	Depends on the font.	<p>ပျံ</p> <p>Correct spelling: ပျံ (ပျံ ဝံ)</p>

	Microsoft	Adobe CS5/5.5	OS X	Mondulkiri fonts on OS X
Symbols before Vowels	Non-spacing symbols and even superscript-vowels (៊៊៊៊៊៊) are permitted before the vowel Aa, Oo and Au. Some syllables may not be composed correctly, whether the visual result differs from the symbol being placed after the vowel depends on the font.	Anything goes.	Depending on the font.	Not permitted.
Examples	កាំ or កាំ (កាំ៊)			កាំ
Zero-width-non-joiner with Aa, Oo and Au (៊ ៊៊ ៊៊)	Permitted by old implementations, not permitted in newer implementations. Most likely not supported by most fonts.	Mondulkiri fonts will break the ligature.	Mondulkiri fonts will break the ligature.	Mondulkiri fonts will break the ligature.
Examples	កាំ (older impl.) កាំ៊ (new impl.)	កាំ	កាំ	កាំ

The examples in the Adobe and Microsoft column illustrate how text would look like if entered as shown in parenthesis.

**Additional notes:**

1. Dotted circles may not always appear in text typed in Pages (OS X 10.6) after typing zero-width-space, but will appear if the same text is pasted from another application.
2. Some implementations of Pango (Linux) may be restricted in the number of 'lookups' (i.e. the number of OpenType instructions for rendering in the font) they support. This may cause some fonts to display text correctly, others to not display the same text correctly.
3. OS X 10.7 (Lion) made a new way of composing syllables in Khmer possible for font developers. Such fonts, however, may not work correctly in earlier systems. Text may look garbled and/or have overlapping characters.
4. Unfortunately some Mac fonts and Adobe implementations permit coengs to be written after the vowels Aa, Oo and Au, but then place them under the base consonant. This is

wrong (See The Unicode Standard 6.1<sup>1</sup> p375). Because this is a frequent typo in Khmer, the Mondulkiri fonts have the option to dotted circles for all coengs after vowels with the help of a typographical feature.

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<sup>1</sup> <http://www.unicode.org/versions/Unicode6.1.0/ch11.pdf>