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# Orientations of Late Neolithic to Bronze Age and Iron Age Long Cairns in Coastal Finland

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**Abstract:** In this study, the orientations of c. 138 long cairns located in coastal Finland were measured and examined, along with other properties of the cairns. The length of the cairns varies from a few metres to almost 50 m. The dominant color of the stones in most of the cairns is red, and they were usually built on locally elevated terrain, e.g. on ridges, rocky outcrops or small islets on the ancient shore. It was found that in the category of long cairns there were several different types of elongated cairns: the ‘simple’ and curved long cairns, some of which were attached to round cairns; the rectangular cairns with one or more central chambers; the very large rectangular cairns; and two different types of ship-formed cairns, Type 1 and Type 2, the latter of which was a previously an unrecognised type of Late Neolithic/Early Bronze Age long cairn. The comparison of the orientations of the cairns of different types and locations suggest that there was some cultural continuity between the Neolithic and the Early Bronze Age cultures on the western coast of Finland. However, based on the present analysis, this continuity does not seem to have extended beyond the Middle Bronze Age. It is also suggested that the appearance of the Type 2 ship-formed cairn in the Ostrobothnia region in the Late Neolithic may have resulted from outside cultural influences, perhaps from the earliest contacts with the central ideologies of the Nordic Bronze Age.

According to present knowledge, cairn building in Finland started in Northern Ostrobothnia during the Early and Middle Neolithic, ca. 5100–2500 BCE.<sup>1</sup> The Middle and Late Neolithic were a period of cultural upheaval in the region and elsewhere on the Ostrobothnian coast. This included the building of large villages of wooden semi-subterranean houses, terraced houses as long as 100 m, and the so-called Giants’ Churches (hereinafter GCs), which were huge rectangular stone enclosures

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<sup>1</sup> See Jari Okkonen, *Jättiläisen hautoja ja hirveitä kiviröykkiöitä – Pohjanmaan muinaisten kivirakennelmien arkeologiaa*, Acta Universitatis Ouluensis B 52 (PhD Thesis, University of Oulu, 2003); Teemu Mökkönen, ‘Stone Setting Filled with Red Ochre from the Keelahaarju Site, Northernmost Baltic Sea Region: A Stone Age Grave in the Context of North European Burial Traditions’, *Fennoscandia Archaeologica* 30 (2013): pp. 13–36.

likely constructed to serve as some type of communal spaces used, for example, for ritual gatherings.<sup>2</sup> The culture relied on marine resources and the villagers carried out extensive foreign trade, which brought outside influences with it. The orientations of the GCs that are arguably connected to astronomical events could have resulted from the cultural transmissions via such trade connections.<sup>3</sup>

The earliest built cairns were at first round and torus-shaped, i.e., round with a large central pit. There is no direct evidence that the cairns were used as graves, but it is usually assumed that this was the case or that they were used for other ritual activities. There were other types of cairn too, with apparent profane usage purposes: huge piles of burnt, fire-cracked stones have been found around the GCs; it is believed those had been used to boil water in the processing of seal blubber.<sup>4</sup>

During the peak of the GC culture in Ostrobothnia, Southern Finland was inhabited by the Corded Ware (Battle Axe) Culture, which lacked built cairns or other large monuments of stone. By the end of the Neolithic, c. 1800 BCE, the GCs seem to have been abandoned and new types of cairns, long cairns, started to be built on the Ostrobothnian shores. Long cairns, as well as cairns with other shapes, were then built on the coast of Finland ever since until the end of the Iron Age c. 1000 CE.

In the early Bronze Age, starting c. 1500–1300 BCE in Finland, the cultural differences between Ostrobothnia and Southern Finland disappeared and similar style cairns were built all along the coast of Finland – with the exception of Northern Ostrobothnia, where the culture there seems to have suffered a permanent cultural decline, probably due to the increasingly unfavourable climatic conditions.<sup>5</sup> The cairns were mostly huge and circular or oval, sometimes with a large central pit or ‘chambers’; later in the same period they became smaller. Sometimes, the Bronze Age cairns were triangular, irregular or attached together so that they formed cross-like or cloverleaf-shaped formations. In the Iron Age, rectangular

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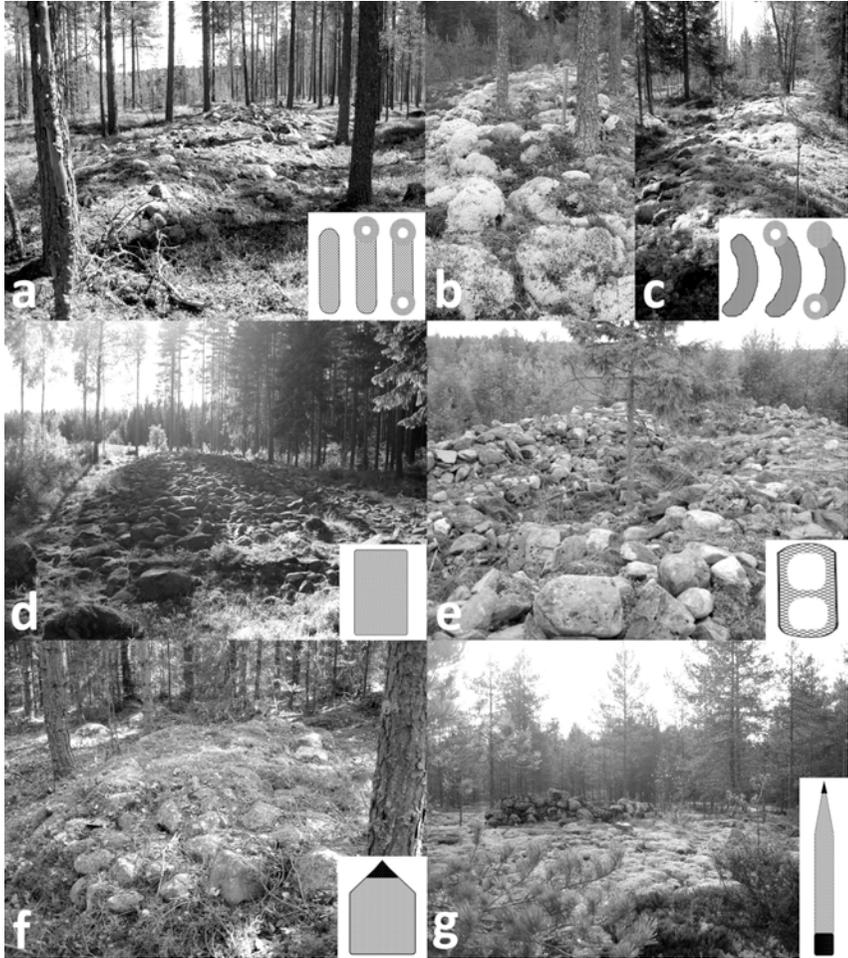
<sup>2</sup> See Okkonen, *Jättiläisen hautoja ja hirveitä kiviröykkiöitä*, pp. 241–42.

<sup>3</sup> Marianna Ridderstad and Jari Okkonen, ‘Orientations of the Giant’s Churches in Ostrobothnia, Finland’, in M. Rappenglück, B. Rappenglück, and N. Campion, eds., *From Alexandria to Al-Iskandariya: Astronomy and Culture in the Ancient Mediterranean and Beyond, Proceedings of SEAC 2009*, British Archaeological Reports International Series, in press.

<sup>4</sup> Okkonen, *Jättiläisen hautoja ja hirveitä kiviröykkiöitä*, p. 195.

<sup>5</sup> See Reijo Solantie, ‘Aspects of Some Prehistoric Cultures in Relation to Climate in Southwestern Finland’, *Fennoscandia Archaeologica* 22 (2005): pp. 28–42.

and triangular stone settings increased in popularity relative to other types of cairns, although the most common cairn type was always the round or oval small cairn. Long cairns were always built along with other types, and a special form of long cairn from the Bronze Age onwards was the ship setting, where the stones were placed in a formation resembling a boat or a ship.



**Fig. 1.** Examples of long cairns in this study: (a) Type 1 M simple long cairn; (b, c) Type 2 M 'curved' long cairn; (d) large rectangular cairn; (e) chambered cairn; (f) Type 1 Ship setting; (g) Type 2 Ship setting. The small inset schematic drawings present the basic possible shapes of all six types of cairns; see the text for further information on the different types. All images are by the author.

The present study only concerns the cairns of coastal Finland (Fig. 1). At least since the Bronze Age, this region has formed a cultural sphere distinct from inland Finland, with the coastal zone showing the central features of the cultural sphere of the Nordic Bronze Age, while the (rather poorly known) inland cultures were probably hunter-gatherers. Cairns were also built in inland Finland, but the inland Bronze Age and Early Iron Age cultures have not yet been properly investigated.

### Methodology

During the project, 138 cairns along the coastal Finland from Kotka in the south to Keminmaa in the north were examined and their orientation measured. The cairns in the study area are not evenly distributed along the coast, but are mostly concentrated in Ostrobothnia and Western Satakunta; the largest group of Bronze Age ship settings is in Kotka.

The fieldwork was carried out in 2009–2013. The axial orientations of the cairns were measured with a magnetic compass (Suunto compass with 360° scale), in addition to other possible axes for evidence of triangular and more complex construction style. The final values for the axial orientations were calculated from the averages of the reciprocal measured axial orientations.

The morphology of the Finnish cairns, especially the long cairns, is a subject not extensively studied. Therefore, the shapes of the cairns were recorded for comparison purposes. Then, to group the measured cairns for comparison with each other by type, the shapes and sizes of the cairns could be taken into account. Other features recorded were the general placements of the cairns relative to the ridges and geology on which they had been built, as well as the sizes, shapes and colors of their constituent stones.

Most of the cairns have only been dated using the shore displacement method, i.e., by using their height relative to the present sea level. The post-glacial rebound of the bedrock in Finland proceeds at a known rate and this can be used to estimate when a given site was on the shoreline in prehistoric times.<sup>6</sup>

Since the sites are now located in forestry due to the post-glacial rebound, the original horizon heights had to be calculated from a digital terrain model. For practical reasons, the horizon line for each individual cairn was not

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<sup>6</sup> See, M. Eronen, 'Land Uplift: Virgin Land from the Sea', in M. Seppälä, ed., *The Physical Geography of Fennoscandia* (Oxford: Oxford University Press, 2005), pp. 17–34.

modelled, but a generalised horizon height model was used. The model was based on the observation that the cairns had usually been built on elevated locations in the coastal zone with good visibility towards their surroundings in all directions and that towards the west and/or the south, the horizon line was often the sea horizon. The astronomical declinations were calculated for the cairns using horizon altitudes from zero to one degree, and the resulting differences in these results were taken into account and regarded as uncertainties in interpreting the results of the analysis.

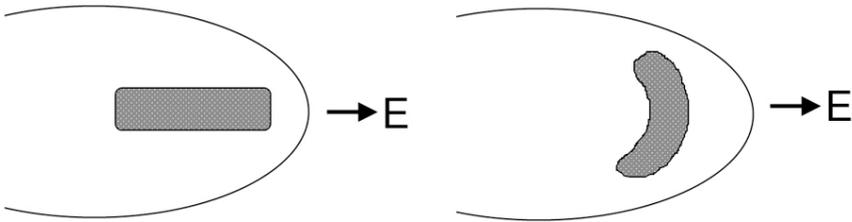
## Results

The length of the cairns examined varies from c. 3 m to 48 m; their width varies from c. 1.5 m to over 15 m. The sizes and shapes of the stones that had been used to build the cairns vary from round beach stones of c. 10 cm to large sharp-edged stones of over 60 cm in diameter to occasional large boulders of over 1 m in size that had been placed in the middle or end of a cairn. The dominating color of the stones used to build the cairns is red; especially among the Bronze Age cairns, all of the stones in a cairn are often red or pink granite and/or sandstone.

The cairns were most often been placed on locally elevated terrain on the ancient shores, e.g., the top of a ridge, a rocky outcrop or a small islet. These locations then offered naturally good, open views towards the surroundings and the sea horizon. However, the cairns themselves have a low profile and could not have been seen from afar, e.g., from a boat approaching the coastline, suggesting that the argument that the cairns could have been used as some sort of territorial markers does not seem to be valid.

It was observed early during the field work that the monuments known as 'long cairns' do in fact consist of several different types of elongated cairns. Even the 'simple' long cairns have considerable differences in their outer appearance. This was expected for cairns from different regions and periods, but cairns belonging to the same region and period as dated by the shoreline displacement method turned out to be of varying types.

The cairns investigated in this study are divided into several different types. The basic 'simple' elongated long cairn was termed as Type M; this type was built in all locations and all periods, but the majority of this type of cairn in this study is from Ostrobothnia and the western coast of Finland in general. In Northern Ostrobothnia, all of the cairns belonging to this type are Late Neolithic; in Central and Southern Ostrobothnia and Satakunta, the use of this type extended to the early Bronze Age. A special sub-type of the 'simple' Type 1 M long cairn is the 'curved M', Type 2 M (Figs. 1 and 2).



**Fig. 2.** Observed placements of Type 1 M and ‘curved’ Type 2 M long cairns relative to the edge of a ridge on which they were built.

It was observed during the study that while the basic M Type 1 cairns had most often been placed along the long axis of a ridge or rocky formation, the ‘curved’ Type 2 M had been built along the edges of a ridge (usually the eastern edge, see Fig. 2). Both the basic Type 1 M and the curved Type 2 M cairns are occasionally attached to round or torus-shaped cairns usually placed at the ends of the long cairn. This type of construction may indicate that one way of building a long cairn was to combine two round cairns with an elongated setting of stones. Most of the cairns of the curved Type 2 M are located on the Late Neolithic shorelines of Central and Southern Ostrobothnia.

Among the Bronze Age cairns investigated in this study, two special types of large cairns were observed: the rectangular or oval cairns with one or more rectangular central chambers with walls constructed out of stones, and the very large rectangular cairns, the largest of which are almost 50 m long. The smallest of the chambered cairns are c. 10 m and the largest over 20 m in length. All of the cairns belonging to these two types are located on the western coast of Finland, from Central Ostrobothnia to Satakunta.

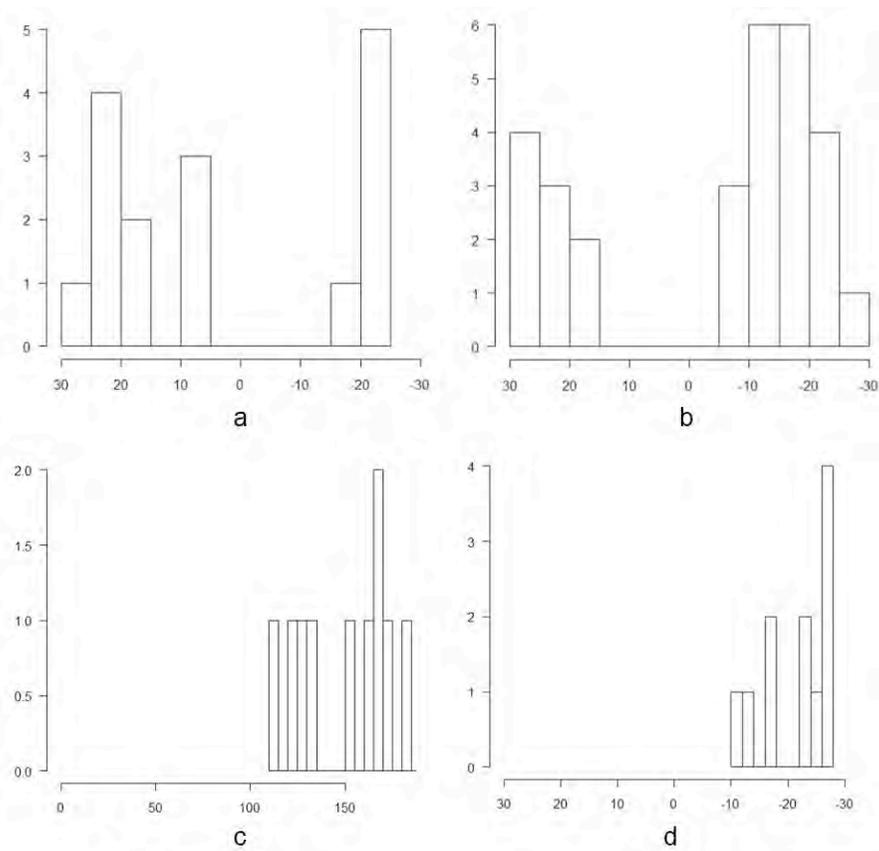
Two different types of ship-formed cairns, Type 1 Ship and Type 2 Ship, were observed in the sample. The former, Type 1 Ship setting is a rather small, ship-formed setting of stones with carefully laid out edges and usually a triangular stone at the ‘front’ of the ‘ship’. Sometimes, at the back of the ‘ship’ a large boulder had been placed. These cairns are usually built of mainly red stones. Type 1 Ship settings are mainly from the Middle and Late Bronze Age, but one dated to the Iron Age. The Iron Age ship is remarkably similar to the older Bronze Age Type 1 Ships. All excavated Type 1 Ships have turned out to be graves. They are usually located near

the former waterline, along ancient waterways, on rocky beaches and beach cliffs.

The latter type, Type 2 Ship setting, is a previously unrecognised subtype of the Late Neolithic and early Bronze Age long cairn. They are 10 m to over 20 m long, rather narrow and are a shallow setting of stones located on the very edge, or on the western slope, of a bare rocky hill or outcrop on the ancient shore. They are always positioned perpendicular to the cliff or outcrop edge, with good views towards the ancient sea in the west, thus seeming to be 'sailing' towards the west. They have a triangular red stone marking the front; sometimes a smaller one in the back of the 'ship' and, sometimes, the back has a large boulder similar to Type 1 Ship settings. These ships are always built of mainly red stones. An interesting detail is that, often, another triangular red stone was placed a few metres away from the ship setting; similar triangular stones can be observed near many GCs and these could be recent. All of the Type 2 ship-formed cairns are located on the ancient coastline from Central Ostrobothnia to Satakunta, while the Type 1 ship settings are encountered from Southern Ostrobothnia to Kotka in the SE coast of Finland, c. 115 km eastwards from Helsinki.

The orientation distribution of all 138 cairns (not presented here due to limitations of space) closely resembles a random distribution, which is to be expected since the cairns span several thousands of years and more than 1000 km of coastline. In addition, the orientation distribution of all Type 1 M cairns (not presented here) is close to a random distribution. However, when the declination distributions of the axial directions of the Northern Ostrobothnian and the Central and Southern Ostrobothnian Type 1 M cairns are examined separately, they turn out to be mutually different and non-random (Figs. 3a and 3b).

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**Fig. 3.** (a) Astronomical declination distribution towards the eastern horizon for the orientations of the long axes of long cairns of Type 1 M in Northern Ostrobothnia (N=16); (b) declination distribution for Type 1 M in Central and Southern Ostrobothnia (N=29); (c) azimuth and (d) declination distributions towards the eastern horizon for the orientations of Type 2 M 'curved' long cairns (N=11). In the Figures, the horizontal axes are in degree units and the vertical axes are frequencies.

The Northern Ostrobothnian Type 1 M cairn orientations are concentrated around the declinations of +20° and -20°, and +10° (in the eastern horizon; note that due to the axial symmetry of these cairns, the declination distribution towards the western direction is similar with opposite signs for the declination values), and the Central and Southern Ostrobothnian the Type 1 M cairn orientations trend along the NW-SE and

N-S directions, avoiding the +10° orientation (again in the eastern horizon; the orientations towards the west were of opposite sign). The Northern Ostrobothnian orientations are similar to those seen in the GCs and the large house pits in Ostrobothnia.<sup>7</sup>

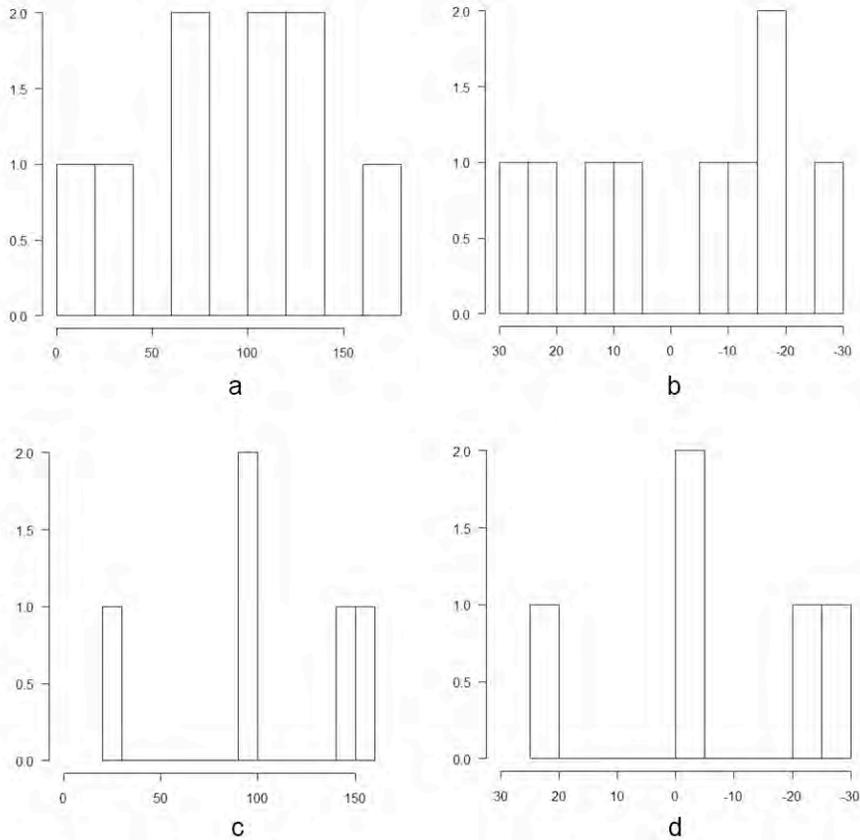
As seen above, the Late Neolithic cairns of the Type 2 M ‘curved’ long cairn were probably intended to ‘look’ towards the centre of the ‘curve’. In Figs. 3c and 3d it can be seen that they looked towards the SE and S directions, mostly directly towards the south, suggesting possible interest towards the autumnal and winter sunrises, with individual orientations also to winter solstice.

The azimuth and declination distributions for the axial orientations of the Bronze Age chambered cairns towards the eastern horizon, shown in Figs. 4a and 4b, do not reveal any interesting clustering features but are rather evenly distributed along the horizon; this may be due to the small size of the sample. It is suggested that these types of cairns should be further investigated, not only because of their rather interesting outer appearance but also because some of the GCs (e.g., Tallbackharju, N of Pedersöre) have chambered cairns nearby, or incorporate those as parts of their wall structures. Moreover, this type of cairn is encountered also in the only known early Bronze Age enclosure of Hednatemplet in Jepua, Uusikaarlepyy in Southern Ostrobothnia, and could thus provide clues to the possible cultic continuation of GC-like enclosures into the Bronze Age.

The azimuth and declination distributions for the axial orientations of the very large rectangular Bronze Age cairns towards the eastern horizon, shown in Figs. 4c and 4d, show orientations close to the directions of the solstitial and the equinoctial sunrises (and, correspondingly, the solstitial and equinoctial sunsets in the west, taking the effect of the horizon line into account). Even though the sample size is very small, the strong concentration of the orientations towards these directions tempts one to suggest that these orientations were of some ritual significance.

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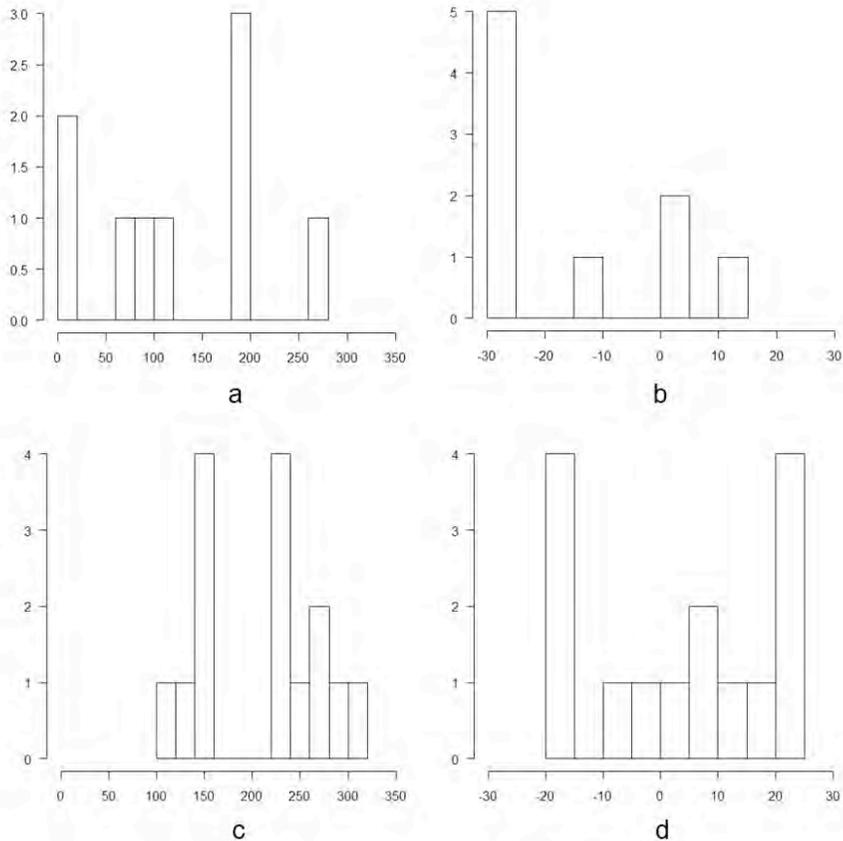
<sup>7</sup> See Marianna P. Ridderstad, ‘Orientations and Other Features of the Neolithic ‘Giants’ Churches’ of Finland from On-site and Lidar Observations’, *Journal of Astronomical History and Heritage* 18, no. 2 (2015): pp. 135–48; Marianna Ridderstad, ‘Orientations and Placement of the Middle and Late Neolithic housepits of Ostrobothnia: A First Investigation Based on On-site and Lidar Observations’, *Suomen Museo* 2015 (2017): pp. 5–74.



**Fig. 4** (a, b) Azimuth and declination distributions towards the eastern horizon for the axial orientations of chambered cairns (N=9); (c, d) azimuth and declination distributions towards the eastern horizon for the axial orientations of large rectangular cairns (N=5). In the Figures, the horizontal axes are in degree units and the vertical axes are frequencies.

Figs. 5c and 5d show the azimuth and declination distributions for the orientations of the Bronze and Iron Age ship settings (Type 1 Ships), and the Late Neolithic and early Bronze Age ship-formed long cairns (Type 2 Ships). These cairns are not symmetrical in shape and, therefore, their orientation was taken to be towards the front of the ‘ship’. The orientations and declinations of the former group (shown in Figs. 5a and 5b) are mainly along, or close to, the cardinal directions, with two towards the

declinations of  $+10^\circ$  and  $-10^\circ$ , while the orientations and declinations of the latter group (shown in Figs. 5c and 5d) are mainly indicative of declinations  $+20^\circ$  and  $-20^\circ$  and  $+10^\circ$ . The orientations of the Type 2 Ships thus resemble the orientations of the Northern Ostrobothnian Type 1 M cairns, as well as the orientations of the GCs and the large Neolithic house pits.



**Fig. 5** (a, b) Azimuth and declination distributions of Type 1 Ship settings (N=9); (c, d) azimuth and declination distributions of Type 2 ship-formed cairns (N=15). In each case, the orientation was taken to be towards the front of the 'ship'. In the Figures, the horizontal axes are in degree units and the vertical axes are frequencies.

## Discussion

Based on their orientations, it seems clear that the Type 1 M Late Neolithic long cairns of Northern Ostrobothnia were an expression of some kind of cultural continuity from the GC culture to the long cairn-building culture in the region. In Central and Southern Ostrobothnia, on the other hand, the orientations of the Type 1 M long cairns seem only partly similar. However, the cairns of the ‘curved’ Type 2 M cairns, most of which are located in Central and Southern Ostrobothnia, are looking towards the same segment of the horizon as the GCs, which could suggest cultural continuation. Further investigation could also reveal local variations and partial cultural continuation in the orientations of the Type 1 M cairns in the region.

Based on the results of this study, it is not possible to deduce with certainty to what extent there was a cultural continuation between the Late Neolithic and Bronze Age cultures on the western coast of Finland. As orientations to the main solar events, the solstices and equinoxes, are an idea universally encountered in many cultures, the orientations of the very large rectangular Bronze Age cairns to, or closely towards, the solar astronomical declinations of the solstices and equinoxes could be the result of cultural continuity from the Neolithic as well as a new ideology. The orientations of the Type 2 ship-formed cairns, however, may indicate the existence of some cultural continuation from the Neolithic to the Early or even Middle Bronze Age. On the other hand, the appearance of the new type of ship settings, Type 1 in the Bronze Age, and its different orientations relative to Type 2 suggest that there was little or no continuation from the Late Neolithic to the Middle and Late Bronze Age.

If the ship-formed cairns of Type 2 really are as early as suggested by the shore displacement dating, this could have a range of interpretations. While the orientations of these ship settings followed the orientations of Neolithic monuments in Northern Ostrobothnia, their ship-like appearance seems to be an innovation possibly reflecting new external ideas and influences. These new cultural influences could belong to the earliest echoes of the Nordic Bronze Age arriving from Sweden, or the development could have been indigenous and connected to the many representations of boats in the rock paintings and carvings in Finland, Lapland and Karelia during the Bronze Age.<sup>8</sup> Alternatively, the Bronze

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<sup>8</sup> See, for example, Antti Lahelma, *A Touch of Red: Archaeological and Ethnographic Approaches to Interpreting Finnish Rock Paintings*, Iskos 15 (PhD

Age ideology, where the ship was strongly connected to solar symbolism, the afterlife and the prestige of earthly power, could have arrived in Finland both from the west and the east, as so many other cultural features have during the millennia. Naturally, this new ideology fused with the central importance of boats already existent in the local cultures that had their roots in the Neolithic and Mesolithic hunter-gatherer way of life.

The idea that a burial cairn could and should be ship-formed can be connected to the role of ships and boats as psychopomps, i.e., the astral or solar ship which carried the dead to the otherworld. This is connected to the belief that at sunset, especially during the extreme horizontal movements of the sun on the solstices and other possible solar key days, the border between the world of the living and the netherworld of the dead could be transcended. The Iron Age Finns, for example, seem to have believed that at the faraway sea horizon, where the sky and the sea met and the sun moved around, one could physically crawl under the sky vault and enter the other realms. Thus, a ship setting that was built on the shoreline with its front oriented to the west was likely meant to ‘sail’ towards the western sea horizon and the realm of the dead, carrying the soul of its owner(s) with it.

### **Conclusions**

In this study, the orientations of 138 long cairns located in coastal Finland were measured and examined along with other properties of the cairns. The length of the cairns varied from c. 3 m to 48 m. The dominant color of the stones in most of the cairns was red, and they were usually built on locally elevated terrain, e.g., on ridges, rocky outcrops or small islets on the ancient shore. It was found that in the category of long cairns there were several different types of elongated cairns: the ‘simple’ and curved long cairns, some of which were attached to round cairns; the rectangular cairns with one or more central chambers; the very large rectangular cairns; and two different types of ship-formed cairns, Type 1 and Type 2, the latter of which was a previously unrecognised type of the Late Neolithic and early Bronze Age long cairn. The comparison of the orientations of the cairns of different types, and their locations, suggest that there was some cultural continuity between the Neolithic and the early Bronze Age cultures located on the western coast of Finland. However, based on the present analysis here, this continuity does not seem to have extended beyond the Middle

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Thesis, University of Helsinki, 2008), pp. 25–26; Eero Ojanen, *Karjalan kalliopiirroksset* (Keuruu: Otava, 1981).

Bronze Age. It is also suggested that the appearance of the Type 2 ship-formed cairn in the Ostrobothnia region in the Late Neolithic may have resulted from outside cultural influences, perhaps from the earliest contacts with the central ideologies of the Nordic Bronze Age.

**Acknowledgements**

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