The Probable Calculation Method in Thai Inscriptions 3 and 5

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Thai inscriptions 3 and 5 concerning the early history of Sukhothai are of interest among other things for the calendrical details they present. They record 710468 days since the Buddha attained Enlightenment (inscr. 3) and 695601 days since he attained Nirvana (inscr. 5).1

Inscription 3 (JSS, pp. 94, 96):

Sakaraja 1279, year of the cock, eighth month, fifth day of the waxing moon, Friday, a 'katt rao' day in the Tai reckoning, (the moon being in) the naksatra of Purvaphalguni. The hour of enshrinement is on the sixth day. ...

If anyone asks, further, 'How long has it been, from the day our Lord attained Buddhahood under the srimalabodhi tree, up to the day this precious relic is being enshrined?', let this answer be given him: 'Counting by years, it is one thousand nine hundred and forty-six years; the year he reached Buddhahood was a year of the monkey. Counting by months, it is twenty-four thousand and sixty months; the month he reached Buddhahood was the sixth month, on the day of the full moon. Counting by days, it is seven hundred and ten thousand, four hundred and sixty-eight days [710468 days]; the day he reached Buddhahood was Wednesday, a 'tau ni' day in the Tai reckoning.2

Inscription 5 (JSS, p. 159):

... on Wednesday, a 'rwan plao' day in the Dai (Tai) reckoning, in the naksatra of Punarvasu, towards evening, one thousand nine hundred and five years after our Lord the Buddha entered Nirvana, [the king] was ordained. Counting by days from the Nirvana up to the day of his ordination, six hundred ninety-five thousand, six hundred and one days [695601 days] had elapsed.

Inscription 3 says that the day being recorded was a Friday kat rao in Mahasakarat 1279, and this can be demonstrated to be 23 June 1357:

1 The texts may be found in Fine Arts Department, Prachum Silabaranik. 7 vols, Bangkok, 1924-1993, Vol. I. 61-6 (no. 3) and I. 92-97 (no. 5). Translations are given in the extensive article of A.B. Griswold and Prasert na Nagara, „The Epigraphy of Mahadharmaraja I of Sukhodaya: Epigraphical and Historical Studies, No. 11, part 1“, Journal of the Siam Society, 61. (January 1973), pp. 94 ff. and 154 ff., esp. p. 159.

2 Cf. The Three Worlds (on which more below):

When our Lord Buddha attained Enlightenment ... it was the year of the monkey, the sixth month, the full-moon day on Wednesday at the time near the coming of dawn on Thursday; ... the Lao say that it was [a] Tao Yi day (Three Worlds according to King Ruang, tr. F.E. and M.B. Reynolds. Berkeley, 1982, p. 49).
Similarly, the Wednesday ruang pao of inscription 5 can be demonstrated to be 22 September 1361.³

³ These diagrams were generated by the Macintosh-specific program „SEAC“, written by the author in collaboration with Lars Gislén (Theoretical Physics, Lund University). The program and a Manual are available free of charge at URL: http://www.anu.edu.au/asianstudies/cvs/cedecv.html.
It can also be established with certainty that JD 2216876 (the value for 23 June 1357) minus 710468 days leads back to 28 April -588 (589 BC), whereas JD 2218428 (the value for 22 September 1361) minus 695601 days leads back to 10 April -543 (544 BC).

The interesting point—given that the two contemporary dates, 23 June 1357 (inscr. 3) and 22 September 1361 (insc. 5) are secure—is whether the day-intervals reaching back to the key events in the Buddha’s life are also secure. And in answering this question no reply will yield a sensible answer that does not replicate the method used by the original experts. The essential here is to reckon by waxing and waning calendar days. These are reckoned from year to year by varying alternations of 354, 355, and 384 days, and would obviously be very cumbersome to tally cumulatively. However, they can be averaged by means of the intercalary rules that say there must be 7 extra months in every 19 years and 11 extra days in every 57 years. A minor adjustment to these rules (the adjustment that comes closest to yielding 292207 lunar calendar days in 800 years) will allocate 350 ordinary years of 354 days, 155 adhikavara years of 355 days, and 295 adhikamasa years of 384 days to 800 years. This gives 9895 lunar months to 800 years, and the (proportional) rule of three would consequently give 24069.5875 months to 1946 years complete (counting in both AS 102 and AS 2047). The original calendrist, with inclusive counting, had one month in AS 102 and eight months in AS 2047 (MS 1279) to discount, and this would indeed give him his 24060 months.

Diagram I illustrates that if the day count is originated at Jyestha Full Moon (7m15), not at Vaisakha Full Moon (6m15), and if the month count is allowed to run from Vaisakha (6th month) in AS 102 to the end of Ashadha (8th month) in AS 2047—and if, finally, the year count is made inclusive, one obtains 1946 years, 24060 months, and 710468 days.

\[\text{Diagram I: the time interval in Inscription 3}\]
The anomaly in this reckoning is the 30-day shortfall that reaches back only to Jyestha 15, not to Vaisakha 15, in the Enlightenment year. Moreover, it is Jyestha 15 that yields the required Wednesday tao yi, whereas the intended date, Vaisakha 15, was a Monday tao san:

![Horoscope Card]

It is interesting, in this context to compare the horoscope of the Buddha’s Enlightenment that appears in the “Three Worlds” (tr. Reynolds, p. 330), a Buddhist cosmology whose compilation is roughly contemporary with the inscriptions. The positions of the planets as presented there are also all valid for the Jyestha Full Moon and not for Vaisakha Full Moon in AS 102. But it is not that the calendrists did not know their job: the prediction for the end of the Buddha Era is correct as to the cyclic day (rawai san) and for six of the seven planets.

Before attempting an explanation of the shortfall, we may also examine inscription 5, whose simpler calculations can be represented as follows. The interval this time (Diagram II) is from the Vaisakha Full Moon of Anchansakarat 147 (543 BC) to Asvina 7 waning in Anchansakarat 2051 (1361 AD). The count of days and of years is again inclusive:

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4 The mistake is not so difficult to make as to be assignable only to one source, but it perhaps suggests that the same horas (astronomers / astrologers) were called upon to provide the technical expertise required. Inscription 3, in any event, specifically (I / 66-7) asserts that King Lithai himself made its calculations. Compare, therefore, the prediction of “The Three Worlds” for 1 July 4456 AD:

When all of the relics ... come together under the great Bodhi tree ... this will be in the year of the rat, in the sixth month, on the Full Moon day when the moon will have its abode in the visakha lunar mansion—the day which the Lao call Hawaya San ...

with the same prediction in Inscription 3, I / 43 ff:

... in the year when the Lord Buddha's religion will disappear altogether, a year of the rat, on Saturday the full moon day of the sixth month, a raway san day in Thai, when the moon is in rak Vaisakha ...

5 In the text Mercury is out of place and in an astronomically impossible position. This strongly suggests an error in the MS, not in the calculations.
The calculations being correct in inscr. 5, one has to explain, if possible, the error in inscr. 3.

In performing the calculations for AS 102, the calendrist would naturally work forwards from the start of the year towards Vaisakha Full Moon. Now, whereas the source year AS 147 was an ordinary year, and the count is correct in that instance, AS 102 was an adhikamasa year and the count is wrong. If, therefore, the calendrist did not reckon Ashadha twice (thereby acquiring 30 more days), he would deduct the interval from New Year (thaiængsok) to Vaisakha Full Moon from 354 days, not from 384 days—30 days too few for an adhikamasa year. (All three other years involved in the two inscriptions were ordinary years.)

There is ample evidence in the Thai record at large that counting elements in a series could vary between inclusive and exclusive reckoning. For instance, some calendrists specify the name of the rœk or naksatra whose number they have just given, which makes it plain that one reckoning implies a count beginning at 1 and another a count beginning at zero. And not only is there difference in the way of reckoning a series at large, but there are differences, too, in the way intervals within the series are expressed. This shows itself with the dates as opposed to the length of princely reigns, and also in the way intervals within the year are counted. The norm is exclusive reckoning: Vaisakha to Bhadrapada is four months—[Vaisakha], Jyestha, Ashadha, Srawana, Bhadrapada. It is never merely three months, but it can be reckoned as five, where one imagines the calendrist telling them off on his fingers and turning the first finger down for Vaisakha the first month in his count. „If you count the months, you will get five.“ Similarly: „If you count the years, you will get 1905.“

Moreover, in past and future calculations for which BS reckoning was normally used, the months must sum to 30 (not alternately 29 and 30), the months must sum to 12 (no adhikamasa are allowed in) and the years must sum to 4999 (to allow for the split year expressed in months and days since the last Vaisakha Full Moon).

Given this as the context in which Lithai’s calculations were made, there is good reason why his initial year missed 30 days and also why the interval from [1]47 to [20]51 is [190]5.
One further small problem arises when the event is said to take place on "waxing five nights ... the time of the enshrinement was six nights". Griswold and Prasert cite Roger Billard, who commented that if the difference here were between the waxing phase of the moon and the moon’s *tithi*, then the second "nights" is out of place. They therefore leave open the question as to whether or not the relic was enshrined "at an hour which was part of the fifth day according to popular reckoning, but part of the sixth lunar day (tithi) as calculated by the astrologers" (p. 94, n. 11).

*The Three Worlds* is again pertinent here. The time of the Enlightenment is there (see note 2) said to have been "on Wednesday at the time near the coming of dawn on Thursday". The astronomical day ran from midnight to midnight; the civil day from dawn to dawn. There were thus six hours that could be simultaneously Saturday for the astronomers but still Friday in civil terms. There is no difficulty in reading the inscription as indicating that the time of the Enshrinement was before 6 a.m. on 6 waxing, still called Friday (since the pre-dawn yam belong to that weekday). The naksatra was then still Purvaphalguni, and the tithi (by Thai, not by Indian reckoning) was in fact only 4:43:

1279 Ashadha 6

*kat rao 6/10 (46)*

*Tithi 4:43*

*Naksatra 10:38 P.Phalguni*