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Entering Trance, Entering Relationship: Liminality at the Finnish rock art sites

Ulla Valovesi

Abstract. This article presents four new possible images of drums in the Finnish rock art, and considers these, and apparent dancing images as an acoustic record of the past. It also presents preliminary results of testing echo at over 100 rock-art sites that suggest that exceptional soundscape is an elemental, if not a fundamental component, of rock art. Both the images and the echo correlate well with the local Sámi ceremonies of singing and drumming at sacred sieidi sites—regional tradition and Finnish rock art point to entering into deeper trance through music and dancing. However, in Finland, there are few entoptic signs in rock art. In some places these signs are connected to shamanism but research shows a correlation with entoptic signs and psychedelic substances but not necessarily with shamanism. This disconnect emphasizes the need for redefining ASC: the term is not singular, but plural. Contrary to being hallucinations, shamanic states can be better understood as being exceptionally present and part of an Indigenous knowledge formation process. A pattern of liminal features, images, and local analogies construe Finnish rock-art sites effectively as sites of liminality, trance, and relationship.

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Introduction

There has been found approximately 140 rock art sites in Finland until now. They all consist of rock paintings made by red ocher, and almost all have been located on vertical cliffs by the water. Most

of the paintings are on the lake areas in Central, and Eastern Finland. Typical images include elks, anthropomorphs, and boats, but also other mammals, birds, snakes, fish, hand prints, and geometric signs.

In his dissertation thesis Antti Lahelma. (2008, 48–64) argues convincingly for different strands of evidence supporting shamanism in the local context as having the most explanatory power in interpretation of the Finnish rock art. These include at least seven strands that are summed up here as following: 1) Shamanism was practiced in the historical period in Finland; 2) Archaeological, linguistic, and genetic material indicates for the continuity of culture over a long period; 3) Ethnographic evidence associates shamans with the cult of sacred cliffs in Finland; 4) Archaeological evidence suggests that a very similar cult already existed in the Stone Age; 5) Neurological research indicates the universality, and antiquity of altered states of consciousness; 6) There are probable representations of trance-experiences in art; and 7) There is formal analogy with other hunter-gatherer groups, which indicate that such states are commonly institutionalized into 'shamanic' practices.

I use shamanism in local context as a starting hypothesis to inquire further certain images, and phenomena at the Finnish rock art sites, review their possible analogies with Sámi and Finnish ethnographic sources, and consider their congruence, or incongruence with the hypothesis. I also compare how the ways of inducing ASC affect the visions, and their presentation in the rock art, and how these states interact with indigenous knowledge formation process. Finally, I consider how there emerges an overall pattern of natural liminal features at the Finnish rock art sites, and how these may have contributed to the shamanic practices identified in the images, and used in the local tradition.

Terminology

The North Sámi word *noaidi* corresponds roughly to the Tungusian term *šaman*, and is translated as a shaman in a more general meaning of the phenomenon in English (Hultkrantz 1973, 26–32). Related terms are known both in all Sámi, and many other Finno-Ugric languages. It is one of the few prevailing archaic pan-uralic words that can still be found in many Uralic languages, and as such also an evidence of the longevity of the tradition. The term, especially the Finnish form *noita,* has been later understood also as a witch with a more derogatory connotations. (Haavio 1967, 313–14; Häkkinen 2004, 791; Kulonen 2013, 227–8 ; Lehtola 1997, 29; Siikala 1999b, 101; Siikala 2002, 20, 80). I will use here local terms related to *noaidi* when used in the original texts, and when suitable for referring to local traditions, but will use the term shaman in its wider meaning when referring generally to similar actors, and shamanism as a theoretical construction for the phenomenon.

For the term shamanism to be meaningful, and capable of separating the phenomenon from many other, often overlapping ones, I understand shamanism through its core functions, especially intentional spirit journey with out-of-body experiences together with intentional, controlled experience of guardian spirits. I am leaving out here uncontrolled and/or unintentional possessions or trance experiences to mark the difference between the shamanic states of consciousness, and many other altered states of consciousness that SSC are part of. Several ASC may be experienced as preliminary states towards shamanhood, and as initiatory states, but they do not constitute the central part of the actual practice of a shaman. Part of the long education, and professionalism of the shaman, or *noaidi* is exactly the process of learning to control her or his powers, and not to be overpowered by them (see e.g. Bäckman and Hultkrantz 1978, 12, 20–24; DuBois 2009, 71–77; Eliade 1964, 4–7; Hoppál 1994, 11–29; Hoppál 2003, 11–37; Hultzkrantz 1973, 25–37; Hultkrantz 1984, 28–36; Krippener 1989, 384; Siikala 1981, 87–91; Siikala [1978] 1987 , 225–230; Siikala

2002, 43; Vitebsky 2001, 6, 22–24). For a smoother reading, and to avoid tautology I use a term trance as more or less equivalent to ASC.

However, the field of a shaman is not restricted to these core functions, and many others like divination, use of spells or leading ceremonies overlap with the work of a shaman, but the nature of these is somewhat different, and includes the capacity for intentional spirit journey. This separation has relevance in the Finnish context since there has existed two cultural traditions, the Finnish and the Sámi, side by side for a long period that both have used ASC to some extent but only one that has institutionalized the use of SSC. The Sámi culture has been shamanic until very recently (and according to some up to today) with classical features of drums, séances, spirit helpers, and spirit journeys. The Finns are known to have had *tietäjä* (the one who knows) tradition until last century with embodiment of power, and magic charms. Careful studies of the old Finnish folk poems reveal that the oldest levels of the Finnish poems have shamanic elements as well, and refer to the travels to the other side. Besides, many of the myths and beliefs are shared both by the Sámi and the Finns, and in language, and its expressions there can still be found old elements of shamanic beliefs (Ganander [1789] 1984, 62; Haavio 1950, 103–177; Haavio 1967, 283–341; Kuusi 1963, 251–7; Pentikäinen 1989, 97–101; Pulkkinen 2014, 248–259; Siikala 1999b, 91–104; Siikala 2002, 242–263; Siikala 2013, 428–432; Siikala and Hoppál 1992, 68–86).

History

Most of the Finnish rock art can be relatively well dated by shore displacement methods to a period between 7200–3000 BP (Hakulinen 2016, 32–39; Jussila 1996, 5–53; Jussila 1999, 113–133; Lahelma 2008, 33–35; Lahelma 2012b, 17; Poutiainen and Lahelma 2004, 59–80; Rainio et al. 2017a, 455; Seitsonen 2005, 6–7). The tradition seems to have continued in some forms later till the

Early Metal Period (Jussila 1996, 14–15; Lahelma 2008, 44; Seitsonen 2005, 6–7). However, in some parts of the country the paintings are today at the same water level still or again as when they were made as in Lake Kivijärvi, the ancient Lakes of Seljänala (Hakulinen 2003, 1–9; Hakulinen 2009, 1–24), along Väliväylä waterways, and Raasepori, so the shore displacement methods alone is not sufficient for determining the cessation of all painting. Both the shore displacement methods, and archaeological finds correlate with the wider cultural framework of the Comb Ware culture, and the Finnish rock art can be quite firmly placed to this cultural context. (Carpelan 1999, 253; Huurre [1998] 2001, 280–287; Lahelma 2008, 42–43).

A slow change was brought in the southwestern Finland already around 3200 – 2350 BCE by the Battle-Ax or Corded Ware culture, and in eastern Finland around 1800 BCE by the Textile Ware Culture. From 0–575 CE onward the wave of migration over the Baltic Sea, and intensified demands of the emerging Finns and Karelians brought pressure on local foraging cultures, which resorted to a more mobile way of life, assimilation, and a slow withdrawal towards north.

However, the Sámi continued to live in all areas of Finland during the first millennium, and also around many rock art sites. (Aikio 2007, 161, 190–192; Carpelan 1994, 13–42; Carpelan 1999, 261–74; Huurre [1998] 2001, 55–57; Lahelma 2008, 33–44; Lavento and Hornytzkyj 1995, 71–75; Lehtola 1997, 19–23; Niurenius [1619–1645] 1905, 7–9; Poutiainen 1996, 22, 26; Uino 1999, 339–346; Vahtola 1999, 110–111). The Finns have been mischievously called Indoeuropeanized Sámi, and there is certain accuracy in that (Lehtola 1997, 21–22).

In neighboring countries the Sámi have continued rock art at some sites until historical times (Shumkin 1990, 55–66; Shumkin 2000, 219–240; Simonsen 2000, 47–48; Mulk and Bayliss-Smith 2006, 36–37; Mulk and Bayliss-Smith 2007, 95–122), but so far only one certain rock art site in Finnish Lapland at Kuerlinkat has been found. However, many of the old Sámi sacred *sieidi* sites are still well known, and respected all over the Sámi area. (Äikäs 2012, 1–8; Äikäs and Salmi 2015,

90–109; Äikäs and Spangen 2015, 1–27 ; Kuoljok 1999, 69–71; Mulk 1994, 123–130; Mulk 2005, 331–348; Lahelma 2012b, 2–4; Paulaharju [1922] 1962, 49–50; 144–47).

Noaidi Versus *Tietäjä* – from Shamanic Trance to Charms

Nouse luontoni lovesta,	*Rise my Nature from the crack,*
Havon alta haltijani	*My Guardian under the rotten trunk,*
Luonani lovehtimahan,	*To entrance (in the crack) by my side,*
Kanssani kavehtimahan!	*Bewitch with me!*

(Ohvonasjeff 1889, 1–4, my translation)

The metaphor used for trance in the old Finnish folk poems is *langeta loveen*, literally to fall into a crack. A term *lovinoita* (crack shaman) in the meaning of *noita* that is capable of diving into the crack is known both among the Finns, and the Sámi. Since certain spirits have been understood to reside inside the cliffs, stones and mountains this skill has been important for the *noaidi.*

While this metaphor is still known to Finns, it has lost its active shamanic content, or has maybe been left with only half of that: until quite recently *tietäjä* has called for her/his helping spirits, and in certain type of furious trance cast spells to exorcise spirits of sickness, to stop bleeding etc. Some *tietäjä* have actually been able to use out-of-body journey, and some have even been learning with Sámi *noaidi*, but in general cultural framework they were called *tietäjä* rather than *noita* which could have caused a severe prosecution (see e.g. Ganander [1789] 1984, 62; Haavio 1967, 283–341;

Lehtola 1997, 29; Siikala 1999a, 16–22, 64–103, 206–238, 291–297; Siikala 2002, 15–24, 71–120, 242–280, 342–349; Siikala and Hoppál 1992, 68–100).

So there is a border area with overlapping phenomena and terminology, but in general shamanism is connected to the Sámi, and *tietäjälaitos, tietäjä* institution to the Finns. While the Sámi have preserved whole spectrum of skills of the classical shamanism, the Finns have used the helping spirits, and ASC to work in 'this side', in the middle world, but had no longer general capacity for intentional out-of-body journey to 'the other side', the lower and upper worlds.

Altered States of Consciousness and Deeper Trance

Because ASC are based on neuropsychology, the capacity for them is universal. While ASC are often seen as an extra ordinary phenomena in modern Western cultures, many indigenous people use these regularly, and can induce ASC at will. There is abundant documentation in ethnography of different techniques for this including drumming, singing, dancing, fasting, running, taking sweat bath, using psychedelic substances etc. (see e.g. DuBois 2009, 113–115, 153–175; Gonzáles Torres 1989, 349-354; Hoppal 2007, 29; Hultkrantz 1987, 54–57; Lewis-Williams 2002, 138–143; Winkelman 70–71, 92–93, 146–150).

We all experience light ASC when we are dreaming. Sometimes we experience that when we are awake without specifically aiming at it like in deep concentration, severe fever or just being in nature, the more so in exceptional places. Many people experience rock art sites as very special places, being often at high cliffs, caves or other exceptional places of nature. Examples across the world, including Finland, indicate that rock art sites have been, and are still experienced as exceptional, or even sacred (see e.g. Chippendale and Nash 2004; Kivikäs 1999, 21; Kivikäs 2001, 146; Lahelma 2001, 2–21; Lahelma 2010, 48–59; Loubser 2001, 82; Miettinen and Willamo 2007,

16–23, 45–69; Mulk and Bayliss-Smith 2006, 31, 55; Mulk and Bayliss-Smith 2007, 95–122; Pentikäinen and Miettinen 2006, 15–33, 40–45, 94–99). This feeling may also be described as sacredness, a nature temple or a church. Interestingly, quite a few of the old *sieidi*, the Sámi sacred sites, have also been referred to churches like Taatsin kirkko (church), Kirkkopori or Vuolitsaskirkko (Paulaharju [1927] 2010, 359–360; Paulaharju 1932, 33–54).

Adrian Harris uses a term ‘wilderness effect’ to refer to the profound psychological impact that spending extended periods in the organic environment can have. We can become sensitive to places, and they can deepen our consciousness from shallow to deeper. As the awareness slides down it broadens into what Harris calls a deep body, blurring the boundaries of mind and body, and between the inner and the outer world enhancing a sense of connection. (Harris [2013] 2015, 406–415). Most probably we are still responding to certain natural places in similar ways as so many other people before and around us: recognizing them as special places, quieting and deepening the consciousness inside us as well. But the cultural capacity or permission, and the means to enter deeper ASC may be lost.

Although ASC are universal, the actualization of these are often understood as the exclusive sphere of shamans or other specialists. However, a central part of indigenous cultures have been initiation rites for the young, and other rites like the vision quest for the adult (Harner 1973b, 146; Hultkrantz 1986, 54–57; Whitley 1992, 89–113). Their main purpose is often exactly to create a liminal experience, the ‘threshold’, and teach and aid to enter ASC. So instead of a shaman or a few, we have whole cultures capable of entering ASC, and the shamans can be considered as part of this wider culture, albeit the most capable ones, entering the deeper trance. In North America this is sometimes called 'democratized shamanism' (Lowie in Hultkrantz 1984, 31), but ethnographic sources describe similar phenomena as ‘family shamanism’ in Siberia (Hoppál 2003, 67–69; Bäckman and Hultkrantz 1978,14), and among the Sámi as well (Fellman, [1844] 1906, 27; Haavio

1967, 308). As Ernst Manker has summed up from the old sources, in some areas every Sámi family used to have a drum. Actually, the Sámi culture did not consist of shamans, and non-shamans, but of greater and lesser shamans (Manker 1938: 420–430).

Neuropsychology and the Finnish Rock Art

In many places shamanism is reflected in rock art. One method to discern images specific for this is the so called neuropsychological model developed by J.D. Lewis-Williams and T.A. Dowson in 1988 for the recognition of the prevalence of ASC in rock art (Lewis-Williams and Dowson 1988, 201–245 including comments). The model has been applied with some correlation in different parts of the world (see e.g. Bradley 1989, 68–75; Dronfield 1996a, 373–391; Lewis-Williams 2002, 136–162; Lewis-Williams and Dowson 1988, 201–217; Rozwadowski 2001, 65–86; Wallis 2002, 735–760; Whitley 1992, 89–113), but it has raised also some controversy (for critics see e.g. Bahn 2001, 52–93; Helvenston and Bahn 2003, 213–224; Kehoe 2002, 384–385; Solomon 2017, 1–25).

The neuropsychological model is based on the fact that all anatomically modern humans share the same nervous system, and that this is behind ASC. In the model the experiences of ASC are mostly induced by psychedelic substances like mescaline, LSD and psilocybin mushrooms in controlled laboratory conditions. These hallucinogens are reported to induce three different types of trance experiences varying from lighter to deeper. In the first stage people tend to see geometric signs like dots, grids, zigzags, nested catenary curves, and meandering lines which are called entoptic phenomena (also called phosphenes, form constants, and endogenous forms). In the second stage people experience a growing meaning behind the signs with blending images. In the third stage, where people often enter via a vortex, people experience iconic images, and unrealistic phenomena

like changing into animals, diving or flying. (Lewis-Williams 2001, 332–360; Lewis-Williams 2002, 126–135; Lewis-Williams and Dowson 1988, 201–245; Whitley 2005, 109–122).

There is also ethnographic evidence that entoptic signs are experienced by some indigenous people, and painted on rocks like among the Tucanoan speaking people in Colombia after ingesting *yagé* (Lewis-Williams 2001, 340; Reichel–Dolmatoff 1967, 107–113), or in California, and the Great Basin where rock art is found at the sites of initiation rites, and vision quest. The area is well known for the use of *Datura inoxia, Datura stramonium* (jimsonweed), and strong tobacco *Nicotiana bigelovii*. (Whitley 1992: 89–109; Whitley 2005: 111–119).

There are some geometric signs in Finnish rock art: the most common include vertical and horizontal lines, oblique crosses, and net-figures. There are also zigzag-lines, but they seem to be connected to human figures near by, and resemble adder. However, lines, grids, and zigzag-lines are relatively infrequent compared to other images, and all geometric signs form only 9 % of all images. There is no concentration of geometric signs, but instead they appear randomly in a vast area. Many places lack them all together. Besides, many signs are incomprehensible. The entoptic signs do not seem to play any central role in the Finnish rock art. (Kivikäs 2009, 89–96; Lahelma 2008, 28; Lahelma 2008, I 34). Following the neuropsychological model this indicates that the first stage of trance has not been visibly behind the Finnish rock art.

However, there are several images in the Finnish rock art that refer to shamanic experiences like therianthropomorphs, images that are falling, placed among fish, driving on elks, presented with snakes or with round objects resembling drums. Also the animals depicted do not correlate with the general variety of fauna, or the contemporary archaeological remains of the diet (Lahelma 2007, 35; Miettinen and Willamo 2007, 37), but instead correlate well with the helping spirits of both Sámi *noaidi* and Finnish *noita* (Lahelma 2008, 52; Siikala 1981, 95–96).

In many parts of the world entoptic signs are present in great numbers at rock art sites, but at other sites with apparently shamanic context they are infrequent, or nearly non-existent. Are they part of the same phenomenon, or why is the imagery different, if the neuropsychology behind is universal?

Psychedelic Visions and Deeper Trance

There is so far little research done on how the means of entering trance affect the experienced visions. However, local people are often well aware of these distinctions. In Amazonian area *Ayahuasca* or *yajé* is a commonly used psychotropic brew prepared from *Banisteriopsis caapi*, and the leaves of several other plants. Luis Luna and Pablo Amaringo describe how Ingano shaman Don Apolinar cultivated many plants for different kinds of *yajé* for different purposes, and visions (Luna and Amaringo 1991: 10, 13). Michael Harner mentions that the Jívaro used datura in the vision quest to encounter the supernatural, but in other times it was considered 'too strong', and prevented the shaman to operate in both worlds simultaneously. These plants are very powerful, and they impinge significantly on the nature of experience (Harner 1973b, 146, Harner 1973a, 151–175; Harner 2013: 43).

In circumpolar area the use of *Amanita muscaria*, commonly known as the fly agaric or fly amanita, has been widely known. While it has been known by the Sámi as well, the use has not been widespread, but rather sporadic. T. I. Itkonen mentions that the Inari reindeer Sámi could still remember that *noita* and *rumb–āhkkuh* (drum women) had eaten fly agaric with seven white spots on the hat (Itkonen [1948] 1984: 344, 347). In the Finnish rock art there has not been found any signs of mushrooms, except maybe one (Fig. 1a and 1b), possibly Amanita, in Saraakallio in the so called "uhripöytä" (sacrificial table). This indicates that fly agaric was probably known, but

generally not used which coincides well with the ethnographic accounts (for Chukotka see Devlet and Devlet 2005: 69–70, 244).

Fig. 1a: Saraakallio I. Photo Ulla Valovesi.

In Sámi culture dreaming, singing and drumming have been the most common ways to enter trance. The ethnographic accounts do not mention entoptic signs as part of the shamanic journey, and shamans seem to have entered directly the deeper, shamanic trance (Historia Norwegie [1160–1220] 2006: 63; Magnus Gothus [1555] 1977, 53–54; Manker 1938, 389–424; Pentikäinen 1995,163–169; Schefferus [1674] 1963, 202–210; Siikala [1978] 1987, 94–302).

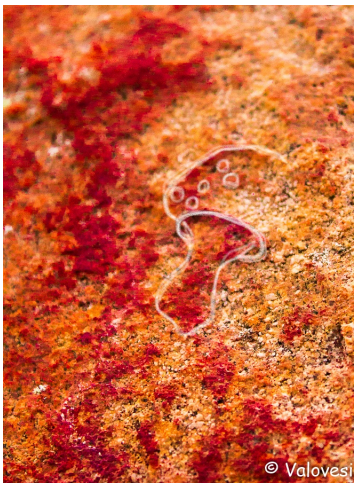

Fig. 1b: Saraakallio I. Outline drawing Ulla Valovesi.

The records published by Harner from the archives of the Foundation for Shamanic Studies of almost 5000 interviews of Westerners who have described their shamanic journeys induced by drumming, seem to confirm this: people usually start their journey to lower worlds by diving straight to a vortex or to upper worlds for instance by flying, or with a ray of light (Harner 2013: 3, 80–91, 109–120).

Jeremy Dronfield has compared art associated with consciousness-altering practices with those that have no connection to these. Quantitative comparison, and statistical testing showed that endogenous (entoptic) forms can be considered diagnostic of the first art, and are predominantly absent in the second, while nonendogenous are diagnostic for the second category. (Dronfield 1996a, 373–91). It may be indicative that all the chosen examples in the first category– Chumash, Huichol, and Tukano – are known to have used psychedelic substances.

The use of psychedelic substances does not necessarily correlate with shamanic practices: using hallucinogens, and having visions is not automatically shamanic. The Viking berserkers apparently used hallucinogens before a battle to raise furious rage that suppressed fear, feeling of pain or any sensible thinking for that matter. Rigveda, the oldest sacred scripture of the Hindu, describes a vedic ritual drink, a hallucinogen called *soma*, that priests used for visions. And the Greek worshiped Dionysus to attain their tipsy ASC by drinking wine. (see e.g. DuBois 2009, 26–30; Fabling 1956, 232–37; Lochtefeld 2010, 659; Siikala 2002, 248–249, 345).

The comparison of the above material affirms that the way of obtaining ASC affects the visions experienced in trance. While entoptic signs are natural for all of us to some extent, some psychedelic substances affect our nervous system so that they apparently predominate in certain ASC. These signs may show prevalence of ASC, but it is another question if or how much these signs are experienced in ASC induced by other means. And while psychedelic substances induce ASC, not all states are shamanic. I would call only the third stage SSC, and even that with some reservations: just getting your head mixed up with psychedelic substances, and being on a trip is not the same as inducing a controlled, intentional out-of-body journey, with or without psychedelics.

However, concentrating exclusively on neuropsychology can be misleading: shamanism is not some automatic response of our brain system. Rather, there is human capacity which is reflected in the brains as well. Robert J. Wallis has criticized the methodology of neurotheologists for reducing the shamans' own experiences for merely brain events, and obscuring the ontologies within which they are embedded (Wallis 2015, 313). Concentrating on brain events may conveniently overplay our own prejudices, and western scientific ontological premises over local, indigenous ways of understanding and knowing.

Instead of hallucinations it may be useful to understand shamanism as a connection as discussed in 'the new animism' by Graham Harvey and others (Harvey [2013] 2015). Indigenous ways are not a

(distorted) belief system, but a lived way of life as Linda Hogan ([2013] 2015, 17–26) expresses it, aiming for good life as a participant within the whole of the living world. While animism may seem an out-dated practice for us, it is good to remember that for many contemporary, and also literate cultures nature is perceived as a living entity. As Harvey notices it is rather modernity that is exceptional. The challenge is to part from centuries long practice of fitting other cultures to our preexisting schemes (Harvey 2005, 209), and to acknowledge indigenous and prehistoric epistemologies, and ontologies as meaningful, and equal to our own.

Mindscape in the Landscape

Most accounts of the Sámi culture emphasize how the Sámi have considered nature as living. Not only humans, but animals, plants, stones, mountains and waters, or phenomena like wind, thunder, stars, the sun and the moon, or even scenery could be understood as living, acting and conscious. Johan Turi, a Sámi who wrote about Sámi life in 1910 tells how the Sámi greeted their summer pastures by *yoiking* (singing):

"Oh mother Earth and beautiful grassland,

oh mother of calves, voya voya nana nana

hello, hello, oh mother ground,

nana nana voya voya

nana nana nana voya voya

receive now my livelihood

and care for them as in the pastures you have done voya voya"

(Turi [1919] 2012, 96, translation DuBois)

In *yoiks* nature could be personified, and related: “you, my beautiful mountain”, or “my grandmother of the lake” or sea (Itkonen 1948, 308; Sergejeva 2000, 221). Every grove, mountain, lake, rapid, river, forest, or other natural entity had a guardian, the spirit that was living in them. The guardians, and ancestors embodied the nature, constructing it as sacred landscape. Some of these would become sacred places called *sieidi.*

The etymology of *sieidi* is unclear, but the present view, interestingly, suggests that *hiisi* (sacred grove), *siida* (local Sámi community) and *sieidi* may all be derivates of a root *šej (> hei) meaning movement, dancing or swaying (Koponen 2005, 392; Lehtiranta 1989, 122–23; Rédei 1988, 499–500). This interpretation would coincide well with the tradition of *sieidi* as a sacred place with ceremonies of offering, singing, drumming, and dancing (see e.g. Fellman [1907] 1961, 38–55; Forbus [1727] 1910b, 66–67; Itkonen 1946, 50–66; Itkonen [1948] 1984, 310–321, 331–335; Manker 1938, 396–404; Mulk 2005, 337 ; Paulaharju [1922] 1962, 138–13; Paulaharju 1932, 7–28, 50; Rask 1991,14; Reuterskiöld 1912, 50; Ruong 1982, 56–58).

The Sámi have had three main types of *sieidi* that helped them with fishing, hunting or reindeer herding. But some *sieidi* have been powerful enough to help with several things. For example before fishing in a new lake, it was important first to search for the guardian of the lake, and to ask permission. The guardian was promised part of the catch, and if fishing was successful, the promise was fulfilled as thanksgiving. After certain rituals that included singing and smearing grease, the place could become a sacred site, in this case a fish *sieidi*. A mutually beneficial relationship was established, and would continue as long as it was beneficial. It could first be a personal *sieidi*, become then a family *sieidi*, and if it was powerful, maybe even a local or regional *sieidi*. The sites with the helping spirits were inherited from parents to children. (see e.g. Fellman [1844] 1906, 14–15; Fellman [1907] 1961, 44; Friis 1871, 134–135; Holmberg 1915, 29–37; Itkonen [1948] 1984:

310–313, 316, 321; Ravila 1934, 76–83; Reuterskiöld 1912, 47–53; Sergejeva 1997, 197-201; for an English summary see Pulkkinen 2005b, 389–392).

It is especially the fish *sieidi* that resemble the Finnish rock art sites. These include similar topography of natural landmarks, and outstanding formations of cliffs and boulders by the water. Associated finds on both point to similar sacrificial culture, and animation of the site. This notion is reinforced by recognition of anthropomorphic and zoomorphic features both at *sieidi,* and rock art sites. (Itkonen 1946, 31–69; Miettinen 2004, 93-98; Lahelma 2008, I 39–40; 2008 II, 3–28; 2008, III 124 –139). The Sámi have their own word for the most respected, anthropomorphic *sieidi*: *Gedgge olmush*, a stone person. (Fellman [1844] 1906, 16–17; Fellman [1907] 1961, 42–44). This points to the relevance of the feature in Sámi culture. There are, however, also some differences: while some rock art sites in neighboring countries are at or near old Sámi sacred sites or mountains (Lødøen and Mandt 2010, 27–41; Mulk and Bayliss-Smith 2006, 49; Simonsen 2000, 47–48), there has not been found so far any certain rock art at the known Finnish *sieidi*. Only fish *sieidi* are by the water, and other *sieidi* are found in tundra or forest. (Lahelma 2008, I 43). On the other hand, both the Comb Ware people, and the forest Sámi have preferred living along the water routes (Huurre [1998] 2001 , 61–63; Mulk 1994, 128), which coincides well with both the rock art sites, and the fish *sieidi*.

Sacred lakes by the *sieidi* were called *sáiva*. They were thought to have a double bottom, and the deceased continued their life there in a similar manner as before, but happier. In Finno–Ugric mythology this is sometimes described as a mirror or upside down world, and may be the reason why the sacrifices for *sáiva* were made upside down. In Norway the sacred mountains were called *passevara*, *sáiva,* or *sieidi* which shows the close connection of these concepts. (See e.g Bäckman 1975, 13–22, 140–142; Chernetsov 1963, 21; Helskog 2004, 266–278; Laestadius [1840–45] 2000,

89–93, 100–106; Manker 1950, 108–120; Pentikäinen 1995, 251–253; Reuterskiöld 1912, 85–87, 92–94; for an English summary see Pulkkinen 2005a, 374–375).

Both in Sámi and Finnish mythology the Underworld is connected to the water. There is also a clear pattern of placing rock art at cliffs by the water where paintings can be seen reflected to the water - upside down. (Lahelma 2008, 20–22; Miettinen 2004, 87-89, 98; Sepänmaa 2007, 105-120). In Sámi mythology the sun has been one, if not the most revered deity or phenomenon, that was considered the giver of life for all creatures (Lundmark 1985, 179–188; Lundmark 1990, 12, 84–85; Mulk 2006, 57; Rheen [1671] 1897, 42). The evident intentional placing of rock art by the water and towards the sun may point to similar cognitive landscape facing the realms of life and death at the rock art sites as well. The border areas between water, earth and air have been considered as liminal places that have allowed connection with spirits (see e.g. Helskog 1999, 73–94; 2004, 282–286; Kivikäs 2001, 146; Lahelma 2001, 10–13; 2005, 29–47; Miettinen 2004, 88, 97-98; Mulk and Bayliss-Smith 2006, 55; Mulk and Bayliss-Smith 2007, 95–122).

The way how the Sámi have understood nature as living could be referred to as animism, but if understood in Tylorian way it would probably lead us rather to confusion than clarify the relationship (see e.g. Logan 2009, 89–114; Segal [2013] 2015, 53–62; Tylor [1871] 1977). Nature is not an object outside a human being to be worshiped, less so some primitive first stage of religion. But there is a phenomenon behind the term: nature that is understood not only living, but conscious, and acting with other beings. This could be understood in the way of ‘relational epistemology’ as suggested by Nurit Bird-David. She also uses a term ‘states of relatedness’ referring to “attentiveness to variances and invariances in behavior and response of things. It is expecting response and responding, growing into mutual responsiveness and, furthermore, possibly into mutual responsibility” (Bird-David 1999: S67–91). Louise Bäckman has noted that the *sieidi* marked the sacred sphere where it was possible to make contact with the spirits (Bäckman 1975,

147), and Jelena Sergejeva has pointed out that the *sieidi* is not so much an object but rather a site of power, and a site of connection (Sergejeva 1997, 192–193).' Relational epistemology' seems to describe the relationship between the Sámi, and the *sieidi* exceptionally well, and may be useful in the context of rock art as well.

Sámi Shamanism

The first known historical account of the Sámi shamanism is from an anonymous writer from the second half of the 12th century in Historia Norwegie[1] [1160–1220] (2006: 63). There *noaidi* falls into trance by singing, and leaping or dancing, transforms himself into an animal form, and makes an out-of-body journey to heal a patient. In the description the *noaidi* has a drum in his hand, and there are depictions of whales, harnessed reindeer, skis and a boat as mediums for traveling.

Historical accounts mention a close connection between the images in the drums, and the sacred *sieidi* sites. According to Tornaeus and Tuderus in the 17th century the symbols of the *sieidi* places (among many other symbols) were painted to the skin of the drums. These symbols were used in divination to ask which *sieidi* was suitable to ask for help for the task in question, and *noaidi* would travel there in trance. *"*

[...] all that are present say: So we ask, so we ask that we will have luck *etc*. But who is it, that they ask? Nobody else but their devil and their Forestgod Seitä.*"*[2] (Manker 1938, 397; Tornaeus [1672] 1897, 30–31, my translation; Tuderus [1672–79] 1905, 15–16). People had ceremonies at *sieidi* sites when they were near by in their seasonal migrations, but at other times they could travel there in trance. (see e.g. Fellman [1907] 1961, 38–48; Forbus [1727] 1910b, 66–67; Itkonen [1948] 1984, 310–318, 331–335; Manker 1938, 389–424).

The new finds have shown that making of rock art continued in Sámi areas in Lapland in some cases until the late Medieval period, and in Northern Norway up to the 16th or 17th century (Devlet and Devlet 2005: 82; Goldhahn, Fuglestvedt and Jones 2010, 7; Mulk and Bayliss-Smith 2006, 36–37, 50–51; Shumkin 2000, 225; Simonsen 2000: 47–48). If we take into account the continuum of rock art at least from 7000 BP to the Medieval period or later, and the apparent images of drums in rock art in wider cultural area (Fig. 2, 3, 4; see also Rainio et al. 2014, 150), it looks apparent that also Sámi drums have had a cultural continuum of several thousands of years. As Shumkin (2000: 225, 240) has pointed out, the new finds may permit us to stretch a chain, albeit thin, of analogies between the Paleolithic age and modern times. Lahelma (2012, 18) has concluded that this makes possible the use of direct historical approach in interpretation of rock paintings. The time gap has definitely narrowed, if not disappeared in the broader cultural area that Finnish rock art is part of.

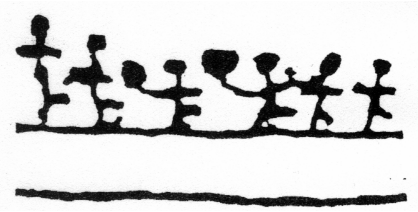

Fig. 2: Drummers on a boat in Norway. Helskog 1990, 34.

Fig. 3: Ural. Okladnikov and Martinov 1972, 133.

Drums in the Rock

In the Finnish rock art there have been found so far possibly three images of drums in Värikallio, which are presented in the article of the working group of Rainio, Lahelma, Äikäs, Lassfolk and Okkonen (2017a, 470; see also Figure 5). I present here four more images from my field work in Mertavuori, Hahlavuori, and Saraakallio. The round patterns resembling drums have mostly gone

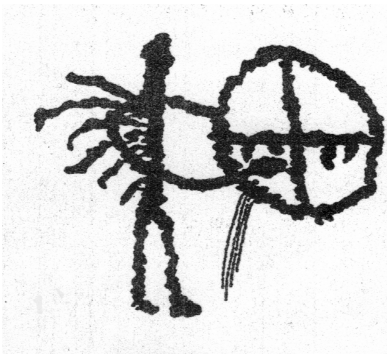

Fig. 4: Middle Yenisei. Devlet & Devlet 2005, 346.

unnoticed in rock paintings, even when they are found in the hand of a figure interpreted otherwise as a shaman. This is apparently partly due to the concentration on the paintings, and omitting the other features of the rock, often with only a hint of paint.

In my documentation of over 100 rock painting sites in Finland I have in addition to extensive photo documentation carefully documented also the landscape, the whole rock face, and the soundscape as the context of the paintings. From this documentation there emerges a constantly recurring pattern where the rock face appears as a main canvass where cracks, elevations, and micro features like pores, and fissures form part of the painting. Similar phenomenon has been documented in other parts of the world as well (see e.g Chippindale & Nash 2004; Goldhahn 2008, 996–103, 1416–143, 1566–7; for Norway Gerde 2010; Helskog 1999, 836–92; Helskog 2004, 2656–286, for Karelia Lahelma 2012a, 15–33; for France and Spain Lewis-Williamson 2002, 1956–96, 1996–200, 2116–214, 2286–66; for Australia Meehan 2010, 31). There is also an exceptionally good echo at the painting sites (more for soundscape see page 31–38, and Appendix 1). This kind of broader approach to rock art requires some perspective, and acoustic practice, but the effort is rewarded by revealing another "language" that lies subtle behind and beside the paintings. I have placed this geological interplay with paint, and acoustics into the local cultural framework, and carefully evaluated analogies with local cultures in the ethnographic literature. An old Finnish folk poem illustrates the idea how the origin of life resides in the rock:

Fig. 5 Värikallio. Photo Ulla Valovesi.

The Birth of the reindeer	*Poron synty*
"The origin of reindeer lies in Northland [i.e., the Otherworld]	*"Poron on synty Pohjolassa*
Its antlers grew out of the rock cliff	*Kasvo sen sarvet kalliosta*
Its horns from the crack in the rock,	*Kippurat kiven kolosta*
Inside which the givers dwelling	*Siellä net antajat asuvi*
The mistresses reside"	*Elelee emäntävaimot"*

(Malińe 1881, translation Lahelma 2008, 54)

In the following I present some natural circles in the rock which are acknowledged significant with a hint of paint, and which are located in a hand, or on a breast of a therianthropomorphic painting. I observe also images close to them, and consider the possible convergence, if any, they have with the central ideas of Sámi and Finnish mythologies, and ceremonies.

The Mertavuori (Mertakallio) therianthropomorph (Fig. 6a and 6b) falling towards a crack in a 45° angle, and the snake arising in front of it, have been well documented, and connected to shamanic trance in literature (see e.g. Kivikäs 2000, 106–107; Lahelma 2008, 57–59; 2008, I 35-36; Siikala 1992, 64–65). *Saivo-gärmai*, a snake of the sacred lake or mountain, is one of the four main helpers (deer, bird, snake and/or fish) of the *noaidi* (for animal helpers see e.g. Bäckman 1975, 114–117; Holmberg 1915, 93–95; Lundius 1905, 6), and trance is often understood as falling into the crack. The body of the therianthropomorph is painted along a fissure in the rock, and its right hand is bent like a wing, which gives an impression of flying. Interestingly, the natural circle in the left hand has gone unnoticed, although it is outlined by faint red paint, has paint in the center, and in half rays – in a similar way as the Nenets, Paleosiberian and Altai drums (Hoppal 1994, 57; Hoppal 2003, 126). The circle is partly formed by a natural, slightly protruding round formation in the rock. The snake

is painted over small protrusions, and depressions in the micro-landscape instead of the smooth surface right next to it which gives an impression of movement. This feature may have been further intensified by the reflection, and vibration of light between the water, and the rock (more for this phenomenon see page 37). The painting seems to follow closely, and take advantage of the micro-landscape of the rock surface, as if giving a platform for the paintings to emerge.

Fig. 6a: Mertavuori. *Photo Ulla Valovesi.*

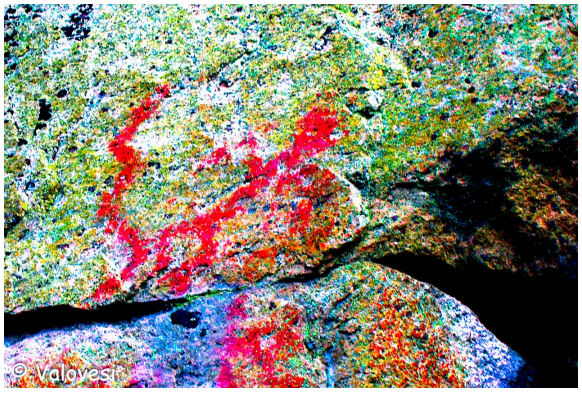

Fig. 6b: Mertavuori. *Digitally enhanced by Dstretch.*

The Mertavuori cliff has excellent echo that would make it a great place for ceremonies with singing, and drumming which have been typical in the Sámi culture. Mertavuori has a relatively long rock wall with several images along it, and it has permitted many people to gather on ice, or boats, and maybe several themes, or levels of interpretations as well.

In Hahlavuori there is a therianthropomorph (see also Kivikäs 1995, 184–188; Kivikäs 2000, 100–101) with a round, painted circle formed by a dense row of pores in its left hand (Fig. 7a, 7b and 7c). This circle has a face with eyes, and a nose, or a peak composed of the pores, possibly indicating the spirit of the drum (Genetz 1891, XLIV; Westman 1997, 39), and it is slightly protruding from the cliff. There is a lively, full painted elk, or (rein)deer touching the circle with its foreleg. Reindeer of the sacred mountain, *Passe vare sarva,* or s*aivo-sarva*, is another main helper of the *noaidi,* called for by drumming, and singing (for the parallels between elk and deer see Lahelma 2008, 53–54). The right hand is thickened maybe for a pawn, and raised similar to a

beating position. With this hand the therianthropomorph is touching the neck of apparently a swan, partly formed by the cliff, that is swimming above a fissure. The swan is a mediator between this, and the other world in the Finnish mythology, swimming on the river of the Death. On the other side of the swan there is a roundish, white circle resembling an egg, and a smaller water fowl, also partly formed by the cliff. The two waterfowl have not been documented earlier. In Sámi, and Finnish mythology the world is born from an egg of a water fowl, often an Aythya that the smaller bird resembles. This scene is similar to the theme of the rock art on Guri Island on Lake Onega with a swan, an egg, and an elk that has been interpreted as depicting Finno-Ugric world creation myth as described in the old folk poems, and mythology. (see e.g. Autio 1981, 134–135; Haavio 1950, 59–69; Kemppinen 1960, 285–301; Lahelma 2012a, 15–33; Sarmela 2009, 513–516; Sergejeva 1997, 95–100; Siikala 2013, 148–156). These images are placed above a big crack. Above there is an apparently dancing anthropomorph touching an upside down diving figure, possibly a dancer entering trance. Above there is an elk with a crack below. A therianthropomorph holding an animated drum, an elk or deer arising from it, a swan over a line, an egg, a smaller water fowl,

Fig. 7a: Hahlavuori.
Digitally enhanced by Dstretch.

Fig. 7b: Hahlavuori. Photo Ulla Valovesi.

Fig. 7c: Hahlavuori. Outline drawing Ulla Valovesi.

cracks, dancing, and diving are all features typical to local shamanism, and mythology. The figure with a circle in its hand seems to have an intermediate position between the images.

These images are centrally positioned in a dense concentration of paintings. The site itself is difficult to reach over big, slippery boulders, and has place for few persons at a time. This suggests that the place has been more for special, individual purposes, maybe exactly for shamans, and shaman initiations. The place has a peculiar soundscape: besides a very good echo, the site is an exceptionally good drumming place. The reverberation of the drumbeat starts circling between the drum, and the rock face intensifying the effect of drumming. The following notion by Jacob Fellman ([1844] 1906, 48, my translation) points to the importance of sound in Sámi ceremonies: "They celebrated the feast for the honor of the gods with song and drumbeat, and the brighter the drum then carried, the better it pleased the god."[3] This notion applies exceptionally well to the soundscape at Hahlavuori.

At Saraakallio I there are at least two therianthropomorphs that have a painted circle which fits to the hand, and the other hand is possibly beating it. The first figure with impressive horns (Fig. 8a, 8b and 8c) is situated about two meters above a terrace, and below one of the main painting panels. This figure has been documented by Kivikäs (1990, Fig. 1, Fig. 15, 82–83, 88), but my outlining varies somewhat from his. The figure is kneeling in a position typical for a Sámi *noaidi,* and apparently flying on a bird rising from a deep cavity. The bird is formed by the features of the cliff, and painted heavily red. The therianthropomorph has on its upper body a heavily painted red circle, that is slightly protruding from the cliff, and surrounded by a dense row of pores. The other hand, or rather a cloven hoof, seems to be holding something, possibly a drum beater of an elk horn, raised for beating. This is also protruding from the rock, has a face of pores, and is acknowledged by paint. There is a beautifully painted elk head right above the therianthropomorph, partly merging together. The close connection with a bird, and an elk gives an impression of the Sámi *saivo-sarva,* and

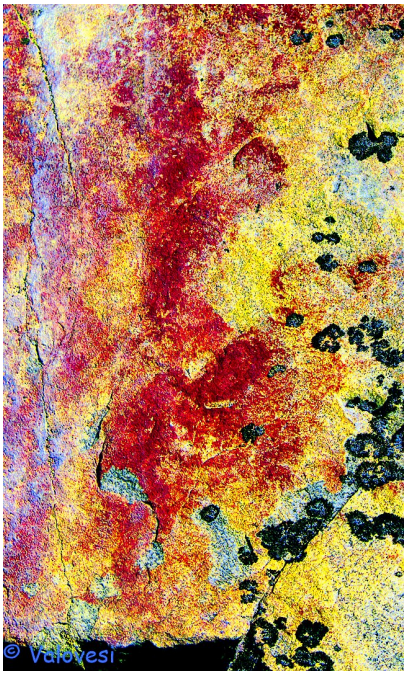

Fig. 8a: Saraakallio I.
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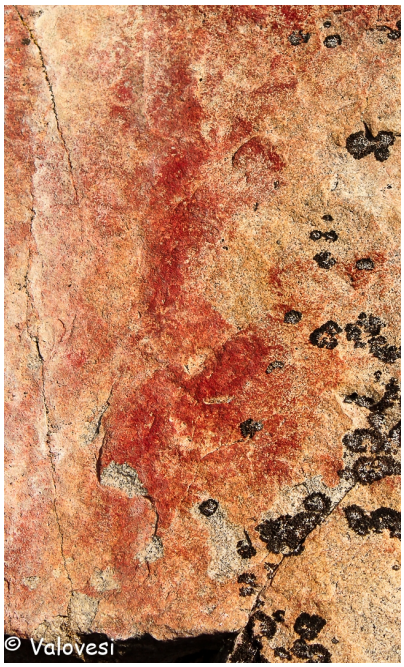

Fig. 8b: Saraakallio I.
Photo Ulla Valovesi.

Fig. 8c: Saraakallio I. Outline drawing Ulla Valovesi.

saivo-lodde, saivo-bird, the third central helper of the *noaidi*. There are big elks, and elk heads right above it, at least one of them with a big belly as if being pregnant (Fig. 9). There is an interesting analogy between the images, and the central ideas of the Sámi cosmology where the Sámi *noaidi* flies with a *saivo-lodde*, the spirit helper for the upper world, to mediate for the procreation of the elk, or deer.

Procreation of reindeer has been a central theme in the Sámi ceremonies (see e.g. Ravila 1934, 45-76, Itkonen 1948, 317-318). The elks have been painted first, and the emerging drum with the therianthropomorph may have helped to continue the use of the older images later when the water level has dropped. The rock face here is a heavily painted palimpsest with many layers of paint,

Fig. 9: Saraakallio I. Photo Ulla Valovesi.

and continued importance, different emphasis, and apparently also intentional merging of images.

The second image (Fig. 10a, 10b and 10c) is a faintly painted therianthropomorph on a steep rise to the terrace in the so called sacrificial table. This figure has not been paid much attention to, or mostly noted as two straight lines connected to a windy line (Kivikäs 1990, 43, 47, Fig. 3). It takes some persistence to perceive the configuration of the faint red lines, and the interplay with the rock, but once recognized, the figure is relatively steadily visible in all seasons, and most weather conditions. The therianthropomorph has a circle formed by a natural elevation, a fissure and pores, and outlined by paint in the left hand, and the right hand is possibly beating it. The circle has two eyes, and a mouth of pores marked with paint. The figure is standing on a heavily painted, flying bird, formed by natural fissures, and an elevation in the rock. Top of the the head has eroded later concluding from the lighter color of the rock without paint, and silica layer. To the right there is a formation painted red, with eyes marked, that resembles a snake. The analogy with two well known helpers of the *noaidi*, *saivo-lodde,* the bird, and s*aivo-gärmai,* the snake, is present also here. Above there is

Fig. 10a: Saraakallio I .
Outline drawing Ulla Valovesi.

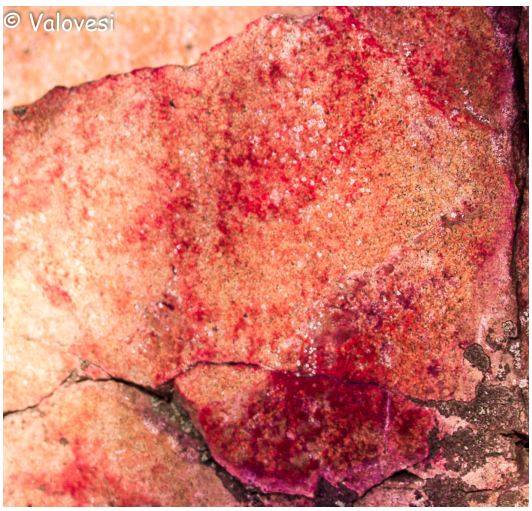

Fig. 10b: Saraakallio I . *Photo Ulla Valovesi.*

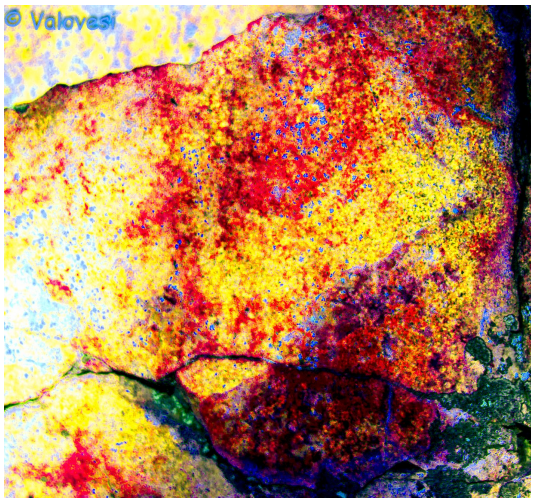

Fig. 10c: Saraakallio I.
Digitally enhanced by Dstretch.

an interesting scene of possibly dancing figures (see Fig. 12), and possibly below as well in the bottom left-hand corner of the Figure 10.

Saraakallio is one of the three big congregation sites with very good echo. The exceptional soundscape with two possible drumming images, and dancing suggest an important role for shamanic ceremonies with music at this site, and with wider context close analogies with the central ideas of Sámi mythology.

All four images are therianthropomorphs with a close analogy for a Sámi *noaidi* changing into her/his animal form, and all four have an exceptionally close connection with the main animal helpers of the *noaidi: saivo-sarva, saivo-lodde,* and s*aivo-gärmai* – the sacred reindeer or elk, bird, and snake. Three images have the other hand similar to a beating position, and one resembles a wing, as if flying, which is a typical feature for a Sámi *noaidi*. All sites have exceptionally good soundscape that make them very good places for ceremonies with singing and drumming, and two images are close to possible dancing scenes which are typical features of local culture. All these images seem to act as intermediaries between other images, which has also an analogy for a Sámi *noaidi* negotiating between different spheres.

All four possible images of drums are formed by natural features of the cliff: they have an elevation in the form of a circle, and three have the outline of a fissure, and/or pores. This geological round form is acknowledged by a touch of paint, and it fits – or is fitted - to the hand of a painted therianthropomorph, maybe giving the starting point for these paintings? Two circles have faces of pores which may point to the Sámi idea of the spirit of the drum, and one has rays. Johannes Tornaeus ([1672] 1897, 29) mentions that the drums were given for the *noaidi* by the s*ieidi,* the Sámi sacred cliff. Since the forms, and features of the rock have been important in interpreting the *sieidi* site, it seems probable that a natural circle in the rock near an intended therianthropomorph in the local cultural context would have been noticed, and given significance in a similar manner.

The general context of these paintings carries manifoldly the typical features of local shamanism, ceremonies, and mythology. This interpretation covers not only the apparent drumming figures with their natural and cultural features, but also the adjacent images extending the explanatory power of shamanism in local context to the whole scenes in these sites.

While drumming images have not been prevalent in the Finnish rock art, their apparent existence at big congregation sites indicates a phenomenon that has been known, and acknowledged already during the Comb Ware culture. The images of drums also suggest that music, and sound have played important part in the ceremonies, probably in a similar manner as in the local culture in historical time.

Singing Rock

Although drumming is a typical feature of sub-arctic, and arctic shamanism it has not been the only way of entering trance. Actually the most common ways among the Sámi have been dreaming and singing, even to the point that the strongest *noaidi* were thought to be those who did not need a drum, but could enter trance by *yoiking* (Manker 1950, 119; Solander [1726] 1726 in Reuterskiöld 1910, 24). And it was especially *sieidi* sites that were places of *par excellence* for the ancient *yoiks*, *dolo*š *juoigan,* that are sung for supernatural powers (Fellman [1907] 1961, 51; Itkonen 1946, 55–56; Järvelä 2005b, 228–229). Jacob Fellman has recorded the following *yoik* to the *sieidi* of Taatsi:

To shrine of Taatsi will I bring

Copper coins for the pray of the forest.

For the fish of the waters,

if the catch is good,

I'll give brass rings on Monday,

Before the day has dawned.

At midday the reindeer's antlers

I'll bring for catching the bull.

I'll bring horns of ram

To the goddess of the woods,

If I should prosper well.

(Fellman [1844] 1906, 230–231, translation Järvelä 2005b, 228–229).

Several accounts mention that echo has been an important feature when choosing a *sieidi*. Samuli Paulaharju tells that Taatsi *sieidi* was chosen because it resounded. Or when people were *yoiking* with Seitasaari *sieidi* in quiet summer nights the Särkijärvi *sieidi* answered. Sometimes a *sieidi* could be heard *yoiking* all night long like in Ketojärvi in Kittilä. (Itkonen 1946, 52; Paulaharju 1932, 27, 50; Paulaharju [1922] 1962, 138–143).

The Sámi say that they have have learned *yoiking* from *ulddat*, *saiwoneidah*, *Passevaraolmai*, *kadnihah* or *maahiset* – that is to say from the ancestors and spirits (Holmberg 1915, 22–23; Laestadius [1840–45] 2000, 105–108; Pentikäinen 1995, 252–3; Turi [1919] 2012, 119, 171). Many references mention spirits inside mountains talking or singing. They "erected their stone gods (siejdde) on mountains and in mountain gullies or in the shores of the lakes and rivers where in former times they have heard ghosts" (Rheen [1671] 1897, 39, translation Petterson 1957, 120). According to Forbus ([1726–1727] 1910a, 83, my translation) "But Yoikning is and the answer [is] taken from PassevaraOlmai, the sacred mountain men."[4]

The Sámi are not so much *yoiking* about something, rather they are *yoiking* the mountain or the far away person to be there with them (Järvielä 2005, 47; Lehtola 2000, 200; see also Magga 2013, 11). Or they can be *yoiking* with the mountain or the cliff, together with the spirits, that gave them the songs in the first place. Närömanuskriptet (Randulf [1723] 1903, 43–44) tells how every sacred mountain had guardian angels (*Angelus tutelaris*) whom the Lapps called by *yoiking* when they needed help or advise, and especially before drumming (see also Solander [1726] 1910, 24).

According to Paulaharju the Sámi did not *yoik* inside since 'between the walls the voice does not come forth that well, and sound as magnificent, and free as outside, and on high mountains' (Paulaharju [1922] 1962, 112, my translation). Ilpo Saastamoinen, who has studied *yoiking,* explained that echo is naturally present when one is *yoiking* on mountains, in a similar way as in *yodeling* in Switzerland (Ilpo Saastamoinen, pers. comm., November 7, 2013). Soundscape has clearly been recognized, and appreciated in *yoiking*.

Yoiking can be understood as relational: it is connecting two subjects into a mutual process of relatedness. Singing, the more so with echo, can transfer the borders, and deepen into state of relatedness with other persons, human and non-human alike.

Echo of Rock Art

Images of apparent drums point to music at rock art sites. There are also images that seem to be dancing with their hands raised, on their toes like in Juusjärvi with a falling image among fish below (Fig. 11), in a row (Fig. 12), or otherwise in dance like movement as the above mentioned gracefully swinging image touching the diving figure (Fig. 7) in Hahlavuori (Kivikäs 2001, 150; Kivikäs; 2009, 145; Lahelma 2007, 37; Miettinen 2000, 24; Miettinen and Willamo 2007, 126, 159). It is possible that the etymology of *sieidi* points to the dancing as well, and highlights the

importance of the kinetic drive known in shamanic practices (DuBois 2009, 153–161; Harris [2013] 2015, 410–411; Winkelman 2000, 100, 147–8), and in the trance of the Sámi *noaidi* as well. These images may represent remnants of an acoustic record as Thomas A. DuBois (2009, 153–154) has referred to dancing, and musical encounters.

While research has usually concentrated on 'seeing', and this has been the implicit presumption in the rock art research as well, some research has recently focused on the soundscape, and echo. The first person to study echo at Finnish rock art sites in 1987 was Iégor Reznikoff who has also documented resonance, and reverberation in Paleolithic caves in France (Reznikoff 1995, 541–557). The positive correlation between echo, and rock paintings in Finland raised interest on topic, and has yielded a thorough acoustic investigation at Taatsi *sieidi,* and the rock art sites of Värikallio and Julma Ölkky (Rainio et al. 2014, 141–152; 2017a, 453–474; see also Äikäs 2011, 112–120; Lahelma 2010, 48–59; for Northern Scandinavia Goldhahn 2002, 29–61). The working group reports exceptional echo at all three sites. At Värikallio there is multiple echo that can be heard to respond from lake shores over again. Interestingly, the first echo seems to emanate directly from the paintings, which was later confirmed by the sound analysis. Even when the natural explanation of echo is known today, the phenomenon may feel magical when experienced at the spot. Riitta Rainio (pers. comm. December, 12, 2017), and the working group (Rainio, Äikäs, Lahelma, and Lassfolk 2017b,

Fig. 11: Juusjärvi. Photo Ulla Valovesi.

Fig. 12: Saraakallio I . Photo Ulla Valovesi.

186–7, 196) use a term sacred soundscape to describe strong, accurate echo, that creates audible experience of someone else participating actively in communication in otherwise quiet natural environment. While canyon lakes have some echo on other cliffs as well, these are clearly less pronounced. The strongest, and most accurate echo was both heard, and measured right in front of the paintings. Similar type of phenomenon has also been documented in Spain, France, Italy and North America (Díaz-Andreu and García Benito 2012, 3591–3599; Garfinkel and Waller 2012, 50; Reznikoff 1995, 550; Reznikoff 2006, 79–80; Tommaso, Farina, Hameau, and Díaz-Andreu 2017, 12-25; Waller 2006, 31–40).

I have tested soundscape at Finnish rock art sites at over 100 sites in a wide geographical area covering over 70 % of all sites. This has included observation of the natural soundscape, basic acoustic tests performed by wooden percussion plates, clapping hands, drumming, short human shouts, and singing as well as evaluating the echo by ear, and by the Audacity audio analysis plots: the quality, volume and direction of echo in front of the paintings, and at chosen reference points. This type of predominantly subjective testing of echo, resonance, and reverberation has been used in several studies in France, Spain, Italy, Russia, Norway, Finland, and North America either alone or combined with other methods to allow digital processing, and representation of echo (see e.g. Díaz-Andreu and García Benito 2012, 3591-3599; Reznikoff 2014, 101–109; Tommaso, Farina, Hameau, and Díaz-Andreu 2017, 12–25; Waller 2006, 31–40). The benefit of this type of testing is that it can be done with a relatively light, portable equipment which allows for a large sample to be tested in comparison to more precise testing with heavier, and less portable equipment which inevitably restricts the size of sample.

I have divided the results of the testing into five categories characterizing the acoustics of the study sites: no echo, modest echo, good echo, very good echo, and excellent echo. With modest echo I mean slight, less distinguishable echo in comparison to good as clearly distinguishable, very good

as very distinguishable, often multiple echo, and excellent echo as exceptionally well reflecting surface that responds even to speech, sound of the steps, birds singing, or water dropping.

However, because of the large scale of the testing it has not been possible to standardize all the testing conditions, and wind, rain, snow, and forestation have affected the results. It is usually possible to confirm echo when the wind is 4m/s or less, but very good, or excellent echo presupposes wind of 2m/s or less which is not frequent at the Finnish lakes. Accordingly, a result of good echo on a windier day may as well be very good or excellent on a calm day at the same site.

For documentation I have used a portable, digital Zoom H2next audio recorder (24-bit/96kHz) with five built-in microphones for four-channel surround recording. For the comparison of echo I have repeated tests at a distance of 2–5m,10–15m, 20–30m from the cliff, and further when possible, and feasible, and sideways along the cliff face. This kind of basic testing allows for preliminary mapping of the soundscape to identify acoustic phenomena, and it provides good overall information about direction, quality, and structure of the echo echo, but it does not allow for more precise documentation, and analysis like measuring the exact points of departure, directions, angles or intensities of echo, or movements of multiple echo.

The most notable feature that has come up from my fieldwork at every 100 tested sites, is the clearly recognizable, good echo at every, single site – except for Mätikän luola, a cave of Mätikkä, which resonated, and was a good singing place, but could not have echo due to the small size of the cave. There are places where I could not do the testing because of the wind, rain, distance or forestation, but every rock painting site where it was possible to do the testing, had good echo. So far I have not discovered any rock art site without good echo, and only the reference points at some distance from the painted cliffs have given results of no, or modest echo. Results of the echo testing at Finnish rock art sites are presented in the Appendix 1.

This said I have to add some cautionary words. First: it is not exceptional that a cliff has audible echo. But neither does every cliff have echo. Some cliffs don't have echo, some have slight reverberation, some muffled echo, some good, very good, or even excellent echo. A good example of this is Leveälahti where there is a row of cliffs along the one kilometer water way to the rock art site. Some cliffs in this water way have reverberation, some muffled echo, some good echo, but at Leveälahti site the echo changes suddenly to very good. Echo at Leveälahti is presented graphically in the Figure 13, and can be listened to on the following link: https://youtu.be/ccw-w9qooXQ

That every tested rock art site has good echo, and often very good, is exceptional. In smaller lakes the rock art site may be a natural "ear-catcher" of the lake, but in bigger lakes there may be several cliffs with suitable face for painting, and only one is chosen (Kivikäs 1995, 30; Kivikäs 1999, 108; Miettinen 2000, 23; Miettinen and Willamo 2007, 119), so far always one with distinctly audible, good echo. The rock paintings clearly avoid cliffs without echo. Chris Scarre has proposed recurrent patterning as one method of discerning human intention from accidental by-product in archaeoacoustics (Scarre 2006, 1–10), and echo at the Finnish rock art sites definitely meets this.

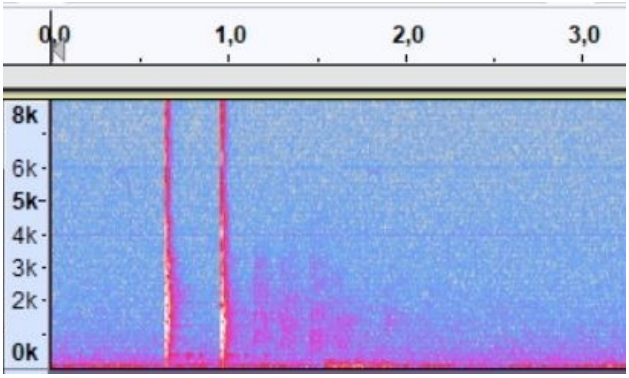

Fig. 13: Spectrogram at the Leveälahti rock painting site showing impulse responses. From left: two clapping of hands are shown with two high columns, and four echoes created by them with four lower columns. Vertical axis: frequency of sound (kHz); horizontal axis: time (sec). +18°C/ 64 °F, 80m.

Second, many sites, especially at Lake Saimaa and Päijänne area, are today several meters higher than they were when they were painted, and it is not possible to reproduce unaltered soundscape there. This effect is somewhat minimized when the testing is done further away from the cliff. However, while the land rise does compromise testing echo at these sites, often the echo is so paramount that it is not probable that there had not been any echo earlier.

Another interesting feature that has repeatedly come up is that the best echo seems to respond right in front of the paintings. Often it seems to be coming directly from the paintings as noticed above in Värikallio (see also Díaz-Andreu and García Benito 2012, 3591–3599; Reznikoff 1995, 541–551; 2006, 79–80; Tommaso, Farina, Hameau, and Díaz-Andreu 2017, 12–25; Waller 2006, 31–40). In basic testing without more advanced technology this might be just a psychological reflection for seeing the paintings, and hearing the echo at the same time. But in several cases I have found the paintings by following echo or reverberation. For instance the 100 meter wide cliff face at Vaskivuori is so covered with lichen that some of the small paintings are difficult to recognize, and it was easier just to follow the reverberation of singing: it led straight to three paintings. Waller (1993, 7–8) and Reznikoff (1995, 547; 2006, 79–80) have had similar experiences of blindfold testing when searching for cave paintings.

The third point that has come up from my fieldwork is the significance of human voice, especially singing. In the beginning I tested echo with short human shouts, and singing came along to the testing gradually with the growing awareness that it was singing that produced the most accurate, and interesting results of the testing: it was exactly singing with echo or reverberation that in many places differentiated the rock paining site from the more general echo of the cliff with accuracy, and richness of sound, as noticed above in Vaskivuori.

Interestingly, this coincides well with Sámi ceremonies, and *yoiking* at *sieidi* sites. When an important part of ceremonies has been singing, it is quite clear that echo, and reverberation have been noticed, and most probably guided singing, and drumming in a similar manner as today: who would choose a muffled microphone when there is a good one available? Reznikoff has found correlation between vocal pitches, resonance, and paintings in Paleolithic caves (Reznikoff 1995, 541–557) which points to recognition of human voice, and responses to it in the caves, and

Margaret Díaz-Andreu and Carlos García Benito (2012, 3591-3599) have used human voice as an instrument to identify places with maximum resonance, and echo in Levantine rock art in Spain.

Besides audible there is another type of 'echo' reported at rock art sites namely visual: the rock paintings are reflected on water, upside down. Both echoes have a common root in Finnish language: audible *kajo* and visual *kaje*, and they can sometimes be used interchangeably in different dialects, and related languages (Häkkinen 2004, 324; Itkonen and Kulonen 2012, 279–280; Paulaharju [1922] 1962, 140) which indicates an interesting connection. In sunny weather the vibration of water is often reflected to the paintings as well. This unreal vision of cliff, cracks, and paintings mirroring to the water, and vibrating together up and down can cause liminal feeling leading the viewer towards underwater. If this is where the ancestors lived, there may be not only a psychophysical, but also cognitive connection between the paintings, and the water.

Somewhat similar vibrating effect is known from Siberian shamans who use a fringed headgear that swings with their movements, and causes flicker of light that aids trance. Harner (2013, 45) calls this kind of optic driving combined with auditory drumming as 'sonic–optic' driving that can 'break up' the ordinary reality, and help shaman to pass to the other world. (see also Anawalt 2014, 62, 65; Hoppal 2003, 94–111; Miettinen 2000, 22; for Irish passage tombs Dronfield 1996b, 37).

An idea of this phenomenon (Fig. 14) can be seen in the following video at Värikallio:

https://youtu.be/hqON9CG7IZA

While full scale research of soundscape requires carefully planned, controlled and measurable tests, and analyzing of sound waves, it is good to keep in mind that rock art sites were not chosen by scientific accuracy, but by human experience in certain cultural framework. This experience was decisive in choosing them: how did they look like, how did they sound, and how were they experienced probably in many other ways incomprehensible to us yet. Hearing echo in good

weather from suitable distance is a natural subjective experience once the physical conditions are present. But echo can also be studied objectively: repeated limitless times, at most sites, recorded, presented graphically, measured and analyzed for different qualities.

Fig. 14: Värikallio. Photo Ulla Valovesi.

Conclusion

Both local traditions, the Sámi and the Finnish, have used ASC as part of their cultural practice, but the first has been shamanic, and the latter based on magic charms. The two differing traditions in Finland make explicit the need to evaluate more precisely what we mean when we are talking about ASC. The term is not singular, but plural. For the term shamanism to have any distinctive power, we should be able to separate SSC from many other forms of ASC, and it should contain at least two basic traits of shamanism: controlled embodiment of helping spirits, and controlled out-of-body journey.

Comparing material used in the discussion of entoptic signs shows that most – if not all – of the examples derive from visions attained with psychedelic substances. While many indigenous cultures are known to use mind altering plants for shamanic purposes, especially in initiation rites as ‘door openers’, some cultures have used psychedelic substances in other contexts like war, priesthood or recreational purposes. Rock art with only these signs may indicate the existence of light trance, but also suggest the non-existence of SSC. The abundance of entoptic signs does not automatically point to shamanism but rather to the use of psychedelic substances, and the connection to shamanic trance – or to some other purposes– should also be demonstrated.

However, there is a vast body of evidence of shamanic trance induced by other means like drumming and singing, with little or no mention to entoptic signs. The non-existence of entoptic signs in otherwise shamanic context may point to entering directly the deeper trance by other means than psychedelic substances. The Sámi shamanism, and the Finnish rock art both elucidate this, and point to an important distinction: the way of inducing trance impinge fundamentally the nature of visions.

In this article I have given preference to indigenous explanations of shamanic trance as a conscious journey, communication and connection, and as a way of acquiring meaningful knowledge over mere hallucinations, 'the perception of something not present' (Oxford Dictionary of English 2018). Contrary, shamanic trance can be understood as being deeply present at the place. The Sámi ways of perceiving nature as a living subject can be better understood in the framework of ´the new animism`, and as 'state of relatedness', and ASC as one way of bridging this connection.

I have presented four new possible drumming images in the Finnish rock art. All of them are therianthropomorphs, and they all have a circle formed by natural features of the cliff, acknowledged by red paint, and fitted to the hand of the figure. Three images have the other hand similar to a beating position, and one is similar to a wing. Two circles have faces, and one resembles Siberian drums with rays. Two are close to apparently dancing images. All images have an exceptionally close connection to the main animal helpers of the Sámi *noaidi*. All sites have exceptional soundscape that make the sites very good for ceremonies with singing and drumming. The iconography is surprisingly consistent, and points to a culturally patterned expression. Both the imagery, and the wider context support the interpretation of these images as shamans transforming into their animal forms in trance induced by drumming in a similar manner known for the Sámi. It is worth noting that these are not mere images of drums, but drums given by the rock itself, as stated in the ethnography, and they constitute a starting point for the paintings, acting as an interface

to the other world. Furthermore, the drumming images are connected to other images around them with relevant analogy to local mythology, ceremonies, and the *noaidi* acting as an intermediary between different spheres. The images, the adjacent figures, the features of rock face, and the soundscape correlate well, and strengthen further the explanatory power of shamanism in local context as one level of reading Finnish rock art.

However, drumming images are relatively rare in the Finnish rock art. This correlates well with what we know of Sámi ceremonies at *sieidi* sites: the most common way to communicate with spirits, and induce trance has been singing. The preliminary studies of soundscape at over 100 rock art sites affirm a remarkable pattern of echo at these sites. Exceptionally good echo is so prevalent at rock art sites – actually avoiding silent sites – that it clearly surpasses mere coincidence, and presupposes a cause. The recent research on *sieidi,* and rock art sites confirms that there has not been only echo, but that echo has been paramount exactly at these sites compared to the surrounding soundscape. This makes rock art sites excellent singing, and drumming places with echo, and reverberation. It can be concluded that good soundscape is an elemental part of rock art – if not one of the decisive features for choosing a rock art site.

At Finnish rock art sites there are present several natural liminal elements like being on the border of water, earth and air, the wilderness effect, the sonic, and optic driving that cumulatively help the mind to slide into deeper body, and ASC. The rock art cliffs seem to have been carefully selected for those qualities that naturally immerse the participator into the place, initiating a process of connection, and communication. It seems apparent that these aspects have been consciously used by singing, drumming, and dancing as depicted in the paintings, heard, and known from the local tradition to deepen the experience into trance. I argue that the Finnish rock art sites have been chosen precisely because of these aspects: for the sites of liminality, sites of trance, and sites of relationship.

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Glossary

ayahuasca. A commonly used psychotropic brew prepared from *Banisteriopsis caapi.* See *yajé.*

ASC. Altered States of Consciousness.

dološ juoigan. Ancient Sámi songs, *yoiks*, that are sung for supernatural powers.

gedgge olmush. Literally a stone person. A sacred Sámi stone, cliff or mountain which has anthropomorphic form.

hiisi. A Finnish sacred grove.

kadnihah. Sámi underground spirits, originally apparently ancestors.

kaje. Visual echo, reflection of light e.g. in the water.

k**ajo**. Audible echo.

langeta loveen. Literally to fall into a crack, to enter trans.

lovi. A crack

lovinoita. A shaman who is capable of diving into the crack, and entering trans.

m**aahiset**. Finnish underground spirits.

noaidi. A Sámi shaman.

noita. A Finnish shaman or a witch.

passevara. A Sámi sacred mountain.

passevaraolmai. The man of the sacred Sámi mountain.

passe vare sarva. A reindeer of the sacred Sámi mountain. One of the main helpers of *noaidi.* See saivo-sarva.

rumb–āhkkuh. Literally drum women. Female Sámi shamans in Inari area in Finand.

sáiva, saivo. A Sámi sacred lake, also a sacred mountain, where the ancestors reside.

saivo-gärmai. A snake of the Sámi sacred mountain or lake, one of the main helpers of *noaidi.*

saivo-lodde. A bird of the Sámi sacred mountain or lake, one of the main helpers of *noaidi.*

saiwoneidah. Women of the sacred Sámi mountain.

saivo-sarva. A reindeer of the Sámi sacred mountain or lake, one of the main helpers of *noaidi.*

sieidi. A Sámi sacred site.

siida. A local Sámi community.

soma. A vedic hallucinogenic drink that priests have used for visions.

SSC. Shamanic States of Consciousness.

tietäjä. “the one who knows”, the people who know the ancient folk poems and songs. Also traditional healers who use natural cures, and magic charms, often with the embodiment of power.

tietäjälaitos.Tietäjä institution. A culturally established practice of *tietäjä* tradition.

u**lddat**. Sámi underground spirits, originally apparently ancestors.

yajé. A commonly used psychotropic brew prepared from *Banisteriopsis caapi*. See *Ayahuasca.*

yoik. A traditional Sámi song.

yoiking. A traditional Sámi way of singing.

Endnotes:

1. The first account of the Sámi shamanism in Historia Norwegie:

"Once, when Christians who had come to trade had sat down at table with some Finns, their hostess fell forward all of a sudden and expired. While the Christians felt serious grief at this calamity, the Finns were not in the least saddened, but told them that the woman was not dead, merely pillaged by the gands of her adversaries, and that they could quickly restore her. Then a magician, spreading out a cloth under which he might prepare himself for intoning unholy sorcerer's spells, raised aloft in his outstretched hands a small vessel similar to a riddle, decorated with tiny figures of whales, harnessed reindeer, skis, and even a miniature boat with oars; using these means of transport the demonic spirit was able to travel across tall snowdrifts, mountain–sides and deep lakes. After chanting incantations for a very long time and leaping about there with this paraphernalia, he finally threw himself to the ground, black all over like a negro and foaming at the mouth as if he were mad; ripped across his stomach, with a mighty roar he eventually relinquished his life. Next they consulted another specialist in the magic arts as to what had happened in each case. This individual went through all his practices in similar fashion, though with a different outcome: the hostess arose in sound health and then he revealed to them that the sorcerer had died in the following way: his gand, having taken on the likeness of a whale, was shooting rapidly through a lake when it had the misfortune to encounter a hostile gand, which had transformed itself into sharply pointed stakes; these stakes, hidden in the depths of the lake, penetrated the repulsed creature's belly, and this was also manifested by the death of the magician in the house."

2. "[…] alle närwarande säija: Så bedie wij, så bedie wij at lyckas wille *etc*. Men hwem är den dhe bidia? Ingen annan än som diefwulen och deras Skogzgudh *Seitä*."

3. "Gästabuden till gudarnes ära firade de med sång och trumslag, och ju klarare trumman därvid ljöd, desto mera behagade det goden"

4. "Men Joikning är och swar tagit af PassevaraOlmai, helige fiällsmän."

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Appendix 1. **Results of Echo Testing at Finnish rock art sites**

Explanation of the symbols: * an unsure painting, - = not tested, D = directly from the paintings (on a horizontal scale), S = a good singing place.

Astuvansalmi, Ristiina	very good		**D**	**S**
Ala-Rieveli, Heinola	good		**D**	**S**
Ekelinniemi, Puumala	very good		**D**	**S**
Enkelinpesä, Juva	good	erratic boulder	**D**	**S**
Hahlavuori, Hirvensalmi	very good		**D**	**S**
Halsvuori, Jyväskylä mlk	good		**D**	**S**
Haukkasaari, Lemi	good		**D**	-
Haukkavuori, Iitti (Konniv.)	good		**D**	**S**
Haukkavuori, Iitti (Kotoj.)	very good		-	**S**
Haukkavuori I, Mäntyharju	good		**D**	**S**
Haukkavuori II, Mäntyharju	very good		**D**	**S**
Haukkavuori III, Mäntyharju	good		**D**	**S**
Haukkavuori**,** Savonlinna	good		**D**	**S**
Havukkavuori A, Enonkoski	good		**D**	**S**
Havukkavuori B, Enonkoski	very good		**D**	**S**
Hopeakallio, Lammi	good		**D**	-
Huonpohjanvuori, Asikkala	excellent		-	**S**
Humalniemi, Heinävesi	good		**D**	**S**
Härätti, Puumala	excellent		**D**	**S**
Ievasvuori, Luumäki	good		-	-
Ilmuksenvuori, Lemi	good		**D**	-
Inkilä, Luumäki	good		-	-
Iso Kuhajärvi, Laukaa	good		**D**	**S**
Itkonlahti, Mäntyharju	very good		-	**S**
Julma-Ölkky, Kuusamo	very good		**D**	-
Juusjärvi, Kirkkonummi	very good		-	-
Jyrkkävuori, Valkeala	good		**D**	**S**
Jäniskallio, Espoo	good		**D**	**S**
Kalamaniemi I, Luumäki	excellent		**D**	**S**

Kalamaniemi II, Luumäki	good		-	-
Kalkkolan Linnakallio, Nastola	good		**D**	-
Kannonalus, Mäntyharju	very good		**D**	**S**
Kannuksen linnav, Taipalsaari	very good		**D**	-
Kapasaari, Jaala	good		-	-
Karhusaari, Iitti	good		-	**S**
Karstun linnavuori, Lohja	very good		**D**	**S**
Keltavuori, Lappeenranta	excellent		**D**	**S**
Kintahuonvuori, Jaala	very good		-	-
Kipolampi, Luumäki	good		**D**	**S**
Kivikirkko, Sulkava	good[1]	erratic boulder	**D**	**S**
Kuorevaara, Parikkala	very good	erratic boulder	**D**	**S**
Kurtinvuori, Enonkoski	very good		**D**	**S**
Kuutinvuori, Puumala	good		-	**S**
Kymenkäänne, Iitti	very good		**D**	-
Lakiasuonvuori, Valkeala	good		-	-
Lammasjärvi, Raasepori	very good		**D**	**S**
Lapinvuori, Ruokolahti	very good		**D**	**S**
Leveälahti Asikkala	excellent		**D**	**S**
Linnasaari, Lemi	good	erratic boulder	**D**	**S**
Lintuinvuori, Taipalsaari	good		**D**	**S**
Louhtovuori A, Suomenniemi	very good		**D**	**S**
Louhtovuori B, Suomenniemi	very good		**D**	**S**
Löppösen luola, Valkeala	good		-	-
Maksasaarenselkä, Puumala	very good		**D**	**S**
Mertavuori, Iitti	very good		**D**	**S**
Muuraisvuoret, Luumäki	very good		**D**	**S**
Määrjärvi*, Salo	very good		-	**S**
Mätikkä,*, Masku	resonance[2]	cave	**D**	**S**
Mörtin kivi, Luumäki	good	erratic boulder.	**D**	**S**
Niinivuori, Savitaipale	good		**D**	-
Orivuori, Savonlinna	good		**D**	**S**

1 Only human voice echoes, trees prevent echo from percussion plates.
2 Human voice resonates, but there is no echo due to the small size of the cave.

Pakanavuori, Kuusankoski	good		-	-
Patakallio, Jaala	good		-	**S**
Patalahti, Asikkala	excellent		-	-
Pikku Kullaanjärvi	good		**D**	**S**
Pyyslampi*, Espoo	very good		**D**	-
Raidanlahti, Jyväskylä	excellent	erratic boulder	**D**	**S**
Rantomäki*, Luumäki	very good		-	-
Rapakko, Savonlinna	good		**D**	**S**
Rautakannanvuori, Iitti	good		**D**	**S**
Rautvuori, Heinola	very good		**D**	**S**
Revonkärki, Valkeala	good		**D**	**S**
Ristnienenvuori A, Miehikkälä	very good		**D**	**S**
Ristniemenvuori B, Miehikkälä	good		**D**	**S**
Ruominkapia, Lemi	excellent		-	-
Ruuniemi, Savitaipale	very good		-	-
Ruusin Turasalo, Taipalsaari	very good		**D**	**S**
Salminjärvi, Vihti	excellent		**D**	**S**
Salminkallio, Luopioinen	very good		**D**	**S**
Saraakallio A, Laukaa	very good		**D**	**S**
Saraakallio B, Laukaa	good		**D**	**S**
Siliävuori, Luumäki	excellent		**D**	**S**
Suurijärvi, Savonlinna	good	erratic boulder.	**D**	**S**
Syrjäsalmi, Puumala	very good		-	-
Tikaskaarteenvuori, Anttola	good		-	-
Toivola, Joutsa	good	erratic boulder	**D**	**S**
Uittamonsalmi, Ristiina	excellent		**D**	-
Ukonvuori, Enonkoski	very good		**D**	**S**
Uutelanvuori I, Jaala	good		-	-
Valkeisaari, Taipalsaari	excellent		**D**	**S**
Valkjärvi, Luumäki	very good		**D**	**S**
Värikallio, Suomussalmi	excellent		**D**	-
Vaskivuori, Luumäki	very good		**D**	**S**
Venäinniemi, Lemi	very good		**D**	**S**
Vesitorninmäki, Elimäki	good		-	-

Vetotaipale, Puumala	excellent		-	-
Verla, Valkeala	very good		**D**	**S**
Vierunvuori, Heinävesi	very good		**D**	**S**
Viherinkoski A, Joutsa	good	erratic boulder	**D**	**S**
Viherinkoski B, Joutsa	very good		-	-
Voikoski, Valkeala	good		**D**	-
Völjärinsalmi, Puumala	very good		**D**	**S**
	102		**76**	**71**

The following two sites have today forestation that prevents testing echo from 20 meters. However, the testing gave interesting results of reverberation also in these places in closer distance:

Ahotaipaleenmäki, Puumala: forest prevented testing of echo. A very good singing place.

Hepo-oja*, Juva forest prevented testing of echo. A good singing place.

Note that the qualities of echo are not directly comparable with each other, since the forestation, and weather conditions affect testing: good echo documented on a windy or rainy day, with snow, or leaves on the trees can be great or excellent when tested on better conditions. The testing has been done at the ground, or water level.

Figure numbers and caption titles

Fig. 1a: Saraakallio I. Photo Ulla Valovesi.

Fig. 1b: Saraakallio I. Outline drawing Ulla Valovesi.

Fig. 2: Drummers on a boat in Norway. Photo Helskog 1990, 34.

Fig. 3: Ural. Okladnikov and Martinov 1972, 133.

Fig. 4: Middle Yenisei. Devlet & Devlet 2005, 346.

Fig. 5: Värikallio. Photo Ulla Valovesi.

Fig. 6a: Mertavuori. Photo Ulla Valovesi.

Fig. 6b: Mertavuori: Digitally enhanced by Dstretch.

Fig. 7a: Hahlavuori. Digitally enhanced by Dstretch.

Fig. 7b: Hahlavuori. Photo Ulla Valovesi.

Fig. 7c: Hahlavuori. Outline drawing Ulla Valovesi.

Fig. 8a: Saraakallio I. Digitally enhanced by Dstretch.

Fig. 8b: Saraakallio I. Photo Ulla Valovesi.

Fig. 8c: Saraakallio I. Outline drawing Ulla Valovesi.

Fig. 9: Saraakallio I. Photo Ulla Valovesi.

Fig. 10a: Saraakallio I. Outline drawing Ulla Valovesi.

Fig. 10b: Saraakallio I. Photo Ulla Valovesi.

Fig. 10c: Saraakallio I. Digitally enhanced by Dstretch.

Fig. 11: Juusjärvi. Photo Ulla Valovesi.

Fig. 12: Saraakallio I. Photo Ulla Valovesi.

Fig. 13: Spectrogram at the Leveälahti rock painting site showing impulse responses. From left: two clapping of hands are shown with two high columns, and four echoes created by them with four lower columns. Vertical axis: frequency of sound (kHz); horizontal axis: time (sec). +18°C/ 64 °F, 80m.

Fig. 14: Värikallio. Photo Ulla Valovesi.