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Multi-scale spatial analysis of Neolithic pictographs at Astuvansalmi, Finland

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Abstract:

This paper considers and evaluates a landscape archaeology research framework which relies on methodologies of Visual Narrative Analysis (VNA) and spatial analysis to study rock art. The innovative approach in this case study is the use of multi-scale spatial analysis, first to examine the *micro-scale* visual narrative aspects of the images— e.g. composition, framing, panelling, and movement – and secondly, to map the *macro-scale* archaeological context. The case examined is the Middle Neolithic pictograph site on the cliffs at Astuvansalmi, in Ristiina, Finland. With approximately 60 painted images, the site is noteworthy as one of the largest rock painting sites in Northern Europe, listed as a tentative UNESCO World Heritage site since 1990. It is argued that there is a need to go beyond traditional ethnoarchaeological approaches with a systematic spatial analysis. This multi-scale spatial analysis offers an alternative approach which seeks a more complete and varied understanding of the archaeological landscape.

KEYWORDS: GIS, multi-scale spatial analysis, Visual Narrative Analysis, Finnish rock art, shamanism

1. Introduction

Visual representations such as rock art are powerful means of communication, belonging to the past and at the same time a part of our world today. The interpretation of meaning in prehistoric art and cultures is limited by many factors, including scarcity of evidence, gaps in scientific methodologies, and missing contextual information. For archaeologists living in a modern environment, the contemporary perspective on the definition of art and its role in societies, and, indeed, our contemporary perspective on landscape, may be considered a significant restricting issue. Our understanding of specific meanings in art – prehistoric as well as modern – is thus imperfect. At the same time, archaeologists in the present record and communicate the observations made today, describing artistic choices in the production of art, such as compositional and spatial patterns, which serve as guides in the recognition of elements that generate meaning as the viewer engages with the art.

A key conceptual premise in this study is that the construction of visual narratives in the past can be studied with the same parameters as are used to study contemporary visual narratives. In other words, we are quite similar to our ancestors. If, as Lewis-Williams (2002, pp. 205-206) writes, Stone Age hunter-gatherers were cognitively fully modern, then how we understand and experience visual stimuli (including art) today shares much in common with how it was understood and experienced in the past. Visualisation and its role in cognition have been integral to the human experience from prehistory to modern times, and humans share the same visual system, as Ware (2004) argues. It is a sense of this commonality across millennia which inspired the drawing together of research approaches from various fields, including theories of cognition, communication, philosophy and design, together with methods of narrative and spatial analysis in this archaeological research.

The central aim in the present study is to contribute to a growing area of research by exploring the possibility of utilising a multi-scale GIS methodological approach to investigate the narrative structural patterns found in rock

art within the site's broader archaeological context. This preliminary report is a multi-scale spatial analysis which studies semiotic and landscape phenomenon: in the first case a (micro-spatial) VNA analysis of the distribution of motifs in the paintings, and in the second case a (macro-spatial) buffer analysis of the spatial distribution of neighbouring archaeological sites in a 10 km region surrounding the site. This methodological approach is applied to the study of the pictographs found at Astuvansalmi, which is the largest assemblage of painted rock art in Fennoscandia. Located at Ristiina, in Southeastern Finland, the pictographs at Astuvansalmi belong to the Hunter-Gatherer rock art tradition of the northern coniferous zone.

The objectives of this paper are to:

- describe a multi-scale spatial research framework which uses Visual Narrative Analysis (VNA) together with spatial analysis to study rock art
- test the framework by examining VNA characteristics (the composition and framing of figures, panels, movement, use of natural features of the rock) in practice at Astuvansalmi with intra-site spatial analysis of the images themselves (using manual vectorisation for digital enhancement of images) and inter-site spatial analysis of the archaeological context of the surrounding landscape
- evaluate this process and the suitability of the framework combining VNA and spatial research methodologies in this type of study

This approach differs in two ways from previous research on the rock art of Finland. First, this study does not rely on ethnographic methods, departing from research linking the art to shamanism. Secondly, this work diverges from the generally-accepted notion that the rock art in Finland is anti-narrative in nature, a viewpoint which does not take into account the ways in which static representations can be interpreted as in motion (Le Poidevin, 1997, p.188), nor the existence of different types of visual narratives, e.g. the Static Visual Narrative (SVN) of Pimenta & Poovaiah (2010).

Besides stratigraphy, the most significant archaeological evidence for context depends on spatial relationships, and archaeologists are dependent upon spatial analysis in their understanding of the social contexts as well as site-formation processes in the archaeological record. The need to study spatial relationships extends to consideration of the use of micro-scale space as well, and in the case of rock art it is precisely the semiotic details in the visual narrative which generate meaning. To quote Nash, "the artist used many devices to either conceal or promote the narrative; one of the props used within this performance would have been the panel on which the art was performed, placing figures into spatial context and observing the rules of grammar" (2017, abstract). These grammar rules can encompass the compositional and spatial patterns identified in the rock art.

The rest of this paper is structured as follows: Part 1 describes the regional setting of Astuvansalmi (1.1) and provides a discussion of analogy and the traditional ethno-archaeological approach typical of research on rock art in Finland (1.2); Part 2 is concerned with the research methodologies – how a multi-scale spatial approach is used in this inquiry. Part 3 describes the VNA methods and results for the micro-scale spatial analysis, while Part 4 provides a description of the landscape archaeology methods and results for the macro-spatial analysis. Part 5 is a synthesis of the results, and the paper ends with the discussion and conclusions in Part 6.

1.1 Background: the regional setting

In this Part of the paper, the geological environment of Astuvansalmi and the pictograph site are briefly described.

The rock art found in Finland consists of pictographs, approximately 127 sites, the majority of which are found on the cliffs in the Southeastern Lakeland region. The rock art case studied in this research is the cliff painting site of Astuvansalmi. The red ochre pictographs at Astuvansalmi are painted on a sharp granite cliff rising above the Lake Saimaa water system (See the location in Figure 1.)

Salpausselkä is an extensive ridge system which was created as the land rose and the ice receded following the Ice Age in Southern Finland. This terminal moraine formed in front of the Baltic ice lake during the Younger Dryas period. The ridge system is to 500 km in length and up to 80 m in height. There were two phases: the first ridge dates to 12,250–10,400 years ago; the second ridge was deposited 11 600 – 1 800 years ago, 10–25 km NW of the first ridge Salpausselkä. The land between the ridges has been occupied for approximately 10,000 years (Scheffel & Wernet, 1980; Saarnisto, 1991; Nenonen & Portaankorva, 2009).

The red ochre paintings of Astuvansalmi, *themselves*, are dated to around 3800–2200 BCE, corresponding to the Middle Neolithic; however, some archaeological evidence suggests the site may have been in use for even longer, up until 500 BCE, through the Early Metal Period. The Astuvansalmi paintings have been dated with reference to the history of the Lake Saimaa water system (Jussila, 1999, Seitsonen, 2005). Due to postglacial land uplift, by 3800 BC only the location of the uppermost painted designs could have been above the level of the River Vuoksi below; thus, that is the terminus *post quem*, or earliest possible date for the pictures. After approximately 1000 years, the water levels had sunk by 2.5 metres, and the shelf beneath the painted rock face emerged, giving a terminus *ante quem* of 2200 BC. Based on these dates, the paintings are associated with the Comb-ware- and Textile Ceramic cultures in Finland.

However, the use of shoreline displacement as a means of dating the rock art has been brought into question by Hakulinen (2011 & 2012), who notes that the level of Lake Saimaa has varied as much as 3 metres per 500 years. Hakulinen further states that the position of both the dwelling sites and the rock art sites relative to the shoreline must also be considered.

At Astuvansalmi, approximately 60–70 figures cover an area approximately 16.5 metres long and 5.5 metres high. The pictographs are between 7.7 to 11.8 metres above the present water-level of Lake Saimaa. Motifs at this site include 13 anthropomorphs, zoomorphs (21 cervids/moose, a snake, and 5 fish), 6 boats, 6 handprints, 1 bow, a number of geometric or unidentified figures, including stray marks and areas which are covered in red. There are three different types of human figures: those with horns or headdresses, one warrior woman holding a bow, and two anatomically correct male figures. The richness in imagery in the Astuvansalmi pictographs makes it an ideal site for this study.

My database of sites and motifs of each type is based on the National Board of Antiquities Registry of Heritage Sites database up until 2015 and the observations of Kivikäs (1995). Although there have been additional pictographs at Astuvansalmi and further rock art sites discovered in Finland more recently, the latest ones have not yet been documented and entered into the NBA database; therefore, the numbers here provided do not reflect the most recently found statistics.

Within the 10 km buffer zone surrounding Astuvansalmi, the other prehistoric sites are: dwellings from the Stone Age and Early Metal Period; cairns from the Early Metal Period, and Uittamonsalmi, the 3rd largest rock art site in Finland, which is situated at 9.6 km to the west of Astuvansalmi. (See the buffer zone map in Figure 2.) More descriptive information about the archaeological landscape is presented in Part 4, together with a map of the 10- and the 20 km buffer zones.

Figure 1 – Location of Astuvansalmi in the Southeastern Finnish Lakeland region

Figure 2 – Astuvansalmi and the archaeological sites within a 10 km buffer zone. The red cross to the west marks Uttamonsalmi, the 3rd largest rock art site in Finland. Other prehistoric sites are: dwellings from the Stone Age and Early Metal Period (triangles) and Early Metal Period cairns (white circles with crosses). A more detailed map of the 10- and 20 km buffer zones is provided in Figure 4.

The brief geological and archaeological descriptions are introductory rather than comprehensive. More details regarding the archaeological background of Astuvansalmi are found in the macro-scale analysis in Part 4. Before proceeding to provide definitions of some of the concepts used in this paper, Part 1.2 summarises the traditional approach to Finnish rock art and why it is considered not to be germane to the present research.

1.2 Traditional ethnographic approaches: Shamanism

Regarding shamanic interpretive approaches, the starting point is to emphasise the significance of situatedness and context. Archaeologists seek to situate prehistoric art within a specific society, inasmuch as possible. Yet, the classic problem in this endeavour is that our understanding of prehistoric cultural contexts is perpetually out of grasp, limited to the archaeological context as it presents today. Therefore, many rock art researchers have turned to an analogical approach, the use of ethnographic methods based on comparisons between the prehistoric and the modern world views. Inquiries connecting the rock art with shamanism make up a large proportion of the research on the rock art within Finland. Essentially, though, this paper does not take that approach for two reasons: a question of polemics but also of methodology and space.

Reason 1: Western biases in ethnographic research. Without a complete understanding of the specific belief system, such ethnographic analogies are likely to be simply “projections of Western biases, interests, and concerns onto non-Western traditional art” (Whitley, 2005, p. 103). Thus – if understanding a prehistoric world view means the use of Western labels like ‘shamanism’ – this is a means of projecting a Western bias on the art, contrasting the ‘primitiveness’ of prehistoric art and people with modern, Western art and people.

Ethnographic provide valuable insights to the cultural and functional aspects of the rock art. However, the concept of ‘shamanism’ is not unproblematic (cf. Lewis-Williams, 1998, p. 11; Kehoe, 2000; Pearson, 2002; Wallis, 2004). The concept can be considered a social construct which separates us not only from our ancestors but also from our indigenous neighbours, “a division within humanity, that between indigenous peoples who live by culture and enlightened Westerners who can see culture (shamanism) for what it is” (Dowson, 2009, p. 379). Further critiques of ethnographic approaches to the study of rock art can be found in Bahn (2001), Francfort et al. (2001), Hoppál, (2003, 2013), McCall (2007, 2010, 2012), and Solomon (2016). In this context, Hoppál’s

(2013) comment is noteworthy: “one must be cautious since not everything on the rocks has a connection with shamanism or religious thinking” (p. 52). Hoppál points out that Siberian shamanism is, in many ways, unique in that there is a clear continuity of the population and practices in Siberia.

Reason 2: Methodology. Much scholarship on the prehistoric rock art of Finland and Northern Fennoscandia has consisted of ethnographic studies. In fact, a considerable amount of literature has been published on the topic within Finland. The symbols in the rock art are seen to reflect a world view of shamanism, animism, totemism and/or hunting magic, in part connected to Sami or Siberian shamanism (cf. Sarvas, 1969, 1979; Siikala, 1978, 1981, 1984; Hoppál, 1993; Autio, 1995; Siikala & Hoppál, 1998; Janik, 2007; Helskog, 1999, 2012).

Comparisons of the rock art images to the symbols on Sami shaman drums is a common theme in ethnographic studies. Núñez (1981, 1995) suggests that such similarities may represent a continuation of Stone Age “magico-religious” traditions into historical times. Helskog (1987), Joy (2007, 2018) and Janik (2009) also compare the pictographs and the Sami drums. The amber pendants found at Astuvansalmi indicate a possible functional similarity between the pictograph sites and historical Sami *seidi* ritual sites, according to Núñez & Franzén (2011, p. 11). The horned anthropomorph motif is interpreted variously as either a shaman (Siikala, 1981; Siikala & Hoppál, 1998) or a god (Autio, 1991a, 1991b). Lahelma bases his interpretation of the horned anthropomorphs as powerful shamans (2008, p. 56) on comparison with shaman figures depicted in Siberian rock art. This explanation is also found in numerous studies of Siberian rock art (Hoppál, 1992, 1993; Rozwadowski, 2012a, 2012b, 2014) and of the rock art in Central Asia (Rozwadowski & Lymer, 2012). Autio (1995a, 1995b) proposes that the ‘horns’ may in fact actually depict a kind of hair style worn by some shamans during historical times.

More recent ethnographic approaches to the study of the rock art of Finland can be found in the works by Lahelma (2001, 2005, 2007, 2008), Joy (2007, 2016, 2018) and Pentikäinen (2012). The significance of shaman journeys is presented by Lahelma (2005): “the Finnish rock art paintings can be interpreted as an expression of a shamanistic system of beliefs. Their iconography appears to reflect experiences of falling into trance, of summoning spirit helpers, of changing one’s physical form, and of journeying to the ‘Otherworld’” (p. 42). The same kinds of arguments are given to explain rock art further afield in Northern Fennoscandia and in Siberia. For instance, Hoppál (2013) explores the rock art of Siberia and Eurasia, placing emphasis on the role of the shaman as an intermediary between this world and a world of spirits. He provides a catalogue of the symbols found on drums and in the rock art, along with detailed discussion of their shamanic meanings; Rozwadowski (2012) writes of shamanism in the rock art of Siberia and Central Asia, and Janik (2009, 2015) considers the role of rock art as part of the development of shamanism and religion in the Sami regions, in Siberia and on the White Sea. Fuglestad (2018) describes the rock art of the Scandinavian Peninsula in terms of animism, totemism and hunting magic. Helskog (2012) discusses the ritual and religious meanings of the bear in Fennoscandian art in light of ethnographic research.

While there is a substantial amount of literature on the shamanistic aspects of rock art in Fennoscandia and within Finland, the short review above presents only a small proportion of the studies on the topic. The link between shamanism and rock art remains outside the scope of the analyses in this project. Instead, the present research aims to deepen our understanding of the pictographs from a spatial angle. The objective is neither to re-tell nor to interpret the stories in the art, but to examine the rock art and the archaeological context with spatial approaches.

My own assertion is that the ‘context’ is human in a broader sense; a uniformitarian view encompassing the human experience in our own time as well, and art as human communication, rather than from a perspective bound up in dichotomies such as Western-indigenous or modern-traditional. However, to understand and interpret the archaeological record as it represents a real world belonging to real humans in the past, one must consider the archaeological evidence (VanPool, 2009) within the temporal and spatial contexts; this is particularly true when there is a lack of cultural continuity (Atici, 2006, p.30).

2. Multi-scale spatial analysis: What it is and how it works

What makes my approach different is that the pictographs are seen within their spatial environment, on both a small scale and within a larger area. The objective is to examine the paintings’ surficial, micro-scale features and how these are spatially configured, and to place the site within a much larger archaeological context.

Multi-scalar approaches to spatial analysis are supported by a growing number of archaeologists studying rock art. Amongst the proponents, Chippindale (2004) is in favour of the inclusion of spatial scales ranging from the smallest scale (elements, motifs and scenes on rock surfaces), to the rock art site and up to the site within its regional landscape. Smith (2001) & McCall (2007) recommend studying rock art at multiple spatial and temporal scales. (See also Crumley & Marquardt, 1997, 1990; Wienhold, 2014; Wienhold & Robinson, 2017). The overemphasis of macro-scale spatial analysis over micro-scale analysis is one of the “conceptual filters” of which (Western) archaeologists should be aware (Smith & Blundell, 2004, p. 244). Rather than focussing on only prominent topographical features in the landscape, they suggest observation also of the minutiae in the art and the topography of the rock surface.

Although the use of landscape analysis in archaeology is a well-established approach, VNA is a relatively new analytical concept and investigatory technique in rock art studies. Thus, VNA borrows definitions and concepts from other fields (e.g. design, cognition, semiotics). Part 3 below provides some definitions and goes on to describe the methods and results of the micro-scale spatial analysis (VNA analysis); Part 4 describes the macro-scale spatial analysis (landscape analysis).

3 Micro-scale spatial analysis: VNA

Archaeologists studying the rock art in Fennoscandia have recognised the micro-scale landscape / surface as an interpretive element (Gjerde, 2006, 2010, 2013; Helskog, 2004), yet this recognition has only taken place relatively recently. The study of the spatial characteristics of rock art surfaces is a specialised area that has yet to be fully explored. In combination with VNA, the micro-scale spatial analysis provides access to the artist’s choices upon the moment of creation, the use of the panel as a prop in the performance of art creation, with attention to the spatial context and placement of the images.

The rest of Part 3 explains the theoretical basis, analytical methodology and results of the micro-scale spatial analysis. The first part (3.1) covers my view on semiotics; the second part (3. 2) is an overview of VNA; the third part (3.3) describes how VNA applied in this investigation; and the final part (3.4) provides the VNA results.

3.1 Semiotics, Narratives and Visual Narrative Analysis

As with ethnographic models, semiotic analysis has limited usefulness in rock art research. This limit is due to the failure of semiotic approaches to account for cultural and archaeological contexts. Beginning with definitions of semiotics, Part 3 proposes an alternative approach grounded in Visual Narrative Analysis.

3.1.1 Semiotics

Before defining narratives and VNA, it is necessary first to address semiotics: what it is, how it works and two disparate points of view on the comparisons between rock art symbols and texts. This section will also discuss the role of semiotic interpretive approaches in rock art studies, particularly the issue of context. Archaeologist Preucel defines semiotics as “the field... devoted to the study of the innate capacity of humans to produce and understand signs” (2006, p. 5). With this definition in mind, semiotics would seem to be a field of inquiry suitable in the study of rock art symbols. There, however, two quite dissimilar stances as to the extent to which rock art symbols are similar to texts. Two divergent and often conflicting discourses have emerged.

Structuralism, and in particular, semiotics, has been emphasised for some time in the study of rock art, notably by researchers such as Leroi-Gourhan (1958, 1965, 1967, 1968), Lewis-Williams (1980, 1982, 1995, 2002), Llamazares (1989), and Conkey (2001). Semiotics as a discipline originated in Swiss linguist Ferdinand de Saussure’s semiology (1983, p. 16). For Saussure the central focus was on language, words as linguistic signs with an arbitrary relation to their meanings. The signs and symbols in rock art would be considered to embody a language with a grammar, and thus the images considered to have meanings such as do words or hieroglyphs, from which a dictionary could be written for interpretation.

There are some weaknesses in a strict Saussurean structuralist approach to the study of material culture in that it privileges semiotic codes and rules over cultural practises (Preucel & Bauer, 2001), which is another way of saying the context is missing. As observed by Conkey (2001, p. 145), classic structuralism in rock art research fails to consider the archaeological context. From a less strict structural point of view, rock art is pre-defined and community-specific in nature, i.e. directed to a particular audience (Llamazares, 1989; Tilley, 1991, 1999; Nash, 1997, 2002). For example, shamanic symbols are the focus of a semiotic analysis of rock art in Siberia (Rozwadowski, 2012a, 2012b, 2014; Hoppál, 2013) and in Central Asia (Rozwadowski & Lymer, 2012), with lengthy catalogues of the various types and shapes of drums depicted in the rock art. Both Hoppál and Rozwadowski, however, carefully place the rock art they study into a social context as far as possible.

On the other hand, there is a distinction between a semiotics equating symbols with words and, in contrast to this, a semiotics which accepts that symbols in rock art are not necessarily readable in the same way as texts. The communicative nature of rock art may be considered to be quite different to written texts, in that rock art is presented as a visual medium “intended to create a three-dimensional relationship to the observer” (Goldhahn, 2002, p. 31). Despite the similarities, the kinds of signifying elements are of an entirely different type.

Saussure’s interest in “the life of signs” and the human communicative capacity is a starting point for semiotic inquiry. Rather than utilising a strict structural semiotic analysis (pictures = symbols = words, with a grammar), the rock paintings are described in this paper in terms which would be used to describe visual images, including especially those in modern forms such as photographs (pictures = pictures).

In a shift away from structural semiotic analyses, the process of understanding visual input and what Johnson (2017, p. 26) refers to as “the specific creator’s communicative intention” have taken the forefront in rock art studies. Participants have begun to be at the centre: the creators of the art and the viewers/intended viewers. Art

is seen as an act of storytelling, or narrative, and the occasion of storytelling – whether in oral, written or visual form – thus involves recognition of the context. All of this brings us to the upcoming section, which describes narratives and the concepts and definitions of VNA.

3.1.2 Narratives and VNA

Next, it is necessary to define the term ‘narrative’. While there are numerous definitions for narrative (c.f. Rudrum, 2005, Prince, 1982), what most of them have in common is that a narrative is not simply a story, but the *telling* of the story, i.e. the performance or presentation itself. Given that the representation of the telling can be written, oral or in symbols, definition of a narrative can be extended to incorporate “the symbolic presentation of a sequence of events” (Scholes, p. 205). The second question pertains to the role of narratives. Narratives serve to help both individuals and groups to form identities and to position ourselves in the world. In other words, narratives control social interactions (Sjöblom, 2001, p. 165).

Precisely because of this social aspect of narratives, research on narratives (as, indeed, in archaeology), the social and cultural contexts or ‘situatedness’ necessitates interpretation of the narrative in light of a particular presentation, performance or occasion. The connection between cultural context and narratives is widely recognised, but the mechanism is not well understood. Freeman (2001) writes, “*That our personal stories are profoundly conditioned by our cultural worlds goes without saying at this point. How they are so conditioned is not nearly so straightforward*” (p. 287). I argue that the mechanisms by which context shapes the narratives of past cultures are best approached through archaeological and spatial contexts.

Archaeology is the study of the context. This is perhaps both the most challenging and, at the same time, most fascinating part of studying narratives in archaeology: there are no simple answers. Archaeological contexts are documented by archaeologists using material evidence, site analysis; excavations, spatial distribution, scientific dating methods and so forth. Yet another tool that contributes to the identification and understanding of specific cultural contexts is related to the use of symbols in communication. One such cultural context which archaeologists commonly encounter is a church or a temple, wherein the symbolism in paintings or sculptures have meanings which are site-specific and temporally situated, meanings which are not readily accessible to those who may be unfamiliar with a particular faith. In a city landscape, churches (and particularly cathedrals) dominate the scenery; while these edifices, as symbols, are noticeable landmarks – and while they have a variety of roles in society through festivals, rituals, and markets – they are not meaningful *in the same way* for all. (See Niskanen, 2017, *in press*.)

Bruner (2001) asserts that “what makes the telling justifiable is also a commitment to a certain set of presuppositions about oneself, one’s relation to others, one’s view of the world and one’s place in it” (p.35). In fact, all human societies and individuals – also in the modern world – have ‘presuppositions about oneself, one’s relation to others, one’s view of the world and one’s place in it’. Such beliefs, however, as well as associated practices, are not static, not limited to the past, nor necessarily shared by all community members. Narratives serve to express ideas and beliefs to others – who may or may not share the same presuppositions – including those archaeologists studying ancient art. Shanks & Tilley (1997) stress that the work of art expresses an actively constructed reality of particular social groups – it is within a social context that the meaning is constructed.

VNA emphasises understanding how actively constructed realities and worlds are visually communicated in narrative form. Going beyond the semiotic rules, VNA encompasses social, temporal, and spatial dimensions and endeavours to intensify how researchers understand experience (Bach, 2008). Visual narrative inquiry has been applied in diverse fields of research, the conceptions of and VNA vary. The following section defines the terms

and then continues with a description of how these transform into a theoretical framework and methodology for this project.

A visual narrative can be defined as visual story-telling (Pimenta & Poovaiah, 2010, p. 25). The visual narrative has a number of aspects which include the presence of a story, a visual that has been made with the intention of communicating the story to an audience and within a universe of its own. Lastly, Pimenta & Poovaiah propose that a visual narrative may be expressed on any medium, for example from paper to stone or an electronic device. As they continue, “The fact that the onlooker does not know the story does not nullify the narrative quality of that visual” (p. 32). While an archaeologist may have only a partial understanding of the narrative and its occasion for telling, the narrative qualities are still a part of the visual representation.

A photograph can be considered a static image, yet the photograph can show an action, even movement. If the photograph depicts a person diving from a bridge, already in the air, this is a liminal stage. The story has a beginning (what happened before the image) and a continuation (what will happen next).

While the rock art in Finland has been generally considered to be static and anti-narrative (although see Bolin, 2010, p. 32), perhaps due to the fact that (according to my own database), most pictograph sites have just 1-2 images (51 sites); 32 sites have between 3-5 images; and 28 sites have 6 or more images. Nonetheless, non-static images do exist and have been noted by Lahelma (2008, p. 52), who lists a number of activities in the pictographs, including falling (Juusjärvi, Kirkkonummi), diving (Haukkavuori, Mäntyniemi) and swimming (Kapasaari, Jaala). Of particular relevance to Astuvansalmi is a similar pictograph site, Verla at Valkeala, which depicts what appears to be a herd of moose, all heading in the same direction, with anthropomorphic figures amongst them.

Parietal rock art such as cave paintings and cliff paintings are examples of what Pimenta & Poovaiah label a Static Visual Narrative (SVN), which they distinguish from the Dynamic Visual Narrative (DVN, such as drama, films, with visual motion) and the Interactive Visual Narrative (IVN, such as interactive games and iPad apps). The dynamism of SVNs is of a different nature, contrasting with the DVN in that the dynamism is one which demands the audience to supply. It is in the perception of the onlooker that there is temporal movement. The viewing is active (p. 33-p. 35).

Visual Narrative Analysis is derived from philosopher John Dewey's view of the connection between humans and the environment (Bach, 2008). He regarded humans as intrinsically bound to their environment, attached to their surroundings. His philosophy captured the interest of students of art, photography and design.

The content of a work of rock art is in a way similar to a text – in terms of the communicants, the ‘narrator’ and the ‘audience’ – but not using the same kind of (semiotic) signals. At the same time, rock art is similar to a photograph, with visual signifiers. These might include, for example:

- Framing – What is included inside the frame of the picture, and what is outside the edges? This is as important in rock art as in photography, as selection of objects and how they are framed is an active choice on the part of the creator. This is true in rock art, as well. “Framing is relevant,” writes Dobrez (2010).
- Composition or organisation of images – Dobrez (2010) also considers the organisation to be significant, particularly in a 2D representation.

- Movement captured (e.g., liminal activities) – Rather than being simply static, images on a 2D surface can be seen as if in motion, as visual narratives (Pimenta & Poovaiah, 2010; Dobrez, 2013). In the pictographs in Finland, there are examples figures in liminal stages, figures caught mid-action, dancing, swimming, diving or otherwise engaged in motion. Photographs, too, depict actions and activities.
- Co-occurrence and ordering – An example of this in a photograph would be the selection of which objects are placed in the front (ordering) and which objects are combined; also the viewpoints of the ‘narrator’ / artist and of the ‘audience’ / viewer; the scale of photograph, “zooming” in or out.
- Panelling – In the case of photography or paintings, panelling is seen in art galleries when a series of photos are hung alongside one another, either as parts of a single scene (such as a triptych) or in a chronological sequence (similar to a series of pictures in a cartoon that tells a story sequentially). Panelling is similar to framing, for example in rock art when cracks in the rock serve to physically separate the panels.

The VNA theoretical framework here borrows from Pimenta & Poovaiah’s (2010) SVN, Bal’s (1997, 1998) & Keats’ (2009) signifiers, and Dobrez’s (2010) formal markers, adapted as a means to study the pictographs at a micro-scale spatial scale.

Particularly in the case of Static Visual Narratives, the viewer is an active participant. In Northeastern Europe, Janik’s recent works (2009, 2014a) take a VNA approach, describing as visual narratives the whale hunting scenes depicted on the rock art of the White Sea in Karelia. Janik considers the narratives and VNA features such as movement in the art from the perspectives of the artist and of past and present viewers (2009, 2014a, p. 124). While Janik differentiates Western and non-Western visual traditions, she also describes “universal aspects of visual expression...which can be used to describe any visual composition” (p. 109). Since this separation cannot be traced back to the Neolithic, it also seems to be a social construct as is the term ‘shaman’. Notably, Janik (2014b) approaches archaeological study of visual art from the point of view of neuroaesthetics/ how the brain processes visual information, in which viewpoint she compares visualisation in prehistory a in modern times. Dobrez (2013), too, considers the neurophysiology of visual stimuli to be different significant in the perception of rock art, but he argues that the perception process differs today from that in the past, from an evolutionary aspect.

Next, in Part 3.3, the micro-scale spatial methodology is described.

3.3 Micro-scale spatial analysis methodology: Vectorisation & VNA

Astuvansalmi was chosen precisely for its unusually high number of images. On the other hand, this richness did not mean that the identification of images would be simple. The present condition of the cliff paintings at Astuvansalmi is such that in some instances it can be difficult to distinguish separate figures and motifs. While identifiable symbols exist, image identification is often constrained by weather-damaged areas, cracks in the rocks, superimposed symbols and smudges. The layering of painted images atop earlier pictographs creates a palimpsest that indicates use and re-use of the site over time, perhaps for several generations, but the superimpositions result in less distinguishable images. In addition to these challenges, it is important to consider the surface irregularities of the cliffs. Artist and author Pekka Kivikäs worked with archaeologists during the 1980s to document the cliff paintings at Astuvansalmi and at other pictograph sites in Finland. His drawings and paintings of the pictographs are based on his own photographs and original tracings and are, therefore, quite accurate. The detailed drawings by Kivikäs have been used as the basis for the manually digitised images in this research.

The first step in the micro-scale spatial analysis was the vectorisation and manual enhancement of images using ArcGIS and Adobe Illustrator. After the digital images were completed, the next step was to measure and scale the images and groups within separate panels. Following this measurement, separate panels were then combined to create a panorama. Finally, the images and panels were inspected to identify identification of visual narrative patterns. Only a small sample of the studied images at Astuvansalmi are presented here for the VNA: more sites and images could be used in further analyses.

Another means of digitalisation commonly used to record rock art is digital photography. However, some details are usually lost in the resulting photographs, due to the over-brightness of red colours in the digitised photos. Since the surface of the rock is in 3D, with curvature and rough textures, the digitised 2D versions, whether in photography or in vectorised form (as in this study), are interpretations, and therefore are distortions. Laser photography, which allows a more accurate representation of the 3D qualities of the cliffs, has been used to document the rock paintings in Northern Finland (Rainio et al., 2014, 2017). For the present research, ArcMap and Adobe Illustrator are used instead. Because the study aimed to identify and analyse narrative signifiers, vectorisation was chosen over digital photography. Digital photographs lack detail for such analysis. Although manual vectorisation does not represent the images and surficial irregularities to the millimetre, the process allows enough specificity for the purpose of this study.

Keyser & Poetschat (2004) stress the use of 3D landscape analysis at a smaller scale. They conclude that, in many cases, natural features and irregularities in rock art canvases may have been meaningful in and of themselves, which is of particular interest in the visual analysis: “Many archaeologists often still miss the relationship between the images and the natural features because they fail to recognize the panel as a landscape in miniature” (p. 118). Such natural features, they argue, may have been chosen by artists as integral parts of the spatial composition of the art, and thus should be “carefully recorded and discussed in interpretation” (p. 129).

Strictly speaking, the resulting digitised images here presented are not scaled precisely. The intermediality of the VNA vectorisation model, whereby the images have been transformed sequentially from the paintings themselves, to photographs, to drawings and paintings, to illustrations in a book, and then to vectorised images, is an ekphrastic interpretation rather than a strictly empirical exercise. (Note: digital photography is also intermedial and interpretative.)

Next, in Part 3.4, the results of the micro-scale, VNA analysis are reported. Then the macro-scale, buffer zone analysis is described in Part 4.

3.4 Micro-scale spatial analysis: Results

Once the vectorised images were ready, the next step was to inquire of the data certain variables, including measurement of the sizes of images and size differentials, e.g. between humans and animals, and of the distances between motifs and between panels; composition (What goes together and in what order? Are there ‘rules’ of ordering?); and physical possible uses of natural formations and rock surface features. Finally, the VNA signifiers were analysed. In the case of Astuvansalmi, the use of contours and cracks of the rock as framing devices is prominent.

The measurements taken were to indicate the average sizes and size differentials of anthropomorphs, zoomorphs, and boats. The results of the image measurements for each of these different motifs:

Measurements:

- Anthropomorphs 33 cm (between 21-43 cm)
- Zoomorphs (cervids) 26.1 cm (between 19-52)
- Boats an average size of 50 cm (between 35-63 cm)

The final vectorised version of the full panorama (Figure 3) depicts humans and cervids which appear to be headed in the same direction. The paintings cover an area approximately 16.5 metres long and 5.5 metres high. There are also several boats, smaller animals, and a geometric 'comb' shape Figure 4 - Digital enhancement, measurement and scaling of the images using ArcGIS and Adobe Illustrator. Images used are the paintings of Pekka Kivikäs 1995 (with his permission); the panorama is based on that of Sarvas, 1979, pp. 7-8.

Figure 3A – At the lower left, there is a geometric shape, which could be interpreted as a hunting pit, toward which all the animals are being led. There could be other reasons for this positioning, though. The paintings higher up are likely to have been made earlier, and the lower figures painted later, as the cliff rose and the level of the water thus lowered, which means that the figure below seems to have been added later.

Figure 3B – The moose at the centre of this image appears to have been drawn so that the stomach is aligned with a crack in the rock.

Figure 3C – These three groups of images are examples of panelling;

Figure 3C – In this set of panels, the figures seem to follow a sequencing pattern: an anthropomorph followed by 1-2 moose. There is also the suggestion of movement, with the moose being led along or possibly herded; in the centre panel, there appears to be a rope attached to one of the moose. The figure at the left wears a headdress or horns. Many of the moose have marks indicating their hearts.

Figure 3D -- One moose appears to be running or walking.

(Original drawing of Kivikäs, 1995, with digital enhancement/ vectorisation)

Utilising just a few examples for each signifier, the final results of the Visual Narrative Analysis are described below.

1. Framing and use of natural formations and rock surface features: Although it is difficult to say with a 2-dimensional image surface how much of the 3-dimensional the rock surface features are actually utilised for framing, there seems to be examples of this. One example can be seen, in Figure 3B, where the moose's stomach is aligned with a seam in the rock. In some of the panels, the images appear to be walking along the cracks, as if the cracks are ground surfaces. (Figure 3C is one such example.).

2. Organisation of images: In Figure 3C, the figures are arranged in a pattern, with an anthropomorph followed by 1-2 moose. In this panel, there are three such groups with this same pattern, which can also be seen in other panels. It is also notable that the moose (with one exception) all face to the west.

3. Movement can be seen in some of the depictions, for example in that the moose are all facing west. The effect of this suggests movement in that direction. One moose seems to be either running or walking (Figure 3D). Together, it seems as if the moose (and the anthropomorphs) are walking, perhaps with the human figures leading the moose toward a trap pit (Figure 3A). (The "pit" image was added later.) One wonders if the humans are, perhaps: a) hunting and / or b) 'herding' the moose. Is this a depiction of a particular event,

of hunting magic, an instructional visual aid for hunters, or an imaginary, mythological story (e.g., at various levels of abstraction)?

4. Co-occurrence and ordering of motifs: The anthropomorphic figures are not seen in isolation, but only occur beside the moose, either in to the left or right of the animal. The distances between the motifs were minimal in most cases. The anthropomorphs and the cervids, in fact, are usually in close proximity and even touching. Every cervid is attended by one or more anthropomorph, with the exception of the one lone, “running” moose.

5. Panelling is seen in the clusters of human + moose figures. For example, in Figure 3C, there are 3 sets of images grouped together. Close association exists between the humans and the moose. Although there are different possible types of panels – cartoon-style, sequential panels; triptych-type panels depicted side by side, or simply separate image groups – the most likely reasons for these panels at Astuvansalmi are that 1) the panels are framed or delimited by the natural curves and cracks in the rocks, and 2) the panels were made at different times. The overall effect is, however, of a scene that spans across the entire width of the painted area.

The micro-scale spatial analysis of the pictures has allowed some of the key visual narrative signifying elements to be identified, suggesting that the use of VNA methodology might be productive. The next section explains the macro-scale spatial analysis and the distribution of archaeological sites found in the buffer zones of 10-20 km surrounding Astuvansalmi.

4. Macro-scale spatial analysis: Buffer zone analysis

At the macro-level, the distribution of sites is examined. The archaeological context of which Astuvansalmi site is a part forms a spatiotemporal palimpsest. Events occurred, monuments were constructed and created, over millennia, and the result is a palimpsest of accumulated evidence in the form of a variety of site types (dwellings, pictograph sites, a hunting pit, and burial sites) and artefacts which were created and deposited in the area at different times. Some sites were in continuous use for longer periods, and some traditions (such as the use of stone tools) continued from the Stone Age up to the Bronze Age. Oral traditions continue for generations, though they change over time. By contrast, visual signs are more permanent than words, meaning that the pictographs were a part of the living landscape for the occupants for many, many generations.

Part 4 is organised as follows: 4.1 defines buffer zones and why they are used; 4.2 describes the methodology and 4.3 the results of the macro-scale landscape analysis.

4.1 Buffer zones and palimpsests

The buffer zone map in Figure 4 shows the archaeological sites found within the 10 and 20 km buffer zones surrounding Astuvansalmi. The distance of 10 km is commonly used for such site catchment analysis, as that is the estimated daily range of hunters and gatherers. As presented by Bailey (2009, p. 61), the normal distance travelled by hunters and gatherers in their daily subsistence activities is 10 km or 2 hours' walking time. After that, energy spent is greater than the benefits from subsistence obtained. For agricultural communities, the distance is 1km, or 10 minutes' walking time. The actual distance of a 2-hour walk depends upon the difficulty of the terrain, availability of resources and of course the range may be much greater where traveling is by other means, such as boats. Archaeological sites within the 10 km range are more likely to have been a part of the everyday landscape experienced by the hunters and gatherers dwelling in the space. Still, archaeologists are

hesitant to make connections between sites several kilometres apart, and for rock art sites this is a significant problem, since dwellings and other sites are seldom found within 3 km of any of the rock paintings in Finland (Niskanen, 2017). As contemporaneity becomes increasingly problematic, social landscapes made up of these sites can be described as spatial and temporal palimpsests. A spatial palimpsest refers to associations of neighbouring sites that are updatable or are not necessarily from the same period, and the temporal palimpsest refers to created landscapes which accumulate in time, for example when buildings are constructed over the foundations of previous dwellings (Bailey, 2007, Niskanen, 2017). More importantly than the observation that sites and landscapes are accumulated over time, is that these physical landmarks of memories of the past become integral to those living in the space (Olivier, 1999).

Archaeological strategies for analysing palimpsest landscapes involve, according to McCall (2007, p. 225), “the use of modern archaeological techniques and technologies, such as GIS and chronometric dating for pulling apart the layers of rock art palimpsests at various spatial and temporal scales.” Smith (2001) shares the view that GIS spatial technologies are suited to investigations of complex chronological questions, observing that rock art palimpsests require multi-scalar approaches.

4.2 Macro-scale spatial analysis methodology: Buffer zone analysis

Buffer maps were made using GIS program ArcMap with site data from the NBA (Finnish National Board of Antiquities) database. Field reports and excavation reports for the sites within the buffer zones were studied for details of finds, excavations, C¹⁴ dates and other information.

4.3 Macro-scale spatial analysis results

The macro-scale spatial analysis began with the creation of a database of the prehistoric sites and stray finds near Astuvansalmi and studying the data available from survey and excavation reports available from the Finnish National Board of Antiquities (NBA). The archaeological landscape of the region was mapped with ArcGIS. This mapping is a necessary part of placing the site spatiotemporally to the extent possible and to give the pictograph site an archaeological context. Due to the relative and approximate dates of the sites, the chronology must be seen as a palimpsest, established with estimated dates of the sites in 10- and 20 km buffer zones. (See the buffer maps in Figure 4.) These sites have been dated by the Finnish National Board of Antiquities as:

Stone Age & Early Metal Period (dwellings)

Early Metal Period – Bronze Age (burial cairns and Lapp cairns)

Stone Age (three other pictograph sites)

Burnt human bones found in a 2015 cairn excavation at Hietaniemi have been radiocarbon dated with the following results:

Hela-3815 Sample 1, KM 40596:31 Burnt human bone, 1.72 g 3138±30 BP 1500 (95.4%) 1300 BCE

Hela-3816 Sample 2, KM 40596:38 Burnt human bone, 1.40 g 3050±28 BP 1400 (95.4%) 1225 BCE

Artefacts found at the Astuvansalmi site include two arrowheads (NM 17363:1-2) found in a 1968 test trench excavation on the terrace beneath the paintings. Of the two arrowheads, one dates to 2200–1800 BP (Neolithic), and the other to 1300–500 BP (the Early Metal Period), evidence that the site was possibly in use up until the beginning of the Iron Age. Slate arrow point NM 17636: 1; Straight-based quartz arrow point (fragment) NM

17636: 2. Four amber pendants have been recovered during underwater excavations at Astuvansalmi depicting a man, a woman, a boy and a bear (Grönhagen, 1991a, 1991b, 1991c; Lehtinen, 1992; Poutiainen, H. et al., 1992).

- Ukko, the old man of Astuvansalmi in 1990 NM 25771
- Akka and poika, the old woman and boy of Astuvansalmi in 1991. The boy pendant was found in several pieces. (NM 26331:1-2)
- Bear pendant (fragment), 1992 (NM 27146)

Along with the two amber pendants found in the 1991 underwater excavation, archaeologists found:

- an anthropomorphic sandstone object (shaped as a head with collar) (NM 26331: 3); a fragment of worked deer antler (NM 26331:5); and a fragment of a burnt mammalian bone (NM 26331:4) (Grönhagen 1994)

Amber pendants in Finland are dated to the Comb-ware culture (ca 5000 BC-3200 BC) and the Typical Comb-ware culture (3900-3400 BC) (Äyräpää, 1945, 1960; Taskinen, 2006, p. 26; Nuorteva & Kinnunen 2008). Imported amber from the southern Baltic in the form of pendants, beads and small sculptures has been found in burials, dwelling site layers and as stray finds. In contrast, the unusual location of these amber finds near the pictographs may mean it has been used as a sacred site (Grönhagen, 1991c, 1994; Núñez & Franzén, 2011, p. 11). Though it seems reasonable to assume a ritual connection, in fact, researchers have not established a clear connection between the amber figurines and rock paintings (Iršénas, 2010, p.182).

Other sites in the 20 km buffer zone include three other pictograph sites, numerous Stone Age and Bronze Age dwelling sites, Bronze Age burial cairns and a trap pit. The sites nearest to Astuvansalmi are Stone Age dwelling sites and a single trap pit. Although dating of the trap pit is not possible— this type of pit has been in use up to historical times in Finland – it indicates the presence of hunters in this area. Burial cairns, likewise, are problematic in terms of chronology; they may be dated to the Bronze Age or as late as the Iron Age.

Significantly, another pictograph site, Uittamonsalmi, is located 9.6 km northwest of Astuvansalmi. Uittamonsalmi, with 22 images, is the third largest pictograph site in Finland. The images are quite similar to those found at Astuvansalmi. The images include 5 different motifs: anthropomorphs, zoomorphs (cervids), boats, a handprint and a bear paw print. The other two pictograph sites are found at Louhtovuori (which has six moose images and one anthropomorph) and Luotolahden Vuori (which has one anthropomorph).

These basic macro-scale findings provide additional information about the environment and how the landscape was occupied by human populations for millennia. The evidence presented here is partial, though, thus it would be beneficial to dig deeper in the archives and in other scientific analyses of the landscape.

Figure 4: Astuvansalmi 10 & 20 km buffer zones

5. Results Synthesis

As discussed in the introduction, there is a wealth of ethnographic information on spiritual/religious/symbolic meanings (e.g. animism-totemism-shamanism) in the study of rock art and descriptions of the specific stories presented in the images, both in Finland and elsewhere. A special problem, however, exists when prehistoric art is the object, because – to some extent – this can be a kind of colonisation of the past. This approach excludes information on the specific uses and functions of the site which, although significant archaeological questions and worthy of investigation, depend upon ethnographic methodologies. The research approach proposed in this paper is presented as an alternative analytical perspective and methodological approach.

The combined results of this preliminary analysis demonstrate that multi-scalar spatial analysis can be used to produce new insights and understanding of the prehistoric landscapes of the rock art. In terms of the combined methodologies, there are two points to consider.

First, this paper presents only a very small sample of the images of a single site. Thus, the micro-scale spatial analysis is based on limited data. Heuristically, accuracy and precision are of less importance than interpretation in analysing vectorised images. What can be seen from this limited data are patterns in the arrangement of images (i.e. the co-occurrence of anthropomorphic and zoomorphic images) and the use of panelling. How panelling is used depends on which type of panels one envisions. One possibility would be that the entire panoramic scene is a single, giant panel, created all at once. This is not the case at Astuvansalmi, however; the paintings accumulated over many years, as can be seen in the presence of superimposed images and images painted below what would have been the waterline when the others were created. Another type of panelling, a comic-book style, would depict sequential activities, such as figures moving in stages from the right to the left. A third type of panelling would be a triptych-type, in which separate panels are depicted side by side and not connected. Yet another interpretation is that this is, indeed, a single scene of a procession moving across a giant canvas, with additional images added in stages, with incidental panels framed by the natural curves and cracks of the surface. The narrative qualities of the art encompass the creation of the entire scene not at a single time but as a continuing and developing work.

Secondly, much more archaeological information currently available has been excluded in the macro-scale spatial analysis. Indeed, the amount of archaeological information continues to accumulate, adding to our understanding of the context in question. However, this landscape analysis is applicable as a means of locating areas of activity, identifying possible connections between sites, geological features and other patterns that may guide in fieldwork and further research. Consider that how we communicate visually is evident in how much information was in the images and maps of the present work. Although the same information could be expressed in words, it would not be the same. The buffer maps provided a rich archaeological context which can be studied for still more evidence of the cultural landscape.

An extended project might include more of the numerous rock art sites in Finland and possibly utilise vectorisation of 3D photography so that the surficial shapes present in the cliff could be taken into account. In the immediate area of pictograph sites, the archaeological, geological and other natural landscapes could be studied in more depth.

6. Discussion & Conclusions

The meanings of rock art lie not only in the visual realm; there are other kinds of meanings with which they are imbedded, from ritual to social and functional meanings. In VNA, the narrative storytelling as an act, the *how* of the stories, remains the focus, examining visual representations as communication acts between creators and the audience. This correlates with a view of art as something that is shared by all humans and recognises the

communicative aspects of the visual. More than just listing of the patterns or signifiers, the research results depend to a large degree upon what archaeological questions we ask of the data and what archaeological explanations we use to understand why the distribution looks as it does.

Returning to the list of aims posed at the beginning, the study set out to: introduce multi-scale spatial approach; and then to test it and evaluate its usefulness in a rock art study. Bearing in mind that the connection between the results for the two different spatial scales is, to some extent, independent, this multi-scale approach combines the two to provide a more complete view of the prehistoric landscape. Some important questions emerge for developing a conceptual spatiotemporal understanding that goes beyond single dates, single images or single dots on a map.

I have argued for reconsidering the spatial aspects in archaeological inquiry of the pictographs in Finland. Despite its exploratory and interpretative nature, the multi-scale spatial analysis reported in this paper is a good starting point for future rock art studies. The enhanced relevance that accompanies the study is the beginning of an ontological and epistemological research paradigm with alternative archaeological entities, questions and ways of studying them. An implication is that this is a part of the narrative and discourse on the nature of artistic and visual communication that we share with our human ancestors. The question is not just about *how* the paintings mean, but about *how they mean to us*.

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