Scales of interaction
Quantity and quality of encounters amongst northern foragers

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Introduction

Most past and recent foraging societies are described as small-scale, a term that often refers to both the size of residential groups and of any larger unit of socio-cultural interaction. Recently, this perspective was challenged by a study suggesting that while residential units may be small, all individuals are part of large-scale social networks, and basic units such as households or residential groups are not nested in a stratified set of socio-cultural groups (Bird et al. 2019). On the other hand, it has also been argued that scholars have neglected to understand the qualities and intimacies of small foraging groups (Bird-David 2017a, 2017b). Here I argue that a narrow focus on quantifying populations at any demographic scale diverts our attention from the dynamics and complexity of interaction within and beyond assumed entities or networks. Interaction operates at different geographical and temporal scales varying from local level and daily occurrences to distant and irregular interactions, and the quality and intensity of the interaction varies accordingly. In addition, even in numerically small communities the patterns of interaction may be very diverse, encompassing a variety of overlapping networks depending on gender, age, tasks, kinship and personal preferences.

While anthropology has often provided archaeology with models for social structures of foraging communities, archaeology is well positioned to address issues of scales of interaction. The input from archaeology is particularly relevant because much of archaeological data comes from foraging societies that were not encapsulated by farming communities nor were impacted by modern colonization. Using archaeological discussions concerning communities

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of practice combined with recent results from an ongoing research project in northern Norway as an example, I will argue that considering the flexibility and dynamics of foraging groups brings us beyond a fixed scale to instead reflect upon networks and interactions at a multitude of scales, varying from residential units to regional and long-distance contacts.

From spatial models to human interaction

The portrayal of hunter-gatherer communities as consisting of bounded local bands or residential units integrated in a larger entity representing a distinct socio-cultural unit is largely obsolete in contemporary anthropological research. Such traditional models appear more deeply ingrained in archaeology (Burke 2021). Explicit or implicit assumptions of a nested spatial organisation associated with socio-economic organisation have prevailed longer. However, few present it as constituting a socio-political organisation and a direct translation into cultural units is abandoned. Inspiration frequently comes from ethnographies. Burch, for example, writes of compound families within socio-political nations in his study of the Iñupiaq (Burch 2006) and the geographer Collignon presents the organisation of the Inuinnait as consisting of residential groups, with those exploiting the same territory forming a distinct and named community (Collignon 2006: 21). In her study of the mid-Holocene socio-spatial organisation of northern Sweden, Lundberg (1997) refers to June Helm's analysis of the 20th century Dene (Helm 1965) and employs the terms local and regional bands. Investigating socio-cultural divisions amongst foraging groups in Neolithic western Norway Bergsvik employs both ethnographic studies and research into ethnicity to suggest the existence of local territorial groups and identities (Bergsvik 2006).

Unfortunately, as many archaeological studies focus on spatial organisation in the landscape, they often neglect consideration of social and demographic flexibility in the composition of residential units or relocation between regions. The spatio-demographic organisation with a minimal band of 25-30 individuals and several such bands nested within a regional band exemplified in Whallon's heuristic model (Whallon 2006, fig.4) is therefore still familiar to many archaeologists, if not necessarily agreed upon. While Whallon's point is precisely that people do interact across units at all levels, the image of bounded, non-overlapping and nested units has not been fully replaced. Archaeology needs to consider the possibility of flexibility in choices

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regarding socio-demographic practices including residence and mobility patterns.

Communities of practice and learning networks

To emphasise the flexibility amongst past foragers, I propose that we turn to the insights from studies of transmission of technology and communities of practice. Individuals in small-scale societies would engage in a range of different activities and the sharing of related knowledge and skills. For the purpose of this chapter, a community of practice (Lave and Wenger 1991; Wenger 1998) is understood as a group of individuals who perform a specific task, sharing knowledge and techniques through a set of particular practices, even if dispersed between different sites. Such practices include manufacture of tools, equipment, dwellings and clothing, and hunting and fishing techniques (e.g. Jordan 2015), but also socio-cultural practices such as rituals, narratives and performances. We can then envision a wide range of communities of practice manufacturing and using specific items.

The practices are transmitted to others, typically the next generation, with varying accuracy, but generally following the same technological principles. Deviances could be due to local innovation or contact with persons from other communities of practice with alternative techniques, although the competency of the apprentice is also relevant. As emphasized by Gosselain (2000, 2008, 2010) some elements of a finished product may be easy to copy; for example, the shape and decoration of ceramic pots that perhaps need only be observed to be replicated. Other elements require more detailed information (e.g. mixing the clay and firing the pot), and therefore must be learned from accomplished individuals over a period of training or replicated using alternative techniques. When studying the spread of material items and practices, we should distinguish between such easily copied or transmitted elements which indicate interaction, but say little of the intensity of it, and elements that would have demanded a prolonged and more intimate learning period for transmission of skills and knowledge (Damm 2012a).

We could also describe such communities of practice as learning networks within which practices are reproduced, consolidated, and transmitted through repetition of technological actions. These networks would overlap only partially, as separate activities would probably have involved a different set of individuals. In small foraging groups with limited specialisation, each individual performs a variety of tasks. However, the network may consist of

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a slightly different group of individuals for each task. It follows that an individual interacts with different individuals for different purposes at different times (Damm 2012b). Much as a person may have multiple identities and be multirelational, s/he also participates in multiple, partly overlapping practice networks. In this way, a person may transmit a particular skill to some persons, and other skills to others. Skills and knowledge are not necessarily shared equally with all persons one encounters or lives with, but predominantly with people who engage in similar activities and share information. For example, Bird-David reports that while names of the most common plants were shared by all in a particular Nayaka hamlet, names of many other plants mentioned by some in the community were unrecognized by others. Individuals appeared to name plants differently, probably a result of the Nayaka practice of foraging "separately together", often in small groups consisting of a couple and their children (Bird-David 2017b: 128, 146). The transmissions of plant names would then be rather limited and in this case probably predominantly transferred from parent to child.

Gardner (2019) stresses that, as most of us, contemporary foragers weigh the information they receive depending on the reliability of the person sharing the knowledge. Aspects to be considered include the skills of the person providing the information, whether the information results from first-hand experience, and how trustworthy the person relaying the information might be. Evaluation of these aspects is easier with socially close individuals than socially distant persons. An ethnographic example from the Nayaka demonstrates the gradual integration of an in-married partner, requiring time for all involved to engage with each other, showing that multirelational ties and closeness evolves over time (Bird-David 2017b: 189). The more time spent together, and the closer individuals collaborate with one another, the bigger the impact they are likely to have on each other. While the recovery of such details may at first appear unattainable for archaeology, the combined use of insights from cultural transmission studies, communities of practice and learning networks will in some instances allow us to uncover the extension of close communication and transmission (Apel 2001; Hallgren 2008; Jordan 2015).

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Spatial Demography of a northern maritime forager community: background

To discuss the extent of interaction within a prehistoric foraging group, it is necessary to explore both the quantity and quality of interaction at several scales, from individual households to long-distance contacts. Such a multi-scalar study requires the use of a range of different approaches, adjusted to the available data to infer quantitative and qualitative aspects of group sizes and interaction. Here I do not focus on the methodologies, but these cover traditional archaeological investigations of sites and artefacts, statistical analyses and comparisons with anthropological studies.

I will focus on the mid-Holocene maritime foragers of northernmost Norway, with an emphasis on western Finnmark (Damm et al. 2020). The geography deviates significantly from the inland contexts put forward by Bird-David (2017b) and Bird et al. (2019). Prehistoric foragers of the area had, since initial human colonisation in the early Holocene, inhabited coastal areas and had a distinctive maritime subsistence base, involving a strong reliance on boats and limited exploitation of terrestrial landscapes and resources. Northern coastal foragers often display elaborate technologies, not least associated with boats and clothing (e.g. Kelly 2013).

The mid-Holocene period c. 5500-2500 cal BC provides a particularly rich archaeological record for the region. Due to a slow rate of sediment accumulation and limited modern infrastructure, dwelling remains in the form of tent rings, cleared floors and house-pits are still visible on the surface. New analyses, based on a Summed Probability Distribution (SPD) of radiocarbon dates, indicate a relative population increase in northern Norway from about 6000 BC with a peak between 4500-3500 BC (Jørgensen 2020). While such models should be interpreted with caution, the initial population increase coincides with the onset of a more stable and predictable mid-Holocene climate, providing a likely ecological basis for population increase. From c. 5000 BC onwards, there is a marked increase in visible dwelling remains, demonstrating investment in more substantial structures in carefully selected locations (Damm et al. 2021). The distribution of distinctive artefact types indicates increased regionalisation. Overall, we assume that the mid-Holocene saw the development of a semi-sedentary settlement organisation, with prolonged seasonal stays at favourable locations. The many visible dwelling remains allow us to reconstruct the spatial organisation of settlements, albeit the focus on substantial dwellings emphasize occupation of some duration and exclude occu-

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pation with more ephemeral shelters (light tents, overturned boats, etc) and shorter stays.

Geographic and economic setting

Western Finnmark lies in the northernmost part of Norway and is characterised by long fjords and numerous sounds with a rugged and rocky coastline. The outer coast is sparsely vegetated with mainly shrubs and some birch, while the vegetation further into the fjords is dominated by birch, although pine was more plentiful during the mid-Holocene (Sjögren & Damm 2019).

Osteological data from excavations (Engelstad 1984; Hodgetts 2010) and evaluation of locally available resources (Damm et al. 2021) indicate an abundance of cod, seal and seabirds as the most frequent subsistence species, although reindeer, elk and fur animals were also exploited. It is noteworthy that, in contrast to other northern circumpolar areas, resources are plentiful on a year-round basis, with no marked lean seasons. A detailed study of one compact region on southwestern Sørøya in western Finnmark shows that sites were located within local seascapes such as bays, inlets or narrow sounds with easy access to resources, giving priority to fish, seal and terrestrial resources in that order of quantity, predictability and distance to foraging locations (Damm et al. 2022). Judging from the seasonal availability of resources it would have been possible to obtain all annually required subsistence resources within this small study area measuring c. 500 km^2 (or 650 km^2 if fjords and adjacent open sea are included). A few terrestrial resources, such as reindeer hides and antler in larger quantities may have been necessary to obtain from further afield. However, it was likely not foraging needs, but rather demographic, social, political and non-subsistence economic factors that motivated mobility out of, and away from, this area.

Spatial organisation, flexibility and mobility

To explore the demography and patterns of interaction amongst these northern foragers we need to investigate the spatial organisation at several scales including the size of residential units, and the geographical extent of regional and long-distance networks. Having indicated scales of spatial organisation (small residential units in a local seascape, regional networks covering several hundreds of km and long-distance contact at a scale above that) we must con-

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sider the extent of flexibility and mobility at several scales to understand the dynamic of interactions.

Residential units, seascapes and seascape groups

The number of dwelling remains at each site can vary from one or two up to 100, with 10 to 20 being most common. Early interpretations considered the sites as representing small villages, whereas research in the 1980s and early 1990s argued for an accumulation of successive dwellings (Helskog 1984), with possible regional anomalies and larger communities mainly after 2500 BC (Schanche 1995). The latest research confirms that not all dwellings were contemporary. Analyses employing Bayesian statistics on the radiocarbon dates from western Finnmark suggest that within a timeframe of 200 years, one to six dwellings at each site were inhabited, but the chronological resolution cannot answer how many of these were in use at the same time (Vollan forthcoming). Recent detailed surveys indicate that dwellings were often organised in small groups of one to four dwellings within sites. This suggests that generally only a small number of dwellings, likely two to four, were inhabited simultaneously. The interior floor area in the mid-Holocene period varied between 8-20 m^2 with an average of about 12-13 m^2, and often had a central stone-lined fireplace. With households possibly varying between four and ten persons, the residential unit size at such a site may have then ranged between 10-30 persons, with the average possibly on the low side of the magical number of 25 (Kelly 2013).

Sites were not evenly distributed in the landscape with long stretches of coastline uninhabitable due to steep cliffs. The geography of northern Norway and locational preferences structured habitation into distinct local seascapes with local resource exploitation (Damm et al. 2021). In such seascapes, spanning 1-2 km of coastline, there would be several possible habitation sites (Figure 1). In western Finnmark, inhabitable seascapes were concentrated in clusters 20-40 km apart with the area in-between often characterised by rough waters and limited landing sites (see also Figure 4). Again, the resolution does not allow us to determine how many sites were occupied at the same time. However, 376 sites with a total of 3828 dwellings in the area cover a timespan of c. 5000 years, suggesting that the number of sites and dwellings occupied at the same time was small and the population density low.

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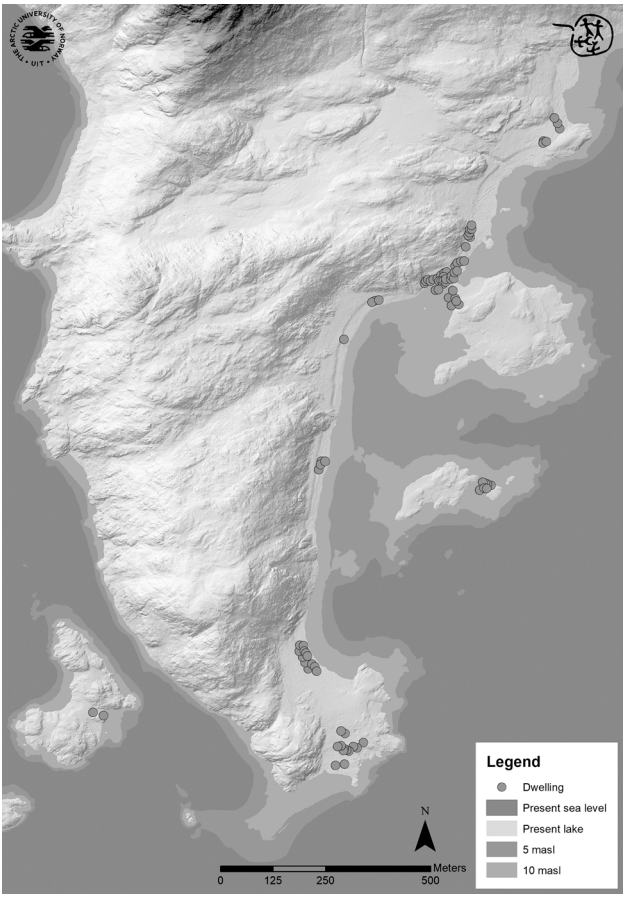
Figure 1: Fella is an example of a seascape with several habitation sites. Coastline at 10 m above present day sea level.



Map: M.S.Lindgren

The dynamics of residential units

The flexibility in households and residential units amongst foragers is often noted (e.g., Bird et al. 201; Bird-David 2017b). Direct evidence for the situation in prehistoric foraging societies is not possible to obtain. While it is highly

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problematic to employ ethnographic analogies, they do provide insights into recent practices. The following examples of demographic patterns are meant as illustrations of residential flexibility in sparsely populated coastal environments rather than direct analogies.

Along the coast of northwestern Greenland (with an outer coastline of roughly 600 km) 36 Inughuit winter sites were in use over the period 1910-1953. Ten to fifteen sites were in use each year, some almost every year, others only occasionally. The population numbered c. 250 persons and c. 60 households. The number of households at each site varied between 1 and 11, with an average of 4, and greater numbers were usually associated with trading posts. The number of inhabitants at each site typically varied between 10 and 30. Individual families rarely used the same winter site more than two years running, and the families co-residing changed constantly (Grønnow 2016).

Similarly, in the Ammassalik area in eastern Greenland, there are reports of 15 sites occupied in the winter of 1899-1900, each with only a single dwelling, but with an average of 27 inhabitants (and 403 in the district in total). An excavated dwelling measured 28 m^2. Many sites were occupied for only one year at a time. New and unrelated families could occupy the house for another winter, or spend the summer at the site, although families often returned to the same site or local area at regular intervals. Generally, related families chose to spend the winter together, but some families altered the relatives they resided with. Often relatives were also present at a neighbouring site (Møbjerg and Robert-Lamblin 1989)

The mid-Holocene Norwegian sites have several small contemporary dwellings, indicating the possibility of flexibility in the composition of the residential units. It is likely that a household relocated one or several times annually to access different seasonal resources. Such relocations may have been an opportunity for reconfiguring residential units, with the possibility of residing with different households seasonally, annually or at more irregular intervals.

Living in small residential units some distance apart over extended periods may have led to the type of very tight and intimate group dynamic described by Bird-David (2017b). Figure 2 is a visual representation from a specific archaeological site, which illustrates the closeness of the dwellings, and the intimate setting of daily life at the site. Regular alterations in compositions would have led to new constellations and enhanced the perception of being multi-relational. Burch provides an example from the Iñupiaq of northwest Alaska where four households make up a residential unit of 30 persons,

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Figure 2: Artistic impression of life at the site Sundfjæra, based on the archaeological record.

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but the total sum of all the individual family ties is an impressive 435 (Burch 2006: 101).

It is possible that under favourable weather conditions individuals or groups paid occasional visits to neighbouring residential groups in a nearby seascape. When visitors arrived, hosts did not necessarily perform other tasks, but they shared them with new persons (Bird-David 2017a: 214). This would have been a situation encouraging the exchange of knowledge and technological information. With regular restructuring of residential units and local visits, the close interaction and transmission of technological and socio-cultural knowledge would over the course of some years have extended to a much wider group than the c. 25 in a residential unit.

Regional networks

Indications of the size of the areas within which a residential unit obtained their resources, the frequency of residential relocation, and the distance of such residential changes/shifts is limited, while estimates for absolute population size in the region remain nonexistent.

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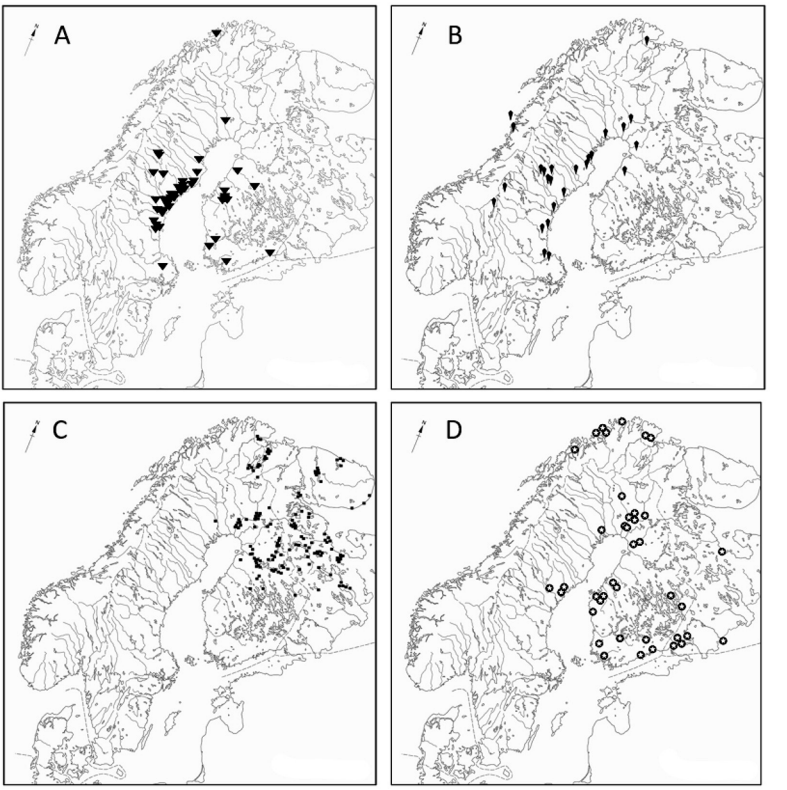
Figure 3: A: T-shaped artefacts; B: animal headed daggers; C: Early Northern Comb Ware; D: Amber



We do have indications for the existence of regional communities of practice. While there are overall similarities in the technologies and artefacts employed across northern Norway, northern Sweden, Finland, and Northwestern Russia (henceforth northern Fennoscandia), an area covering a total of c.1,000,000 km^2, there are also regional variations. Several distinct types of artefacts display a regional spatial dispersion. These include T-shaped slate tools concentrated along a c. 250 km coastal stretch of central northern Sweden (Figure 3A), slate daggers with animal heads found across 700 km along the coast of northern Sweden (Figure 3B), leaf-shaped bifacial chert points oc-

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curing over 700 km along the coast of northern Norway, and leaf-shaped slate points over at least 300 km along coastal northwestern Norway (Damm 2014). The first pottery, Early Comb Ware, was introduced from the east at c. 5300 BC and spread across eastern Fennoscandia but did not continue further west (Figure 3C). Analyses have indicated regional variation in decoration (Skandfer 2005). Each of these artefact types reveals a spatial range of interaction. The T-shaped tools show a clear fall-off pattern from the only available slate source in the centre of the distribution area, with several small concentrations up to 100 km away. This suggests a central location for manufacture, but also a spatial region within which such tools were in use. Across the Bay of Bothnia in Finland similar tools are found in smaller numbers but manufactured from local material. Copying the tool was in this case not difficult, but the small number of items in Finland suggests either that the use of the tool (i.e. the activity it was used for) was less frequent or that a different tool or tool material was used. To me this indicates different communities of practice. Similarly, the abrupt halt of the spread of pottery, where sites on one side of the Varanger fjord contain pottery and those on the other not, despite otherwise nearly identical inventories, show us that activities involving pottery were absent from one area, or performed differently there. It also indicates that different communities of practice (linked to objects such as pottery, slate tools and chert points) did not have the same spatial distribution. Instead, they only partially overlap, suggesting that they represent separate networks.

Regional network dynamics

In the fjord-sound system of western Finnmark, there are several clusters of seascapes (Figure 4). Similar clusters are found in neighbouring fjord-sound areas to the east and west. It is uncertain to what extent residential relocations incorporated adjacent fjords for resource exploitation. Given the natural geographical division in northern Norway, I would be inclined to suggest that the majority of the relocations happened within an area delimited by logistic maritime routes connecting seascape clusters, i.e. within western Finnmark. This area is c. 2,300 km^2 if restricted to land area, but 6,200 km^2 if marine resource areas such as fjords, sounds and the open sea are included. This corresponds to interpretations of contemporary data from western Norway, where technology, typology and raw material provenance studies suggest that primary interaction was concentrated in separate fjord-sound systems (Bergsvik 2006). Given the rather short distances in western Finnmark (80-100 km from

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the head of the Alta fjord to the seascapes on Sørøya) regular interaction between individuals, households and residential groups across the entire fjord-sound area is highly likely.

However, for both western and northern Norway there are also indications of interaction between such primary geographical areas, as demonstrated in the wider spatial distribution of provenanced lithic material, the technology of specific lithic points and distinct artefact types. This spread of technologies and material would have required individual or group visits to residential units in fjord-sound areas beyond western Finnmark, if not relocations for partners or other reasons.

Another possible basis for intra- or inter-regional interaction could be regular aggregation. Some northern groups historically had an annual pattern of aggregation and dispersal, often with larger groups at winter settlements followed by summer dispersal (e.g among Kets and the Sámi). We see no strong indications for such patterns in our area for the period in question. However, aggregations for shorter periods may have taken place regularly for collective foraging at seasonal peak resource concentrations, for exchange or for rituals and indeed often for a combination of purposes including social interaction and exchange of information. For mid-Holocene western Finnmark aggregation could have taken place in relation to the early summer fishing at primary salmon rivers (e.g. Alta river) or during the important early autumn reindeer hunting, where rock art scenes provide evidence for the use of corrals (Helskog 2012). Such aggregations could have been combined with ritual activities at the main area for rock art at the head of the Alta fjord.

There is a rich rock art record in Northern Fennoscandia from c. 5200 BC onwards. There are also significant similarities across this vast area in types of motifs (animals, humans, boats), in hunting and ritual scenes and in the incorporation of the micro-topography of the panel surfaces. However, the motifs are expressed with different stylistic templates and the dominant species vary between regions. Fennoscandia has more than 300 rock art sites, but only a small number of larger sites with many panels and motifs. These appear to be distanced 200-300 km apart (Gjerde 2018), possibly reflecting places for regional aggregation.

Aggregations would be occasions for kin and non-kin to meet and interact, for collaboration in hunting and fishing and later processing of the harvest, and for the transmission of related knowledge and technology in the process. Again, one must bear in mind that these transmissions took place within communities of practice and between persons participating in con-

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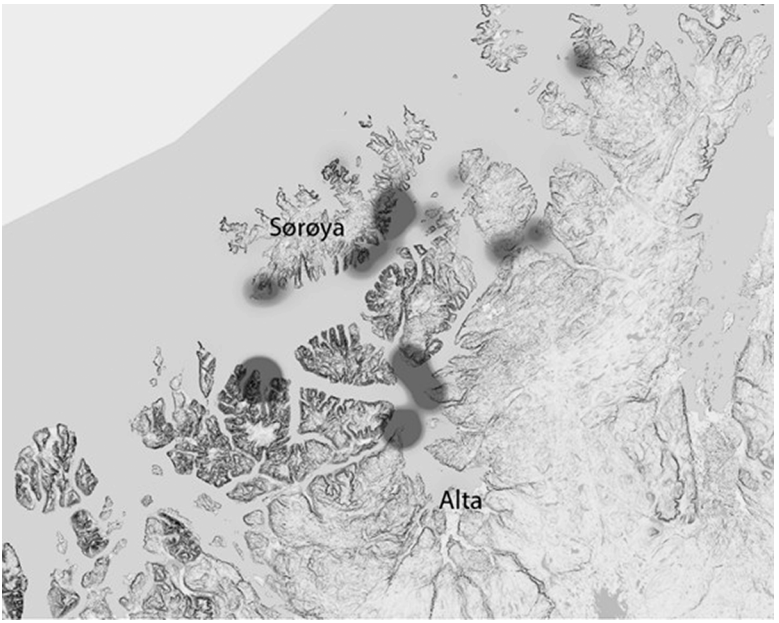
Figure 4: Density of dwelling remains in Western Finnmark in northern Norway, based on 376 sites and a total of 3828 dwellings.



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crete activities. These communities may have been very open and inclusive but could for some tasks have been more narrowly delimited, thereby including a smaller number of skilled persons than the overall community and aggregated persons.

Long-distance interaction

Analyses of lithic adzes and axes deriving from known sources of volcanic greenstone at Lake Onega in Karelia show that the majority of preforms, indicating primary production, lie within 50 km from the source, and that beyond 150 km from the source there are only finished items. However, many such adzes and axes were found 200-700 km away (Tarasov and Nordqvist 2022). Similarly, the T-shaped slate artefacts (Figure 3A) cluster within a ra-

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dius of c. 100 km from the known slate source, with some found up to 500 km away (Damm 2014). Other long-distance contacts are demonstrated through discoveries in northern Norway of amber beads from Latvia 1,500 km away (Figure 3D), a copper dagger from sources at Onega 1,000 km away, picks of material obtained at the head of Bothnian Bay 500 km away, and unique finds of animal headed daggers 500 km from their concentration in central northern Sweden (Figure 3B).

We have no concrete evidence (from for example isotope analyses) for journeys across 4-500 km. It is possible that for parts of these distances the objects were handed down the line from household to household. Nevertheless, recent research indicates that central parts of the inland (inner Finnmark) north of the Bothnian Bay were inhabited only to a limited extent in the mid-Holocene (Skandfer et al. 2022). In northern Sweden and Finland, habitation appears to be linked partly to the coast, but also partly to river and lake systems. The major routes of travel were therefore along the coast or linked to water systems, while crossing of watersheds appears to have taken place to a lesser extent. Hence, there were areas with limited activity and few occasions for passing on items. The items that did cross such natural geographies suggest that at least occasionally some persons or groups would journey longer distances to other regions bringing along goods and items (Damm & Skandfer 2022). That some persons for various reasons (adventure, exchange) travel longer distances is also known ethnographically, for example when large groups of umiaks travelled hundreds of kilometers northward along the west coast of Greenland, overwintering before returning to their home area the next summer – or small parties travelling from east to west Greenland often spending several years on the journey (Gulløv 1997, Jensen et al. 2011). Spending a season or more in a different region would provide not only exotic goods, but also new social relations, perhaps exchange partners, marriage partners, new information and stories and possibly new technological skills.

Intensity and extent of interaction

The key demographic entity in mid-Holocene northern Norway appears to be the small residential unit, consisting of a few households. Rather than view households and residential units as homogeneous faceless collectives, we must attempt to perceive the past as inhabited by a diversity of persons of different gender, age and capacities (e.g., Tringham 1991, French 2021). Also forager households are heterogenous. They consist of changing compositions

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of women and men, children, teenagers, adults and elderly, each with different competences, each involved in a different set of tasks. As a result, although they live in small residential units, a variety of patterns of interaction may be expected both within and beyond any current residential unit. This would have contributed to multiple situational identities or roles for each person, enhancing the multi-relational social fabric stressed by Bird-David (2017a, 2017b).

The most intensive interaction in mid-Holocene Norway would have taken place within the residential units, which we assume existed for many months. But if the co-residing households within these units were altered frequently, the number of persons one had close interaction with over time expanded significantly. With each new combination of households there was renewed potential for transmission of knowledge and skills within communities of practices.

The regional delimitations and variations in tools and rock art suggest that there were regional practice and learning networks, each producing and using distinct types. Such networks could only be established if there was regular interaction between individuals intra- and inter-regionally. Beyond the co-residing households, we may assume some informal and irregular contact between residential units, and possibly occasional or regular aggregation of many households for communal hunting/fishing and for social and ritual events. Such larger gatherings would have allowed for exchange of information and perhaps inspired more superficial copying, rather than transmission of underlying technologies and content of practices. It is possible that the activities performed varied between the small residential sites and larger aggregation sites. This difference in activities may have prevented transmission of details from practices not actively engaged in during larger gatherings. However, these events may have constituted the basis for new compositions of residential groups, or for a person to change household – through partnership, friendship or other types of motivations and obligations. Such flexibility was at the core of the social and cultural relations in such communities (see also Hofmann et al. 2016). Ultimately then, making new contacts at a gathering, which lead to relocation, could in turn lead to wider distribution of skills and knowledge. However, the quantity of people gathering at such an event may have had little bearing on the impact on knowledge transmission. While the number of people one person may have met over a lifetime may be substantial (as outlined by Bird et al. 2019), this does not necessarily reveal much about the closeness of the interactions. The number of people one individual had socially close relations to may have been significantly smaller.

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It is not necessary for everyone within a regional community of practice to meet everyone else; the transmission may take place from one household to another as residential units alter or as new partners with other skills and experience join a household. While the present assumption is that the majority of mid-Holocene mobility took place at a regional geographical scale, spanning one or more fjord-sound geographical areas, there are also indications of long-distance contacts. This indicates a small-world network (Tarasov and Nordqvist 2022, Maier et al. this volume) where local and regional networking dominates, but where cases of long-distance interaction are evidenced.

On the other hand, extensive journeying was not always necessary for an individual to participate in a long-distance network. If one person relocated to another household for a season or longer, the entire receiving residential unit acquired a new social relation, with all his or her skills and knowledge. The incomers would perhaps not work closely with all members of the residential group. But if this was a prolonged stay, they would become integrated, and their knowledge gradually gain weight. In other words, one can stay put within a small geographical area, and meet a limited number of individuals, but acquire information as if one has travelled far.

Conclusion: Quantity and quality of encounters

Residential units of mid-Holocene maritime foragers in northern Norway were mostly small (<25 persons), and the majority of the population probably mainly exploited a limited coastal area covering one or two fjord-sound systems. However, if the composition of the residential units was flexible (as indicated by small dwellings of "household" size), a person could have lived with a much larger number of individuals than 25 in the course of their life. In addition, informal visits and regular aggregations would have considerably expanded the number of people any person would have met and interacted with directly. Furthermore, it is likely that some persons from the regional water system travelled farther away and returned with information and that long-distance travellers arrived for stays of some duration, if not permanently. In both cases, these perhaps rather few long-distance travellers would bring information from other regions to the persons staying put; even if they had long-distance interaction, although of a different kind. Considering interaction at several geographical scales, let us reflect upon the differences in impact regarding systems such as those for the transmission of technology and knowledge.

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Flexibility in residential composition and mobility, and the resulting wider networks, allow news and technological innovation to spread. Whether or not residential units in northern Norway employed the information arriving with travellers must have depended on the extent to which travellers were integrated into a household or residential group. The spread of news and ideas partly depends on whom you trust and choose to imitate, suggesting, again, that the length and intensity of social interaction played an important role.

Scale matters! But while the assumed flexibility of residential units – in combination with regional mobility and aggregation – suggests that the number of interpersonal contacts over a lifetime was quantitatively high, their impact depended heavily on the quality and duration of those interactions. Beyond quantity, it is the intensity and quality of interaction between persons that truly matters.

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Comment by Elspeth Ready

The meaning and usefulness of the term "flexibility" as a descriptor of social organization has been debated in anthropology for a long time. In Inuit studies, flexibility refers to "the *prevalence* of situations in which no strong social preference is exerted, or even shown, for any one of several feasible courses of action" (Lange 1977: 107, emphasis added). For instance, no particular arrangement for Inuit post-marital residence was strongly prescribed and so it and might be described as a "choice," albeit one in which the conflicting desires and interests of many different people potentially played a role. In the Inuit case, flexibility in social organization emerges from the fact that situations in which active choice and consensus determine the course of action occur frequently and in multiple domains. In other contexts, flexibility in social organization may emerge from the possibility of choosing between several different culturally-specified alternatives (Aberle 1963), or from the fact that actual social arrangements do not match cultural models (Firth 1957).

Because different mechanisms can produce variable social organization, a problem with the term "flexibility" is that it is sometimes used to describe the variability in social organization itself and sometimes for the cultural traits that produce it. Wiessner (1982: 61) highlights this issue: "the apparent flex-

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ibility of organization among the !Kung [Ju/'hoansi] is not true flexibility in itself, but the product of a structured system of social organization." In this case "apparent flexibility" means observed variability, while "true flexibility" presumably means an absence of rules governing that organization.

Furthermore, simply using the term "flexible" does not explain variability in social organization (Cook 1966). Inuit studies have again had an important influence on functional explanations for flexible social organization (e.g., Willmott 1960): the lack of rules for deciding residential arrangements allowed group composition to be highly responsive to changing social and ecological opportunities and constraints at a fine temporal scale. As such, flexibility is often considered to be a cultural adaptation to scarce or unpredictable resources (Cook 1966). There are good theoretical reasons that this can be the case (e.g., Dyson-Hudson and Smith 1978), but observing variable social organization does not necessarily mean that that variation has an adaptive function.

I have cited old work here to highlight the time depth of debates about what flexibility is, but these issues are still relevant to understanding contemporary uses of the term and need to be considered when using the concept in archaeology. Although variation in social organization may leave material traces, the cultural practices that generate that variation are difficult to access through archaeological evidence alone. In contrast, the broader spatial and temporal scope of archaeology has advantages for examining potential adaptive explanations for variable group organization, for instance, in the ability to examine correlations between climate change and social organization over extended periods of time (e.g., Woollett 2007).

In her contribution to this volume, Damm infers "flexibility" in social organization from variability in the number of dwellings at residential sites and evidence for residential mobility (with different sites occupied seasonally and different locations potentially used from year-to-year). It is not clear to me that "flexibility" is more than a synonym for variability here, as variability across sites does not tell us much about the cultural mechanisms that produced it, nor if that variability was adaptive.

However, Damm's study tells us more interesting things about cultural processes at a different scale. Scaling out to regional patterns reveals the presence of different, partially overlapping networks ("communities of practice") for different tasks, as evidenced by, for example, lithic tool types or pottery styles. Thus, settlements were not little replicates of one another but rather need to be viewed as an interconnected system. From this coarse-grain view, the sets of practices that constitute "culture" did not come not as a single pack-

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age bundle, but instead were locally assembled via persons who were part of communities of practice relating to different tasks. Despite their ultimate reliance on person-to-person interaction, these communities were likely not visible from the perspective of persons embedded within them.

This is interesting as each of these communities represented different kinds of knowledge, and may have been more or less tolerant of variability in practice or able to maintain fidelity of transmission through time. The structure of these networks, and the way in which different communities of practice overlapped, could undoubtedly could either enhance or constrain innovation or responses to change (Jones et al. 2021)—producing a different kind of "flexibility," or a lack thereof, at a much coarser scale than implied when ethnographers use the term (though I would not recommend proliferating uses of the word). I would be greatly interested to see future research exploring in more detail the spatial and temporal dynamics of these communities of practice.

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Comment by Andreas Maier

When approaching archaeological questions on different spatial and temporal scales, the role of the individual is often a topic of concern. Charlotte Damm rightly points to the fact that all transmission processes, be it of skills or information, depend in the interaction between individuals. Individuals make up populations and are the basic acting unit that creates the archaeological record. Being thus undoubtedly a central player, the question arises whether individual actions and decision making is pivotal for all process scales, or whether there are instances when they become less relevant. Focusing on individuals makes sense at scales, where individual decision making can be meaningfully observed and has a major impact on the processes of interest, i.e., within the temporal and spatial action radius of the individual. For prehistoric societies, the temporal scale thus probably spans from moments up to several decades, rarely exceeding individual lifespans. Spatially, relevant impact will be largely restricted to the local and regional scale, rarely exceeding distance of 1000 km. Beyond these limits, the individual's potential for influencing processes is clearly reduced.

Many processes are scale-bound and not all processes are meaningfully observable at all spatial and temporal scales. This scale dependency applies for both quantitative aspects (size, extent, magnitude, frequency) and qualitative aspects (intensity, intimacy, trust, and content of encounters, network structure, network connectivity, social organization) of societies and social interaction. It also has a strong impact on system responses and feedback processes of social systems and governs the occurrence of emergent properties, i.e., characteristic and often decisive properties of a system which are observable only at certain scale levels, but not at others. With increasingly higher scale levels, the importance of individual decision making for the observable processes strongly decreases, while other factors are gaining in impact. Group behaviour, i.e., the emergent properties of group actions, not just the sum of the actions of individuals in that group, will become more important, alongside stochastic effects, for instance in the form of drift, accidental events, or

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long-term shifts in the environmental setting. It is therefore of major importance to match the process scale of interest with the scale of observation. If we are interested in individual decision making, the temporal and spatial scale of observation must be sufficiently small. If we are interested in large-scale processes, we must choose a large-scale perspective, where individuals and their actions are often no longer visible. Thus at certain scales, individuals and their conscious decisions are decisive. At others, individuals become invisible, and their decisions are just one factor among many others that are equally or even more important. Considering individual decision making and all its variation usually also means dealing with rather noisy signals. At higher scale levels, some signals may become less noisy. Therefore, observations on higher scale levels can provide additional information about social systems not observable at smaller scales and vice versa. Differences in observations at different scale levels are thus not necessary an expression of irreconcilable opposites, but rather can complement one another. This is illustrated by comparing the contribution of Damm to the one from Maier et al. Charlotte Damm argues from a temporally and spatially intermediate scale that is in congruent with the scale of individual lifetimes and sphere of action and informed by an exceptionally well-preserved archaeological site record. Maier et al., in contrast, argue from a temporally and spatially much larger scale, spanning several millennia and about 2 million square kilometres, thus surpassing individual action spheres by orders of magnitude. Nevertheless, both studies eventually agree that while being small in numbers and living predominantly in small groups, the investigated prehistoric foragers also had and maintained contact with many more people also over larger distances. Both findings are complementary inasmuch as they propose different network structures for their specific scale of observation. Charlotte Damm identified different and only partly overlapping network circuits as best fit for a regional spatial scale. Maier et al. argue for a structure that resembles a small-world network, where far-travelled individuals ensure the connectivity between different regional clusters. Together, these findings suggest that the network structure of foraging communities might be different at different scale levels. This has consequences for both the quality and quantity of transmission processes. In a structure, where many people are involved in passing information through the network, the amount of information that can be transmitted is higher than in a structure, where the transmission process depends on individuals. At the same time, the probability of copying errors (both beneficial and adverse) occurring 'on the way' is higher the more people are involved.

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Eventually, there can be no general claim to the necessity to engage with the sphere of individuals in archaeological research, nor can it be dismissed as unimportant. The question whether prehistoric research should be concerned with individuals or if "faceless collectives" are just as fine or even better is more than a personal preference: It is a matter of scale.

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