Ancient Mayan Eclipse Predictions

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Introduction to Mayan Culture
The Mayans were one of many Mesoamerican civilizations throughout the years 6000 B.C. all the way up to 1500 A.D. The Mayan civilization was developed in an area that encompasses southeastern Mexico, all of Guatemala and Belize, and the western portions of Honduras and El Salvador. Their lives revolved around the outer world, and because of this, they learned to calculate the earth’s rotation and were able to foresee the dates of eclipses almost as exactly as our calculations today.

Base 20 Number System
- The United States uses a base 10 number system
- The Mayan’s used a base 20 number system
  - One dot represents “one”
  - One bar represents “five”
- They used the base 20 number system in order to make their calendar
- They used their base 20 number to predict solar eclipses
- Here is an illustration of the type of base 20 digits the Mayan’s used:

<table>
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<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<td>18</td>
<td>19</td>
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</tbody>
</table>

Mayan Calculations of Solar/Lunar Eclipses

The Mayan Calendar
- The Mayans were infatuated with numerology and astronomy
- They used many “special numbers” to form their Teo calendar
- The first Mayan calendar consisted of thirteen 20-day periods
  - 13 x 20 = 260 days total
- The Mayans developed a solar calendar as well.
  - This specifically described the “Vague Year”
  - 365 days consisted of eighteen 20-day periods.
  - It also included five “days with no name” and these days were considered very unlucky.
- Every 52 years were broken down into four 13-year periods
- Other mathematical coincidences:
  - There were 146 ritual years in 65 synodic periods of Venus.
  - There were eight Vague years were equal to 5 synodic periods of Venus.
- Mayans used their knowledge and interest in mathematics and the sky in order to predict astronomical cycles.

Lunar Eclipse Cycle Calculations
- The Mayans used the cycle of new moons to count the number of days for each month. If they could see the thin crescent moon at night or when they could not see the waning moon in the morning, they labeled the day as “zero.”
- They used the phases of the moon as hieroglyphics.
  - Day zero in the lunar cycle was represented by a new moon hieroglyphic
  - Lunar ages 1 through 19 were represented with a D hieroglyphic accompanied by the number of days that had passed from the new moon.
  - E hieroglyphics were used to represent ages 20 through 30 in the lunar cycle and were accompanied by the number of days passed from day 20.
- The Maya wrote whether the lunar month was 29 or 30 days as two glyphs:
  - A glyph for lunation length followed by either a glyph made up of a moon glyph over a bundle with a suffix of 9 for a 29-day lunation or a moon glyph with a suffix of 10 for a 30-day lunation.
- Since the Maya didn’t use fractions, lunations were approximated by using this formula:
  - There were 149 lunations completed in 4400 days,
  - This gave a short mean month of exactly 4400/149 = 29 + 79/149 days = 29 days 12 hours 43 minutes and 29 + 59/149 seconds, or about 29.5302 days.

Conclusion
The Dresden Codex was the table created by the Mayans consisting of all of their solar eclipse predictions.

The Mayan were part of some of the earliest astronomers and showed their abilities in applying mathematics with science. Their skills were very advanced as seen with the calendar they created using their base 20 number system and the phases of the moon. The growth of this historic civilization shows that humans are capable of the extraordinary. There is no limit as to how far we will advance from this point in time and on.