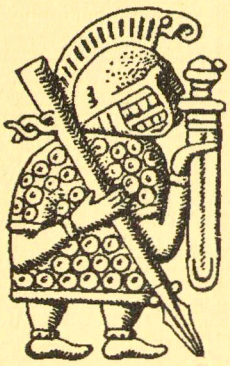

FORNVÄNNEN

JOURNAL OF SWEDISH ANTIQUARIAN RESEARCH

New interpretations of Viking Age weathervanes
Engström, Jan
Fornvännen 91:3, 137-142
http://kulturarvsdata.se/raa/fornvannen/html/1996_137
Ingår i: samla.raa.se

New Interpretations of Viking Age Weathervanes

By Jan Engström and Panu Nykänen

Engström, J. & Nykänen, P. 1996. New interpretations of Viking Age weathervanes. *Fornvännen 91.* Stockholm.

The famous Viking Age weathervanes which have been found in Sweden, Norway and Finland are re-examined. The authors claim that weathervanes were not merely *objets d'art* or symbols of rank but also played an important part as navigation instruments. Weathervanes were used as angle measuring devices for estimating the height of the sun or stars above the horizon. Later on the weathervane was adopted by the Christian Church and its original use was forgotten.

Panu Nykänen, Jan Engström, Department of archaeology, University of Helsinki, PL 13, FI-00014 Helsingin Yliopisto, Finland.

Viking navigation

It is common knowledge that the Vikings were very active sailors throughout the Viking era. Their extensive journeys were made possible by their relatively seaworthy vessels, their high standard of seamanship and their knowledge of celestial navigation.

Ships were navigated on the open sea by expert navigators who were very highly respected in their society (Norr 1987). Some physical evidence concerning the actual practice of Viking age navigation and sailing has been preserved. Most of this knowledge is obtained through interpretations of the Icelandic sagas and by means of experiments with replicas of Viking ships (Crumlin-Pedersen & Vinner eds. 1986). However, navigation in particularly has been neglected and up-to-date descriptions of Viking Age navigational skills and aids are rare. It is true that very few actual artefacts which could be associated with both navigation and the Viking Age have been preserved but there is one object which has been taken as being wholly other than a navigation instrument.

The Viking age weathervanes (or windvanes), most of which have been found in Medieval churches in Norway, Sweden and Finland have hitherto been regarded as non-functional windvanes, mere symbols of rank and power. There is no reason to disagree with the opinion that they were indeed used also for this purpose, but in our view they were designed primarily as navigation instruments; only later were they adopted by the Christian Church, and the original function forgotten.

The weathervanes

The weathervanes seem to have been used to measure celestial angles in two different ways. The first probably served to measure the stars' height from the horizon since the vanes are designed to be focused directly onto the object. Naturally this was impossible with regard to the sun. The so-called miniature weathervanes from Saltvik, Åland and Björkö, Sweden are of this type I. The measurement is performed through a diopter sight, and the reading can be taken with a lead-line attached to the plate (Fig. 1). The weathervanes of type II were most likely used for measurement of the height of the sun using the shadow thereof as an indicator (Fig. 2). The instruments accurately aligned with the horizon with the help of a lead or a wooden plank floating in a bucket of water.

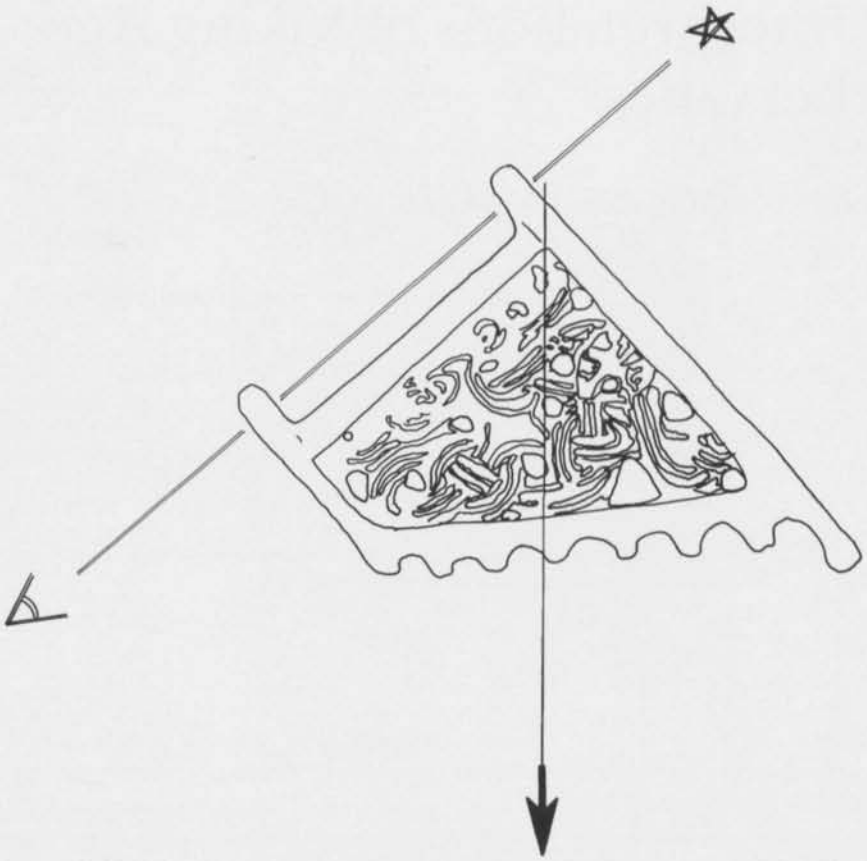

Fig. 1. The so called miniature weathervanes (type I) can be used to determine a star's height above the horizon. – De s.k. miniatyrvindflöjlarna (typ I) kan användas för att bestämma stjärnornas höjd över horisonten.

Some minerals are capable of polarizing light, so that the position of the main light source can be determined despite the presence of clouds. The use of this so-called *sólarsteinn* (sunstone) has enabled measurements even when the skies were overcast (theory by Ramskou 1967). A *sólarsteinn* could easily have been attached to the weathervane.

The most important fact is that the division of the readings in all the instruments is the same, approximately 4.8 degrees up to the height of 70° above the horizon. The reading divisions of the weathervanes are measured from the angle between the vertical axis and the marks along the edge of the instruments.

It must be noted, that while the readings from the weathervanes can be measured nowadays very precisely with modern devices and computer technology, formerly the measurements were based only on human eyesight, presumably in very rough conditions. So computer interpretation could lead to wrong impressions of the instrument because of two sources of error. The significant facts in the reading of angles could be distorted, so that a modern man would search for meanings which were unthinkable in the Viking Age. So all the given numbers have only a representative value—they were not in use in real life.

We do not know for how long navigators have used measurements of degrees of angle readings. Most probably the basic unit used by the Vikings was the semidiameter (S.D.) of the sun—wiz. 0° 16'. 20 × S.D. = 5° 20' nearly coincides with the mean division of the readings in the weathervanes. Twenty is known to be an an-

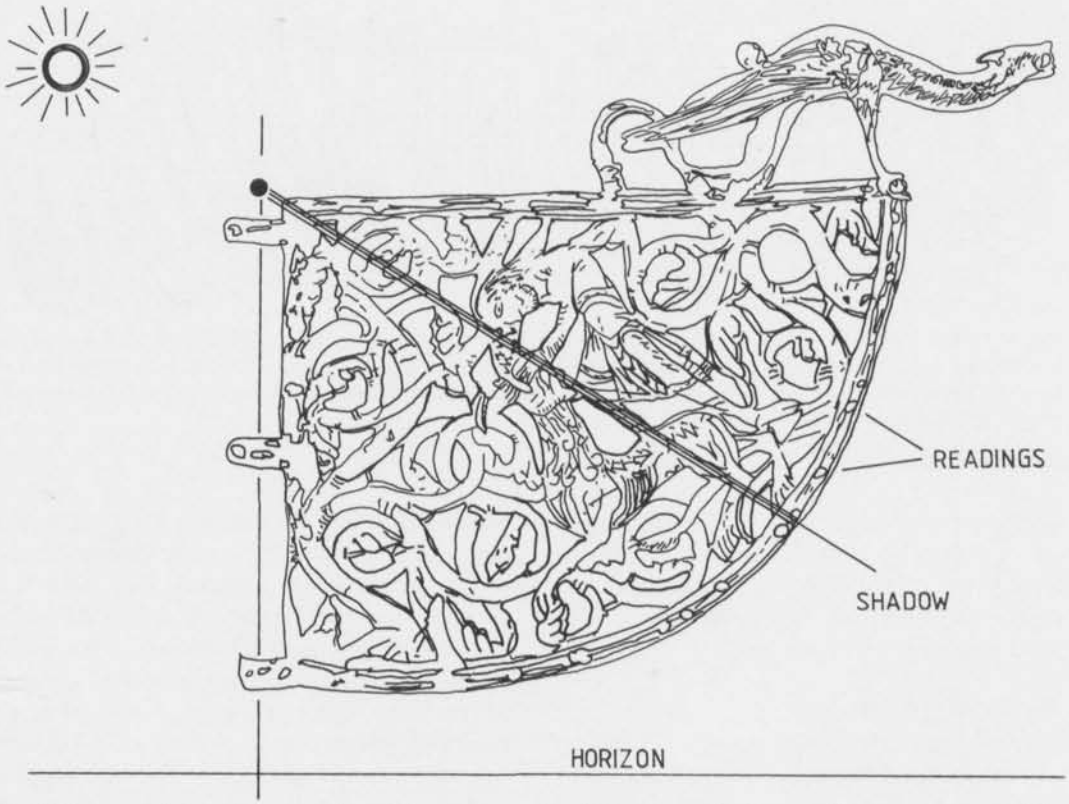

Fig. 2. The so called weathervanes (type II) contain marks which were probably used for measurement of the height of the sun. In all five known cases the division of the readings is approximately 4.8 degrees. – De större vindflöjlarna (typ II) har punkter som troligen har använts för att mäta solhöjden. På alla de fem kända flöjlarna är delningen ca 4,8°.

cient measurement unit in many contexts. The reading accuracy is, of course, much better. The instruments in question could easily be read in the accuracy of 10 S.D.'s—which surely enabled a landfall on Iceland or the Faeroes.

The marked division of angles in the instruments (the artefacts are listed in Lindgrén & Neumann 1984); def. = deformed structure.

Saltvik, Rangsby, Åland, Type I.
4.5°; 9.9°; 14.3°; 22.1°; 27.7°; 36°; 41.5°; 50.5°; 56.5°; 64°; 68,6°; 73.1°; 80.3°

Björkö, Sweden, Type I.
?; 8.0° def?; 13.7° def?; 15.3°; 20.7°; 25.0°; 29.6°; 33.8°; 38.7°; 42.2°; 46.5°; 50.5°; 54.3°; def.; def.

Söderala,Hälsingland, Sweden, Type II.
3°; 7.2°; 11.8°; 16°; 20.8°; 25°; 29.1°; 33.8°; 38°; 42.5°; 46.2°; 50.8°; 55.3°; 59.8°; 64.2°; 69.3°; 73.9°

Källunge, Gotland, Sweden, Type II.
3.9°; 9.1°; 14.1°; 19.2°; 23.7°; 30°; 35°; 40.2°; 45.7°; 50.9°; 55°; 61°; 67°

Høyfjord,Vestfold, Norway, Type II.
5.1°; 11.2°; 16.8°; 23.1°; 29.2°; 34.2°; 41°; 46.8°; 52.2°; 59°; 65.2°; 72°; 79°

Tingelstad,Oppland, Norway, Type II.
5.1°; 11.9°; 18.5°; 25.4°; 31.7°; 39.4°; 46.3°; 54.3°; 61.8°; 68.7°

Heggen,Buskerud, Norway, Type II.
4.2°; 10.7°; 16.7°; 22.5°; 29.1°; 35.5°; 42.7°; 50.5°; 57.4°; 65.7°; 73.5°; 82.5°

The inaccuracies between the instruments can be explained by the manufacturing techniques and the usage of the instruments. Each of them was made to suit the experience and knowledge of those who would use it. Therefore the mathematical approach to the task of measurement is not necessary. However since the the reading accuracies of various instruments are very similar, there must have been a rule of thumb for the division of angles. The similar

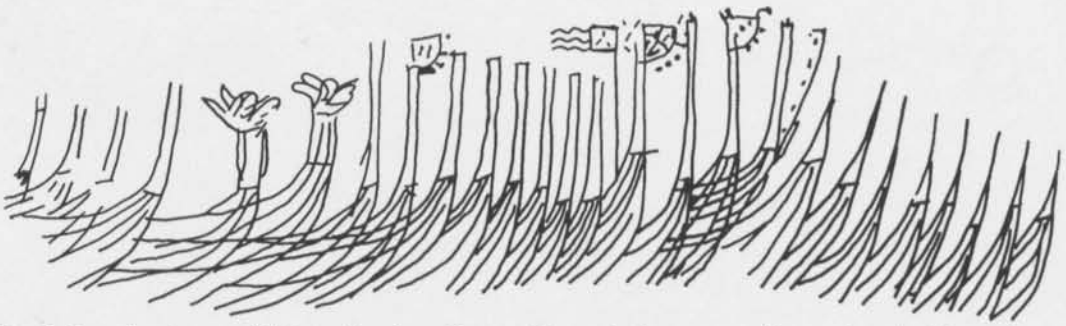

Fig. 3. Part of a picture of Viking ships from Bergen, Norge. It shows some ships equipped with weathervanes beating into the wind. Note the flag with stripes in the opposite direction. – Utsnitt av ristning med vikingaskepp från Bergen. Den visar några skepp utrustade med vindflöjlar riktade mot vinden. Märk vimpeln vänd i andra riktingen.

division may originate in the sailing experiences in the Northern Atlantic. Moreover at least some of the existing weathervanes are copies, in which case the significance of their markings had been forgotten.

The essence of navigation

Terrestial navigation was based primarily on experience and tradition, and special instruments were used by navigators sailing in friendly waters with land in sight. When a sailor wanted to cross open sea with no landmarks, an wholly different approach and understanding of space was necessary.

The Vikings had names for at least all of the eight cardinal points of the compass, and they were undoubtedly able to divide the rose even more precisely when necessary. Sixteen intercardinal points result already in an accuracy of 22.5 degrees, and in most cases without adequate information on time this is the limit of their precision notwithstanding that the possible bearing dial fragment found in Greenland is divided into 32 sections (an accuracy of 11.25 degrees) (Binns 1971, p. 24).

The Viking navigators, particularly the Norwegians, had an awareness of latitude. Centuries of sailing up and down the predominantly north-south oriented Norwegian west coast had taught them how the height of the sun and the stars over the horizon varies depending on the season and on the point of observation. Proof of such observations have been preserved in the manuscripts of the sagas (Beckman 1913). Thus a Viking navigator could try to sail along the same latitude all the way to the desired destination. This method is commonly known as latitude sailing. In order to remain on a specific latitude, a navigator needed to know the sun's meridian passage height from the horizon or a certain star's zenith height on the desired latitude. Furthermore, he must be able to see both the horizon and the astronomical object, and have a device to measure the angle (i.e. the height). The quadrant and the *solsskuggafjol* which are known from literary sources, must have served this purpose and according to our studies so did the so-called weathervane.

Since the voyages over the North Atlantic were fairly frequent, the Vikings must have felt confident when setting out to a transatlantic passage. Naturally, good weather, especially a fair wind and clear skies, were awaited before embarking on a journey. Nevertheless, the Vikings were the best navigators of their times and weathervanes were the top-of-the-line navigation instruments in which beauty and functionality merged.

Dimensions in the Northe Atlantic

At first glance, the North Atlantic is a vast space of sea, but if we take a closer look, we realize that no matter what direction is followed from the west coast of Norway, it would be almost impossible not to hit either the British Isles, the Shetland or the Faroe Islands, or Iceland. This, of course, is not an appropriate approach for a

merchant with a specific destination and presumably a cargo to deliver, but it gives an idea of the degree of accuracy was called for when sailing in the North Atlantic.

If, for the sake of the argument, we stipulate that the Viking ships could sail with an average speed of five knots (nautical miles per hour), it would then take less than five days to cover the 500 miles from Norway directly to Iceland. With a speed of 3 knots the journey would take about seven days. So the time spent on the open sea was not as long as would be expected. Most of the sailing was done during the summer, when weather conditions were fair and stable. Moreover Haasum (1974, p. 93) suggested that the weather on the North Atlantic in general was more stable a thousand years ago than today. If the navigator could measure the ships latitude once a day an adequate accuracy of navigation was attained.

The social status of the weathervane

The bronze of which the weathervanes were made was so precious as to make the instruments extremely valuable to the Vikings. But their true importance lay in their usage. The Viking ship which could afford to carry one and an individual who could use it, was able independently to sail the open seas. This made it possible to approach the British Isles and the continent of Europe, and withdraw to the open sea when the situation so required.

Probably the ship carrying the instrument was leading a fleet, and because of its special status as a flag ship, the instrument functioned as a pennant when not used for navigation (Fig. 3) (see Lindgrén & Neumann 1984, p. 24). All known examples of weathervanes, except type I, are decorated with a recognizable picture of a dragon (see Blindheim 1982; Lindgrén & Neumann 1984, p. 21). This may pertain with the known fact that the biggest Viking warships were called *dreka*. It is possible, of course, that the instrument's secondary function superseded its primary purpose already during the Viking Age. Blindheim (1982) perceived a change in the construction of the weathervanes after the 11th century. The change could indicate the end of their primary use.

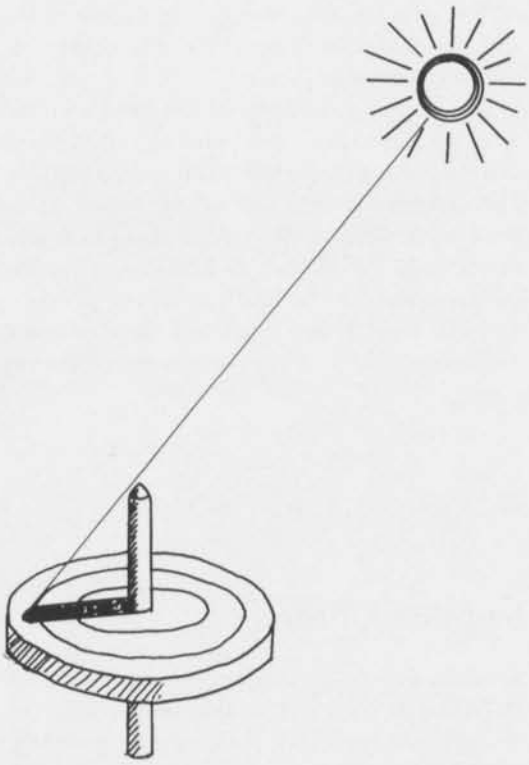

Fig. 4. Reconstruction of a wooden instrument which was probably used during the Viking Age to measure the height of the sun. – Rekonstruktion av träinstrument som troligen har använts under vikingatiden för att mäta solhöjden.

The other known type of instrument (Fig. 4) used in the Viking Age to measure the sun's height is possibly easier to use—it can be horizontally aligned simply by floating the whole instrument in a bucket of water. It was also much cheaper, beeing made of wood. So a new instrument probably came into general use soon after its invention. If so, it is remarkable that this did not change the angle readings in any of the known weathervanes.

The Medieval Church assumed the spiritual power in Scandinavia just as the Viking raids ended. Once the weather conditions deteriorated and the routes between Scandinavia, Iceland and Greenland were closed, the trade ceased. When commercial trade had no need for open sea navigation—merchant vessels hugged the coast—the navigation instruments became useless. The Church adopted the status

of "the navigator" in the Viking communities and decorated its own "ships" the churches, with the symbol of Christ.

The angle readings could not been seen far away on the roof of the church, and the primary significance of the vane was forgotten. The decorative motives would hardly have been so similar on all weathervanes throughout Scandinavia if they had not been carved for a specific purpose. At least all the weathervanes of type II were found in the vicinity of the home ports of the ocean-going Viking ships.

References

Beckmann, N., 1913. *Rimbegla, ett bidrag till Islands lärdomhistoria.* Studier i nordisk filologi IV, 7. Helsinki.

Binns, A., 1971. *Sun Navigation in the Viking Age, and the Canterbury portable Sundial.* Acta archaeologica. Copenhagen.

Blindheim, M., 1982. De gylne skipsfløyer fra sen vikingetid. Bruk og teknikk. *Viking 46.*

Crumlin-Pedersen, O. & Vinner, M. (ed.), 1986. *Sailing in to the past.* Roskilde.

Haasum, S., 1974. *Vikingatidens segling och navigation.* Thesis and papers in North European archaeology 4. Stockholm.

Lindgren, S. & Neumann, J., 1984. Viking wind vanes. *Meteorol. Rdsch. 37.*

Norr, S., 1987. Vikingarnas navigationskonst. *Fjölnir 6.* Uppsala.

Sammanfattning

Artikeln behandlar vikingatida sjömanskap. Det finns inte mycken bevarad information om de navigationsmetoder vikingarna använde, men man kan inte tänka sig att de resor de företog över Atlanten gjordes utan kunskap om grundläggnde navigationsteorier och vissa enkla navigationsinstrument. I denna artikel visas hur de vikingatida vindflöjlarna av metall kunde användas som navigationsinstrument för att mäta latituden. På alla kända exemplar bildar den svängda nedre konturen en "gradskiva" indelad i avläsningspunkter med inbördes avstånd om ca 4,8°. Avläsningspunktens latitud kan bestämmas genom att man använder vindflöjeln som solur. Noggrannheten i avläsningen har gjort det möjligt att finna väg över öppna havet.

Vindflöjlarna som betecknade ledarskapet inom en grupp vikingaskepp övertogs sedan av kyrkan för att beteckna denna institutions roll i samhället.