Numerology and Cycles

To make the difference between numerology and science understandable, several steps are necessary. Here are thoughts and examples on handling claims that cycles are related to each other. The sections are:

1. A Shift from Numerology to Empirical Science
2. Our Modern Calendar
3. The Venus Table of the Dresden Codex
4. Where the "extraordinary" is simple mathematical necessity, not extraordinary at all.
    Discovery of the 819-day count by Thompson
    Relations of 819 to 364 and to 7182 may be mathematical artifacts, not necessarily Maya.
5. Precession of the Equinoxes
6. Evidence for Astronomical Interpretations
7. Attempts to Discover Deeper Calendrical Concepts

1. A Shift from Numerology to Empirical Science

I do not have a source reference to offer, but remember reading that this kind of a shift occurred around the time of Isaac Newton. The idea that the universe might be generated from abstract numerical and logical concepts had been around for a long time. The new idea was that everything had to be measured, to as much precision (as many decimal places) as is desired. In the newer view, most things would turn out not to be generated by simple whole numbers.

These two approaches to the nature of the world are still in competition, and numerology, the idea that things are generated from abstract whole numbers and concepts, rises again and again in thinking. It is very appealing, but usually not true. Even when we investigate the history of culture, and consider whether people in the past did engage in numerology just as some do today, it is much too easy to assume they believed more deeply in the numerology than they in fact did.

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2. Our Modern Calendar

Consider our modern calendar, the number of days in the year. Most people know that the year has 365 days. A majority of people know a minimum about leap years, that they return every four years and have an extra day in February. (That gives an average year of 365.25 days.) A very few know that we omit that leap day in years divisible by 100. (That gives an average year of 365.24 days.) Still fewer know that we add the leap day back again in those years divisible by 400. (That gives an average year of 365.2425 days.) Fewest of all are aware of our scientific knowledge of the year, that its length is approximately 365.2422 days.

So is our manipulation of the calendar numerology? Yes and no. We prefer to operate with whole days. We want each year to begin on a day "1st of January". We achieve this by adding some extra days.

Might an archaeologist of the future think we believed in a numerology of the calendar? Perhaps to a degree, if details known only to a few are not preserved.

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3. The Venus Table of the Dresden Codex

In the famous Venus Table of the Dresden Codex, it is apparent that the Maya had figured out how to keep the synodic cycle of Venus comensurated with (co-ordinated with) their cycle of 260 days and in part with their approximate year of 365 days. They did this with a table of 104 years of 365 days each, divided into 13 rows with each row consisting of 5 x 584 days, the synodic cycle of Venus being approximately 584 days.
They knew that whole numbers of days were not quite adequate for this. They had a method of starting the cycle again before it was complete, in two differnent ways. They could do this in such a way that the day of first Heliacal rising of Venus would again begin the use of the Table on a day 1 Ajaw. But then they would necessarily lose any co-ordination with their vague year of 365 days. So they provided more than one set of tropical-year dates to reflect this lack of co-ordination (as they also provided three successive day names in their Eclipse Table, because it was a part of a day off from a true match to Eclipse cycles).

Was this numerology? Yes and no. The Maya knew what they had was an approximation. They made it work for them in practice. The reason they were able to do this is because the nearest whole-number approximation to Venus's synodic cycle, 584 = 8 x 73, and the year of 365 days = 5 x 73 have in common the factor 73. So five Venus cycles of 584 days = 2820 days = 8 years of 365 days. Each of the 13 lines of the Dresden Venus Table totals 2920 days. The 13 lines together total 37,960 days, two Calendar Rounds of 52 x 365 days. These equations simply group the factors differently: (8 x 73) x 5 = 8 x (73 x 5). Also 13 x (4 x 5) x 73 = (13 x 4) x (5 x 73), and twice that is (13 x 5) x (2 x 4) x 73.

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4. Where the "extraordinary" is simple mathematical necessity, not extraordinary at all.

Many numerological investigations include claims that something is an "exact" match if we only first adjust by a few days (or a larger amount). That kind of wording is a clue that the writer is not in an empirically-grounded or scientific mode. The proper conclusion is such cases is that there is **not** an exact match, or in some special cases, that there is an **approximate** match. This is much better, and more honest, than manipulating the data and pretending there is an "exact" match. Once we start dealing with questions about **how exact** something is, statistical probabilities become more obviously relevant. How likely is it by chance that following certain methods we might get an approximation as close as X to some target we are interested in? Those who prefer numerology do not in general find statistical sorts of problems as interesting. They don't like it when the answer from statistics is that some approximate match occurs very often simply by chance.

Following examples will not be cited as to source, because the purpose is not to embarrass anyone, but to assist in improving reasoning for the future. Almost all of us make some error of this kind on occasion.

Example A:

<<12 Lamat 11 Kumk'u-another 12 Lamat lub. What is so very extraordinary about this CR is that if you count 13 B'aktuns above or below it you will end up on a day 12 Lamat. Count 13 B'aktuns and 13 Piktuns above or below the day 12 Lamat 11 Kumk'u and one will again fall upon a day with a 12 Lamat. Keep adding higher cycles with multiples of 13 and one will land on yet another 12 Lamat (note if the base CR was 11 Imix, or any other 260 day, then following the same addition of thirteen cycles, another 11 day 11 Imix will be reached).>>

This is a strange paragraph, because the author shows a full awareness that the fact claimed is not at all extraordinary. It is mathematically required by the Mayan calendar. Since day names are composed of 13 numbers and 20 day names, and period endings are multiples of 20 days, it follows that any distance number which is composed of period endings multiplied by 13, when added to any date, leaves the Tzolk'in (260-day

cycle part of the date) unchanged. Yet the application of words like "extraordinary" tends to convey that a novel idea has been proposed, or confirmation found for a hypothesis which was not obviously correct. The phrasing here normally will be taken to imply that the specific calendar round "12 Lamat 11 Kumk'u" has an extraordinary property which other calendar rounds lack. But in fact any Calendar Round has this property.

Greg Reddick discussed other cycles which happen to have 7, 9, or 13 as their length. These are respectively the "Y" glyph of the supplementary series, the Lords of the Night, and the number coefficient of the Tzolk'in day names. By themselves, each of these could be a coincidence, especially given that the 819-day cycle begins three days before the era event 4 Ajaw 8 Kumk'u. The "Y" glyph and the cycle of 13 coefficients of day names in the Tzolk'in do line up with the beginning of the 819-day cycle.

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Example B: Discovery of the 819-day count and the size of its cycle

This is an example taken directly from J. Eric S. Thompson (1960) p.214 where he discussed the 819-day count. The point of the example is that any of these numbers 13 or 7 or 9 or 63 or 91 or 117 or 273 or 819 could have been taken as the basis for this cycle. Thompson reasonably chose the largest one, because the distance numbers which link 819-day-count stations to the dates they precede are between 210 days and 561 days, other than a single case of 20 days. If the Maya were choosing the 819-day-count base closest preceding the date to which they were relating it, then the cycle might most resonably be taken to be larger than that. The colors and directions seem to confirm that it is part of a larger cycle 4 x 819.

<<As in all six texts [texts which Thompson was discussing at that point] the day sign coefficient reached by subtraction is 1, the intervals between these positions must be multiples of 13. In days these intervals are 11,466, 15,561, 3,276, 16,380, and 1,433,250, but the highest common factor of these is not 13 but 819. Such a high common factor could hardly be the result of chance; the odds are over a thousand to one against it. This number is composed of 91 x 9, or 117 x 7, or 273 x 3. ... [or 63 x 13 -- added note by LA]

<<Since 819 is divisible by nine, the same form of Glyph G of the lunar series, G6, is required by all the parenthetical clauses. >>

["Lords of the Night". Because the era date has G9, and an 819-day-count station is three days earlier, it will have G6 (3 earlier than G9), and therefore all other 819-day-count stations will have G6.]

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Example C. Relations of the 819-day count to other cycles: the 364 day "computing year" and the idealized Jupiter-Saturn conjunction cycle

<<The 364-day year divides into four quarters or seasons of 91 days each. Each quarter divides into seven trecenas, i.e. 7 x 13 = 91 and 28 x 13 = 364. The 364-day year goes into 819 days twice with a remainder of 91 days or one quarter of a year. This means that each 819-day count begins with the first day of a different season of the year for four years, after which the cycle repeats.>>

This is correct, but practically it is of little use for longer time spans, because the day difference between 364 and 365 or 365.2422 accumulates so fast.

<< A count of 819 days goes evenly into a round of 13 counts of 7182 days. Only each thirteenth 7182-day count can begin with a station of the 819-day count. >>

As in Example A. above, we have the factor "13" introduced where it was not naturally present in the cycle of 7182 days = 2 x 9 x 7 x 57. Because both 7 and 9 are factors of both 7182 and 819, this works. However, the resulting cycle 13 x 7182 is very large, 93,366 days, so of little use. And the idealized cycle 7182 is far off of the empirical average (around 7153?) for Jupiter-Saturn conjunctions, so that after 13 times the discrepancy is very large (on the **order of magnitude** of 377 days). Given the high accuracy the Maya achieved in other respects, it is implausible they would use such a cycle. The number 7182 is 19 x 378 days (whole-number approximation to Saturn's synodic cycle, 9 x 7 x 3 x 2) and 18 x 399 days (whole-number approximation to Jupiter's synodic cycle, 7 x 57).

<< This is a logical origin for the idea of rounds of 13 katuns of 7200 days in the later history of the Maya calendar.>>

Conceivable, but no independent support is given for this. It seems to depend crucially on the 819-day-count being present first, and that is difficult to justify.

<< Unfortunately there is no 7200-day katun that has ever begun on the day of a Jupiter-Saturn conjunction. Is there a station of the 819-day count that coincides with a Jupiter-Saturn conjunction? Yes. That would be on February 11, 2091 B.C., which is 1 Imix 9 Zip in the Classic Maya calendar and 1 Imix 8 Zip in the Post-Classic Mayapan calendar. There was probably no priest-astronomer around to make that observation in 2091 B.C., but what priest-astronomer was around to observe a zenith passage of the sun on August 11, 3114 B.C.?>>

This would seem to be an argument **against** the hypothesis. If one has to perform such cartwheels to avoid something being considered counter-evidence, then perhaps the initial hypothesis is the problem. For 3114 BCE, we have a Long Count which points us to it from the vast majority of recorded historical dates. For this 2091 BCE there is nothing (?).

<< Floyd Lounsbury showed that the birth of the primal ancestress, the mother of the Palenque Triad, was contrived by Palenque astrologers to fall shortly before the 4 Ahau 8 Cumku base date of the Maya era and 1,359,540 days before the birthday of Lord Pacal. This figure factors into 1734 [correct to: 1,743] triple sacred almanacs [780] and into 1,660 counts of 819 days. It placed Lord Pacal's birth in A.D. 603 on the same day of the almanac as that of the ancestress and in the same relationship to stations of the 819-day count, though not on an actual station of the count. Pacal's birthday was 8 Ahau and followed by twenty days the nearest station of that count.>>

Since the ancestress is normally assumed to be mythological, contrived to legitimate the later Lord Pakal, perhaps this large contrived distance number was intended to place the birth of the primal ancestress on the same day of the almanac as that of Lord Pacal, in other words stating this in reverse of what was quoted above.

Floyd Lounsbury's point for many years was that Maya contrived distance numbers are often combinations of many **small** prime factors. In this case, 1,359,540 has factors 1660 x 819. We can further decompose it into 7 x 9 x 13 x 4 x 415 or into 4 x 5 x 7 x 9 x 13 x 83 (9 is of course not prime). There is no reason here to choose the larger numbers just quoted, nothing like the argument which supports Thompson's choice of 819 instead of 13 or other smaller divisors as the length of the cycle.

In general, the sequence of steps in the argument above includes a large number of assumptions of cycles and frameworks for which there is no direct attestation in records by the Maya. This should warn us away from treating the hypotheses as having much plausibility.

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5. Precession of the Equinoxes

It is possible that other cultures discovered the precession of the equinoxes independently of the Greeks (and Chinese? others?). The problem is that many who wish to argue for cultural knowledge do not have sufficient evidence or reasoning to be convincing except to those who want to believe even with no evidence. This has had the unfortunate consequence that the entire field is somewhat in disrepute. The book *Hamlet's Mill* by Giorgio de Santillana and Hertha von Dechend is now so negatively viewed by most archaeoastronomers that whatever value it has in pointing to parallels in mythologies and cosmologies may have to be rediscovered almost independently by the field of comparative mythology. The same holds true for most attempts to link the planets and stars with mythologies.

Here is however an instance in which evidence comes from an unexpected source, and may just possibly show that the Maya kept track of precession in a way we are not aware of. The verdict is not in, and it is difficult to predict at this point how future discussions will go.

In 2002 Matt Looper in a *Glyph Dwellers* Report 15 "The 3-11-pih Title in Classic Maya Inscriptions" discussed a carved bone from Tikal Burial 116 with three short sentences, each consisting of a Calendar Round and then one of the expressions "the 1st / 2nd / 3rd 11-PIK" in order. The Calendar Rounds could be at intervals of 8660 days from each other, and the first one is at the same interval starting from 4 Ajaw 8 Kumk'u (whenever this is placed in time). The total of the three is then at a minimum 25,980 days, around 71.13 years.
In March of 2008, Barbara Macleod gave a talk pointing out that a couple of Maya inscriptions which mention the "3-11-PIK" title come at a point where a ruler may have passed the third of these calendar rounds during his reign. She also noted that taken literally, "11 PIK" can mean "11 Baktuns", 4400 TUUNs. Three of these together, thus 13,400 TUUNs, is very close to half of the cycle of Precession. The shorter interval of 71.13 years is approximately the time in which precession moves the stars the equivalent of one day's movement of the Sun across the background stars. Is this something the Maya were aware of and their knowledge was somehow reflected in these titles and in the one bone which puts the three smaller intervals together? We cannot be certain at present, but this may turn out to be a case in which working out numerological possibilities has led to discovery of some ancient cultural knowledge which we do not happen to have complete records of. If so, it will have come (as is so often the case) from an unexpected source.

A 2007 dissertation at the University of California Davis written by Michael Grofe, *The Serpent Series: Precession in the Maya Dresden Codex* must also be mentioned here. It will obviously be food for lots of thought.

6. Evidence for Astronomical Interpretations

For the Maya, other than studies of explicit Venus and Eclipse tables in the Dresden Codex, there is not yet a strong set of methodological tools for evaluating claims about astronomy. The single best article for indirect inference may be Floyd Lounsbury (1989) where he showed a **difference** between the Palenque Ruler Chan Bahlum's birth and death dates, on the one hand, and on the other hand other dates in his reign. All of the others seemed to cluster around first visible departures of Jupiter from its 2nd stationary point. The birth and death dates did not. Since birth and death cannot be scheduled to fit human preferences, while other events can be, this appears to be a strong and we can hope reliable tool for statistical evaluation, usable whenever we have say a half dozen dates from a single ruler. This might sometimes be usable with successive rulers at a single site, if preferences for scheduling events with specific astronomy sometimes extended beyond a single ruler.

Since the vast corpus of Maya dates has not yet been evaluated in this way, this is a very rich opportunity for someone. This writer is only testing tiny bits of it at a few sites.

A second method of looking for astronomical significance is to examine all the intervals between attested dates to see which of them have as factors either actual or idealized whole-day synodic cycles of planets. David Kelley did this in his "Astronomical Identities of Mesoamerican Gods", *Archaeoastronomy* 11 (2):S1-S54. More recently, Gerardo Aldana has used a partly similar method in his 2007 book *The Apotheosis of Janaab' Pakal*. The University Press of Colorado. In 2008 it is too soon to see whether some of his reasoning and conclusions will be generally accepted. The basic method itself as just described is entirely legitimate. Difficulties in such enterprises often come in trying to define the terms governing statistical estimates of chance.

Lounsbury's method described above does not use statistics per se, but rather looks at whether the proportion of astronomically significant dates is greater among those dates where the Maya could choose when to schedule an event than it is among dates they could not schedule (like births and deaths, unless falsely reported). Such an approach is looking at degree of skewing of patterns in the data, independent of sample size, and so is more appropriate to small samples. As Lounsbury pointed out, different polities and even different rulers might choose differently which kinds of astronomy to pay attention to and to record, so we can't simply do statistics lumping all together. Yet our confidence in conclusions we draw will be strengthened if we find strong consistencies across times and places.

7. Attempts to Discover Deeper Calendrical Concepts

Various people, both professional scholars and others, have attempted to use what evidence we have available to make inferences to deeper calendrical concepts. While the works listed just below have not achieved consensus in the field, and discussions in various pages here may help readers to understand where there may be weaknesses in reasoning, or confusion between facts and interpretations, we should not assume they are of no value. I must necessarily specify that my comments on these do **not** reflect having read them through completely (I have no access whatsoever to Kelley's thinking on the topic mentioned). Rather, in each case, the note here is to indicate something of the content considered by these authors, and that they have not achieved consensus, and my estimates as to some possible reasons for that, based on very partial exposure to the claims, reasoning, and data offered. Others should not rely on my opinion, but should form their own.

Many very important ideas in the history of the world started out as pure speculation, and evidence supporting them was discovered later. Many important ideas were at first rejected. Of course the majority of speculations in any field do not end up accepted later, simply statistically, because speculations by definition start out life with little evidence in support of them. Even when an idea is speculative and does not end up achieving consensus, it may stimulate others to new thoughts which are productive, or to new ways of handling some of the data considered, which can be useful. Here are a couple of the more serious attempts to explore new territory which have not achieved consensus. One which may have a chance of achieving consensus eventually is the possible reflection of precession of the equinoxes discussed above.

David Humiston Kelley has suggested a different correlation constant for the Maya long count. He has proposed new understandings also of apparent inconsistencies in Central Mexican historical records. [Are these available in published form anywhere?]

John Major Jenkins has suggested that Winter Solstice in 2012 AD, where the current long count reaches 13.0.0.0.0, was foreseen by the Maya and considered of great importance, on the scale of a "World Age". Many of his presentations seem subject to reservations expressed elsewhere in these pages, but there may be other material of value. He has published a book in 1998 *Maya Cosmogenesis 2012: The True Meaning of the Maya Calendar End-Date*. And two other books since then, *Galactic Alignment* (2002) and *Unlocking the Secrets of 2012* (2007).

A web page http://www.mayastudies.org/html/understanding_2012.html by Jim Reed of the Miami Institute of Maya Studies represents views allied with those of J. M. Jenkins. It is an interesting exercise for readers to read this web page, and attempt to identify statements which are factually true, statements which are factually false, and statements which are religiously colored and are not part of factual science. Also to look at whether claims about what scientists now accept are valid.

Robert Hall has suggested dates which he believes work to integrate a number of the Mayan and other calendric cycles. The chief reservation this writer has is that a large proportion of those dates are not actually recorded anywhere by the Maya. Even some of the cycles are not. So the speculation seems to go rather far from what are known facts and records. But we can still learn from him, and some of the ideas may bear fruit. One book is 1998 *An Archaeology of the Soul: North American Indian Belief and Ritual*. A book chapter is "A Comparison of Some North American and Mesoamerican Cosmologies and Their Ritual Expressions", in *Explorations in American Archaeology,* Mark G. Plew, ed., pp. 55-88 (Lanham, MD 1998).