The golden fabric of Time or "phi in the sky"

by

Nicholas Kollerstrom, PhD

Certain approximate relations of solar-lunar periods have been discovered by the brothers Robin and Richard Heath, using the Golden Ratio phi: $\mathbf{\Phi = (1+\sqrt{5})/2}$ = 1.618.... We wish to express them here as follows.

Part I: The Golden concordance of Sun and Moon

The solar year in days is given by

$$\mathbf{Year = (18 + \Phi)(18 + 1/\Phi)\ days} \quad \text{- to 99.998\%}$$

Thus, eighteen plus phi times eighteen plus the reciprocal of phi yields the solar year, within ten minutes.[1] The 'eclipse year', from the Sun's revolution against the lunar nodes, is shorter than the solar year at 346 days, and this too reaches a high precision with its 'Heath formula':

$$\mathbf{Eclipse\ year = (18 + 1/\Phi)^2} \quad \text{- to 99.997\%}$$

Subtracting these two year-formulae indicates that the eclipse year is shorter than the solar year by $\mathbf{18+1/\Phi}$ days, or just under 19 days; the eclipse year is shorter than the solar year by the square root of its magnitude.

The Islamic year of twelve lunar months can also be expressed in these terms:

$$\mathbf{Islamic\ Year = 19(18 + 1/\Phi)\ days} \quad \text{– to 99.8\%}$$

but attains only a lower accuracy, of half a day. A thirteen lunar-month 'year' works better:

$$\mathbf{13\ lunar\ months = (19 + \Phi)(18 + 1/\Phi)} \quad \text{– to 99.99\%}$$

i.e. within about an hour.

The terms in these formulae are *all years*, insofar as in earlier times when months were lunar, a year had to contain either twelve or thirteen months. A symmetry is manifest here, in that the thirteen lunar months are greater than the solar year, by the same period as the eclipse year is less.

There is an Indian Vedic 'Jupiter year', from Jupiter transiting through one zodiac sign per year, i.e. one-twelfth of its orbit period, called the 'Barhaspatya Samvatsara', four days short of the solar year.[2] Again we find a remarkable precision in the formulation given by Richard Heath:

Enquiries about this article should be addressed to: nkastro3@gmail.com

Jupiter year = 19^2 days - to 99.99%

These phi-formulae are defining *four different kinds of year* to one part in ten thousand i.e. within about ten minutes.

These results are perplexing, as seeming to imply a connection between duration of the day, the solar year, and the revolution of the lunar nodes, which ought not to exist according to current cosmology. What are the numbers 18 and 19 doing here? These formulae, very much interconnected, are attaining a one-in-ten-thousand precision.

The longer solar-lunar periods

The period of rotation of the lunar nodes, which is 18.613 years, slots neatly into this scheme of things. This is the very same $18 + 1/\Phi$, but expressed in years rather than in days: the period by which the eclipse year is shorter than the solar year in days, equals the node rotation period in years.[3] A day-for-a-year concordance is going on here. We may write its equation as:

$$\textbf{Lunar node period} = (18 + \Phi)(18 + 1/\Phi)^2 \qquad \text{- to 99.97\%}$$

using the 'tropical' value of the lunar node period, the time for the Moon's orbit plane to revolve once against the zodiac and not its sidereal period (18.599 years). The tropical period has a relation to the Earth, being more earth-centred.

The Saros and Metonic cycles are both 'mere' coincidences, in that on any rational analysis they ought not to exist. Neither is an astronomical cycle. They are high-precision coincidences which emerge so to speak from the cosmic machinery, poised enigmatically on either side of the 18.6-year node period. Maybe the phi-formulae here involved give a hint as to why they do exist. The 19-year period of Meton has served for two and a half millennia to maintain lunar/solar calendars, while the 18-year, 11⅓-day Saros predicts eclipses. The former can track a relatively small number of lunar eclipses, while the latter tracks long chains of both solar and lunar eclipses. Multiplying the solar and eclipse years by 19 yields these two periods:

$$\textbf{Saros} = 19(18 + 1/\Phi)^2 \qquad \text{- to 99.99\%}$$
$$\textbf{Metonic} = 19(18 + \Phi)(18 + 1/\Phi) \textbf{ days} \qquad \text{- to 99.998\%}$$

Thus we can express the Saros as 19 eclipse years, within an hour or two, though this may not be its primary definition.* The ratio between Metonic and Saros periods is normally

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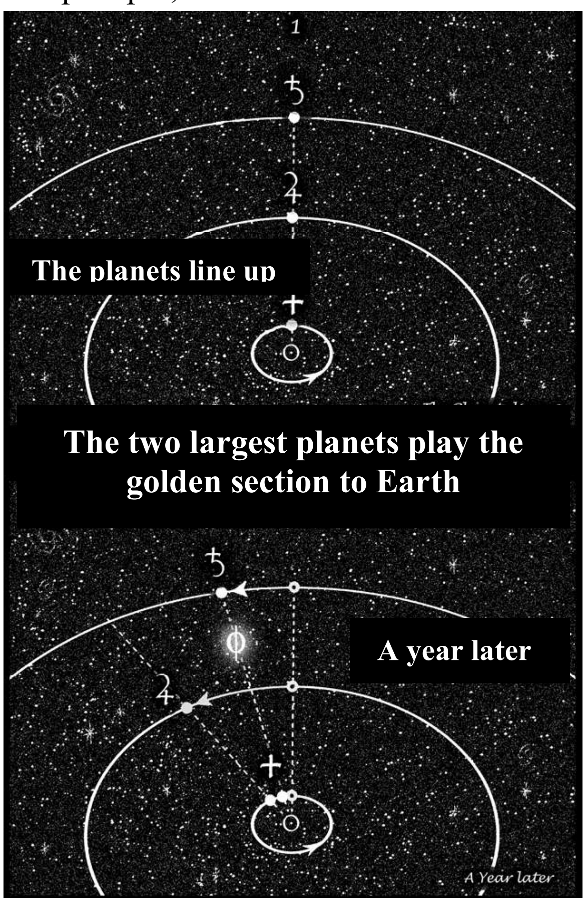
*The improbability of the Saros eclipse-relevant cycles resides in: the synodic month (29.5 days), the apogee-perigee month (27.5 days), the nodal month (27.2 days) and the year. How often do these come into synchrony? Of the eclipse recurrence found in the Saros, it has been noted: 'though it seemed that a similar eclipse would take place only after an extremely long interval, two prodigious coincidences bring the period to less than 20 years, and make the Saros Cycle a cycle of considerable interest'(Callatay 1964). Ptolemy's *Almagest* simply defined it as a period in which these three lunar months coincided (Ptolemy c. AD 150). That being the primary definition, a secondary and (we believe) unrelated definition puts it equal to nineteen eclipse years, as in the above formula.

expressed as that between the 223 and 235 lunar months, whereas it may be viewed in more 'golden' terms as that between 18 + Φ and 18 + 1/Φ; as likewise the periods of the Saros and the lunar node are related as 19 to (18 + Φ). These formulae have an inner beauty. They are independent, except that the 'eclipse year' period derives from those of the solar year and the lunar node cycle[4].

Part II: The Golden Concordance of Jupiter/Saturn

The glyph for the planet Saturn alludes to the image of Chronos, Old Father Time. Traditionally, Jupiter and Saturn were the *chronocrators,* the spheres which measured out Time in its longer, historical cycles (Critchlow 1979) – just as the Sun and Moon measured its shorter cycles. Their synodic cycles are their periods as experienced in relation to the Earth, between their retrograde loops seen in the night sky. The 'golden' pattern forms between the mean ecliptic angular distances moved by Jupiter and Saturn during their synodic periods, and it is as the square of the golden ratio – to 99.996 %. This precision is comparable to that shown earlier, around one part in fifteen thousand. The square of phi is one plus phi, i.e. 2.61803...



This concordance was first published in 2001 by John Martineau, with a diagram as shown. Alluding to 'the relative speeds of orbit of Earth, Jupiter and Saturn', he explained:

"We start with these three planets in a synodic line at twelve o'clock. Earth orbits much faster than the outer planets and makes a complete orbit of the Sun (365.242 days) and then a bit more, before lining up with slowcoach Saturn again for a synod after 378.1 days. Three weeks later, it lines up again with Jupiter (after 398.9 days). Richard Heath recently discovered that the Golden Ratio is defined here in time and space to a stunning 99.99% accuracy!" (Martineau2001) Martineau used a heliocentric diagram to depict the synodic periods, e.g. that of Saturn is the interval between Sun-Saturn oppositions.

A year later, a book by Richard Heath succinctly described the discovery, which he had made as:

'The excess of the Saturn synod over the solar year can be divided by the excess of the Jupiter period over that of Saturn to yield the Golden Mean ratio.' Heath 2007. We can express that as

$$\Phi = (Ju - Sa)/(Sa - Ea) \text{ - to } 99.996\%$$

This is a primordial and simple equation, where 'Ju' is the Jupiter synodic period, 'Sa' is that of Saturn, and 'Ea' is the Earth year (Heath 2002). These are the experiential periods – we experience synodic cycles, or at least could do if we look at the night sky, whereas sidereal periods are more abstract and conceptual.

Scrutiny of Martineau's diagram indicates that the ratio of movements around the zodiac between these two planets per synod is as the *square* of the golden ratio. (If a line AB is divided at C such that AB/AC = Φ, then AB/BC = Φ^2). Therefore we may prefer to express the proportion as:

$$\Phi^2 = (Ju - Ea)/(Sa - Ea)$$

- formed by adding unity to the previous expression. The Martineau diagram expressed the ratio more in terms of *space*, i.e. a ratio of angular measure, while this formula is in terms of *time,* i.e. between periodic times. The latter may more resemble Heath's original definition (Martineau 2001).

Meaning of the equations

These formulae use tropical, not sidereal periods, i.e. they are orbit periods not measured against the stars but in relation to the Earth-Sun defined ecliptic framework; indicating that something is happening in relation to the Earth-Sun reference system. These equations use synodic periods, which are in essence geocentric. Maybe they are telling us that *there is no place like Earth.* We are here developing a *rational* approach to these cycles of heaven, where 'rational' means 'ratio' and the most perfect ratio is 'golden.'

As to what these formulae 'mean', one possible answer is: they concern that which is perfect. That is what this ratio – often called the 'divine proportion' – is all about. It has acquired that primarily artistic meaning since the Renaissance. Perfection is not an easy concept. Today it is quite unfashionable. Alternatively, if planet Earth has uniquely developed self-reflective awareness, then it could turn out to be relevant that this ratio has a self-reflective character (as AB is to BC, so is BC to AC). These equations would appear to be *constraining* the astronomical phenomena. If that is correct, it would mean that the solar system has not been arbitrarily set up, and that the role of chance has been greatly exaggerated; and even further, that the system inherently could not be improved upon, which could have theological implications in terms of intelligent design.

We note that the phi-values found here approximate in precision to that optimally achieved on Earth in the flower-pattern Fibonacci series. The sunflower normally has its spiral-patterns clockwise and anticlockwise sum to 55 and 89, but does sometimes achieve the 89:144 ratio (Stewart 1998)

<u>Data used:</u>

Solar year 365.242 days — Eclipse year 346.620 days
Synodic month 29.5306 days
Synodic period of Jupiter 398.8840 days, — of Saturn 378.0919 days
Sidereal period of Jupiter 4332.59 days

Endnotes

1. A paper on these relations was submitted to The RAS Observatory by Robin Heath in 1995 but rejected.
2. The Jupiter orbit-period we here take as 4332.59 days (Source: NASA factsheet). The Heath brothers discovered these things (but not the Jupiter-period) in 1993.
3. These results were first published by Robin Heath (1999), pp.42-3.
4. The equation here is, 1/eclipse year = 1/year + 1/node cycle.
5. Richard Heath (2002 pp.18-19, 2007 pp.28-9) gave a verbal definition resembling this equation.

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Editor's note: Part 1 of this article was originally published in the Letters section of Correlation Vol. 27 (1) pp 62-64. Part 2 was intended for publication in the Letters section of this issue of the journal. It has been decided to print both Parts 1 and 2 together as an article, here.