



Orientation of megalithic monuments in Germany and the Netherlands

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Abstract

The Western Group of the Trichterbecherkultur (TRB Culture) built the megalithic monuments in Northwest Germany and The Netherlands. These monuments include different types of megaliths belonging to the TRB-West group, among which the most common are Passage Graves. We have obtained data for 163 monuments in this area in three campaigns. The present study completes two previous communications at SEAC meetings. We consider that the measured sample is largely completed and therefore we attempt a full analysis of the data. We have measured the orientation of the chamber and passages (where possible) for the Passage Graves, and for the so-called Langebetten. The general orientation of the chamber of the Passage Graves is east west, with another concentration of monuments at azimuths around 70 degrees. The passage is always located to the southern or eastern sides of the chamber. Possible astronomical explanations involving the Sun and the Moon are attempted. We find a preference towards lunar orientations. The general orientation of the Langebetten is similar to the Passage Graves although a preference to significant positions of the Sun and Moon is detected.

Finally we perform a comparison with data from the literature of other TRB groups and give a tentative explanation for the evolution of the megaliths and their orientation.

Keywords: Neolithic, Burial rituals, Passage Graves, Earthen Long Mounds, Orientation, Monuments.

Introduction

Passage graves and other similar megalithic structures are common in the Neolithic landscape of The Netherlands and North West Germany. They belong to the Trichterbecherkultur (TRB) culture dated back to the Early and Middle Neolithic period (Bakker 1992, Midgley 1992, Baldia 1995). The earliest TRB pottery appears between the lower Elbe and middle Vistula region with a somewhat homogeneous character (4500-4000 BC, Midgley 1992). Bakker (1992) also points out that the TRB in Denmark appears later than in Poland or Holstein (Germany). After this formation period follows an expansion to several neighboring regions and the formation of local groups in the pottery types dating around 4000 BC (Midgley 1992, Bakker 1992). The radiocarbon dates and the typological dates of the ceramics are somewhat late for the so-called West group (Netherlands and Germany west of the river Weser, 3400-2800 BC; Baker 1992). Such late dates are often attributed to lack of research although it has also been explained in terms of a spread of the culture from the North or East group to this western region after the formation of TRB culture in the eastern area (Midgley 1992).

TRB people buried their dead in a number of different structures among which are megalithic tombs. In the North and East groups there seems to be an evolutionary track in the morphology of the graves used. The first one would have been the

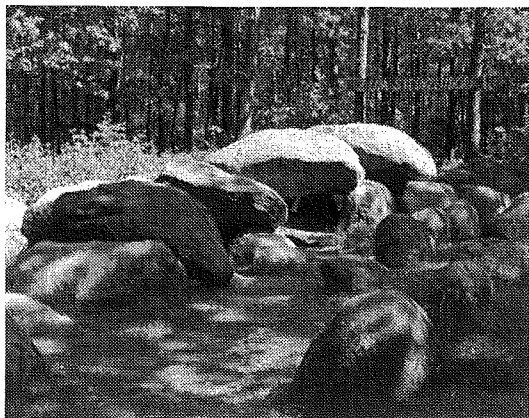


Fig. 1: The *grossSteingrab* near Thuiene.

earthen long mounds and the flat graves (Bakker 1992, Midgley 1992, Baldia 1995). The long mounds or long barrows often had massive boulders and/or timber structures along with shallow ditches defining a ritual space. An evolution of this would be towards the urdolmen and the different types of dolmens reported (Baldia 1995). From these evolved the GrossDolmen and finally appeared the GrossSteingraber whose main difference with the GrossDolmen is the position of the entrance in one side of the chamber instead to be at one extreme (Baldia 1995). During this evolution the burial chamber is becoming larger. Sometimes more than one of these structures coexist in time in the same area and tends to blur the evolutionary track. A parallel evolution of dolmens and passage graves has also been proposed (Midgley 1992).

The TRB West region has been termed the passage grave area due to the high relative number of these structures with respect to dolmens (almost non existing west of the river Weser, Midgley 1992). There we mostly find GrossSteingraber, although a few of the other structures have also been reported such as long mounds or Langebetten (Fansa 2000, Bakker 1992).

Here we report on the orientation measurements of 163 megalithic structures in the TRB West region. This study complements and completes previous ones presented in other SEAC meetings (Gonzalez-Garcia & Costa Ferrer, 2003b, 2006b).

A GrossSteingrab consists on a rectangular chamber formed by large orthostats. The space between these massive boulders is filled by dry stone masonry. An entrance is commonly located in the middle of one of the long sides and is often marked by a few pairs of stones. The whole structure would be covered by an earthen mound (tumulus) leaving open the entrance and probably the capstones that covered the chamber. In several cases a kerb of stones, whose purpose would be to support the soil of the tumulus, surrounds the tumulus.

In the TRB West region the passage is always much shorter than the chamber. In fact the TRB West GrossSteingraber developed the largest cham-

bers of the whole TRB culture (Midgley 1992, Balidia 1995; see Fig. 1), while the passage is only marked by one or two pairs of stones or even sometimes does not exist at all.

The building process of these structures has been explained in the following way. First a rectangular mound of soil is laid in the place and with the orientation of the chamber. A ditch is carved around this mound. Then the previously cut boulders would be rolled until one extreme is situated near the ditch. At this moment the boulder would be raised and placed vertically, lying over the mound with the flat side towards the inner part. This would be repeated until the mound is covered with boulders and dry masonry, leaving open only the place for the entrance. The soil would then be removed leaving the chamber in place. Finally the whole structure would be covered by the earthen tumulus, which prevents the megalith from collapsing (Fansa 2000).

In this process we can see that one of the first elements to be built is the chamber and probably its orientation was the first to be determined. This together with the much larger size of the chamber relative to the passage for the megaliths of this region prompt us to choose the chamber axis as the main one for the orientation. Given the patterns in orientation seen below and the lack of prominent topographical features in the landscape we think that an astronomical aid to achieve the proper orientation was probably used.

Measurements

We have taken readings for the chamber orientation of 163 megalithic monuments. The readings for the Netherlands can be found in Gonzalez-Garcia & Costa-Ferrer (2003a) and for the monuments in Germany in Gonzalez-Garcia & Costa-Ferrer (2006a). At first sight there is no obvious reason to prefer any particular sense of direction. The remains of bodies found inside the Passage Graves in TRB West are very scarce due to the acidity of the soil (Bakker 1992). In other TRB regions there are remains inside Passage

Graves but the bodies seem to be dismembered. This has led to think that the megaliths were secondary burial places at least in an evolved of the TRB culture (Bakker 1992, Midgley 1992). Although there seems to be a certain sense of ordering the bones in piles, there is no obvious preference in the orientation of the remains within the chamber (Midgley 1992). Human remains have been found in pre-megalithic burials, Iwaniszewski (1995) reported on relationships between the orientations of long barrows and the burials inside them in Poland, often with the head to the west (Iwaniszewski 1997) although in a number of them with more than one body inside the remains are placed in antipodal directions (Balidia 1995).

Figure 2 (outer circle) shows the pattern of orientation for the chamber. We represent the orientation to both ends of the chamber. We see that although there are monuments around the whole compass, there is a preference for the orientation of the chambers towards east-west directions. In particular 85-87% of the monuments are within the arcs for sunrise/sunset for the latitudes of these monuments. If we consider the extreme positions of the

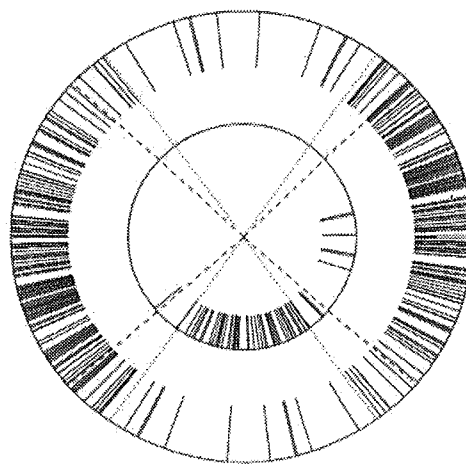


Fig. 2: Orientation diagrams. Outer circle shows the orientation of the chamber to both ends. The inner circle presents the orientation for the measured passages. Dashed lines indicate the solar extremes and the dotted lines the lunar extremes.

Moon then 94 % of the monuments lay inside these limits. This seems to point to a possible astronomical origin for the orientation of the chambers.

To discriminate which end (east or west) should be preferred we have looked at where the entrance is placed. We could measure the orientation of the passage for 63 monuments; this can be seen in Fig. 2 (inner circle). The passages are always in the middle of one of the long sides. We see that for the monuments with the chamber oriented east west the entrance is in the southern side. There are well-defined extremes for the range of openings of the passage in the southern rising and setting of the Sun and the Moon. Also for those monuments which chamber is oriented north south the entrance is always to the eastern side. Although we must be cautious generalizing these limits to the full sample because we only have passage measurements for 39% of all the monuments considered here, the trend of finding the entrance to the southern or eastern side seems robust. This prompts us to choose the southern orientation of the chamber for the monuments placed north south and the eastern one for those placed east west.

A histogram for the orientations is presented in Figure 3. We find two well defined maxima, one close to azimuth 90 degrees and a second one at azimuth 70 degrees. Considering that the orientation is astronomical we argue that such peaks could be related to either the rising Sun or Moon. For the Sun the peak at 90 degrees could be related to the Sun near the spring or autumn equinox, for the 70 degrees this could be the rising Sun around 1 month after or before the spring/autumn equinox. If we consider that the relevant object was the Moon, then the maximum at 90 degrees could be related to the rising Full Moon near the equinoxes. For the 70 degrees it could be the rising Full Moon one month before or after spring/autumn equinox.

Following Gonzalez-Garcia et al. (2006c), we have tried several models to find an explanation for the 70 degrees peak. In particular the Full Moon one month after the autumn equinox matched quite well the distribution and the position of the maximum for this 70 degrees peak (see the dashed curve in Fig. 3).

In view of this, we argue that the important element to explain this peak is the Full Moon one month after the autumn equinox. Also if the peak at 70 degrees is explained by the Full Moon we feel that the peak at 90 degrees should also be explained this way, and most probably all orientations as well.

In this sense it is interesting that autumn equinox marks the start of the cold part of the year and has been traditionally linked to the cult of the dead. The Moon has typically a psicopompous nature, acting in several cultures as the souls bearer to the other world.

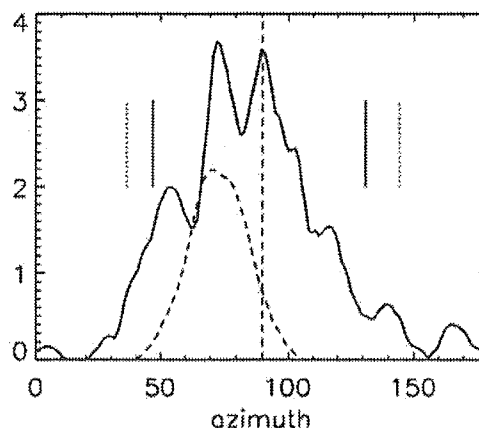


Fig. 3: Histogram for the azimuths of the chambers (solid line), the relative number is normalized to the mean of the distribution. The dashed curve represents the range of azimuths for the rise of the Full Moon one month after Autumn equinox. Vertical solid lines give the solar extremes and the dotted vertical lines the lunar extremes.

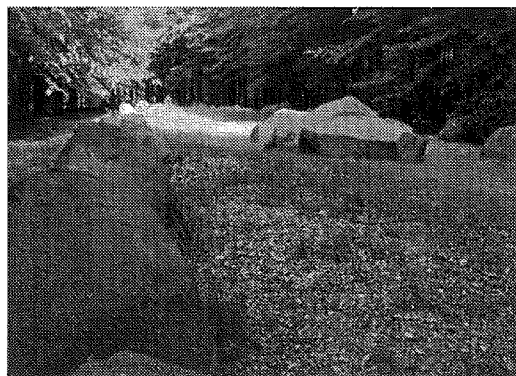


Fig. 4: The Visbeker Brautigam, example of a Langebet.

Langebetten

Possibly the most conspicuous megalithic monuments in the TRB area are the so-called long barrows or Langebetten. These consist of a large earthen mound surrounded and contained by large orthostats. Inside this structure there is often one or more megalithic chambers, sometimes with a short entrance. An example of these monuments is the Visbekker Brautigam (Fig. 4). Its mound is more than 100 meters long and a cluster of smaller GrossSteingraber surrounds it.

For the TRB-West we have identified 11 of these structures with a total of 14 chambers. We have measured the orientation of the mound. Long barrows in other TRB regions show a 'tail' edge giving a clear sense of direction (Iwaniszewski 1995), however TRB West Langebetten do not show such clear short side and therefore we follow the same reasoning as before to select a given sense of direction.

The results are shown in Fig. 5. The top panel shows a hint of a concentration towards east and winter solstice but the relative low number prevents to draw any general conclusion.

We have tried to complete the sample from map measurements for the TRB North (Tilley 1999) with 26 of these structures. The bottom panel in Fig. 5 shows a histogram of the orientations for the total 37 Langebetten. A highly prominent peak around east is found with secondary maxima near other astronomically significant directions.

In our view this must be astronomically intended. Again the fact that one of such peaks is a cluster around one of the extreme positions of the Moon seems to point to a lunar basis for the orientation.

Langebetten have been claimed to be an evolution of the wooden long houses of the LBK culture although with a change in the general direction (Midgley 1985, Iwaniszewski 1997; However, in recent years timber constructions are viewed as a consequence of lack of stones rather than an evolution). If this is the case and given the differences and similarities between the orientations of the Langebetten and the GrossSteingraber we can see a sense of evolution also in the orientation patterns of the mega-

lithic monuments with time, perhaps reflecting an evolution in the ritual mind of this people.

Other Groups

We want to investigate how the results for the TRB West group relate with the orientations of passage graves for other TRB groups. To do so we have taken the data collected by Baldia (1995) in his PhD thesis. He collected data for over 1200 megalithic sites around the TRB area, out of which he has map measurements for the passage for around 700 monuments. We have checked out his data for TRB west with our measurements and find a good enough agreement, so we feel that for the sake of comparison his database is accurate to provide a reasonable working model. For the TRB North we also use results from Hardh and Roslund (1991) and map measurements from the book of Tilley (1999). Finally for Mecklenburg we also have measurements from

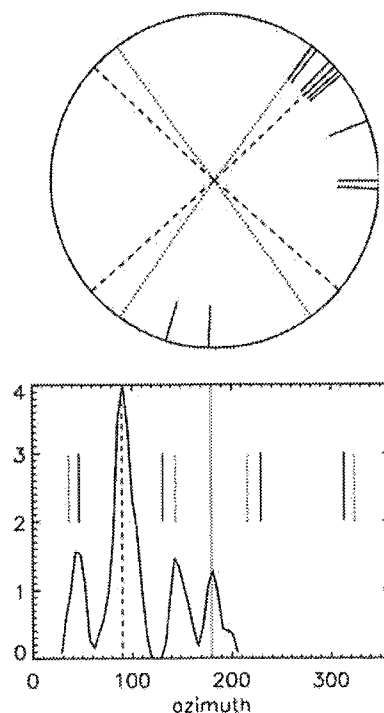


Fig.5: Top: orientation diagram for 11 Langebetten in TRB-West. Bottom: Histogram for 37 Langebetten from all TRB areas.

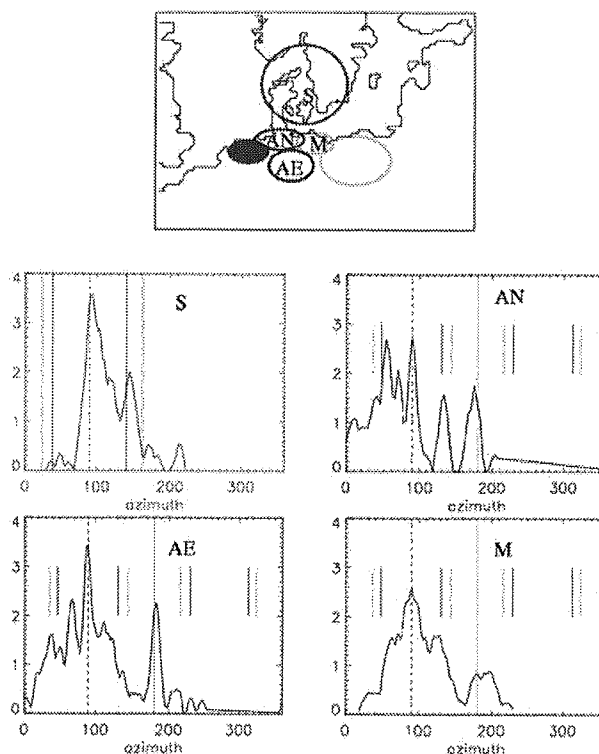


Fig. 6: Diagrams of chamber azimuth for different TRB areas. Top, the different regions considered. Middle left, azimuth of the chambers for Scandinavia; middle right: North Germany; bottom left: South Germany; bottom right: Mecklenburg.

Hamel (1985).

In Fig. 6 we present the results for each TRB group as a histogram, to compare with the results for TRB west see Fig. 3.

As we go towards the east we find a similar situation to what is found for TRB West. We find the strong peak at 90 and a secondary one at 70 degrees. The 70 degrees peak is not so prominent in the other regions as it is in TRB West. For Mecklenburg it could not exist at all. For the North of Germany there is a secondary peak at azimuth 55 degrees.

Finally for TRB North the situation is rather more complicated. TRB North passage graves present quite long passages, and this is the structure that has usually been taken as the one defining the main direction. If we consider this then there is a peak at 90 degrees and a secondary peak at 145 degrees. It is interesting to note that the perpendicular to this last one is around 55 degrees in agreement with the most prominent peak found in northern Germany. Finally

there is no peak at 70 degrees or at the perpendicular of this (160). The overall distribution is thus different from the one found to the south.

Discussion

The Langebet enclosures seem to present orientations well correlated with astronomical phenomena. They are mostly oriented towards east and towards the rising of the Moon at the extreme positions. Iwaniszewski (1997) performed a study of the orientation of these structures for several clusters in Poland and compares with local groups of LBK long houses. While the orientation of the long houses tends to be N-S the long mounds are oriented towards directions included in the solar range with a preference towards due east-west, pointing to a significant change of direction perhaps aiming to symbolize "relations of non-identity" with the LBK structures. Pasztor & Roslund (1997) measured the orientation of long barrows in the Mecklenburg area finding clus-

tering of the orientations towards N, NE and E in agreement with Iwaniszewski (1997) and our data.

Iwaniszewski (1997) finds for the flat graves a common tendency to be clustered with a large spread around 254 degrees. It is suggestive to find that if we consider the eastward direction instead of the westward for these structures we would find 74 degrees, close to the 70 degrees peak that we report for passage graves. Bakker (1992) points out that there is no flat grave found in TRB west. This perhaps indicates a previous evolution of the building strategies and a later introduction in TRB west. Also TRB west shows almost no dolmens and has therefore been termed as the Passage Grave area (Midgley 1992)

The TRB West Passage Graves have chambers oriented mostly east west and around 70 degrees, with the entrance always in the southern (or eastern) side. The pattern of chamber orientation could be well explained by the rising of the Full Moon. To explain the concentrations of orientations towards east and at 70 degrees we can argue that the target was the Full Moon near the equinox, and the first Full Moon one month after the autumn equinox. These second date is close to the date of the end of October beginning of November a traditional period in North European regions for the cult of the dead, indicating also the beginning of the colder part of the year symbolized by the Celtic feast of Samhain. Iwaniszewski (1997) already proposed this hypothesis after discussing the orientations of the long mounds in Poland. Our results provide support for this hypothesis after taking into consideration a group from the same culture but from a different and distant geographical location.

Baldia (1995) considers the possible celestial relation of the orientation of the megalithic structures of the TRB culture. He argues that the entrances could be thus related to for example the midsummer Full Moon rise. However he disregards the possibility that chambers are also astronomically oriented. To reach this conclusion he uses chamber measurements from map measurements and does a coarse binning in sets of 22.5 degrees along the eastern direction between north and south. Doing such exer-

cise it is easy to find that structures such as those presented in figures 3 and 6 of the present paper are blurred and an almost flat distribution is found. For TRB west it can be argued if the passage or the chamber orientations was the important one for the cult practices. However given the relative shortness of the passage it is likely that the first structure to be built and to be oriented needed to be the chamber. Given the lack of prominent landscape features in this area we argue that the intended orientation must have been achieved by astronomical observations.

The orientation of megalithic monuments along several TRB areas presents a common trend to have the main structure oriented towards east, however there are local differences for the different regions. Although the structure of the monuments seems different to those to the south, a secondary maximum could appear in Scandinavia and north Germany related to 55/145 degrees, possibly associated to the solar or lunar extremes. A difference appears between east and west of the river Elbe with regard to the 70 degrees peak, which becomes stronger as we move towards the west. This may point to a local evolution in the orientation customs.

Following the reasoning of an evolutionally track from LBK long houses to long earthen mounds (Langebetten when surrounded by massive boulders, Midgley 1985) and from these to Passage Graves (either directly –Midgley 1992– or after dolmen evolution –Baldia 1995–) and given the consistency in the orientation patterns found between Langebetten and passage graves this claims for a long preservation through the TRB culture (more than a thousand years) of orientation customs.

A local origin and evolution of TRB megalithic monuments could be consistent with the orientation patterns here described but possible local evolution should also be considered. These local evolutions could have been suffered from external influences but more studies on near by megalithic regions are needed to support or disprove this hypothesis.

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