

Interpreting Prehistoric Labor North and South of the Forager-Agricultural Frontier in Central Fennoscandia, Northern Europe

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Abstract. The prehistory of Fennoscandia is characterized by a split of the north and south into what is commonly interpreted as forager and agricultural subsistence contexts. The cultural divergence between the two took place in the region over the span of 4,000 years. This article focuses on analyzing products indicative of extrasubsistence labor, which signify distinct-yet-comparable activities in the divergent regional contexts. The activities are studied by interpreting the production processes of the most common types of pertinent archaeological remnants and interpreted through two attributes: labor intensity and expertise. The combined analysis reflects the differences between the two regional material records while also indicating different logic related to the persistence of labor activities. This difference in logic is interpreted with a framework pertaining to worldview differences between subsistence production and subsistence procurement. Beginning from the 4th and 3rd millennium BC, communities in the southern context are argued to have adopted aspects of an ideology of production. These communities maintained and strengthened their labor efforts in the long term. Contrastingly, in the northern zone, several phases of the decline of labor-related activities can be discerned in the long-term prehistory when labor roles were completely reorganized or abolished. The difference may be due to an ideological separation between the two contexts concerning nonsubsistence-related work and the associated issue of social organization.

One cannot understand Scandinavia without being aware of the division between the north and the south, defined by the limits of cultivation . . . In the south, cultures change more rapidly, and these changes are more pronounced and far-reaching, created and fostered in large part by agricultural surpluses and the rise of more complex societies . . . The basic way of life involving hunting, fishing, and collecting did not change significantly in

the interior of northern Scandinavia until the Industrial Revolution, and remains in a few places today (Price 2015:378).

This quote by T. Douglas Price relates to Fennoscandia as a whole. Unlike most of Europe, where cultivation has been seen as gradually replacing foraging as the overriding subsistence mode much earlier, two cultural contexts practicing different

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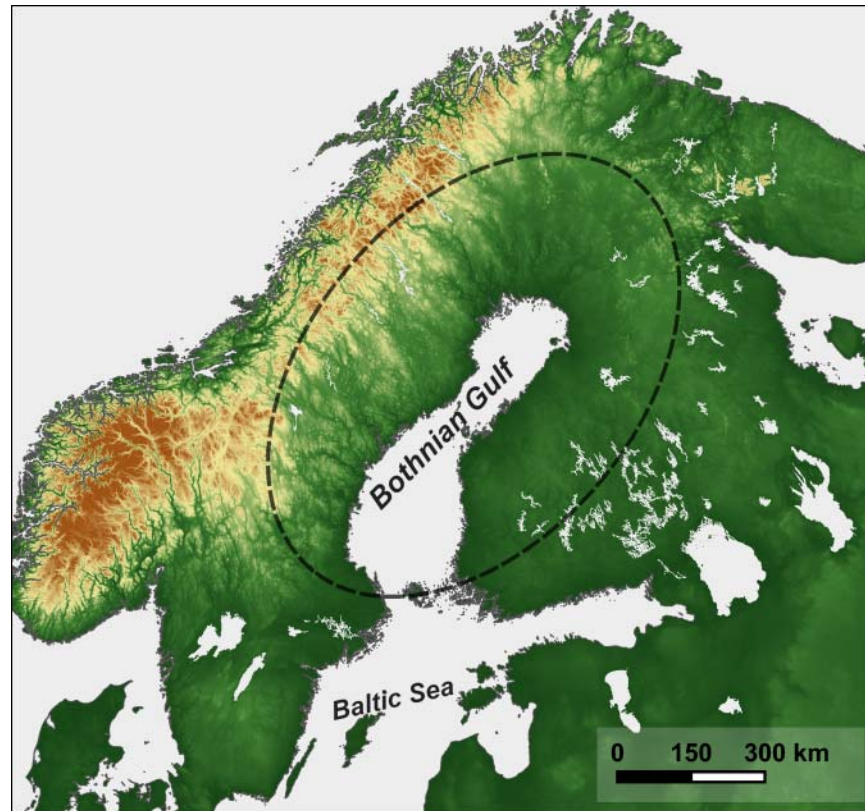


Figure 1. Fennoscandia and the study region delimited with dashed lining. Background: DIVA GIS elevation map, 250 m resolution.

subsistence modes coexisted for at least 4,000 years, with a transitional frontier in central Fennoscandia (see Fig. 1).

Nevertheless, the binary distinction between the two forms of subsistence has been criticized. It is often accepted that farmers may hunt and practice fishing alongside the growing of food crops. Yet, foragers have more often been defined in a singular light, either as “pure hunter-gatherers” or already embarked on the cultural evolutionary journey to early agriculture. In recent decades, the distinction between the two has become increasingly blurry (e.g., see Bird-David 1992; Hitchcock 2019), as evidence of domestication and plant cultivation has been presented from contexts that are otherwise indicative of what Kelly (2013) referred to as the foraging spectrum (e.g., Descola 2013). This critique, and evidence in its support, have also emerged in Fennoscandia (Bergman and Hörnberg 2015; Herva et al. 2014; although cf. e.g., Fraser et al. 2018), undermining the foundations of Price’s statement.

Even so, there is no denying the soundness of the broad overview provided by Price. Seeing Fennoscandia and its past as a whole, a schizogenesis (see Wengrow & Graeber 2018) between north

and south—a divergence of world systems—becomes apparent. Large burial monuments emerged in southern Sweden in the 4th millennium BC, along with evidence of farming practices. In the 3rd millennium BC, the widespread Corded Ware Culture seems to have introduced pastoral subsistence methods to southern Finland, as exemplified by dairy lipids in pottery (Cramp et al. 2014). While northern rock art is centered on a deer motif, southern Scandinavian rock art revolves around depictions of humans (e.g., Goldhahn 2017). Long after these events, the most monumental expression and, later on in the 2nd millennium AD, state formation takes place in the same regions.

In this paper, the contradiction between the archaeological manifestation of the two contexts and the critique of binary subsistence is considered from a new perspective, which does not devalue either view. Instead, the two apparently distinct prehistoric cultures are studied by turning the focus from subsistence modes to issues of the expenditure of labor. Here, 12 varying activities of labor output, which are supplemental to basic subsistence, are analyzed and collated to formulate long-term trends in central Fennoscandian

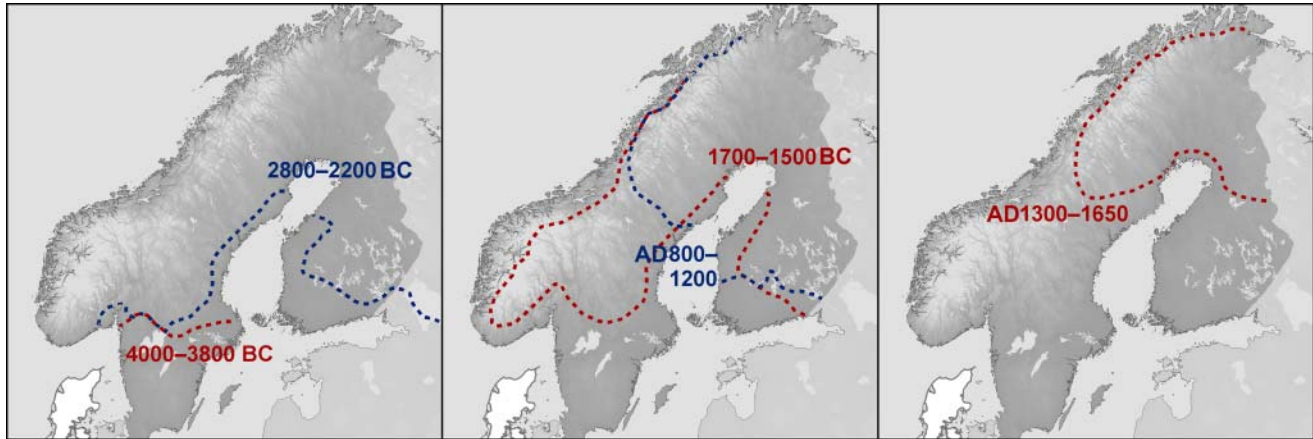


Figure 2. Shifting frontiers of the southern and northern subsistence contexts throughout the prehistory of Fennoscandia until the Historical Age. Background: DIVA GIS elevation map, 250 m resolution.

prehistory. The results are interpreted in the context of diverging worldviews (Ingold 2000:40–88), pertaining to the ideological aspects of procurement and production. This perspective offers a pathway to explaining why such a divergence ever took place. The political effects remain in Fennoscandia even today, especially in the form of imbalanced power relations and incompatible worldviews of the Nordic and the Sámi cultures (e.g., Minde 2003; Lehtola 2015; Ojala 2020).

Aspects of labor can be used as a unifying theme for comparing the widely varying archaeological material record of the region. Assessing the production processes of prominent forms of extra-subsistence labor activities offers a theoretical pathway to comparing the materiality of otherwise unassociated material forms. With relative assessments of the related labor activities and with the knowledge of their chronologies and contexts, we may trace two parallel yet diverging narratives of labor activity in long-term prehistory.

The study area is located in Northern Europe at the center of the Fennoscandian Peninsula. Central Fennoscandia is defined here as the watershed of the Bothnian Gulf, the northernmost branch of the Baltic Sea that Finland and Sweden share. The study's timeframe is vast, covering six millennia (ca. 5000 BC to AD 1000), encompassing the Mesolithic–Neolithic transition to the beginning of the local historical age. The primary source of data comes from previous research and the two national archaeological site registries of the region: The Finnish *Muinaisjännösrekisteri* and the Swedish *Fornsök*.

The relevant 6,000-year prehistory of the region is too vast to outline in detail (for an overview, see Halinen 2015; Lavento 2015; Price 2015; Raninen and Wessman 2015; Welinder 2009), and

thus the approximated frontier of the northern and southern contexts is illustrated at different periods in Figure 2 (for details, see Kuusela 2013; Nordqvist 2018; Sørensen 2014; Vanhanen 2019). The maps show the shifting of the frontier zone, with northern expansion, southern retreat, and a renewed expansion within several millennia (see also Solantie 2005).

Subsistence is not only practical but also ideological. It affects cosmology and how the world is understood (Herva and Lahelma 2020). This paper reframes the simplified subsistence narrative by accepting both the effect of subsistence on ideology and vice versa. The two ideologies are designated “procurement” and “production,” which derive from Nurit Bird-David’s (1992) conceptualization. They represent two cultural realms with diverging cosmologies concerning humanity’s place in the world (Bird-David 1992; Fowler 1999; Ingold 2000; see also Graeber and Sahlins 2017:18–19). I define the ideology of procurement as seeing oneself as an inseparable part of nature, practicing hunting, fishing, and gathering, but also plant cultivation, animal tending, and even producing a storable food surplus for redistribution. By ideology of production, I refer to productivity as a moral impetus in applying animal tending, plant cultivation, hunting, and fishing as means to produce food surplus for extrasubsistence activities. The latter ideology, which I consider related to the Western Cartesian notion concerning the ontological separation of culture and nature (Latour 1993; also, see Bird-David 1990, 1992; Descola 2013; Ingold 2000:13–76), is based on seeds sown further back in time. It is exemplified by its conspicuous form in Bronze Age cuneiform tablets relating to formalized agricultural management (e.g., Kriwaczek

2010:81–82). As subsistence activities, production and procurement can exist simultaneously within any group (Bergman and Hörnberg 2015; Bird-David 1992:), but as ideological modes or ultimately, as questions of morality, they are largely incompatible, causing social friction between societies, communities, families, and individuals.

Translating and Unentangling Labor

The study involves comparisons between 12 seemingly unconnected units of materiality (see Table 1). Thus, significant ontological translations are required to make the data comparable (e.g., Callon 1986; Latour 2005:106–109, 2013:39–42). The key concept here, leading to a connected interpretation, is the labor involved in producing the materiality. Although this subject is not directly reflected by materiality, certain comparative activities can be rendered visible by tracing the entangled processes that formed the pertinent artifacts and archaeological remnants (see Hodder 2012:179–205).

Some sense of the extent to which the enacting communities were preoccupied with the 12 phenomena under study here can be observed via two related attributes: labor intensity and labor expertise. Labor intensity means the amount of work required to realize the associated archaeological record, while labor expertise indicates the level of skill and knowledge required. The evaluations of the 12 activities here summarize the *chaîne opératoire* (Inizan et al. 1999) of the material product, including the acquisition of raw materials, entangled processes, direct manual labor, possible maintenance, and the recurrence of the activity (Hodder 2012).

The analysis consists of relative evaluations since there are no credible absolute scales for intensity and expertise. “Time spent” or “energy used” could provide absolute scales for labor intensity (Curcija 2018; Turner 2018; Xie et al. 2015), but even such evaluations are debatable without direct ethnographic or experimental evidence of the practices (Feinman et al. 1981; Kolb 1997). Thus, only relative scales are used here to evaluate intensity and expertise. The studied activities are ordered from lowest to highest, and each activity is assigned the corresponding sequence number as an abstract numerical value (Table 1). The chronology of each activity is determined in hundred-year intervals within the two subsistence ideological contexts.

The method is admittedly subjective and imprecise, but it still allows us to see the local material record from a new point of view. However, since there are only 12 studied activities, the attri-

Table 1. Labor activities and their interpreted relative values.

Activity	Order of Intensity	Order of Expertise
A. Quartz use	2	2
B. Bothnian tools	1	3
C. Boat axes	6	8
D. Giant's churches	9	6
E. Monumental burials	11	7
F. Small cairns	3	1
G. Hillforts	12	10
H. Bronze casting	4	9
I. Cooking pits	8	5
J. Burnt-rock heaps	7	4
K. Stone-box furnaces	5	11
L. Shaft furnaces	10	12

bute values range only from 1 to 12. Also, the activities were not undertaken evenly throughout the region. Instead, hubs of activity changed locations from time to time, even though related activities took place in their largely separate contextual spheres. Despite the inherent imperfections of the analysis, the emerging picture allows a rough comparison between the two contexts. This overarching sketch may offer new questions regarding the region's prehistory. Finally, I collate the results with the two subsistence ideological contexts in mind while retaining the chronologies of the activities. Before jumping to conclusions, the evaluations of the activities and the divergence of the two contexts are detailed.

Products of Stone Working

Stone objects make up a major proportion of prehistoric materiality. The focus here is on three indigenous materials and their end products: (A) quartz tools in general, (B) Bothnic tools made of mafic volcanic rock, and (C) boat axes made of Satakunta diabase. Examples of the three are illustrated in Figure 3.

Quartz (A) is the primary stone worked in the region. Its use spans from the early Holocene pioneering phase until the middle of the Iron Age. As a raw material, quartz is hard and tends to fracture unpredictably, which produces sharp edges. Archaeologists have noted that its fragmentation makes quartz practical—it requires little expertise and effort to making simple and convenient tools

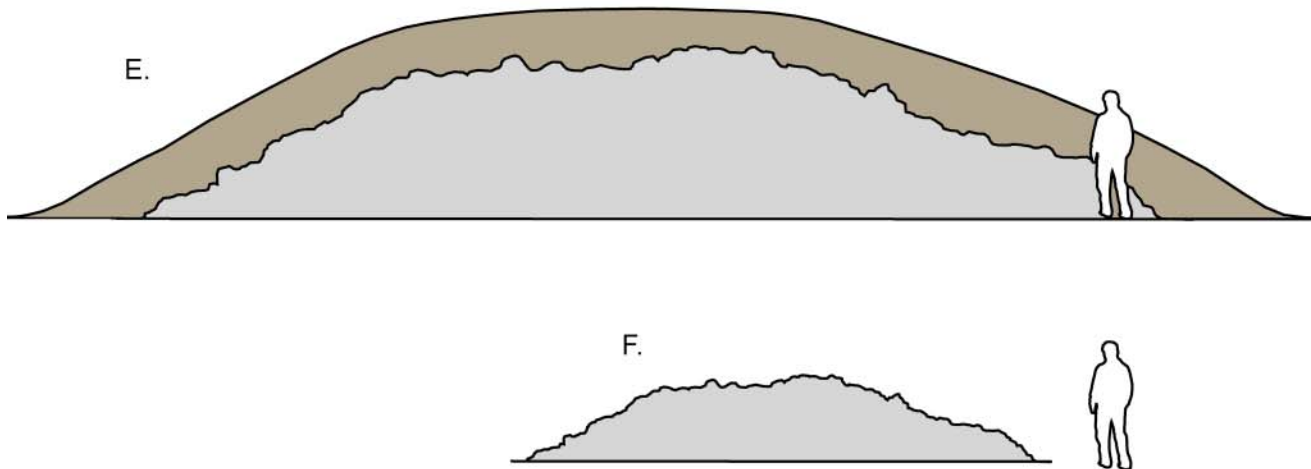
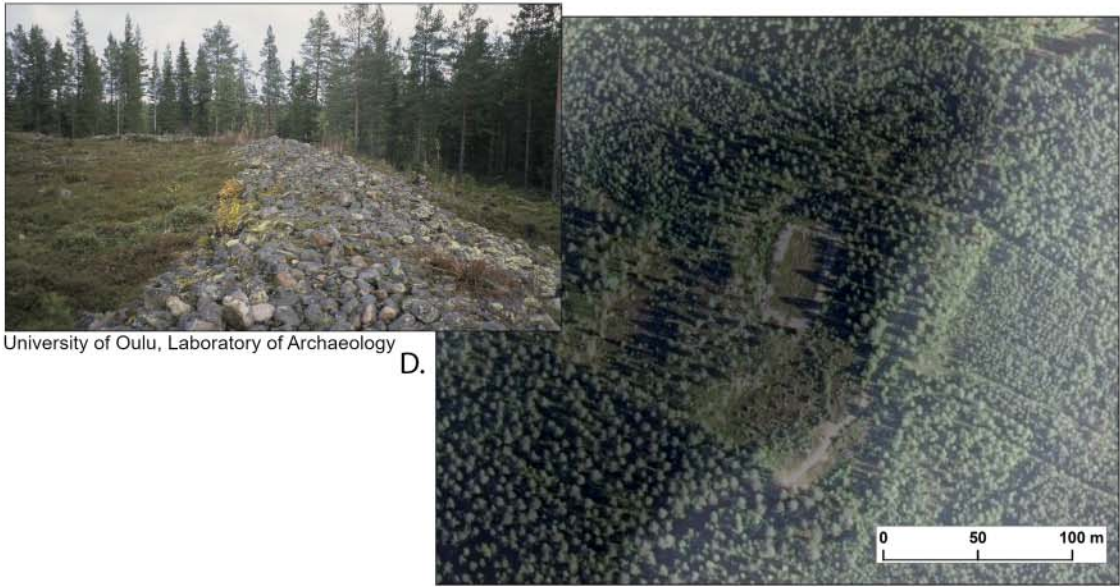


Figure 3. Illustrations of activities from A to F, corresponding with lettering in Table 1.

(Driscoll 2011; Rankama 2002:107–108; Rankama et al. 2006). However, it is more difficult to fabricate into predetermined shapes than flint or slate materials (Manninen 2016), which tend to fracture more predictably (Knutsson 1988; Nunez 1998). Accordingly, while finely crafted quartz artifacts were occasionally made, the stone was mainly used for easily produced scrapers and small blades.

Quartz veins were mined for high-quality raw materials, sometimes using fire to create cracks in the rock that could be extracted by hacking. Noel Broadbent (1979:99–105) studied two significant quartz quarries in the region, with areas of 3×1 m and 4×4 m, where 40-cm-thick quartz veins had been exploited. Through the use of heat-cracking, a large quantity of stone could have been quarried over a lifetime by even a single person, indicating small-scale labor activity. Quartz is also found all over the region as smaller boulders, stones, or rocks, plucked and hauled by earlier glacial ice. These various forms of raw material could have been easily used in fabricating practically all types of quartz objects used in the region.

For these reasons, quartz working is estimated as a low-end form of labor activity in both its intensity and required expertise (Rankama et al. 2006). The chronology of the use of quartz for making tools is vague (Raninen and Wessman 2015:217), but it is estimated to have ended, at least in the northern zone, around AD 300 (Hamari and Lahti 2002). The same range is used here for both zones while admitting that the actual timing is unlikely to be as clear-cut. Nevertheless, we can apply the use of quartz as a baseline to all other assessed activities here.

The second pertinent material is frequently called Tervola slate, greenstone, mafic tuffite, or *strahlstein-slate*, but the geological umbrella term “mafic volcanic rock” is used here. It is soft compared to quartz and either dark grey or light green in color. Due to its mineral composition, it tends to fracture longitudinally. The material was mostly used for the so-called Bothnic tools: elongated stone objects with polished blade-points (Fig. 3: B; also, see Moberg 1955; Nunez 1998). After quartz, mafic volcanic rock probably represents the second-most archaeologically visible local resource used in the region during the late Mesolithic, Neolithic, and early Bronze Age (5500 BC to ca. 1000 BC). Other local materials were used, such as the red slate of Norrland found in the western regions of the gulf (e.g., Zvelebil 2006:186), but there was not enough available research related to these for them to be included in this analysis. Nevertheless, we can consider Bothnic tool production associable with other similar regional activities in the north.

At least three mafic volcanic-rock quarry sites have been found, all located in the Kemijoki River valley in Tervola. Here, according to Hannu Kotivuori (1996:39), who surveyed the sites, elongated bars of rock can be snapped off by hand. The bars need minimal crafting to be fashioned into Bothnic tools. The manufacturing process involved knapping to form the point and sides of the tool and then subsequent grinding to smooth and sharpen the point. The ready-made objects could be used or given away with little work required in the process, making them extremely practical hacking implements despite their size and apparent clumsiness.

A stark contrast to the previous dynamic can be seen in the Finnish Corded Ware Culture’s (ca. 2800–2300 BC) (Nordqvist 2018) signature symbols: the boat ax (Fig. 3:C), also known as battle-axes. The earliest were made from different materials, but diabase and olivine diabase from Satakunta on the eastern shore of the Bothnian Sea quickly gained preference (Huurre 1991:202–203; Laitakari 1930:16). How diabase was quarried is unclear, as no quarry sites have been verified (Huurre 1998:91). Although at least one possible diabase quarry has been located near Satakunta (Salo 1959), it remains unstudied.

What is certain is that the manufacturing of boat axes required considerable expertise and intensive labor in comparison with the two previous stone-working activities. The time estimate for making a single boat ax is 40–50 hours of work (Olausson 1998). Based on my own crafting experiments, diabase fragments in tiny chips, making reduction by knapping time-consuming. However, the danger of accidentally breaking a diabase tool during manufacture is less than with quartz or, arguably, even flint materials.

The form of the boat ax was made to mimic cast-copper and bronze axes from the south, with many of the stone versions having seam lines carefully fabricated where the two halves of a bronze mold would have joined. The distinct shape of the boat axes and the minute details were achieved mainly by pecking, extensive grinding, and thorough polishing. All boat axes are perforated by vertical shaft-hole, laboriously crafted by boring (Olausson 1998). The task thus involved multiple phases, ending with the crafting of a wooden handle. The boat-ax tradition profoundly affected later axes, with less minutely detailed variants manufactured until the early Bronze Age.

This description for the first three indicators outlines how their relative intensity and expertise rates were assigned. Bothnic tool production and working with mafic volcanic rock (B) is the least intense of the three, while common quartz use (A) requires the least expertise. Both rates for boat ax production (C) surpass the two other labor activities.

Monuments of Labor

The tradition of monumental construction offers evidence that is comparative with the ubiquitous stone working. Four types of earthworks are included in the analysis: the so-called (D) giant's churches, (E) monumental burials, (F) small cairns, and (G) hillforts. Continuing chronologically, we begin with an activity that was likely contemporaneous with the use of boat axes: the establishment and maintenance of giant's churches.

Giant's churches, named after their story of origin in local folklore, are remnants of large walled enclosures (see Fig. 3:D). They were constructed on boulder fields located on hilltops and ridges along the coast. Boulders and stones were cleared from the center to the sides, typically creating a 0.5–1-meter-high and 2–3-meter-wide stone embankment with several openings. The sizes of these ruins range from 10×6 m to 70×30 m. There are at least 17 giant's churches that are over 30 m long, from a minimum of 40 such monuments. If I include all of the unverified monuments, the total rises to 54, all of which are on the eastern coast of the Bothnian Gulf. There is no consensus as to their function, although suggestions have been wide-ranging from fortifications to hunting traps to astronomical observatories (Okkonen 2014).

The few sites that have been dated using absolute dating methods suggest an establishment period of 2800–2600 BC for the monuments (Okkonen 2014). Since postglacial land uplift is substantial in central Fennoscandia (Lindén 2006; Poutanen and Steffen 2014), it offers additional temporal reference (Hakonen 2017; Okkonen 2003). According to a chronology of shoreline displacement, the construction of giant's churches could have occurred anywhere from before 4000 to 2000 BC (Sarkkinen 2012; for a refined chronology, see Hakonen 2017), but some of the constructions at higher elevations were likely built on lakeshores some distance inland from the coast. In this paper, I use a 3000–2000 BC range (Okkonen 2003:123), although the reader should note that the tradition could have begun even earlier.

There is plenty of evidence to suggest that constructing such massive monuments involved a considerable workload. The construction of the largest embankments was undertaken by moving hundreds of tons of stones. According to an elevation model published by Jari Okkonen (2003:194, Fig. 96), the outer dimensions of one of the structures is 60×35 m with an inner clearing of 42×20 m. The 6-m wide embankment is over a meter high, and the area inside is on average 70 cm lower than the top of the wall. The total weight of removed stones is approximately 300 tons. This labor assessment includes not only the construction of the stone foundation but also the

likely additional structures erected on the foundations (Okkonen 2003:132–133; Schulz 2009:141).

Although partly sharing territory (Mökkönen 2011:59; Sipilä and Lahelma 2007), no Finnish Corded Ware Culture material associable with the southern zone has been found in connection with giant's churches. On this basis, in the labor analysis, the remnant type is designated only as part of the procurer zone. It should be noted again that the zones are not uniform. At the northern end of the Bothnian Bay, far from the interaction zone and on the western side of the gulf, no giant's churches or similar structures have been identified.

After the waning of the giant's church tradition, cairns burials became a prominent feature. Burial traditions of the northern and southern regions of the gulf differed significantly during the Metal Periods of 2000 BC to AD 1000. The cairn building tradition may have begun earlier during the Neolithic in the north, although this has not yet been verified (Okkonen 2003:238). On the northern parts of the Bothnian Bay, shallow stone settings (see Fig. 3:F) were used as burials as early as the 5th millennium BC (Liedgren 2014; Mökkönen 2013), but similar features have yet been dated to the 4th and 3rd millennium BC.

Monumental long-cairns (E) were sporadically used in the northern zone from approximately 1800 to 1500 BC, after which smaller cairns became preferred (Okkonen 2003:236). Conversely, the southern agricultural area was characterized by large burial monuments (see Fig. 3:E), used in conjunction with smaller ones (F) from 1500 BC onward. These were either stone cairns or, later, earthen mounds or barrows often situated in groups. Instead, the northern forager zone contained mainly smaller cairns and stone settings in lesser numbers. Although most cairns are solitary, a sizeable northern burial site may contain up to a dozen small cairns (see Hakonen et al. 2017). In contrast, a large southern burial site may include dozens (Tuppurainen 2014) or, in extreme cases, more than 100 cairns (e.g., Salmio 1980).

The northern cairns and stone settings certainly required less labor than monumental burials (Bläuer et al. 2013). The former was constructed rather sporadically until the last phase of the burial tradition around AD 1–400 (Okkonen 2003). During this phase in the procurer zone, the size and number of burial monuments abruptly increased before disappearing altogether. In the producer zone, cairns and burial mounds were replaced by inhumation cemeteries only around AD 1000, probably due to the expanding influence of Christianity (Hakonen and Hakamäki 2019; Price 2015:368).

Hillforts (Fig. 4:G) are the final grand monument to labor in prehistory. These are specifically located within the southern zone. Their timeframe

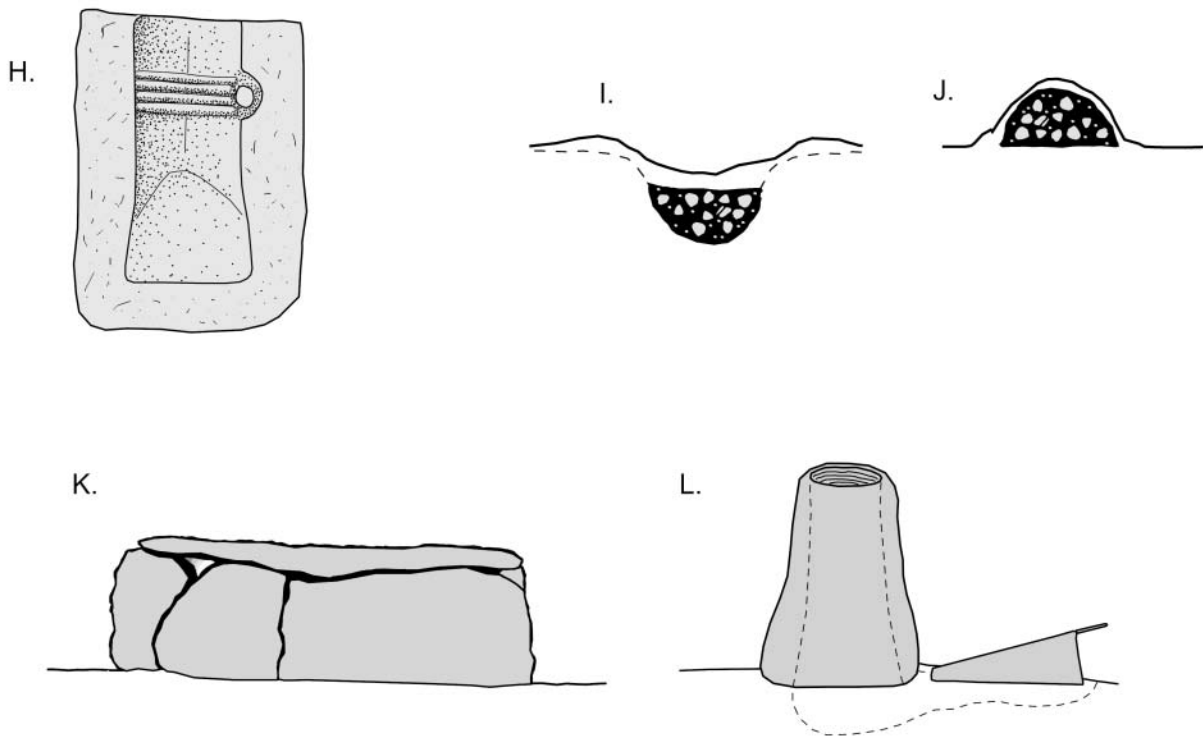
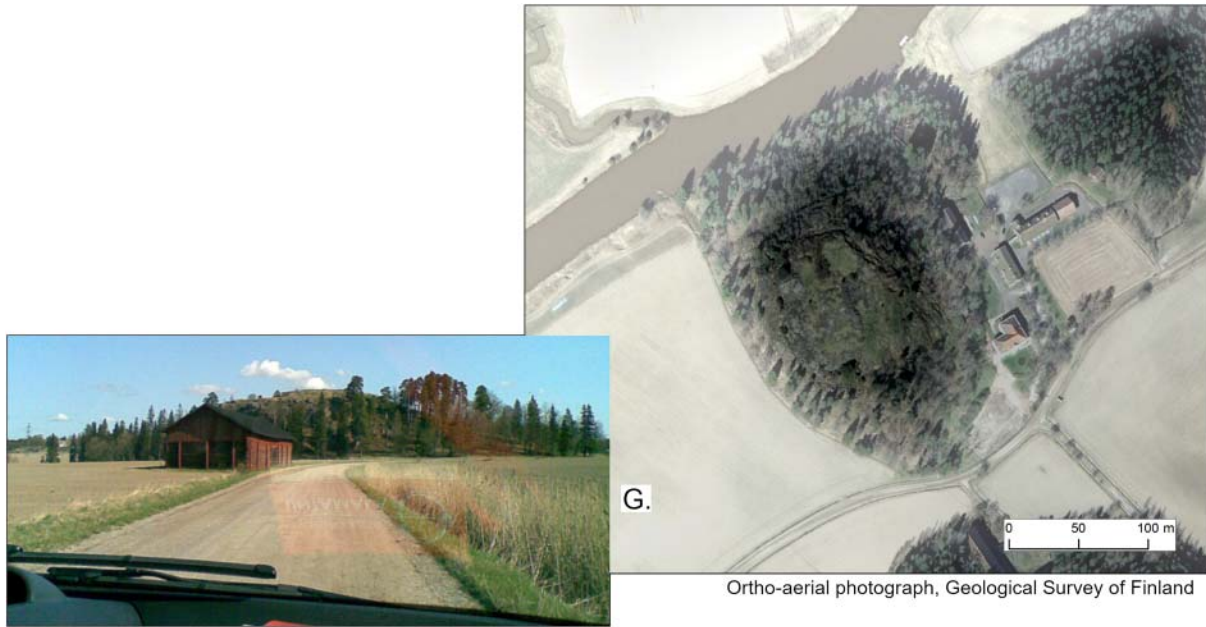


Figure 4. Illustrations of activities from G to L, corresponding with lettering in Table 1.

in the region is difficult to ascertain with any specificity. Some of them may have already been used during the Bronze Age (Olsson Eriksson 2020), although some dating relies on nothing more than wide-ranging ceramic typological dates (Asplund 2008:116–122). In Uppsala’s Broborg hillfort, 70

km inland from the southwest coast of the Bothnian Sea, the erection of ramparts has recently been dated to ca. AD 400–700 (Ahmadzadeh et al. 2020). Similar chronology may apply to several hillforts on the western coast of the Bothnian Sea (Olsson Eriksson 2020:Fig. 3), which have been

tentatively associated with monumental burial traditions and iron production taking place during the same period (Hemmendorff 2010; Lindeberg 2009). Conversely, some Finnish hillforts have been interpreted as dating to AD 1000–1400 (Taavitsainen 1990). Nevertheless, several hillforts located 70 km southeast of the Bothnian Sea coast indicate activity already in AD 600–800 (Asplund 2008:116–122). Because of the problematic chronology, a simplified range of AD 500–1200 is applied in this analysis, even though earlier use is also a distinct possibility.

As with giant's churches, little organic material has survived within Fennoscandian hillforts. In some cases, stone ramparts remain (see Lahelma 2002), but primary structures seem to have been wooden fencing, palisades, or more elaborate wooden walls (Taavitsainen 1990). Their construction obviously required a considerable workforce, with multiskilled and specialized labor. The stones of Broborg's ramparts are fused together by vitrified glass, melted with high heat, which has puzzled researchers for centuries. Whether this is a feat of engineering or an accidental phenomenon remains unresolved, although recent analyses seem to support the former explanation (McCloy et al. 2021; Weaver et al. 2018).

Interpretations of hillforts as militaristic elite powerbases have recently gone through various reappraisals (Asplund 2008:111–116; Holmring 2014:12–13; Thurston 2009). Yet, such sites are still often viewed as places for elevating communal identity in relation to neighboring communities or as places representing hierarchical political arrangements (Delfino et al. 2020; O'Driscoll 2017). While in southern Finland, these sites tend to be viewed rather austere as largely unmaintained communal places of shelter from outside invaders (Raninen and Wessman 2015:360–361; Taavitsainen 1990; although c.f. Asplund 2008:346), in Sweden, they are more often interpreted as places for consolidating communal or hierarchical identities and as militaristic or ritual sites associated with many entangled activities (Holmring 2014:5–14).

Thus, at this stage of the analysis, the hillforts (G) represent the high point of labor intensity and expertise. Monumental burials (E) are the second in intensity, requiring an organized labor force. Many such excavated remnants contain elaborate inner structures, such as burial cists. Some expertise in the construction process is needed, but arguably less so than in the fabrication of meticulously crafted boat axes. However, I should note that more elaborate inner burial structures may have vanished without clear traces. Giant's churches (D) represent, in my opinion, due to their vastly smaller numbers, lesser labor intensity compared to monumental burials, as well as slightly lesser expertise, although this may change if more

evidence of organic structures comes to light. Small cairns (F), which occupy the lowest ends of both labor scales, differ from the other monuments. I assess them as signifying slightly higher intensity than commonplace quartz use and Bothnic tool production but less expertise, meaning that small cairns occupy the lowest rung of the expertise ladder. It is obvious that different analysts may come to different conclusions. Still, slight shifts in relative assessments, when they concern largely comparative activities, have little effect on the combined results.

Metallurgy and Surplus Production

Stepping back in time from the hillfort era, we will lastly expand our dataset by five more activities. We will now focus on the most evident forms of production that were practiced separately from basic subsistence activities. These activities involve bronze casting (H), cooking pits (I), burnt-rock heaps (J), stone-box furnaces (K), and shaft furnaces (L).

Bronze casting is represented by sporadic finds of ceramic crucibles and soapstone molds (Fig. 4:H), suggesting that bronze casting was either practiced or experimented with locally (Bolin 1999; Ikäheimo 2020; Spång 1997:197). No tin ore has been found in this temporal context, signifying that bronze was probably not locally alloyed but acquired via material networks. Provenance studies of southern Scandinavian bronze objects of 1500–500 BC indicate that the copper originated mainly from the Mediterranean region (Ling et al. 2014). Bronze was probably moved predominantly as complete objects, which could be recast according to stylistic preference (Kuusela 2013:133).

Although frequent in the nearby region of Uppland (see Ojala 2016:107–108), evidence of early bronze metallurgy is scarce throughout central Fennoscandia. On the eastern coast of the gulf, there is evidence from at least four sites in both the southern (Holmblad 2010:73; Salo 1984:116) and northern contexts (Ikäheimo 2020). Factoring in the soapstone-mold chronology indicates that the activities date roughly to 1200–500 BC (Melheim 2015). Possibly, bronze-casting ceased after this for some centuries, although this can be explained simply by the indistinctness of relevant traces. After AD 100, in southern contexts, evidence of bronze casting is discernable alongside iron metallurgy (Lindqvist 1989). Also, in the north, between AD 100–400, both iron and bronze/copper metallurgy were practiced simultaneously (Mäkivuoti 1988).

The few verified Bronze Age crucibles found in central Fennoscandia suggest local smelting, even though no related structures have been

confirmed (Ikäheimo 2020). Nevertheless, if the bronze molds were used for local recasting, the activity required a relatively high level of expertise, as indicated by the multifaceted operational chain (see Engedal 2010:142–162). However, labor intensity is assessed as low due to the scarcity of evidence throughout the region. For the same reason, the temporal range of the bronze casting is particularly uncertain since even a single chance find may indicate the continuation of the activity between 500 BC and AD 100.

More apparent activity during the Bronze Age is production related to heating rocks, as indicated by large clusters of cooking pits (Fig. 4:I) and burnt-rock heaps (Fig. 4:J). These feature types are often interpreted as having similar functions (see Nilsen 2016), although some of the burnt-rock heaps were, at least in some regions, also used for burial purposes (Ojala 2016:98–103). Primarily though, both the pits and heaps have been interpreted as places for processing goods such as meat, fish, or vegetables, or the production of train oil from seals (Äikäs 2009; Lundin 1992; Nilsen 2016). Conversely, some researchers see cooking pits as ceremonial fire pits, especially in southern Scandinavia, where they were sometimes dug in two or more parallel rows (Martens 2007).

One of the largest concentrations of cooking pits is next to the river estuary of Oulu and contains nearly 300 pits (Äikäs 2009). Such large cooking-pit clusters date roughly from 1000 BC to 200 BC (Hakonen 2017; Kuusela 2014; Nilsen 2016). On the east coast of the Kvarken, in southern producer contexts, a large assemblage has been dated to 1200–500 BC (see Holmblad 2010:64–65, considering only radiocarbon dates with low deviation).

Burnt-rock heaps are also found at several earlier giant's church sites. It is worth considering that these heaps may be functionally related to later similar heaps. The few dated Neolithic burnt-rock heaps indicate this activity occurring between 2600 BC and 2400 BC (Okkonen 2014), but due to lack of systematic research, I use the same broader chronology as for giant's churches (3000–2000 BC). Later, they are concentrated in Åland at the southern end of the Bothnian Gulf. These are roughly dated to 1300 BC–AD 450 (Nilsen 2016).

The work involved in using the cooking pits obviously included digging and collecting rocks and firewood. In interpreting sites with dozens of pits, their related labor intensity can be assessed to be in the medium range, also considering that it is likely that some of the work-involved activities took place (e.g., the acquisition of products processed in the pits). The heaps are similarly ordered but lower on both scales since they do not

include the digging of cooking pits. There is no available evidence that the heaps were associated with additional structures.

In the northern zone, the end of cooking-pit-related production coincides with the emergence of ironworking. Iron could be processed locally from start to finish without dependence on external material networks. Local iron production throughout the northern and eastern Fennoscandia, taking place in ground-level stone-box furnaces (K), seems to have been small-scale and, due to the sparsity of such features, probably primarily experimental in nature. In northern Fennoscandia, such sporadic iron production began ca. 300 BC and seems to wane after AD 300 (Bennerhag 2012; Karjalainen 2016).

Recently, Joni Karjalainen (2016) conducted experiments involving the production of iron in stone-box furnaces. The process was highly laborious, involving gathering lake or swamp ore, collecting firewood, possibly the production of charcoal, and constructing and using a furnace. Effective operation of such furnaces requires a high level of expertise (see Karjalainen 2016).

Also, the iron-producing society of southern Norrland, in the region west of the Bothnian Gulf, has been thoroughly studied (Lindeberg 2009; Pappas Adlerburg 2017). Here, iron production was more intense, arguably even centralized, with the processing of ore in shaft furnaces (L) and the products hammered into local spade-shaped iron bars. The production and use of the iron bars continued from ca. AD 1 to around AD 900 (Lindeberg 2009; Pappas Adlerburg 2017; see also Hjärthner-Holdar et al. 2014). Recently, the contemporaneous activity of tar production has come to light in the adjacent region of Uppland (Hennius 2018). Tar production is not included in this analysis since its inclusion would only accentuate the emerging difference between the two contexts, which is already considerable (see Fig. 7). The manufacture of tar would be roughly comparable to iron production in shaft furnaces, although arguably requiring less expertise but possibly representing more intensive effort depending on the number of production sites involved. According to Hennius (2018), the two activities may actually be related since charcoal, which is required in iron-ore smelting, is a byproduct of tar production. The summed radiocarbon chronology of local tar pits is ca. AD 100–1200 (Hennius 2018). While these are not included in the analysis, they serve to accentuate the contemporaneous activities of production.

Lastly, corresponding temporally with the use of hillforts was the re-emergence of cooking pits (I), this time mostly on the Swedish coast of Bothnian Bay. These have been associated with the proliferation of fishing basecamp sites on the

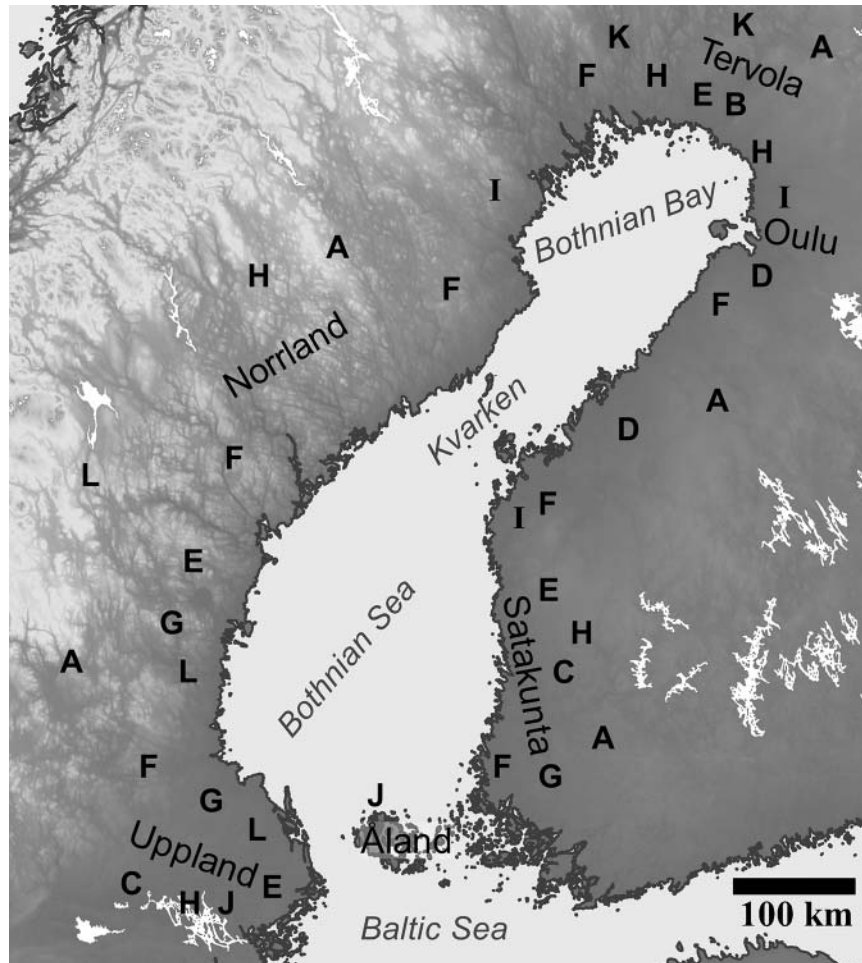


Figure 5. Geographical distribution of activities analyzed in the paper and place names mentioned in the text. Background: DIVA GIS elevation map, 250 m resolution.

western archipelago of the bay (Bergman and Ramqvist 2018). Fishing constituted much of the subsistence base in the region, but the quantity of related sites indicates surplus production. Increased surplus food production can be seen as a local effort in engaging with maritime trade (Bergman and Ramqvist 2018).

With the addition of five activities to the previously collated dataset, Table 1 achieves its final form. The two approaches to iron production—experimentation in the north (K) and the high-intensity production in the southwest (L)—are respectively assessed as medium and high intensity, but both required high expertise. Bronze casting (H) occupies lower rungs than K in both regards, being relatively lower in intensity. And finally, the rock-heating production in pits (I) and heaps (J) are sorted to the high-medium range in intensity and low-medium in expertise.

Labor Activity in the Long-Term and its Implications

The geography of the 12 analyzed activities is illustrated in Figure 5. This map is complemented by Figure 6, where the temporal occurrences of the activities are presented. Based on their spatio-temporality, allocating the activities to the two previously discussed conceptually dichotomic contexts and compiling the chronologies and the relative labor values allows us to complete our data analysis by pivoting Table 1 and Figure 6 into the trendline-graph presented in Figure 7.

Figure 7 by no means represents the complete picture. The analysis, due to its binary perspective, undoubtedly exaggerates the unity within the two contexts. Still, I argue that a conceptual divergence between procurement and production ideologies, an idea derived from Bird-David (1992)

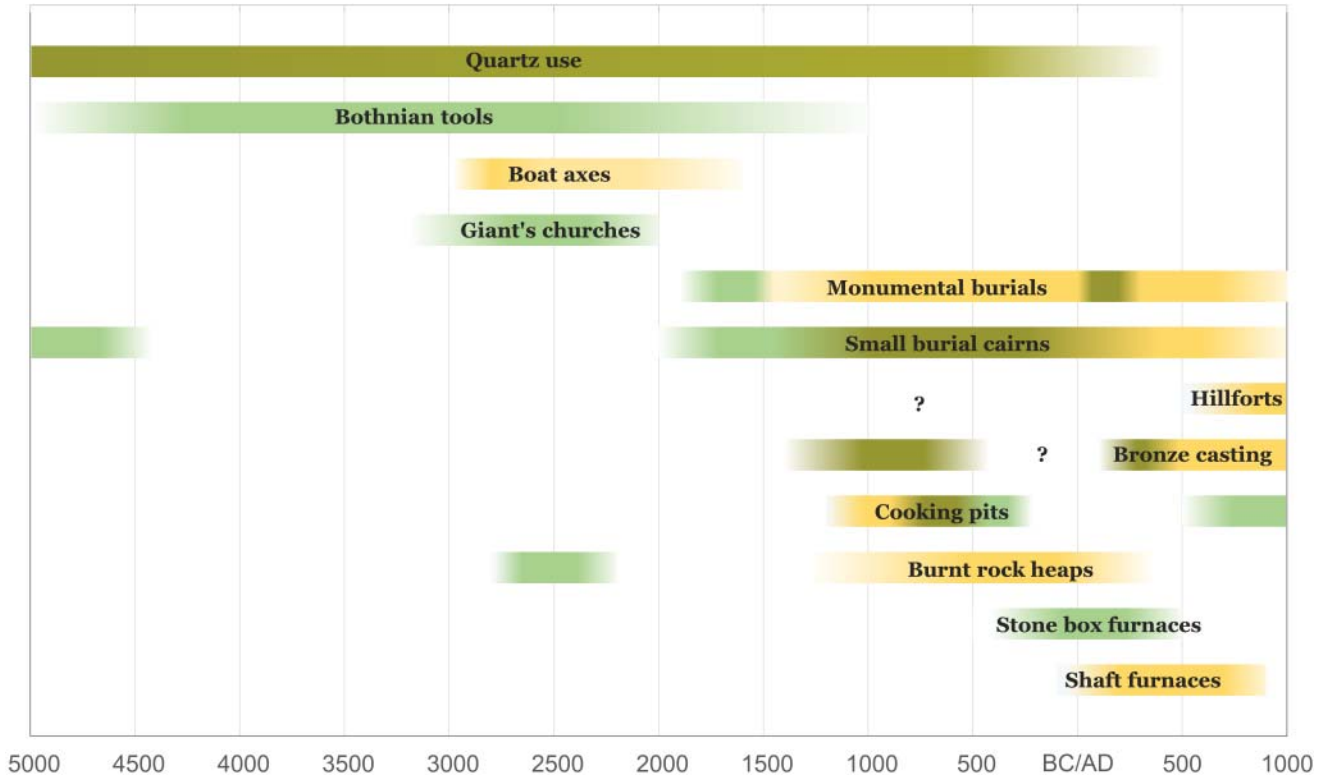


Figure 6. Studied labor activities. Green (or gray) indicates procurer activities, and yellow (lighter gray) indicates producer activities. Olive (dark gray) indicates activities undertaken in both contexts.

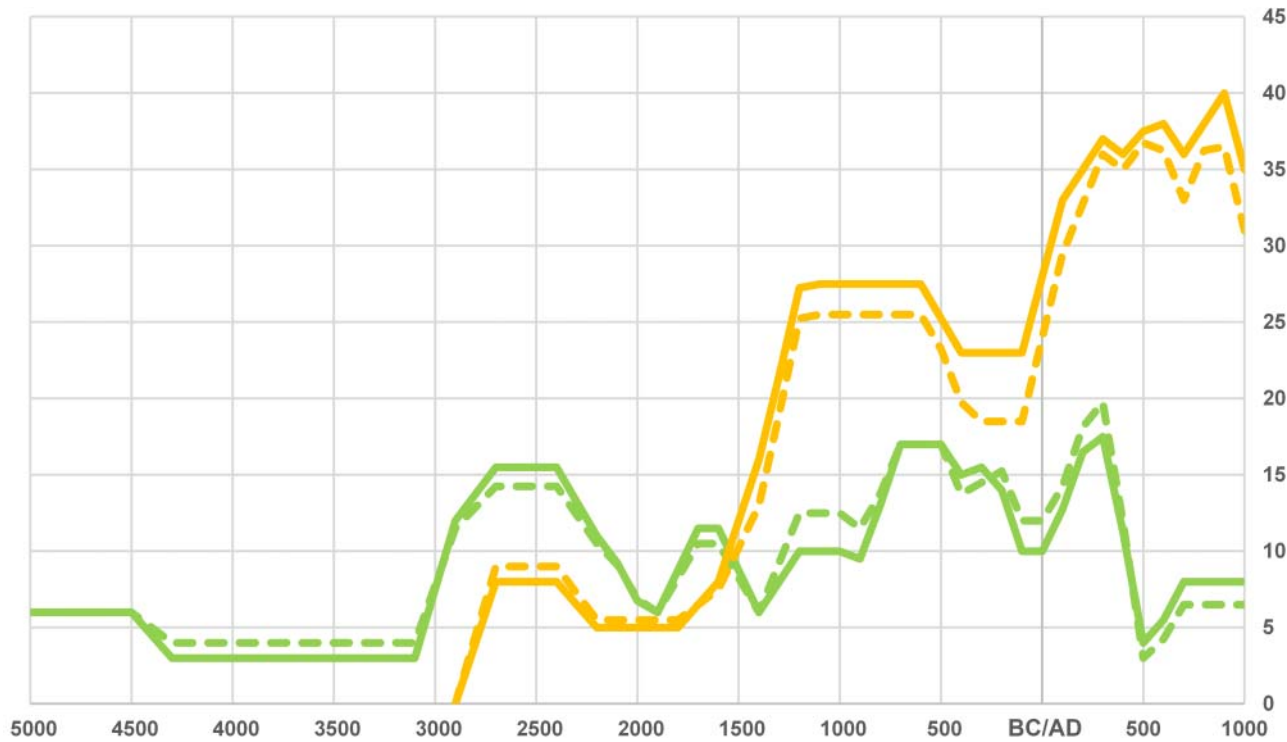


Figure 7. Trendlines visualizing labor intensity (line) and expertise (dashed line) in the two contexts (according to Table 1 and Fig. 6): Yellow (light gray) line represents the southern zone while the green (dark gray) represents the northern zone.

and Ingold (2000), may hold the key to understanding the apparent cultural dichotomy in the region, rather than basing the observation simply on differences between subsistence modes. However, simple dichotomies invariably result in abstractions. Studying local mortuary practices from a nonlabor perspective actually diminishes the perceived differences between the two contexts (Hakonen and Hakamäki 2019).

Still, I hope that this preliminary analysis stimulates discussion, aiding in the collation of more activities, which would fill the most glaring gaps in the narrative. Much of the most common and laborious practices in the material record that are beyond basic subsistence are included. And although no absolute values were determined for the activities, the comparative analysis shows certain trends that should be addressed.

According to the collated results, the northern zone of central Fennoscandia experienced five periods between 5000 BC and AD 1000 when extrasubsistence labor activities intensified:

1. 3000–2400 BC: Establishment of monumental buildings and a related burst of labor activity, possibly beginning even earlier.
2. 1800–1600 BC: Short-lived construction of monumental burials.
3. 1400–500 BC: Gradual intensification of surplus production.
4. AD 1–300: Short-lived construction of monumental burials.
5. From AD 500: Regional surplus production as a byproduct of basic subsistence.

Meanwhile, the southern zone shows three periods of intensifying labor:

1. 2800–2400 BC: Production of boat axes as prestige items following the Finnish Corded Ware Culture expansion.
2. 1700–600 BC: High labor intensity, with local production and construction of burial monuments.
3. 100 BC–AD 900: Centralization of iron production in the southwest, along with increased tar production (Hennius 2018), followed by the building of hillforts.

Mostly different activities took place in the north and south. The exception is between 1700–500 BC, when similar activities were undertaken in both contexts, with the southern zone exhibiting overall more significant labor activity. But it may be more important to discuss the abatement phases when certain labor practices seem to have been abandoned. The different dynamics observed in the two contexts serve only to strengthen the notion that we are discussing two separate cultures or world systems.

In the southern zone, the level of labor activity rose considerably during the Bronze Age (1700–500 BC), followed by a period of decline. After the slump, new labor activities were introduced, with labor activity in Figure 7 reaching new heights. This trend may reflect the power dynamics within the southern zone. Returning to the theoretical discussion, ideology of production is rooted in landscape and soil and their modification. Suitable habitats for productive activities were engineered, making them vested territorial interests. Maintaining control of the land that the community had partly created could have been justified by communal or private ownership, where land was claimed as per law or custom. Land ownership and its protection intensified the formation of politically hierarchical leadership roles, which laid the foundation for a maintained labor force. This is arguably the *modus operandi* of the early Swedish kingdom, which formed after a long history of related production activities indicated within the archaeological record (see Ersgård 2018; Hennius 2018; Lindkvist 2015; Ojala 2016).

Nevertheless, there is no guarantee that such a model applies to the long-term past of the southern zone, even when the material record reflects an association with ideology of production. For one, Graeber (2007:265–269) pointed out that labor organization is not always a matter of coercion. Instead, participating as a laborer in erecting monumental—especially ceremonial—constructions may often be appealing and rewarding in itself. Thus, the end result of long-term development (i.e., the formation of a hierarchical state) should not be projected to all periods of intensified labor activity. Such trends could also indicate other events, such as the reorganization of ritualistic activities.

Still, phases of increased labor intensity have often been interpreted as reflecting political developments involving leadership roles (Earle 1987; Webster 1990). Yet, the question of whether the activities reflect more communal decision-making or authoritarian leadership is not answerable in the context of this analysis. Granted, material expressions such as monumental burials are often taken as reflections of hierarchical relations (Artursson et al. 2016; Kuusela 2009). On the other hand, others are inclined to interpret monumentalism and laborious effort as expressions of communal identity (O’Driscoll 2017). As a consensus, we may borrow a fitting conclusion, that is agreeable to both views, from Egyptologist John Romer (2012:35), pertaining to communities adopting plant cultivation along the Lower Nile between 4400–4000 BC: “By their very labour, they were redefining the universe in which they lived and their place within it.”

In the northern context, phases of decreased labor occurred 2400–1900 BC, 1600–1400 BC, 500–200 BC, and after AD 300. In three periods, labor activity reached similar levels as those in the 4th and 5th millenniums BC. This reduction signifies near abolishment of laborious non-subsistence related practices in the north. What should we make of this in relation to what occurred in the south?

One scenario is that these labor-abatement phases reflect the abolishment of leadership roles, whether communal or more authoritarian. In political organizations devoid of institutionalized hierarchies, for which there is less evidence in the north than in the south, leaders would have had precarious positions. Anthropologist Pierre Clastres (1989) discussed such seemingly formal-yet-flexible political economies where the influence that leaders have on others depends on the willingness of those others to participate. When leaders are incapable of arguing their case or lack the wealth to redistribute, or people simply lose interest, their supporters may as well decide to stop following them (Clastres 1989; Graeber 2004).

This dynamic—the intangibility of political influence—could be the reason why labor activities in the northern zone reverted several times close to a level of basic subsistence. Such events may indicate a reorganization of agreed-upon political structures, whether based on individualistic or communal leadership, to a more anarchistic, leaderless society. In the southern zone, such events do not appear in the long-term record. If anarchistic phases took place in the south, they do not seem to have been as drastic, as long-term labor activity ebbed and flowed but never reached the levels indicating near-total abolishment of labor-related activities. Thus, the long-term account suggests differing labor dynamics in the two contexts. At the very least, it seems northern communities experimented with but recurrently rejected a “redefined universe.” This observation may partly explain why the material records of the two regions diverged and why sovereign power structures and states emerged in the south but never in the north.

Conclusions

The relative analytical method introduced in this paper to compare different material expressions of prehistoric labor indeed suggests new insight into the central Fennoscandian past. In this model, labor practices that were supplemental to basic subsistence were instituted by some form of leadership, whether communal or more authoritarian. Thus, changes in such practices may indicate, among other things, the rearrangement of leadership roles. Periods of high labor activity manifested materially as products often interpreted in

terms of symbolic, redistributive, or ritualistic expression relating to the negotiation of leadership organization. However, without the consolidation of such roles, whether in ritual, custom, or law, the performers of such labor activities could cease the additional work, abandoning their leaders before any hierarchies became set in stone. Whether the long-term model is robust enough to persist with increased scrutiny, time will tell. The initial findings can be summarized as follows.

The southern archaeological context, traditionally associated with agricultural development, shows overall increasing labor activity, especially from the early Bronze Age on, in accordance with the paradigmatic view of local prehistory. Interpreting this in terms of local politics, the intensification of such activities may indicate efforts to strengthen the control of landscape. The ideology of production, whether grounded in the harvesting of domesticates or excess hunting or fishing, makes access to relevant geography a moral imperative. The objective of effective control may have attracted communities to establish formalized leadership roles, arguably reflected in the increase of labor intensity. Labor activities largely persisted and accumulated within the southern context after their initial undertaking. Conversely, the northern context, which is mainly associated with the ideology of procurement, repeatedly undertook labor activities, which were eventually abandoned or abolished. These events may indicate political reorganizations in which leadership roles were periodically experimented with, followed by periods of anarchistic power relations. The different dynamics between the north and south suggest that anarchistic society, mostly uninvolvement in excess labor, was intentionally maintained in the north, while, in time, sovereign hierarchies became ingrained in the customs of the southern region, eventually overtaking the whole north.

Acknowledgments. The foundations involved in the funding of this study include the Otto A. Malm Foundation, the University of Oulu Faculty of Humanities, the Swedish-Finnish Cultural Foundation, and the University of Oulu Scholarship Fund. I am forever grateful for their support. For comments and ideas, I extend my gratitude to Vesa-Pekka Herva, Kirsti Paavola, Jari Okkonen, Ville Hakamäki, Janne Ikäheimo, and Karen Niskanen, and to the legions of anonymous reviewers.

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