Lunisolar Calendrical Symbolism on the Phaistos Disk

The disk and its text

The famous Phaistos disk is a small Minoan clay disk, about 15 cm across. It was discovered in the excavation of the palace of Phaistos by L. Pernier in 1908. The disk was found in the so-called temple repository room underground. A Linear A tablet was found nearby. The disk was dated by Duhoux (1977) to the Middle Minoan period, ca. 1850-1600 BCE. The disk is now generally believed to be of Minoan origin, not an import (see, e.g., Jackson 1999).

On both sides of the disk, there are printed signs that closely resemble Cretan or Anatolian hieroglyphic signs, but many of the signs have no apparent equivalents among other known hieroglyphs.

There are 45 different signs, 9 of which are used only once. The total number of the signs on the disk is 241, and these are divided into 61 signs groups or 'words', 31 words on Side A and 30 on Side B. Some of the sign groups also have a stroke sign in the end of the group (see, e.g., Godart 1995).

Based on the number of signs, the writing system of the disk is considered to be syllabic or logosyllabic (see, e.g., Duhoux 2000), which is in accordance with the Cretan hieroglyphic script and Linear A. Timm (2004) argued, based on statistical analysis of the text, that the language of the Phaistos disk script is similar to the language of Linear A.

From the printing order of the signs, it is can be deduced that the text is meant to be read inwards, from right to left towards the faces of the printed human and animal figures and the center of the disk (see, e.g., Jackson 1999). Which side of the disk was to be read first is not yet clear.

The text of the disk is very repetitive. There are also many repetitive parts of words, which may reflect the grammatical rules of the underlying language, e.g., prefixes are more common than suffixes (Duhoux 2000 and refs. therein).

Because of the repetitiveness, the text of the disk has usually been assumed to be a poem, a religious formula, a game, or a calendar.

In this paper, no decipherment of the text is attempted. Instead, the connections of the hieroglyphic text and individual signs to Minoan calendrical symbolism are examined.

Observations on the sign groups and symbols

The symbols used on side A of the disk considerably differ from those used in side B. This can reflect the difference in the vocabulary used. Another possibility is that the symbols on side A differ from the symbols of side B, because the maker of the disk wanted to relate the pictures to the general symbolism of the text as a whole. In syllabic scripts, there are sometimes several possible signs for one syllable, and the writer may choose whichever he prefers. The signs on one side of the disk may have been selected to symbolize the content of the text on that particular side.

In Minoan, as in Anatolian hieroglyphic text, some of the hieroglyphs signify not just a single syllable, but a whole word. This is obviously related to the development of a syllabic script from the pictorial representation of words. Often, this only adds to the difficulty of trying to interpret an unfamiliar syllabic script. In the

case of the disk, however, it enables connecting the symbols to the original purpose of the disk.

I have shown elsewhere that for the Minoans, the spiral was a solar symbol, representing not only the disk of the sun but also its varying path on the sky during one year (Ridderstad 2009). The spiral form of the text connects the disk to the significance of the sun in Minoan religion, and makes a calendrical interpretation more likely. Another symbol of the disk, which can be connected to the sun or, possibly, a star is the 'rosette' (Figure 1), Sign No. 38 (hereinafter S38; similar notation, following the numbering by A. Evans (1909:126), is used below for other signs, too). This symbol occurs three times on Side A, but only once on Side B.

One is now able to connect S38 to calendrical symbolism probably related to the solar calendar. But what about the lunar calendar? There is no obvious sign resembling the moon on the disk. However, S7 closely resembles the Anatolian hieroglyph No. *193 LUNA (Laroche 1960; see Figures 2 and 3). Therefore, it is likely that this is the sign for 'moon'; not a helmet, a bread, or a breast, which have also been suggested.

If one accepts S7 as a lunar symbol, then Side B of the disk seems to be related to the moon, as this sign is much more common on that side (see Appendices). With Side A related to the sun, this suggests a lunisolar calendrical interpretation for the disk. It can be noted that both on Side A and on Side B, the ending "word" in the middle of the disk contains the characteristic symbol of that side (S38 and S7, respectively).

The interpretations of the disk as a calendar have mostly been based on the repetitiveness of the text, as well as the division of the text into 30 sign groups on side A, which could correspond to the 30 days of a month.

The simplest way to obtain the number of days in a tropical year using the words of the disk is by noting that 7 x 30 + 5 x 31 = 365. However, there are no indications that the Minoans had 31 days in any month. Instead, there is evidence that they used a month of 30 days, plus five epagomenal days in the end of the year - the system, which was also used in Egypt (Ridderstad 2009).

The last and most prominent character in the central sign group A31 on Side A is S38, the solar symbol. Therefore, it may have a special meaning, and this particular sign group could have a special function as a kind of 'ending mark'.

Let us assume for a moment that the sign group A31 is indeed a special one and should be treated differently, possibly be skipped. In this way, both sides of the disk could be used to obtain 12 x 30 = 360 days, which was the length of the ancient Egyptian year. The remaining five epagomenal days in the end of the year would be denoted by A31. This would total 360 + 5 = 7 x 30 + 5 x 31 = 365 days for the solar year.

However, if A31 is special, then A12, A28 and B12, which also have S38, must have a special meaning, too. Another question concerns the lunar calendar. As Side B has lunar symbolism, a calendrical explanation should include the lunar calendar, too. Moreover, it is known that the Minoans had a lunar calendar based on following the phases of the moon, the lunar synodic month (Blomberg and Henriksson 1996, 2001, 2008).

How could the lunar calendar be represented by the disk? If there were 29 and 30 sign groups on the two sides of the disk instead of 30 and 31, the disk could be easily related to the length of the lunar synodic month, which is 29.53 days long on average.

On Side B, the 'lunar' side, the sign group B12 is the only one including S38, the solar symbol. Thus, B12 could be regarded as a special sign group on this side, which suggests that it could be dropped. S38 appears also in A12, although other signs are not the same as in B12. By skipping B12 and A12, and thus leaving 29 sign groups, i.e., days on Side B and 30 days on Side A, one is able to count 6 x 29 + 6 x 30 = 29.5 x 12 = 354 days, which is the length of 12 lunar synodic months.

However, the lunar calendrical year of 12 synodic months is 365 – 354 = 11 days short of one solar year of 365 days. Therefore, when the solar count made using the days on the disk would have already been full, the lunar count of days would still have continued for 11 days. This can be the reason why the solar symbols are situated in the 12th sign group of each side (A12 and B12) and not, e.g., in the first ones.

But what about the sign group A28? If the solar rosette S38 is a kind of 'stop sign', then some solar or lunar count on Side A has to be stopped at 26 or 27 days. This could refer to the length of a sidereal month, which is 27.3 days. Although this period of the moon is more difficult to observe, there are some indications that the Minoans were familiar with it, too (Ridderstad 2009). Thirteen sidereal months are 13 x 27.3 = 355 days long, and thus close to the length of one synodic lunar year.

However, there is another possible explanation for A28. Because the solar and lunar calendars differ by 11 days, an extra month must be inserted every two or three years to prevent the festivals related to the moon from wandering through the dates of the solar year. This kind of intercalation system was used in Classical times, and it was probably in use already in Minoan Crete (Blomberg and Henriksson 1996, 2001; Ridderstad 2009). The first intercalated lunar month must be inserted, when three solar years have passed, and the difference between solar and lunar years is 3 x 11 = 33 days. However, after inserting an additional lunar month of 30 days, a difference of three full days still remains: the lunar count gives 37 x 29.53 = 1092.61 days, while the solar count totals 3 x 365.25 = 1095.75 days. In this way, the lunar count would stop at A27, while the solar count would continue to A30. Thus, also the symbolism of the lunar intercalation system is included in the disk.

Summary and conclusion

Using the sign groups and special signs of the Phaistos disk, the length of the solar year, 360 days plus five epagomenal days, as well as the length of the lunar synodic year, 354 days, can be counted. The solar and lunar counts combined for one year and for three years can be represented using the disk.

Whether the disk was an actual calendar, or perhaps a calendrical game of some kind, can only be ascertained, when the hieroglyphic text on the disk is deciphered. However, the symbolism of the disk, its sign groups and signs clearly indicate some kind of lunisolar calendrical connection for the disk.

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APPENDIX 1

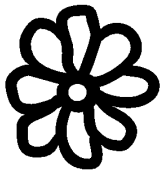

Figure 1. Sign No. 38, ‘rosette’.

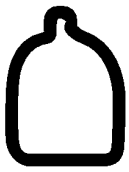

Figure 2. Sign No. 7, ‘moon’.

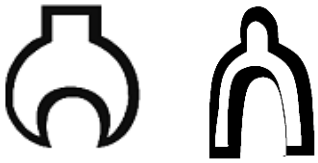

Figure 3. Anatolian hieroglyphic sign *193 LUNA, two variants.

APPENDIX 2
The text of the Phaistos disk

Side A, from A1 to A31, in numerical transcription:

02-12-13-01-18/. 24-40-12. 29-45-07/. 29-29-34. 02-12-04-40-33.
27-45-07-12. 27-44-08. 02-12-06-18-?. 31-26-35. 02-12-41-19-35.
01-41-40-07. 02-12-32-23-38/. 39-11. 02-27-25-10-23-18. 28-01/.
02-12-31-26/. 02-12-27-27-35-37-21. 33-23. 02-12-31-26/. 02-27-25-10-23-18.
28-01/. 02-12-31-26/. 02-12-27-14-32-18-27. 06-18-17-19. 31-26-12.
02-12-13-01. 23-19-35/. 10-03-38. 02-12-27-27-35-37-21. 13-01.
10-03-38.

Side B, from B1 to B30:

02-12-22-40-07. 27-45-07-35. 02-37-23-05/. 22-25-27. 33-24-20-12.
16-23-18-43/. 13-01-39-33. 15-07-13-01-18. 22-37-42-25. 07-24-40-35.
02-26-36-40. 27-25-38-01. 29-24-24-20-35. 16-14-18. 29-33-01.
06-35-32-39-33. 02-09-27-01. 29-36-07-08/. 29-08-13. 29-45-07/.
22-29-36-07-08/. 27-34-23-25. 07-18-35. 07-45-07/. 07-23-18-24.
22-29-36-07-08/. 09-30-39-18-07. 02-06-35-23-07. 29-34-23-25. 45-07/.