

**Skiing on the rocks:  
the experiential art of fisher-gatherer-hunters in prehistoric Northern Russia.**

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In this paper we argue that in order to understand the visual imagery expressed in the rock art of prehistoric fisher-gatherer-hunters of northern Russia, it is essential to amalgamate a number of different strands in contemporary rock art research. We integrate the three dimensional recording of morphology of the rock surfaces themselves with a cognitive approach to visual arts. We argue that the prehistoric artists brought their own experiences to the creation of the visual narrative expressed in the rock art, reaching beyond representational art to experiential art.

We hope that by combining contemporary knowledge of how the brain works in relation to visual perception, the ‘embodied realism’ approach, we will be able to add new interpretative elements, bringing archaeology and rock art research into the framework of wider discussions in science and the history of art. Such an approach allows us to appreciate the creativity of prehistoric artists through exploring the relationship between archaeology, the cognition of vision and visual perception.

Rock art is usually recorded by archaeologists for two purposes, first to record the images, and second to interpret them. Various techniques are used, including sketching, drawing, rubbing, tracing, photography, photogrammetry, and infrared photography (Whitley 2001, 55-79, Oswald et al. 2005-2006). In recent years, the use of laser scanning and photogrammetry has resulted in the production of high

resolution images of the rock surfaces and the images they bear (Helskog 2003), methodological advances which form the basis for the approach set out in this paper.

The interpretation of images in relation to their particular location on rock surfaces has been highlighted by recent studies into the seasonality of depictions, and beliefs and practice, creating the visual narrative of representational art (Arcá 2004, Bradley 2000, Coles 2003, Fossati 2004, Helskog 1999, 2004, Keyser and Poetschat, 2004, Lewis-Williams 2002, Taçon and Ouzman 2004, Tilley 2004). While being in part influenced by such interpretative developments, the significance of the approach presented in this paper lies, firstly, in studying the three dimensional morphology of the rock surfaces as an integral part of the visual imagery of the rock art. We argue that the physical dimensions of the rock surface were used in simulating a physical landscape familiar to the prehistoric artists and that in such a way experiential art has been created. Secondly, we also used, for the first time, a cognitive approach to visual perception to combine an appreciation of the artistic endeavour of rock art with an enhanced understanding of the human capacity for creating such images. Using particular cognitive elements common to us all, an artist increases the evocativeness of the composition; his/her creative abilities are used in making choices which affect the way in which the visual narrative is constructed and the viewer follows it. We shall elaborate this point further while describing the whole composition. The results of this approach to rock art contribute to a better understanding of the creative and cognitive aspects of prehistoric fisher-gather-hunter art. A detailed example is discussed showing how the physical landscape was 'recreated' in the morphology of the rock by using the motion of skiing to illustrate one of the visual narratives at the site of Zalavruga.

## **Rock art and the prehistory of the Vyg River**

The rock carvings of northern Russia are one of the most prominent examples of visual imagery produced by fisher-gatherer-hunters in Europe (Fig. 1). A remarkable complex of prehistoric petroglyphs extend along the Vyg River, which discharges into the White Sea. While at present these sites can be reached by land, during much of prehistory higher water levels in the Vyg River meant that they were on islands within the river system.

The first rock art sites to be discovered in the area were found at Besovy Sledki by Linevski in 1926, since when many hundreds of petroglyphs have been found in the region. From 1926 to 1968, a total of some 2100 carvings were discovered, forming over 100 discrete compositions. Following his initial discoveries, A. M. Linevski proceeded to survey the whole area. His discoveries at Yerpin Pudas Island, formally recorded by V. I. Ravdanicas in 1936, along with finds on other islands in the Vyg River, are one of the milestones in the study of prehistoric northeast European art. The current project has focused on one of the compositions, known as Group IV, within the Nova Zalavruga complex. These carvings were first studied by Y. A. Savvateev between 1963 and 1968. Nova means “new”, and the Nova Zalavruga complex is differentiated from the Stara (or “old”) Zalavruga complex which was discovered by Ravdanicas during the 1936 survey. Access to the carvings at Besovy Sledki is now prevented by the deterioration of the structure constructed to protect it.

The rock art panels date from the Neolithic to the Iron Age (approximately 5000 years ago to 3000 years ago). The use of relative dating techniques has been employed here and is composed of two elements: the disappearance of the rock surface due to sea level changes, and the relationship with dated archaeological layers (Keyser 2001). The first aspect of relative dating is based on the correlation of the rock surface elevation with known sea level fluctuation. The work of E. I. Deviatova (1976) provides us with the elevation of the rock carvings and settlements, together with the C14 dates. (Table 1). This data allows us to correlate the rock surfaces exposed above the water level with the presence of human occupation in the area.

The second aspect of the relative dating is based on the relationship between the carved surfaces and dated archaeological layers. For the panels we are studying, stratigraphic relationships between rock carvings and settlements have either not survived or prehistoric communities did not settle close enough to create such relationships. However, stratigraphic relationships have been used to date other similar rock art panels in this region. Cultural layers dated at 2900 cal. BC – 2300 cal. BC covered one of the groups in the complex of New Zalavruga (Savvateev 1970, 128). The cultural layer is divided from the carvings by a layer of sand, which indicates that these prehistoric settlers did not see the carvings in this particular place, and provides a *terminus ante quem*.

Russian archaeologists have argued that the relationship between the elevation of settlements and rock carvings suggests that the Nova Zalavruga petroglyphs were visible during the occupation of nearby sites. On the islands of the Vyg River a number of settlements of various archaeological periods have been excavated. The

dating of those settlements, from 5700 – 5150 cal. BC to 2300 cal. BC to 1400 cal. BC, indicates the presence of prehistoric peoples on the islands during the period in which the petroglyphs were created. Table 1 lists the available radiocarbon dates for the occupation of the area in which the rock art is found. The cultural layers of the settlements from which these dates come, however, are stratigraphically above the rock art, providing a terminus *post quem* for the rock art, meaning that the carvings could not have been created after the dates shown in Table 1. Despite the presence of these settlements in the vicinity of the rock art, it is difficult to infer the role rock carvings played in the lives of prehistoric fisher-gatherer-hunters and, moreover, it remains problematic to define if and to what extent the rock art was exposed and visible at different times in prehistory.

Fig. 1. Map showing location of White Sea rock carvings region (Global 30 Arc-Second Elevation Data Set).

Date	Calibrated Date (95.4%)	Settlement name
3510 ± 170 (TA – 636)	2300 BC – 1400 BC	Zolotec I
3700 ± 100 (TA - 797)	2500 BC – 1750 BC	Zalavruga IV
3780 ± 150 (TA - 801)	2650 BC – 1750 BC	Zolotec VI
3810 ± 50 (TA - 794)	2460 BC – 2050 BC	Zalavruga VI
3990 ± 60 (TA - 798)	2850 BC – 2250 BC	Zolotec XI
4150 ± 80 (TA - 793)	2900 BC – 2490 BC	Zolotec VI
4050 ± 70 (TS – 634)	2880 BC – 2450 BC	Zolotec I
4430 ± 80 (TA – 390)	3350 BC – 2910 BC	Zalavruga IV
4630 ± 80 (TA – 391)	3650 BC -3100 BC	Zolotec VI
5160 ± 150 (TA – 421)	4350 BC – 3650 BC	Zolotec VI
5240 ± 50 (TA – 800)	4230 BC – 3960 BC	Yerpin Pudas
5460 ± 80 (TA – 795)	4460 BC – 4040 BC	Yerpin Pudas
5990 ± 100 (TA – 799)	5250 BC – 4600 BC	Yerpin Pudas
6510 ± 120 (TA – 344)	5700 BC – 5150 BC	Yerpin Pudas

Table 1. C14 dates for the settlements at White Sea Rock Art Complex (Devyatova 1976).

### **Cognition and the perception of vision in the archaeological interpretation of rock art**

The link between the morphology of the rock face and the personal experience of prehistoric artists in the creation of particular images can be demonstrated through the use of a cognitive approach to rock art combined with an understanding of what we here term the cognition of vision.

The study of the cognition of vision is part of the broader field of visual perception, which begins with our understanding of the cognitive abilities of human beings in contrast to the stylistic or iconographic abilities of particular artists. We follow Lakoff and Johnson in defining cognition as ‘any mental operations and structures that are involved in language, meaning, perception, conceptual systems, and reason’ (Lakoff & Johnson 1999, 12). Our approach to visual perception draws on their concept of embodiment, and especially the notion of ‘embodied realism’, based on the findings of ‘second generation’ cognitive science. These findings reveal the central role of ‘embodied understanding’, which allows human beings to function meaningfully in the world and to make sense of it via both the body and imaginative structures (Lakoff & Johnson 1999, 78). This is accomplished, according to Lakoff & Johnson, by the fusion of two parts. The first part is composed of the mind and body as one. The second is that the way human beings experience the world they live in is ‘an inescapable consequence of our biological makeup’ (Lakoff & Johnson 1999, 18).

Further, they postulate that the ‘mind is not merely embodied, but embodied in such a way that our conceptual systems draw largely upon the commodities of our bodies and environment we live in’ (Lakoff & Johnson 1999, 6). However, if we live in different environments, our experience will differ despite our shared biological makeup, creating cultural metaphors and categories. Visual perception in such a light is a blend between ‘human being as neural beings’ (Lakoff & Johnson 1999, 18) and the world in which we visually communicate with others by creating images and depictions.

How this knowledge is translated into the creation of a physical entity such as a rock carving depends as much on the physical abilities of the individual artist as on the cultural preferences which constrain those abilities. What we mean by this is that the emphasis on particular physical properties in bringing up children and members of a particular community, focuses on some physical aspects rather than others. One of the most striking examples comes from the short account given by Ramey concerning one of the other physical senses, touch, and its cultural manifestation:

‘Receptiveness to being touched varies from culture to culture. Americans do not feel as comfortable touching one another as people in other cultures do, whether it be casual touching or affectionate caressing of children by parents. The latter point could be significant, because cross-cultural studies have demonstrated that societies in which parents show more physical affection towards their infants and children tend to have significantly lower rates of adult violence. On a lighter note, one study of adults in social settings such as cafés reported that casual touch, such one friend patting

another's shoulder or hand, occurred about some two hundred times in 30-minute period in France versus twice in 30 minutes in the United States' (Ratey 2002, 78).

Ratey argues that cultural preferences affect physical behaviours, including the creation of art objects. Among other examples, Ratey discusses the upbringing of talented musicians. They very often come from musical backgrounds where parents encourage their offspring to play or sing, which in neurological terms equals firing repeated electrical signals which create neurological synapses which in turn enable a great musician to develop. It can be argued in this way that a young person can have a genetic predisposition to be 'good at music'. We do not argue that some people are predisposed to be better in one thing than the other. What we are stressing here, however, is that without encouragement in the early years the predisposition will be lost by the lack of creation of neurological synapses. As we can see, the process of physical behaviour and cultural preferences shape the cultural, social and physical aspects (including creative potential) of any particular community or society.

Visual perception and cognition are intricately interwoven in constructing visual images. "Visual perception concerns the acquisition of knowledge. This means that vision is fundamentally a cognitive activity (from the Latin *cognoscere*, meaning to *know* or *learn*), distinct from purely optical processes such as photographic ones" (Palmer 1999, 5). Such acquisition of knowledge is complex and visually led because it allows us to assess and to make sense of the environment around us. To take the examples of skiing and hunting, it is through vision that we assess distance and stimulate our motor function e.g. how to walk up or down hill. As we will see later on, the prehistoric artists of the Vyg River were able to see and to transform this

implicit knowledge into rock art by creating a visual metaphor of the landscape that was based on the bodily experience of skiing. The motor sensory systems build neurological connections through such acts, and allowed the prehistoric artist to draw on them in creating an embodied visual metaphor for movement, landscape, speed, excitement and the hunt.

It is well understood that we “see” as a result of particular stimuli or information entering our brain via the retina, which in turn stimulate various electrical charges within the brain, which are then transformed into visual concepts which are already stored in the brain as a part of memory. The information entering the brain represents only 10% of the light that reaches the eye. Light is filtered by the retina to prevent the brain being overpowered by the information it carries (Ratey 2002). As we will see below, from the viewpoint of visual perception rock art depictions can be divided into two categories depending on the morphology of the location. The first category of depictions are those which are clearly visible and where the background comprises ‘visual calm’. The second category includes those depictions which are placed in locations where the visual background creates ‘visual noise’. This distinction can perhaps best be explained by reference to a painting hanging on a wall. If the picture is hung on a plain white wall, the background seems to fade, leaving the viewer to focus on the clearly visible picture. If, however, the same picture were placed on a wall decorated with a strong flowery-patterned wallpaper, the viewer would have to concentrate much harder to focus on seeing the picture clearly. We will return below to explore how prehistoric artists successfully manipulated our ability to distinguish between visual noise and visual calm, focusing our attention on particular depictions.

We propose that such an understanding of visual perception contributes to present archaeological research on rock art (Whitley 2001, Chippendale & Taçon 1998, etc), by adding a further dimension to our knowledge of the images. In recent archaeological literature, the role of the rock surface and the images carved into it, as well as the way it has been recorded, has been emphasised (Coles 2005, Coles 2000, Helskog 2004, Keyser and Poetschat, 2004, Taçon and Ouzman 2004, Tilley 2004). Keeping this in mind, we set out to explore the how the morphology of the rock surface itself contributes to the visual narrative being created by the artist. Using this approach, the rock surface is treated as a three dimensional entity which has been observed and recorded not only by rubbing, photography and artistic sketches, but also by measuring the morphology of the rock surface. We then related the morphological features of the rock to the compositional aspects and imagery of the rock art.

Adopting a framework of embodied realism goes beyond looking at the study of brain and art. It fuses the brain and body with the experiences which humans have. Our bodies are built in a particular manner. We have two legs and two hands, instead of four legs; our brains, as they work produce particular images. Our physiology of seeing is different from that of an insect or a bird, and therefore our experience in the world differs from that of other living creatures. Experiences themselves depend on the environment we live in, the material world we relate to and operate within. These elements taken together create a unique way of being human in the world. To make sense of the world is to build embodied metaphors that are related to our brain-bodies and experiences. Lakoff and Johnson's work relates to language and the way

metaphors are constructed in English. In our work we illustrate the way in which visual representation was constructed.

Drawing a parallel between language and rock art has been criticised previously (Janik 1999), arguing that the grammar of one language differs from the other, and therefore while language is a universal form of communication it varies between the cultures and peoples. Applying the principles of the English language as an analogy to the way rock art is understood is misleading and counter productive. What is interesting is that Lakoff and Johnson criticise the use of semiotics, arguing that the unique properties of a particular language cannot be transformed into another language since they are not only biological properties of brain and bodies. We communicate through language which reflects our experiences that are captured in metaphors which are culturally specific. For example, a 'warm welcome' translates into Polish as a 'whole heart welcome'. Therefore, in our view, building analogies based on linguistic metaphors is misleading.

Incorporating the approach of 'embodied realism', cognitive theory when applied to rock art research uniquely explains the relationship between the rock surface and the images which were carved into it and the bodily experience of the carver, bringing us into the realm of experiential rather than representational art.

### **The topography of the rock surface at Group IV**

Back at the Vyg River, the best example of the relationship between artistic expression of the physical landscape, the cognition of vision and the morphology of

particular rock surfaces is a fragment of the composition Group IV of the New Zalavruga complex. Prior to discussing the details of the composition, a number of methodological issues need to be mentioned. The intricacies of the 3D surface were captured by surveying (level, total station, GPS), photogrammetry, stereophotography and laser scanning. The location of the Zalavruga rock carvings placed certain limitations on the methodology. The equipment had to be transportable, affordable and applicable at the scales required by the research. In particular, GPS surveying in the Russian Federation is not practical, and many assisted photogrammetry techniques (where a grid or other forms are projected on to the surface) have considerable electrical power requirements which are not available in this part of Russian Karelia (Avern 2001). Although the most accurate technique for examining micro scale features, extensive laser scanning is expensive at the scales required by most projects. Initial survey by total station, collecting several hundred points, allowed the major rock-surface features to be recorded. Photographs were then rectified, so that they could be draped over the surface using GIS software. As this survey established the importance of the morphology of the rock surface for understanding the rock art, it is proposed to build on this initial work and undertake more detailed survey using a laser scanner in the future.

Despite these methodological limitations, it was possible to digitally recreate the shapes and elevations of the rock surfaces at Group IV, allowing the examination of the cognitive aspects of the use of rock surfaces both for the composition as a whole and also for particular elements within the composition. The resulting recreation clearly demonstrates the creative incorporation of the morphology of the rock surface into the visual composition by the prehistoric artists (Fig. 2).

During analysis of the recorded surface it became apparent that the topography of the rock surface was connected to particular parts of the composition in unexpected ways. The rock surface appears to be 'translated' into a representation of the natural landscape, defined by physical activities such as skiing. It is important at this point to recognise the distinction between something that simply resembled a piece of natural landscape, and something that is an accurate representation of the morphological characteristics of a natural landscape. The former has been widely acknowledged in the literature (Arcá 2004, Coles 2003, Fossati 2004, Helskog 1999). At New Zalavruga, however, we can demonstrate the latter. This unexpected result led us to consider the kinds of creative devices used by the prehistoric artist both in the composition a whole, or only in a particular part of the composition.

Fig. 2. Reconstructed surface of Group IV superimposed on the reconstructed rock surface; elevation is shaded from dark (low) to light (high).

Group IV is located on a surface that serves as a platform for all the images. The top part of the rock face is about 50 centimetres higher than the bottom, creating a raised area of unobstructed display for the viewer to observe. The composition of Group IV can be regarded as a closed composition, like a framed picture. The size of the composition is restricted by the rock surface, even though there are no artificial boundaries limiting its dimensions as in ordinary pictures (Fig. 3). Group IV is constrained on all four sides by different natural features creating a coherent, closed composition. This is despite the fact that at first sight, due to its location on the one of few flat rock surfaces available, Group IV looks as if it is free from restriction, almost

as if it had been almost carved in an ad hoc, unplanned fashion. In the upper part, the sharp slope and rising rock restricts the rock surface. On the right, the edge is constituted by a crack in the rock followed by the slope. At the bottom of the composition, the leaning slope ends by the edge of the water. The water level rises and falls depending on the time of the year because of differential rainfall, but standing water is always present in the shallow end. Fluctuations in water level mean that the bottom edge of Group IV is in constant flux, sometimes closer to and sometimes further away from the carved depictions. On the left hand side the composition remains open, with bare rock undecorated by carvings. The rock surface itself, however, in this place forms a gentle slope restricted at the bottom by a sharp incline and standing water.

Fig. 3. Location of Group IV.

The composition comprises a variety of images suggesting a series of themes, the majority relating to marine and terrestrial hunting. Looking at the location of the depiction of the rock surface, two separate blocks can be immediately visually distinguished. One is composed of an elk hunting scene, while the second comprises all the other images.

The hunting scene starts from the top of the rock terrace (Fig. 4 Point A) with carvings of skis and ski poles as if left in the snow. The marks vary from walking to skiing downhill. On the other side of the ski tracks some elk prints are visible, carved as if the elk was walking through the snow towards the hunter. Where the figure of the hunter and elk first appear, only the walking prints are carved (a full description of

the scene is presented below). The scene ends with the hunter holding a bow in his hand, the elk still standing, but pierced by three arrows. At point B the first block of the composition connects to the other carvings. The elk almost seems to be taking part in the marine hunting scenes, where three boats are involved in hunting a beluga whale. At point C a large boat can be seen with an elk head-shaped prow. The sizes of the boats vary as do the number of people on each boat. Each boat is linked to the whale by a harpoon line. Aside the boats, there is also a single person taking part in this hunt, behind whom we can see two other people. They are engaged in a shooting scene and both have bows in their hands. One is shooting an arrow whilst the other is not. It is not very clear whether they are shooting at each other although, according to Savateev (1970), that is precisely what they are doing. At point D a wavy line carves its way between the two people with bows and another probable marine hunting scene, below which we see more of the same.

Fig. 4. Drawing of Group IV, after Savvateev 1970.

The composition, however, was originally more complicated than this, and some of the depictions, for example those at point (E), can no longer be clearly distinguished. Previous interpretations suggested that they are schematic depictions of humans (Savateev 1970, 199-221), but we suggest that they might be other boats. Single boats of different sizes, a young elk and a male with a bow can be seen in close vicinity to the scenes described above. There are also further carved figures whose shape cannot be determined.

Looking at the lower part of the composition, complex marine activities involving numbers of boats are absent, and the most prominent visual place is taken by terrestrial hunting scenes. At point F we can distinguish two men with bows, shooting in a seated position. Once again, we do not know for certain if they are shooting at each other or at the object of indeterminate shape visible between them which has been struck by two arrows from opposite sides. Below the larger man, on the left, there is another man with a bow. Behind the smaller man, footsteps at point G have been carved leading to another male with a bow and arrow, and an elk. To the right of the footprints, at point H we can see two boats facing each other, almost creating a mirror image, although one is smaller. Their prows are crowned by elk heads. The lower part of the larger boat is linked by a number of arrows that have hit an unknown animal sitting on the top of a tree. We consider that the hunter visible next to the tree (I) is responsible for the arrows, even though they are physically linked to the boat. The scene is taking place in winter since there are ski prints carved behind the hunter. However, the hunter himself is undressed, as indicated by his penis being visible. To the left of the tree we can see depictions of indeterminate shapes, as well as a swan hit by arrows (J).

The most visually arresting image in this part of the composition is the depiction of another male hunter with a bow and arrow, followed by bear prints (K). An arrow can be easily distinguished wedged in the hunter's back. In front of him we see a much smaller male who appears to be holding a bear above his head on his spear. The spear in the bear's back makes him look upside down, and an arrow has pierced his throat. To the right of the bear prints is a carving of a boat with an elk head prow, drawing the eye towards another boat, occupied by a single male, linked to the beluga whale

by a harpoon line (L). We can also see in the vicinity a number of scenes with various unknown shapes, and a very small boat and young elk. Slightly higher on the right of the boat is a depiction of a single male on skis (M) with a pole, and above him on the right there is another male carved this time without skis or pole.

On the far right side of the composition are two last hunting scenes. The first (N) is composed of a single male, possibly with a spear in his hand which is holding up the figure of a bear. The bear has an arrow sticking out of its back. Behind the hunter, bear prints can be distinguished. The second scene, engraved above this terrestrial one, is composed of a large boat containing many men (O) and a beluga whale. An empty, smaller, boat, upside down as if a reflection, is located above the big boat. There are also a number of indeterminate shapes and two possible carvings of whales (P).

### **Visual noise and visual calm**

Although not as obvious as in a colour painting hanging on a white wall, it is still possible to distinguish between visual noise and visual calm in the rock panels at Zalavruga. This is despite the rock surfaces themselves not being mono-coloured, the grey of the granite being less uniform than the white of the walls in the case of a painting in a gallery, and moreover the carvings are the same shades as the rock surface into which they are carved. We can, however, still distinguish between visual 'noise' and visual 'calm'. The creation of these two visual categories allowed prehistoric carvers to focus the viewers' attention on a particular part of the composition, for instance the skiing scene. In this way the viewer is led to concentrate

at first on particular aspects of the composition through the interplay between carved and not-carved parts of the rock surface.

The smoothness of the rock surface can be seen as calm despite the fact that from time to time it is interrupted by veins of crystal cutting into the granite surface. These intrusions do not disrupt the calm because of the way they are incised into the rock surface. These veins run in parallel lines from the top to the bottom of the composition following the level of the platform, dropping from the top to the base. The colours of the crystal veins do not interrupt the colour scheme of the rock surface despite appearing as shades of yellow against shades of grey. This can be explained by looking at pastel colours in contrast to primary pigments (Livingston 2002: 36-45). When we place pastel colours together they do not clash visually. However, if we add any primary colours we can see the contrast very clearly. Thus the impression of visual calm is achieved mainly by three components: texture - smoothness of the surface; colour contrast - similar tones of the grey rock surface and the yellow crystal incision; and the verticality of the rock surface – the lines of crystal veins as well as cracks in the rock surface which run from the top to the base of the rock surface. The rock surface of Group IV has not been eroded by lichen, as indicated by the smoothness of the surface, indeed Savateev (personal communication) noted that after the soil was removed from the carving, the rock face was not in any sense damaged.

To create a sense of visual ‘noise’ the prehistoric artists had to optically contradict these three elements to attract the visual attention of the viewer. This was achieved in a variety of ways. In the first instance the calm of the smooth rock surface, polished by the weather, was subverted by the visual noise of the carvings pecked into the rock

face, creating a rough, matt surface. In this case rather than pigment, it is texture that breaks light into different wavelengths allowing the eye of the viewer to distinguish between visual calm and noise. The contrast between the colour tones of the rock surface and the carvings is greater than that between the rock surface and the crystal intrusions. In addition, the reflection of light from the edges of images carved into the rock surface will always produce a darker image of the depiction even if they are the same colour as the surface itself (Palmer 1999, 128). This contrast between colour tones further increases the visual noise perceived by the viewer. The optical verticality of the viewing platform is counterbalanced by the way images are visually conceptualised in the composition. In the majority of cases the images are composed in a horizontal plane, for example the boats and elks. Furthermore, the traces of curved skis and footprints elaborate the horizontality of the visual composition. The artists who carved the images created noise visually recognisable to the viewer, allowing them to distinguish the depictions from the background rock surface. This use of visual noise provided the artists at Zalavruga with a visual device which led the gaze of the viewer towards a particular location in the composition, namely the skiers and elks.

### **Seeing an elk being hunted on skis**

One of the most prominent places in the composition of Group IV is occupied by representations of ski tracks and elk footprints in the snow, and depictions of skiers and elks. We argue that the prominence given to these images in visual terms is due to the relationship between the blank or calm surfaces, and those with carved images, which create visual noise. The surface surrounding the images was left uncarved in

order to enhance the artistic impression for the viewer. This was achieved by shifting the viewers attention to the elements of the composition located above and to the right side, as in a coloured picture hung on a white background. We deduce that in this instance the shape and the natural features of the rock surface were taken into account in the creative process of composing Group IV (Fig. 5).

Fig. 5. 'Free' surface of the Group IV composition.

The scene of an elk being pursued by hunters on skis provides the clearest demonstration that the morphology of the rock surface was being consciously engaged with by the people who created the carvings. The physicality of skiing through the natural landscape was translated into the physicality of the artistic expression of the scene, which explicitly incorporated the three-dimensionality of the rock surface. We use our approach to cognitive and visual perception discussed above to gain an unprecedented insight into the creative capacities of the prehistoric fisher-gatherers-hunters who produced the rock art along the Vyg River. In conceptualising their imagery, the artists had to reach beyond the direct relationship of looking at the subject of their representation and engraving it on the rock surface. As suggested by Ramey and discussed above, images had to be generated from memories stored in the brain. Ramey says 'for example, PET scans show that when a subject, seated in a room, imagines they are at their front door and starting to walk either to the left or the right, activation begins in the visual association cortex, the parietal cortex, and the prefrontal cortex-all higher cognitive processing centres of the brain' (Ramey 2002, 107).

The creation of these representations involved the artists of the Vyg River not only in imagining skiing as a winter activity, but rather in the recreation of an actual skiing event in a particular landscape at a specific time or times. This point is amplified by two kinds of representations of skiing. The first is an oil painting of a skier skiing down a slope. The viewer, and indeed perhaps the artist, does not know where or when this event occurred, but this is not important as it is the idea of skiing which is being represented, and all of the exhilaration that activity evokes within the viewer. The second is a representation of skiing captured in a photograph. This representation is of a specific act of skiing, evoking particular associations and triggering memories, of the type: 'Here I am skiing down the slope at Klosters during my winter holiday in December 2006', recalling the specifics of the physical exhilaration, the properties of the slope, where to turn, where to slow down, the location of humps, bumps and bends where I had to be careful not to fall. In the creation of the former, the artist has called upon generic memories of the physical experience of skiing and of the typical landscapes within which skiing takes place. In the latter, the photograph captured memories of a particular landscape and a specific skiing trip. It is the latter which is analogous to the way in which the granite rock surface was used in the skiing scene at New Zalavruga. The artist was able to imagine skiing on the rock surface itself – his (and it does seem to be a he since a penis is visible in the carving of the third hunter) memory of skiing allowing him to make a realistic representation of the physical activity of skiing across this landscape.

The creation of Group IV, in particular the elk hunting scene, can be also understood as engaging with the higher cognitive processing centres of the brain (Ratey 2002, 107). In existing publications (Savvateev 1970). the illustration of the skier is flat and

two-dimensional, and suggests in some way 'just skiing', as if the rock face was flat, ignoring the critical importance of the structure of the rock surface in the construction of the visual composition (see Fig. 4)

During the process of establishing the relationship between the art and the rock surface, the significance of the three-dimensionality of the rock face became apparent. As part of the current study, a series of photographs were taken from various angles which allowed the reconstruction of the trajectory of skiing. The analysis of these photographs showed that the prehistoric artists of the Vyg River were, consciously or unconsciously, employing a form of visual distortion or illusion based on the manipulation of the angle at which the image was viewed, a *trompe d'oeuil*, which created the visual impression of perspective analogous to the Ames Room, a room which while not actually rectangular, appeared to be so if viewed from a particular angle (Palmer 1999, 247). The three-dimensionality of the rock surface provides other visual illusions for the viewer. For instance, carvings on raised areas of the rock surface are closer to the viewer and therefore appear bigger. Trying to understand this problem brings us back to the cognitive sciences which are still looking for a comprehensive understanding of the relationship between visual perception, cognition of vision and three-dimensional surfaces (Palmer 1999, 249). In order to further understand these optical illusions, a high-resolution total station survey of the rock surface around Group IV was undertaken which, when integrated with the photographic survey, enabled the reconstruction of the use of the rock surface as a 'natural landscape' where skiers are traversing deep snow (from point A to B, Fig. 4).

Using the model of the rock surface, it is possible to analyse the relationship between the skier and the surface over which he is moving. The skier is sometimes walking through deep snow, and sometimes skiing in pursuit of an elk. The trajectory of the skier was digitised from the rectified photography, to provide a set of points from which to generate a profile across the surface. The skier starts at point A. At point B the tracks split into two lines, one set (B-C) and a second set (B-D) (Fig. 6). This profile shows a clear relationship between the movement of the skier, i.e. walking or skiing, and the shape of the rock surface (Fig. 7).

Fig. 6. Reconstruction of the Group IV rock surface.

Fig. 7. Trajectory of skiing (A – C on Fig. 6), A; a - skier walking on almost flat surface, b - skier sliding down the slope, c - skier walking up and down the slight slope, d - skier is sliding up and down the slope. In sections C and D skier is walking.

Integral to our approach to this reconstruction is an appreciation of the artistic expression which so effectively captured the physicality of skiing in the carvings of the skiers and the elks they were hunting. If we were to take the depictions of skiers at face value, as we see them in this and other rock art compositions (Fig. 8), we would come to the conclusion that prehistoric fisher-gatherer-hunters went skiing with just one ski pole (discussed further below). This represents a cultural choice in the way in which certain subjects are depicted, and requires us to accept that the fashion or the way artists do things are not necessarily determined by common human cognitive abilities. Rather, it shows how these abilities are manipulated within any particular culture at a specific time and place, and that this affects the way subjects are depicted.

Fig. 8. Three skiers from the Scatter Composition of Old Zalavruga (wax rubbing L. Janik).

The images in Composition IV are always presented as though they were being seen from the side, as if in silhouette. The simplest way to visualise this is to think about the shadow produced if a spotlight is shone on us from one side. We can see a reflection of our profile, in a similar way to how the images in Composition IV were visually presented. What is interesting is the way the skiers' profiles are shown. When the skiers are walking, they are shown with two legs, but when they are actually skiing only one leg (and indeed one ski and one ski pole) is shown. The representations of ski tracks, with the marks left by poles on either side, however indicate, that skiing did indeed involve the use of two poles as is the case today. The prehistoric canon ('a general law, rule, principle or criterion' Allen 1990, 163) of the representation of skiers, while effectively capturing the physicality of skiing, may therefore at first glance appear misleading to a modern viewer. Only through the combination of the reconstruction of the landscape and a contextual understanding of the mode of visual expression captured in the carved rocks can we begin to deal with this issue.

Through close study of these images and by comparing them with depictions in skiing manuals, (Jacques 1950, Crawford-Currie 1982) it was possible to reconstruct the movement of the skier down the slope. The technique employed in this depiction belongs to what is now known as the classic Nordic tradition of cross-country skiing. The technique used by the hunter is recognisable as what is termed 'poling', probably

‘with glide steps’, a method which leaves continuous parallel lines in the snow, achieved by keeping both skis constantly in the snow, with the marks of poles used to push the skier forward on their sides (Jacques 1950, 29-44, Crawford-Currie 1982, 64). The second way hunters moved on the snow was by walking along uneven terrain. In the case of a landscape that has rolling gentle slopes and deep and fresh snow, opportunities to ski down slopes are particularly restricted. The use of poles is very important here in preventing the skier from sliding backwards while tracking the elk. The form of pole marks vary during the pursuit of the elk, depending on the shape of terrain, in accordance with the actions particular hunters had to undertake during the chase. In part of the elk-hunting scene the pole marks repeat a pattern of three, although there is only one ski track represented.

Two possible interpretations can be put forward for this. The first is linked with the actual process of skiing, the second with the representation of skiing. According to the first, it could be argued that when skiing cross-country, the skiers followed in each others’ tracks, instead of producing their own tracks. They thus left behind them just one ski track in the snow, and the holes left by the poles depend on the strength or the physical size of the particular skier. The second interpretation relates to the representation of the the visual information embedded in this part of the composition, which might be considered to indicate the presence of three hunters rather than a single one. This is significant if we consider that the elk tracks point to the presence of one elk rather than three. We have to bear in mind that this is a symbolic representation of a hunting scene, the strongest reminder of which comes in the visual representation of the hunters themselves. At least one of them is undressed, a situation which in real life in the cold northern climate of the Subboreal would lead to frostbite,

hyperthermia and death. The Subboreal, during which the Group IV carvings were created, saw the establishment of the maximum of spruce, hazel and deciduous trees within the mixed coniferous-deciduous forest. We still consider this to be the representation of an actual landscape, even though it is difficult to point out exactly where the particular skiing as visualised in the carvings of Group IV took place, due to alterations in the morphology of the natural environment related to a variety of factors including geostatic rises in the landmass, the creation of bogs and islands in the upper part of the river, and changes in water level over the millennia since the images were carved.

The skiing depicted on the natural landscape/rock surface can be divided into five separate sections. Walking on the slope, as seen in the first section, is continued through the other scenes. The snow is probably soft, fluffy and relatively deep, allowing the hunters to walk rather than slide. The marks left by the skis indicate possible 'alternative walking' or 'two beat diagonal stride' steps: right leg, left stick (Jacques 1950, Crawford-Currie 1982, 62-3) (Fig. 9). Representation of ski marks and ski poles on the snow comprise lines (the tracks left by skis) and dots (the impressions left in the snow by ski poles during the alternative walking or two beat diagonal stride steps).

Fig. 9. Representation of ski marks and ski poles on the snow.

In the first part of the skiing scene the alternative steps are missing some pole marks, indicating deep snow into which the skis cut deeply, and the skiers' feet would subsequently have to be lifted high to clear the snow (Fig. 9, A-a). These alternate steps are illustrated by the matching movement of a particular leg with that of a

particular hand, with the hand always being in front of the walker. The second part of the scene shows the tracks made by sliding down the slope. It looks here as though the skiers have stopped walking. They have aligned their skis and, pushing strongly on their poles, probably whilst leaning forward and without lifting their legs from the ground, they slide down the slope (Fig. 9, A-b). In the third part of the scene, the slope rises slightly, and the skiers once again revert to walking, using the alternative step technique (Fig. 9, A-c). In the fourth part of the scene, the skiers are represented skiing up and down the slopes using the technique of 'poling' probably 'with glide steps' (Fig. 9, A-d). It appears as if the skiers are now able to build up sufficient speed coming down the slope that they can continue skiing up the other side without reverting to walking. At the start of the descent there are only pole marks on the right side of the tracks, perhaps indicating that at this point the hunters adjusted their bows or harpoons. They slide up and down the slopes, without lifting their feet from the ground, and make use of their ski poles to propel themselves along. The sequence ends with one of the hunters in a crouched position as he or she finishes sliding down the slope, ready to release the arrow from his or her bow. The elk is shown already struck by two arrows.

The fifth section is broken up into two separate sections depicting a split in the traces of tracks carved on the rock surface (Fig. 9, B) The first few marks show the departure of a skier in pursuit of an elk. Shortly thereafter the track splits into two. What unites these two separate sections is the theme representing the final hunting scene, when the hunters pursue the elks on foot. The first hunter in this fifth section (the second if the entire hunting scene is taken into account) climbs a small slope supporting himself using the alternate step technique (Fig. 9, D). The hunter finishes

tracking the elk he is hunting by striking the animal with his harpoon or spear. The last hunter pursues the elk up and down the slope using an alternative step technique to the previous hunter (Fig. 9, C). He is shown in a standing position with penis being visible, the bow in his hands empty, and the elk he was pursuing struck by three arrows.

The prehistoric carver captured and reconstructed with astonishing precision the relationship between the rock surface, the natural landscape and the movement of the skiers through this landscape (Fig. 9). The effectiveness of the depiction of the various postures assumed by the skiers, depending on their position on the slopes, which allows us to recognise the various techniques illustrated in modern skiing guides, is testimony to the visual perception of the artists and demonstrates the cognitive aspects of the process of composition and execution of the rock carvings.

The artists drew on memories of personal experiences in the creative process of engraving the rock surfaces. The relationship between bodily movements, such as the way they were using their legs and hands reflected in variations in the ski tracks and pole marks carved into the rock surface, and the three dimensional morphology of the rock surface mirror the artists' own experiences of skiing in a particular landscape. These bodily experiences informed the specific carvings on the rock surfaces, taking the carved image beyond the representational into experiential art.

## **Conclusion**

In this paper, we have demonstrated the significance of the morphology of the rock surfaces in the depiction of a range of activities in the physical landscape by the prehistoric rock carvers in the valley of the Vyg River. We have shown how an understanding of the cognition of vision and visual perception is important for interpreting the art and for reconstructing what lies behind the artistic expression of the physical landscape. We have further shown that depicting the different modes of travel is dependent upon a prehistoric artistic canon which draws on careful observation of how the human body moves according to the mode of travel adopted, and we have shown the relationship between the variation in the depiction of ski tracks with the variations in the landscape as expressed through the morphology of the rock surface. These observations in turn draw on an appreciation of how visual perception depends on the memory of the physical actions involved in moving through the terrain. We have also shown how all of this is interwoven with the narrative of the elk hunt. Using the approach adopted, we have moved towards a fuller understanding of the relationship between the creative capacities of the prehistoric artists and the cultural norms and artistic canon within which they worked to create these striking rock carvings of experiential art. In so doing we have contributed to the development of a cognitive approach to the prehistoric fisher-gatherer-hunter art of northern Europe, and have drawn closer to an understanding of the visual narratives they express.

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### **Bibliography**

Allen, R. E., 1990. *The Concise Oxford Dictionary of Current English*. Clarendon Press: Oxford.

Arcá, A., 2004. The topographic engravings of Alpine rock-art: fields, settlements and agricultural landscapes, in *Pictures in Place: the Figured Landscapes of Rock-Art*, eds. C. Chippindale & G., Nash. Cambridge: Cambridge University Press, 318-349.

Avern G., 2001. A new technique for recording archaeological excavations: research progress report, in *Proceedings of the Computer Applications and Archaeology Conference*, eds. Z. Stancic, & T. Veljanovski (BAR International Series 931.) Oxford: Archaeopress.

Bradley, R., 2000. *An Archaeology of Natural Places*. London: Routledge.

Chippindale, Ch. & P. S.C. Taçon, (eds.) 1998. *The Archaeology of Rock-Art*. Cambridge: Cambridge University Press.

Coles, J., 2005. *Shadows of a Northern Past: Rock Carvings of Bohuslan and Ostfold*. Oxford: Oxbow Books.

Coles, J., 2003. And on they went... processions in Scandinavian Bronze Age rock carvings. *Acta Archaeologica*74, 211-250

Coles, J., 2000. *Patterns in a Rocky Land*. Uppsala: Department of Archaeology and Ancient History, Uppsala University 27.

Crawford-Currie, R., 1982. *Cross Country Skiing*. London: Pelham Books Ltd.

Devyatova, E. I., 1976. *Geologiya I Palinologiya Golocena I Hronologiya Pamyatnikov Pervobytnoj Epohi v Yugo-Zapadnom Belomorie*. Leningrad: Nauka.

Fossati, A., 2004. Topographic representations in the Valcamonica rock art tradition: typology, chronology and interpretation, in *Rock Art in Landscapes - Landscapes in Rock Art*, ed. K., Sognnes. Trondheim; Tapir Academic Press, 31-50.

Helskog, K., 2004. Landscapes in rock-art: rock-carvings and ritual in the old European North, in *Pictures in Place: the Figured Landscapes of Rock-Art*, eds. C. Chippindale and G., Nash. Cambridge: Cambridge University Press, 265-288.

Helskog, K., 2003. *ROCK-ART Image People Land Knowledge*. Rock art exhibition at the Cambridge University Museum of Archaeology and Anthropology University of Cambridge.

Helskog, K., 1999. The shore connection. Cognitive landscape and communication with rock carvings in northernmost Europe. *Norwegian Archaeological Review* 32(2), 73-94.

Jacques, A., 1950. *Downhill Skiing (French Technique)*. London: Nicholas Kaye Book, 29-44.

Janik, L., 1999. Rock art as a visual representation or how to travel to Sweden without Christopher Tilley, in *Anthology of Rock Art*, ed. J. Goldhahn (British Archaeological Report, International Series 794.) Oxford: Archaeopress.

Keyser J., D., and G., Poetschat, 2004 . In *Pictures in Place: the Figured Landscapes of Rock-Art*, eds., C. Chippindale and G., Nash. Cambridge: Cambridge University Press, 118-130.

- Keyser J., D., 2001. Relative dating methods. In *Hand Book of Rock Art Research*, ed. D. Whitley. Walnut Creek, Lanham, New York, Oxford: Altamira Press.
- Lakoff, G. and M., Johnson, 1999. *Philosophy in the Flesh*. New York: Basic Books.
- Lewis-Williams, D., J., 2002. *The Mind in the Cave: Consciousness and the Origins of Art*. London: Thames & Hudson.
- Livingstone, M., 2002. *Vision and Art, the Biology of Seeing*. New York: Harry N. Abrams, Inc., Publishers.
- Loendorf, L. 2001. Rock art recording, in *Hand Book of Rock Art Research* Whitley, D. Walnut Creek, Lanham, New York, Oxford: Altamira Press, 55-79.
- Oswald, A., Bryan, P., and T. Barnet 2005-2006. The rock art recording pilot project in Northumberland and County Durham. *Newsletter of the English Heritage Research Department 2*, winter, 24-27.
- Palmer, S., 1999. *Science of Vision, from Photons to Phenomenology*. Cambridge: The Massachusetts Institute of Technology Press.
- Ratey, J. J., 2002. *The User's Guide to the Brain*. London: Vintage.
- Savvateev, Y. A., 1970. *Zalavruga, Petroglify*. Leningrad: Nauka.
- Taçon, P., S., C., and S., Ouzman 2004. Worlds within stone: the inner and outer rock-art landscape of northern Australia and Southern Africa in *Pictures in Place: the Figured Landscapes of Rock-Art*, eds., C. Chippindale and G., Nash. Cambridge: Cambridge University Press, 39-68.
- Tilley, C., 2004. *Materiality of Stone: Exploration in Landscape Phenomenology*. Oxford: Berg.
- Whitley, D., 2001. *Hand Book of Rock Art Research*. Walnut Creek, Lanham, New York, Oxford: Altamira Press.

