

**To:** Unicode Technical Committee

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**Date:** 7 March 2017

**Subject:** Mayan Numerals: Layout and reading order in Mayan historical texts

The following provides an overview of how Mayan digits are laid out in the Mayan codices, which is more complicated than modern use of the digits as described in [L2/16-264](#), where the bar is horizontally oriented. More details will be provided once more research is completed on the Mayan codices, later in 2017.

### Mayan Codices

In general, layout for the Mayan codices varies between “text” portions versus calendrical portions. Note that calendrical portions are quite prominent in the codices; some 40-50% of all signs are calendric.

The following shows in red the “text” portion (or “primary grid”), whereas the grey portion indicates the calendric section (“secondary grid”).

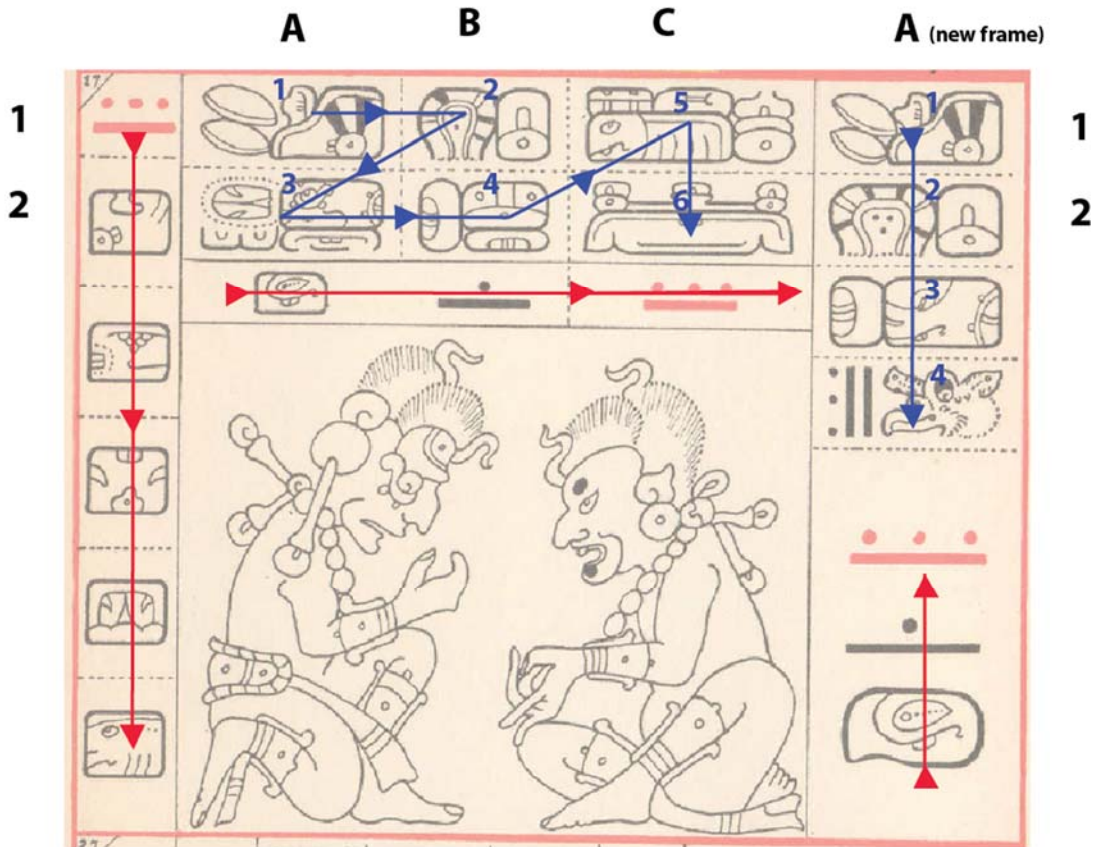


In the primary grid (red), text is *generally* read in paired columns, reading the paired characters. The numbers in the primary grid tend to appear vertically (that is, with a vertical bar and dot). The example below comes from the Dresden codex.

The blue arrows below show the reading order for the primary grid:

A1 – B1 – A2 – B2 – C1 – C2

Then it continues in a new frame, but this new frame (on right, below) is read top to bottom: (new frame) A1 – A2 – etc.



In contrast, the secondary grid with the calendric signs (red arrows above) *tends* to have the numbers horizontally oriented (i.e., the bar is horizontal), whether the reading order is horizontal or vertical.<sup>1</sup>

### Monumental Inscriptions

Note that the description above contrasting the primary “text” vs. secondary calendrical sections is only true in the Mayan codices. In the monumental inscriptions, the separation of the two grids is less clear, often with the two merging with one another. In the monumental


<sup>1</sup> The red bar and dot number combinations indicate base dates, “stations” or arrival points, indicating where you start and where you “land,” after adding whatever amount is indicated by the black bar and dot numbers (which are intervals, or “distance numbers.”)

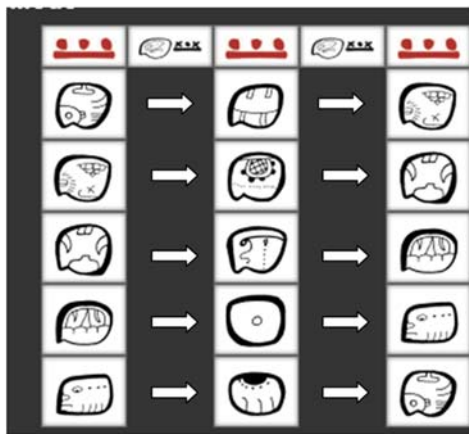
inscriptions, numerals appear vertically oriented most of the time, but the reading order is most commonly left-to-right in paired columns, as above for the primary grid (with blue arrows).

### Details on Reading the Calendrical Grid

The above description is an abbreviated simplification of how the calendrical grid is actually read. An experienced Mayan priest would be able to read the calendrical grid, and fill in the gaps.

#### Example 1

In the secondary grid or matrix below, the top row contains black numeric intervals (  <sup>2</sup> ) and the resulting red coefficients that they add up to. The (explicit) red coefficients, which can range from 1 to 13, are meant to be read in combination with twenty different (implicit) unwritten day-names on blank imaginary rows below them, with coefficients and day-names forming new columns of dates or "stations" within the 260-day cycle (13x20=260).



In the above example, the system starts on day 47 of the cycle (8 Manik'), added 26 days to reach day 73 of the cycle (8 B'en), added 26 days to reach day 99 (8 Kawak, first row completed), and from there, kept adding 26 days each time to reach days 125 (8 Chikchan), 151 (8 Chuwen), 177 (8 Kab'an), 203 (8 Ak'b'al), 229 (8 Muluk) and so on

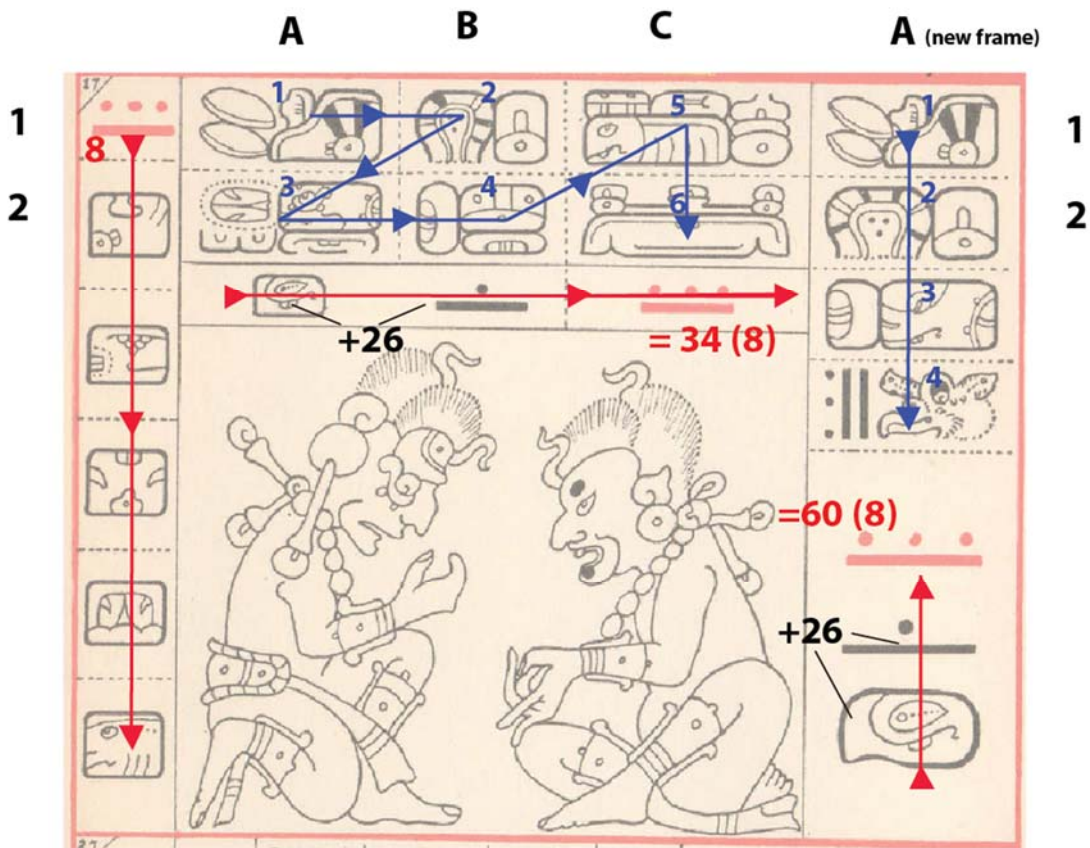
A	B	C	D	E
8	26	8	26	8
047	→	73	→	99
99	→	125	→	151
151	→	177	→	203
203	→	229	→	255
255	→	21	→	47

<sup>2</sup> The "x's" in the intervals are space-fillers, and have no inherent meaning.

Hence, one crucial aspect of the secondary grid or calendric portion of texts is that some computations are abbreviated and the scribe-priests had the ability to reconstruct the whole grid in their minds.


*Example 2*

In the example below, the cycle starts with a red 8 (upper left), then you add the black 26 (the two glyphs, the first one is "twenty", plus the bar-and-dot "six"), so you get 8+26, resulting in 34 (but after "reducing", you end up at 8, because  $34/13=26$  with a remainder of 8). At this point, you need to read the last bit from bottom to top, as the syntax dictates always a pattern of red, black, red, black (or base date, interval, resulting date, new interval, new resulting date, and so on). So after the red 34 (reduced to 8), you need to add 26 (bottom right) to reach 60 (reduced in turn to a new 8, because  $60/13=4$  with a remainder of 8). So you cannot have a "red" following another "red" (unless a new almanac begins, which is not the case here)



Addendum:



In , which is taken from the figure on page 1, the dot above the two bars is not '11'.

To quote Karl Taube (1992:105):

"The facial band also appears in the name glyph of God Q, which is usually prefixed with a coefficient of ten (Figs. 53a-d). In the Dresden and Madrid codices, this coefficient of two vertical bars is frequently topped with a single dot, suggesting that the coefficient is to be read eleven rather than ten. However, Thompson (1950: 131) points out that the dot does not allude to the number one, but rather to a death sign—a disembodied eyeball. Thus in the Codex Madrid, the element is often clearly rendered as an eye. Moreover, in the Madrid and Paris codices, the prefixed coefficient of ten can appear without the dot (Fig. 53d)."

(Taube, Karl A. 1992. *The Maya Gods of Ancient Yucatan*. Studies in Precolumbian Art & Archaeology No. 32. Dumbarton Oaks Research Library. Washington D.C.)