

Neolithic Cosmology?

Abstract

It could seem far-fetched to propose a cosmology in Neolithic time but it is never the less the subject of this paper. The hypothesis is that astronomical events could have had serious impact for the development of the culture during Neolithic times. Attention is given to the Funnel Beaker Culture (from about 4000 BC to about 2800 BC) in Northern Europe. Recent investigations of the overall layout of megalithic monument in Scandinavia concerning position and orientations show a complex pattern in clusters of megalithic monuments¹. The pattern in these structures could have been inspired by the behaviour of the rising full moon during the summer period. Following these patterns it is possible that the Neolithic people in Scandinavia learned to use the full moon as a lunar 'season pointer' and perhaps even found a way to use lunar eclipses in burial and ritual praxis. Some evidence is perhaps found in ancient literature and local names.

Introduction

The word *cosmos* originates from the Greek term κόσμος (*kosmos*), meaning 'order' or 'ornament' and is antithetical to the concept of chaos. Today, the word is used as a synonym of the Latin loanword 'Universe'. In general, the word refers to the world order, which also includes the complete Universe and its content. The word cosmology means the knowledge about cosmos. So having a cosmology means that you have knowledge about the world order. Pythagoras is said to have been the first philosopher to apply the term *cosmos* to the Universe, perhaps referring to the starry firmament². None or very little is about cosmology from Neolithic times (i.e. prehistoric period) known. Only the remains of megalithic monuments, rock carvings or archaeological evidence can give us a clue. When comprehensible written sources occur the situation is somewhat different, but unfortunately not in this case. The astronomical events referred to in this paper have no destroying cataclysmic effects on society, i.e. not meteorite or comet impacts which could cause great damage on the landmasses, in the sea or in the atmosphere or altogether. Therefore, the changes in society and culture of interest are only a result of human behaviour.

The Funnel Beaker Culture and its ability

The term Funnel Beaker Culture is inspired by the shape of the ceramics produced by this first agriculture culture in northern Europe. The culture existed from approximately 4000 BC to about 2800 BC. The Funnel Beaker Culture seems to have been centred at the area today known as Denmark. The Danish islands, mainly Zealand, may have played a central role in the Funnel Beaker Culture due to their geographical

Fig. 1. The approximate area covered by the Funnel Beaker Culture, about 3500 BC. Note the central position of the Danish island of Zealand (lower circle). Enclosed in the upper circle is the Swedish Falbygden area. Here, about 70% of all known passage graves in Sweden is concentrated.





Fig. 2. This triple grave located on Zealand close to the city of Kalundborg points out three other passage graves in the core of a passage grave cluster over a distance of approximately 3 kilometers.

position (lower circle in Figure 1), number of megalithic monuments and advanced complex megalithic constructions as double and triple graves³. The most spectacular relics from the Funnel Beaker Culture are in fact the sometimes enormous megalithic monuments known as passage graves or passage tombs, see Figure 2. These tombs are very clever and complicated constructions.

The entrances to these graves have a significant orientation⁴, with about 80 % pointing in the south-eastern quadrant, see Figure 3. The distribution pattern seems to fit full moon rises during the summer period. The funnel beaker people were peasants and had a similar culture. A peasant culture could probably benefit from some kind of a calendar. The azimuth⁵ distribution pattern seen in Figure 3 has an interesting implication. It reveals three main

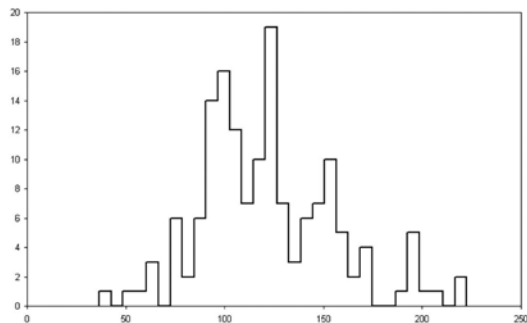
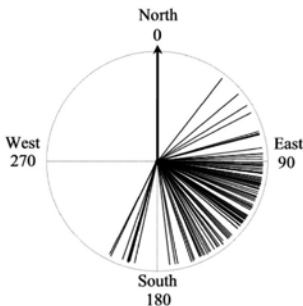
concentrations in the distribution, one peak around 100 degrees, one about 123 degrees and one about 149 degrees. All three directions related to the moon. Investigated in details these three directions can be used in two ways, one not excluding the other⁶.

A) The most obvious use of the three directions is a kind of a calendar use. Concerning the moon, these three directions can point out different periods during the summer time. The direction about 100 degrees is of special interest in this connection. These full moons indicates spring or fall. For this direction a simple astronomical phenomenon occurs. The sun and the full moon make a crossover at the horizon when they rise (see Figure 4). This is possible because the rising full moons and the rising sun move in opposite directions at the horizon. The phenomena cannot be seen directly because the sun rises on the morning and the full moon rises approximately 12 hours later in about the same direction on the horizon. The situation occurs in two periods:

- 1) At spring (from about mid-March to about mid-April) when the full moon has just made the crossover.
- 2) At late harvest (from about mid-September to about mid-October) when the full moon rises just before the fall crossover.

Fig. 3. Figure 3 gives two different presentations of the measured azimuth. The left diagram present the azimuth according to the compass directions and the right diagram shows the same directions in histogram form. The histogram reveals three significant peaks at 100 degrees, 123 degrees and 149 degrees which all can be related to the moon.

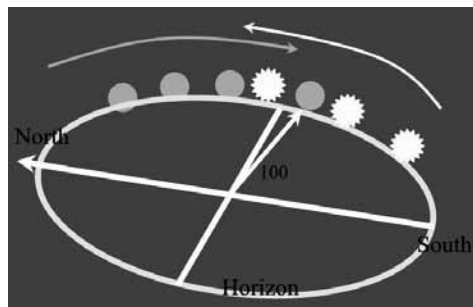
Denmark and Scania: 152 azimuth directions at latitude 55.0 to 56.5 North



The second direction around 123 degrees is the first full moon rise after the first cross over or the first full moon rise before the fall full moon, i.e. the harvest moon. These periods occur from about the beginning of May to the beginning of June or around the beginning of August to about mid-September. All other full moon rises between 123 degrees and 149 degrees indicates mid-summer period in June and July. This is the lunar 'season pointer' (see Figure 5).

B) By nature's whim the three mentioned directions could also be used to determine certain lunar eclipses. These types of lunar eclipses are called lunar standstill eclipses. In years when the southernmost full moon rise about 125 degrees (southernmost minor standstill point 3200 BC) or about 151 degrees (southernmost major standstill point 3200 BC), full moon rises about 100 degrees can be followed by a lunar eclipse. This is the conclusion from the overall distribution pattern. It is worth to mention that the rising points of the moon move between the standstill points with a cycle of 18.61 years, close to 19 years. Another indication for the full moons and a lunar interpretation is that directions around the mentioned directions for full moons appear in various structures concerning the clusters of Danish passage graves. In all investigated clusters, it seems like directions belonging to the three main directions (i.e. the three peaks) have been favoured. So far, it seems that clusters can point out the next cluster, nearly always

Fig. 4. The lunar-solar 'crossover' at spring when the rising sun is moving towards north at the horizon and the rising full moon is moving opposite towards south.



with directions within the South-Eastern quadrant. This is of course only indirect evidence concerning the moon, but out of 8 investigated clusters or pair of clusters we see that 6 clusters are connected in pairs where one cluster points out the next one through a south-eastern line⁷. The Sarup cluster complex, located on the island Fünen (see Figure 6 and Figure 7) is such an example. This complex excavated during a period of about 40 years has revealed a concentration of 125 megalithic monuments⁸ in a relatively small area within 20 square km. A more remarkable feature seems to appear now and then. It shows that the passage grave mound is clearly placed on a platform or ledge⁹. If this is an artificial feature, the funnel baker people were able to manipulate the landscape to obtain intervisibility between the megalithic units. Another remarkable feature is a possible geometrical aspect concerning the clusters of passage graves, which are seen both in Denmark and in Sweden^{10,11}. But concerning the astronomical aspect we need more directly archaeological hard-core evidence to verify the moon (or sun) relation. In recent years findings of small clay plates could support the idea but no conclusive statement can be taken (see Figure 8)¹². Therefore, traces or clues in the ancient literature or even local names must support the overall picture.

Evidence in literature and names of local places

In a comprehensive article from 1969 about Stonehenge and other megalithic monuments on the British Isles, the Swedish astronomer Peter Nilson refers to earlier studies and ancient literature which discuss the use of prehistorically monuments from the Neolithic period¹³. Nilson himself is convinced that people in Northern Europe during the Neolithic period and the Bronze Age had well developed skills concerning astronomical observations.

Also he points out that very little investigation has been done in Europe since Norman Lockyer did his first investigations of megalithic monuments in England, Scotland and in Ireland in the beginning of the



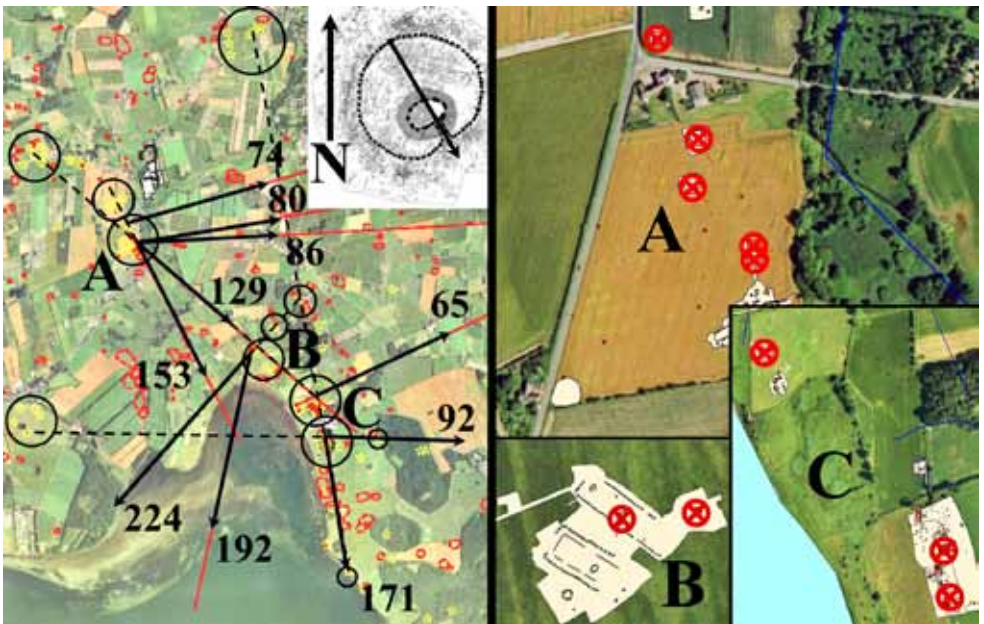
Fig. 5. The lunar 'season pointer' directions compared to the observed azimuth according to the compass presentation.

1900s. He also proposes that a greater effort in this field will reveal how people in prehistoric and ancient times solve calendar problems. This has changed dramatically the last 20 years. The author's own work is an

example of this effort. Beside the scientific work concerning the position and orientation of the megalithic monuments one has to look at local legends, myths, traditions and names of local places. This is very important work which could reveal traces of the thought and idea behind the use of the megalithic monuments. Even in ancient literature from antiquity a limited number of hints can be found. In both cases the information value is poor, but it is important if this information, in one way or another, supports your own conclusions.

Peter Nilson reports further in his article that the Italian historian of science Giorgio de Santillana points that Plutarchos, a Greek philosopher and writer (46 AD to 120 AD), in his work refers out too an opinion

Fig. 6. The left panel shows the Sarup area with its cluster complex. Niels Andersen and his teams have excavated the three 'sub' cluster structures (A, B and C) and other structures in the Sarup area. Clearly there are two main lines, one around 129 degrees and another around 171 degrees pointing in the southeastern quadrant. The insert in left panel shows the ground plane of a passage grave from group A and its pointing direction (153 degrees). The right panel shows details from the investigated groups of megalithic monuments. The monuments marked with the red encircled cross are megalithic monuments with a passage, passage tombs, i.e. passage graves and dolmens with a passage. The remaining megalithic monuments are without a passage, with only an opening or in some cases no opening. The orientations of these monuments without passages seems somewhat different with directions towards West. These monuments are older than the passage tombs and could represent another world view? Often the megalithic monuments are built in long barrows, which again have their own orientation pattern concerning their axis of symmetry. The distances between the units in the local groups are within a few hundred meters.



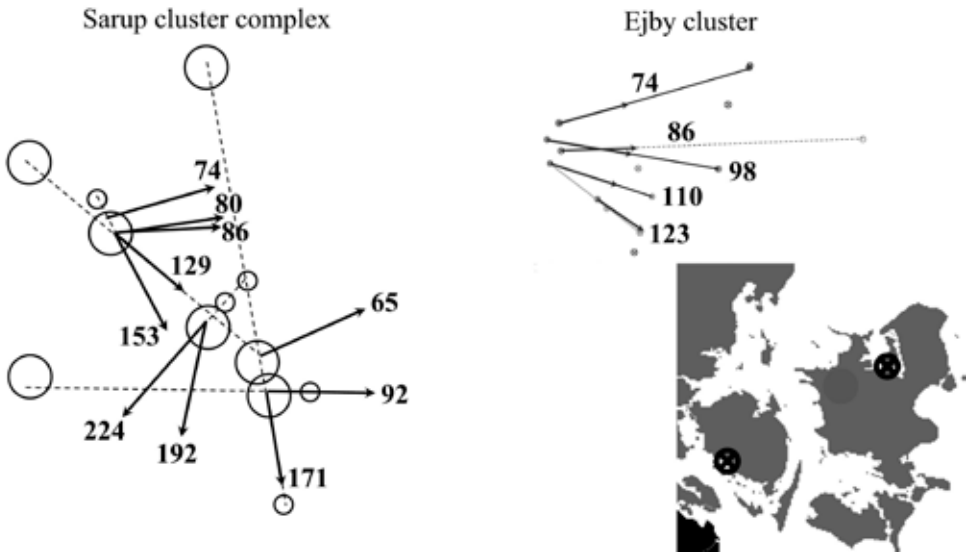


Fig. 7. The Sarup cluster complex (left) compared to another Ejby cluster (right) located on Zealand. The Sarup complex is located on the island of Fünen (left island on the enclosed map). The upper cluster points out the lower cluster through a southeastern line (see Figure 6 and figure caption). Note that the right cluster presented, located on Zealand, share common directions with the Fünen clusters. Note also that the Fünen cluster complex presents directions which belong to the interval covered by the three peaks in Figure 3, whereas the cluster on Zealand only reveals two of the peak directions. The distance between the two cluster locations is approximately about 120 kilometers. The encircled cross shows the position of the two cluster structures on the enclosed map.

from Eudoxos of Knidos concerning the "eclipse daemon" Tyfon as associated with an 56 angled geometrical figure¹⁴. The number 56 is connected to the interpretation of the Stonehenge Aubrey-circle which has 56 'postholes' along its circumference. Gerald Hawkins proposes in his article 'Stonehenge decoded' the 'Stonehenge cycle' which is a 56 year lunar cycle connected to lunar eclipses¹⁵. Peter Nilson argues that a perhaps more directly allusion to Stonehenge can be found in the work of the ancient Greek historian Diodorus Siculus (Diodorus of Sicily) 'History of the Ancient World' (English translation from 1935)¹⁶. Diodorus reports about the prehistoric Europe, in the end of a description concerning the prehistory of England:

'The moon seen from this island seems to be on little distance from Earth revealing an uplift in the landscape which is similar to them (uplift) on Earth, visible for the na-

ked eye. According to the legend it is told that even the God visits the island every 19 years, which is within the period the stars fulfils a complete cycle returning to their original position in the sky. There also is a magnificent area in the landscape devoted to Apollon and a strange temple and its guardians are named "boreaders"¹⁷ and the successors for this post are always drafted from their families.'

It is possible that the 'god' mentioned in the above quotation refers to the moon. Apollo could in this case refer to the moon (before he was associated to the sun). In any case the number 19 could refer to the 19 year lunar eclipse cycle and could indicate that this cycle was known in prehistoric times. Otto Neugebauer one of the foremost experts on ancient astronomy from last century has proposed an interpretation of the astronomical sections of the Book of Enoch which has been preserved in an



Fig. 8. (left) A small clay plate, as referred to in the text, found in a dolmen, interpreted by archaeologists as showing both the sun and the moon. The plate is estimated to have been made in the period 3000–2700 BC, i.e. the late Funnel Beaker Culture. If the interpretation is correct, it could provide evidence for the sun/moon combination idea, i.e. the lunar-solar crossover. (right) An idealized drawing of the plate.

Ethiopian translation¹⁸. In these sections are mentioned the four ‘gates’ of the moon which Neugebauer interpret as the lunar standstill points. The lunar standstill points have four specific azimuth directions for rising and four for setting. The lunar rising or setting points move between the minor and major standstill points with the cycle of 18.61 years very close to the lunar eclipse cycle of 19 years, as mentioned earlier.

The mentioned examples of described lunar knowledge from ancient literature give a clue about the interest for the moon in ancient times and perhaps in prehistoric times. It is also known from the Babylonian sources that the moon played a central role. Again we find comprehensive work by Otto Neugebauer concerning astronomy in antiquity and ancient times¹⁹. Especially the moon tables are of interest in this matter. According to Neugebauer It is possible that the Babylonians already from about 700 BC knew the lunar 19 year cycle.

It is not only in ancient literature we can find traces or clues about the interest in the moon.

Local names, local traditions or perhaps even local tales can give us some information about the interest in the moon. To illustrate this we have local place names. In the Danish register data base²⁰ for local names and places appears now and then a name as ‘Maanehøj’, ‘Månehøj’ or ‘Monshøj’ concerning burial mounds which contains passage grave or dolmens. In English these names means ‘Moon hill’ or ‘The hill of the Moon’. Other names such as ‘Vårhøj’ or ‘Solhøj’ which means ‘Spring hill’, ‘Sun hill’

respectively are also seen. These names are names for mounds which have existed for at least 5000 years. Could it be interpreted as an expression for knowledge about the Lunar-Solar cross over at spring? The total number of mounds, with the mentioned names extracted from the Danish register data base for local names and places, are 196, mainly concentrated on the Danish island of Zeeland (see Figure 1).

Anyway, possible evidence for interest in the moon in ancient times and perhaps prehistoric time exists, even if it is not so widespread in ancient literature, and must be taken into account for further consideration. F. Richard Stephenson writes, in the end of an article from 2003, that he wishes that historians and astronomers should have better cooperation when it comes to translating astronomical literature from ancient times²¹.

Discussion

Taking both the physical evidence, the clues in ancient literature and names of places as an indicator for interest in the moon in prehistoric times it is possible to imagine a kind of cosmology in Neolithic times, at least in Northern Europe. As a speculative idea could the following be proposed:

The funnel beaker people knew already since the beginning of their culture (4000 BC) that the moon, not the sun, could be an important indicator for the seasons. It could give the starting point for certain rituals concerning seeding, harvesting etc. not an exact time (the weather will tell you

when it is the right time for seeding and harvesting) but the time for the rituals synchronized by the moon. This is possible over a gigantic area as long you can see the (full) moon. The cluster structures of passage graves and dolmens expanding in the landscape will in a sense take the whole landscape into account in a Neolithic context as a ritual landscape. This could be interpreted as a cosmology controlled by the moon and its laws laid out in the landscape.

As the lunar eclipses were recognized special rituals were performed. When the moon was eclipsed it revealed an opening to 'the kingdom of the dead' and this was the right time for doing a ritual concerning the dead. In a sense, you could say that the passage in a passage grave could function as a 'spiritual launching-pad'. To perform this kind of ritual, one would rebury the dead in the passage grave when the time was right – and the time was right when the lunar eclipse occurred. The speculations can go further: perhaps the cluster structures also functioned as gigantic preformed spiritual lock systems which also showed the direction to the next settlement?

A complete cosmology was performed with the sun and the moon, a solar lunar relation, with the moon as the steering and the dominating factor, at least for a period.

This idea is of cause only a contribution to other ideas concerning cosmology in prehistoric times and of cause a hypothesis but physical evidence seems to support this idea.

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Notes

¹ Claus Clausen, Ole Einicke and Per Kjærsgaard, 'The orientation of Danish passage graves', *ACTA Archaeological*, vol. 79 (2008), [hereafter Clausen, *Orientation of Danish passage grave 1*]: pp. 216-29,

Claus Clausen, Per Kjærsgaard and Ole Einicke, 'The orientation of Danish passage graves on the islands of Samsø and Zea-

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Claus Clausen, 'Danish passage graves and intervisibility: a new perspective', *ACTA Archaeological*, [hereafter Clausen, *Danish passage graves and intervisibility*]: preprint (2012).

² Anon., Wikipedia at <http://en.wikipedia.org/wiki/Cosmos> [accessed 30 October 2012]

³ Torben Dehn and Svend Illum Hansen, 'Doubleness in the Construction of Danish Passage Graves', in *Neolithic Orkney in its European context*, ed. Anna Ritchie, (McDonald Institute Monographs, 2000), pp. 215-21.

⁴ Clausen, *Orientation of Danish passage grave 1*, p. 219.

⁵ The azimuth is the angle along the horizon for a rising celestial body measured clockwise from geographical North = 0 degrees to 360 degrees (North).

⁶ Clausen, *The lunar 'season pointer'*, p. 5.

⁷ Clausen, *Danish passage graves and intervisibility*, pp. 3-4.

⁸ Eriksen, P. & Andersen, N.H., 2014. *Stendysser. Arkitektur og funktion*. (Jysk Arkæologisk Selskab, Århus 2014)

⁹ Clausen, *Orientation of Danish passage grave 1*, p. 219, Figure 3.

¹⁰ Clausen, *Danish passage graves and intervisibility*, p. 3, Figure 4.

¹¹ Lars Blomqvist, *Stenåldergeometri: Avancerade beräkningar bakom gånggrifterna på Falbygden, Västergötland* (Nyköping, Nyköping Tvärvetenskapliga Bokförening, 1991), [hereafter Blomqvist, *Stenåldergeometri*], p. 6 and pp. 10-13.

¹² Uffe Lind Rasmussen, *Dusagerdysen: Beretning om en genfundet dysse ved Skejby*, Moesgård Museum, report FHM4745 (Århus, 2009), p. 8

¹³ Peter Nilson, 'Kring några undersökningar av Stonehenge och andre fornlämningar på de Brittiske öerne', *Astronomisk*

Tidsskrift, nr. 1, (1969), [hereafter Nilson, *Undersökningar av Stonehenge*]: pp. 1-26.

¹⁴ Nilson, *Undersökningar av Stonehenge*, p. 26.

¹⁵ Gerald S. Hawkins, 'Stonehenge Decoded', *Nature* 200, (26 Oct. 1963): pp. 306-308

¹⁶ 'The ancient world' Diodorus Siculus. Diodorus of Sicily. Translated by C.H.Oldfather et al. 12 vols. Cambridge, Mass.: Harvard University Press, and London: Heinemann, 1935.

¹⁷ Boreaders are often known as the brothers of Cleopatra VII. Anon., Cleopatra VII Biography at <http://www.notablebiographies.com/Ch-Co/Cleopatra-VII.html> in the section 'The house of Ptolemy'[accessed 10 November 2012].

¹⁸ Otto Neugebauer 'Notes on Ethiopian astronomy', *Orientalia* 33, (1964): p. 49.

¹⁹ Otto Neugebauer, *A History of Ancient Mathematical Astronomy* (Springer-Verlag, 1975) and

Otto Neugebauer, *The Exact Sciences in Antiquity*, Vol. IX (København, Ejnar Munksgaard, 1951)

²⁰ Anon., At <http://www.kulturarv.dk/fundogfortidsminder/Download/> [accessed 1 November 2012]

²¹ F. Richard Stephenson, 'Historical eclipses and the Earth's rotation', *Astronomy & Geophysics*, vol. 44, 2.22, (2003)

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