DO NOT MAKE SNAP DECISIONS ABOUT WHAT YOU ARE
SEEING: HOW DIGITAL ANALYSIS OF THE IMAGES FROM THE
CANADIAN SHIELD HIGHLIGHTS THE DIFFICULTIES IN
CLASSIFYING SHAPES

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Abstract *The act of classification has the widest implications for scholarship. Whatever the format, it involves the totality of our being. The use of our eyes indicates that decisions about whatever it is that we observe have already been made. Yet the interaction between the mechanical act of seeing and the mind or memory has rarely been registered. An object once seen implies that the researcher's consciousness is engaged. The description of mere shape records that interaction.*

To establish whether sub-conscious decisions have been made as to the meaning of a shape, it might be placed in an armature. VIPS/ip software, created by both computer scientists and art historians, provides such an armature. The separate roles played by memory, brain, and eye in engaging with the shapes, encountered on the pictograph sites of the Lake of the Woods might then be detected. Subsequent labelling which bears these roles in mind just might isolate the contribution made by memory. The systematic identification and cataloguing of such images by an investigator may also enable us to understand something of the intricate and uncharted past of the Canadian Shield and about ourselves.

Keywords: shape, classification, identification, meaning, eye, VIPS/ip, pictographs, Lake of the Woods, Canadian Shield

International Journal of Humanities and Arts Computing 5.1 (2011): 59–81

Edinburgh University Press

DOI: 10.3366/ijhac.2011.0021

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www.eupjournals.com/ijhac

INTRODUCTION

In the act of viewing an image or shape, the human brain interacts with the eyes. The relationship between the mechanical act of seeing and the activity of the mind is rarely registered by the person examining the object, image, or screen in question. This relationship is an important one, and it is vital to address this problem from a holistic perspective. But doing so explicitly demands that the archaeologist and humanities scholars who wish to do so must embrace a grand challenge. Grand challenges address fundamental problems in science or engineering, but the term is as applicable in archaeology and to the humanities in general as it is to the physical sciences. In this instance, the humanities researcher must develop a sophisticated mental infrastructure to enable the collection, organisation, and structuring of data. Such an infrastructure would entail the employment of various lenses, recognized as such by the researchers concerned as well as by their predecessors and their audience.

Mentally labelling, identifying, and recognising a shape or image enables viewers to place it within their private mental and physical worlds. An example will suffice. If a person familiar with tropical vegetation views one of the jungle paintings by Henri Rousseau (1844–1910), such as *Tiger in a Tropical Storm (Surprised!)*, painted in 1891, it is clear that something odd or ‘strange’ is going on: shapes are somehow ‘wrong.’ Rousseau is known for paintings of the tropical forest which enthralled the European viewers with their richly detailed plant and animal life. But he never left France, and these tropical scenes are a melange drawing on his own imagination, visits to the zoo and botanical gardens, and from postcards and books.

In his seminal publication *Art and Illusion*, E. H. Gombrich argued that learning to perceive an image was a matter of learning codes.¹ He asserted that all representations permit an infinite number of interpretations and that the viewer naturally provides themselves with a specific reading of what is seen. Gombrich maintained that it is impossible to separate what we view from what we know and that errors can and will occur during this activity. These mistakes result from the viewer’s inability to view the image prior to making the mistake. The desire to find meaning, Gombrich asserted, exists in the mind of the viewer and is vital to well-being for it prevents people from thinking that their world lacks purpose. He explored the question at considerable length throughout his work, but a key point will be pertinent to our discussion. He argued: ‘The image, it might be said, has no firm anchorage left on the canvas, it is only “conjured up” in our minds.’²

Clearly, researchers need to acknowledge that there are unconscious decisions which take place in the mind between the acts of looking and interpreting or conjuring up in our minds. The archaeological enterprise depends to no small extent on developing our ability to parse this interaction. The business

of classification implies that archaeologists are conscious that words have to be chosen to describe whatever it is that the scholar perceives and whatever it is that they wish to understand.

Archaeologists perceive the tasks of identification and classification, which are acts of seeing, as fundamental to the practice of their craft. Some argue that the act of identifying and classifying artefacts such as images, as well as the canonical role played by certain categories of image which might be lithics (stone tools), human and faunal bones, ceramics, and plant remains found within the archaeological record, mean that these represent the only legitimate steps along the road to a more complete understanding of the context within which the archaeological record was created. Only those who study such a narrow range of evidence could provide a sense of the larger view. Awkward, incongruous, abandoned by the establishment, Rousseau's *Tiger* once lay abandoned on the cutting-room floor of our past.

Something had been lost; images depicted in the world's pictographs and petroglyphs, like Rousseau's *Tiger*, cannot be excluded from scholarly examination and their possible contribution banished from view. This means that an interpretation of an archaeological site may well be seen as problematic in terms of the development of the discipline itself. Regardless of the principal type of artefacts being examined, all must be given equal importance as they are possibly even integral to each other's context. It cannot be argued that these images are too difficult to tackle. Archaeologists can draw on different sets of techniques which have specific methods integral to the identification, classification, and collection of specific information regarding the nature of an artefact in question according to whether the item is a lithic, bone, some ceramic, or even the remains of some plants. Examples of such methods are: AMS radiocarbon dating, flotation, and use-wear analysis.

Images too are available in this sense. For example: consider the images found on pictograph sites in the Lake of the Woods at Whitefish Bay in northwestern Ontario, as shown in Figure 1. I want to try and highlight the disparate roles of the brain and the eye in the mental process that occur as we, as sentient beings, consider how images might be described. It is crucial to understand this step before proceeding to the forms of classification that might prevent meaning from infiltrating the first mechanical process. In the case of this example, my brain and my eyes essentially made decisions as to the location of the edges or boundaries of each image. The role played by the human memory in identifying the shape of an image increases in importance as the edges of superimposed images are identified and made available for analysis through the interaction of the software and human memory. The limitations of this methodology were rapidly exposed. Any attempts to make the shape solid and remove the noise meant that my eyes and brain were filling in the gaps when they recognised an image, and they perfected the resultant shape so that it could be identified,

Figure 1. DiKm-3 is an excellent example of a pictograph site from Whitefish Bay, the Lake of the Woods, Ontario, Canada. (©Author June 2001).

labelled, and classified. This is inherently problematic. Obviously the human eye and the human brain play major roles in the identification of an image when we consider the description of the shape of anything we see, let alone intend to discuss, for the purposes of identifying meaning.

Why consider this relationship? It is important to remember that the relationship between the mechanical act of seeing and the activity of the mind is rarely registered by the person who is examining the object, image, or screen in question. But the nature of the archaeological enterprise depends to no small extent on developing our ability to parse this minute and intimate interaction. The business of classification implies that archaeologists must be conscious that words are chosen to describe whatever it is that scholars perceive and whatever it is that they wish to understand. But researchers must acknowledge that there are a series of unconscious decisions which take place in the mind between the acts of looking and interpreting.

This argument might be explored further. An individual, in our case the archaeologist, observing the outline of a shape that might conceivably resemble a human being must first acknowledge that she has a particular construct in their own minds. This construct profoundly influences her perception of its

meaning. The mind of the observer is involved in organizing and recognising a powerful set of image-patterns matching thousands, if not millions, of algorithms of incalculable complexity and strength.

The allocation of a label to any shape involves an act of classification because decisions are unconsciously made prior to its identification as a mere shape and prior to its being placed in the larger mould. These decisions in turn fashion the terms by which it might be examined. My own small task was set as a result of conversations with Dr. Bruce Trigger and his enthusiastic support for the larger discussions, especially working with leading computing scientists such as Dr. Kirk Martinez, Professor Paul Lewis, and Professor Dame Wendy Hall [Intelligence, Agents, Multimedia (IAM) Group, School of Electronics and Computer Science, University of Southampton, UK] (en passant I would like to thank Dr. Kirk Martinez for having invented the slider tool that I utilized). The VIPS software was co-developed by Dr John Cupitt and Dr Joe Padfield (The National Gallery, London) and Dr Kirk Martinez (University of Southampton).³

I will endeavour to isolate the steps which are made by the mind in the observation of the pre-historic objects. Consequently, I employed VIPS/ip, an image processing software, as a prelude to utilising two experimental search engines and KLEIO IAS (a database management system).

THE PHYSICAL LOCATION OF THE IMAGES AND PICTOGRAPH SITES

But, first, the physical location of the pictograph sites must be described. A detailed literature review revealed that the pictograph sites of the Lake of the Woods region could be representative of sites throughout the Canadian Shield.⁴ The map in Figure 2 demonstrates the physical location of the Lake of the Woods with respect to the Great Lakes and Hudson Bay, while the map in Figure 3 illustrates both the physical location and the distribution of the pictograph sites examined, as well as information regarding the number of images found at each site.

A field crew collected collateral data over during three and one-half months of archaeological fieldwork in 2001. Twenty-seven pictograph sites were examined: twenty-five sites on cliff faces and two inside caves. Most of them are in the eastern and northeastern portion of the region. Neither pictograph or petroglyph sites exist in the southwestern region, possibly because the geology is different and that area is swampy, sandy, and contains muskeg and bogs. The petroglyph sites had a propensity to be more numerous in the northwestern and northern regions of the lake. However, these sites were not examined because the high water levels in 2001 meant they were not visible during the summer season, when the lake was ice-free.

Figure 2. Physical Location of the Lake of the Woods in Central North America (© Author June 2006).

REJECTION OF THE TERM 'ROCK ART'

Before discussing the means used to establish that both the human eye and the brain play major roles in the identification of an image, the term 'rock art' must be rejected as the ubiquitous descriptor for images of any provenance found on the surfaces of rocks for the following four reasons:

1. The term 'art' loosely used by commentators is inherently mischievous because it suggests that these images have primarily a decorative value and no intrinsic value or meaning of their own.
2. The term 'art' naturally implies classification of these images according to Western notions of high or low art, or perhaps even more misleadingly, a craft.⁵ These terms have loaded meanings that impose the analyst's conventional values. They should not be considered within the cultural context of the reader's or viewer's influences on perception and classification. They should certainly not be understood as part of the 'great

Figure 3. Physical Location of the Pictograph Sites in the Lake of the Woods (© Author June 2006).

age of historical mythology’, much less the ‘invented tradition’ identified by Eric Hobsbawn in 1983⁶ or, in Tony Judt’s words, the ‘evocation of a genuine nostalgia for the fake past.’⁷ Any pre-judgment threatens to adversely affect the manner in which these images may be understood.

3. Clear guidelines indicating the ways in which the meaning of such images might be unpacked are not provided even by practitioners of images from other cultural contexts.
4. I disagree with Whitley's argument that the term 'rock art' should be canonical simply because a western intellectual tradition has used it for more than one hundred years.⁸ The use of a term for a long period of time does not of itself justify its continued usage, particularly if the users acknowledge that it is inherently problematic. Furthermore, the continuation of such a practice or tradition merely leaves the arena open for continual dispute and a fundamentally pointless discussion over whether these images are art or not.

I propose that if they are to be considered within the canon, then these images should be termed rock images, or petroglyphs and pictographs. So, let us get back to our problem.

THEORETICAL APPROACHES USED BY ARCHAEOLOGISTS

An integral part of my research entailed organising a precise sequence of those well-known theoretical frameworks identified by Trigger.⁹ These frameworks have existed for some time and have often been invoked by archaeologists interested in undertaking interdisciplinary research to manage the superabundance of data from a variety of disciplines and to identify which techniques should be used and in what order. Indeed, casual conversation amongst my colleagues who are archaeologists regarding their data collection practices alerted me to the inherent dangers of a merely pragmatic resort to the body of knowledge referred to as archaeological theory. Obviously the choice of theoretical approach, which is an intellectual framework, influences the fieldwork, analysis, and search for meaning(s) and should be indicated from the outset of the research. While archaeology is practiced worldwide it is problematic to jump from that assertion to maintain that it is truly a global discipline¹⁰ because practitioners in disparate parts of the globe may have evolved different practices and they may well perceive the relationship between theory and methodologies differently.¹¹

From the outset, the choice of theoretical approach will influence the shape of the fieldwork, the analysis of the data encountered during fieldwork, and the search for meaning(s). These frameworks are utilised by archaeologists regardless whether they conduct research in either an academic or a commercial milieu. The frameworks are important because they enable the wide range of practical techniques—applied either whilst undertaking fieldwork, in the laboratory or at the desk—to be used in a sequence that maximises the amount of information obtained from a body of data. Archaeologists must consider

Figure 4. Sequential Order of Theoretical Approaches (© Author June 2006).

and use theory in conjunction with their methods and tools as intertwined, like the threads in a skein of wool, with specific intellectual frameworks. Theory must not only be identified but must always be woven with method and function like the warp and the weft of a piece of fabric. One cannot be used without the other. Different theories inform different methodologies utilised by archaeologists during their fieldwork and subsequent analysis of the data collected.

In order to infer human behaviour and meaning from archaeological data archaeologists use five different interpretive frameworks or approaches: culture-historical, contextual, intuitive, analogical, and homological. Each of the five frameworks prescribes the types of questions applied and determines the levels of understanding obtained concerning the archaeological evidence in question. If the potential quantity and quality of information gained are to be realised, then the same data must be examined in sequential order using these different approaches as demonstrated. Three levels exist as indicated in the table in figure 4.

So what happens? The archaeologist concerned must diligently follow through the whole process, initially implement the culture-historical approach, subsequently the contextual approach, and as final steps employ intuitive,

analogical, or homological approaches. This sequence of complementary archaeological frameworks, or approaches, as described above (see Figure 4), was applied to all of my data during as well as after I had undertaken the fieldwork. This was crucial because, as argued earlier, the methods, techniques, and computing tools employed to analyse data carry intellectual baggage that burdens the manner in which data might be considered. Archaeologists must first always apply the culture-history approach to their data. This framework is crucial because the images and their physical context will be surveyed for the various aspects of the physical location of the images recorded in words and as a photographic record. The images themselves must be described verbally and a photographic record created. This enables the red images at each pictograph site, such as the one visible in Figure 1 above, to be examined individually. Application of the culture-historical approach enables the archaeologist to establish the form, date, and physical location of each artefact, including an image. This provides archaeologists with the ability to gather the basic data that they will need to perform higher-level analysis. Detailed information must be assembled about each individual archaeological site, and each image must be considered as a separate entity. The contextual approach enables the culture-historical information to be connected with the totality of the artefact in question, in this case the images and the natural features of the site itself. Essentially the culture history and the contextual approach seek to answer questions such as what material there is to study, when the images were created, and who might have created them. Taken together the analogical, homological, and intuitive approaches seek to ascertain the purposes for which they were created and establish meanings intended by their creator(s).

It is conventional wisdom that archaeologists apply only one of the three approaches concerned with meaning to interpret either an archaeological site or of an artefact. The archaeologist concerned to establish the meaning of rock images in a more rigorous and persuasive fashion must adopt either the analogical or the homological approach rather than the intuitive approach, (narrative, constructivist, or so-called humanist). I did not utilise the intuitive approach, (narrative, constructivist, humanist), which is concerned with meaning, because of the problems that emerge when it is employed at this stage of our work. Archaeologists must articulate to others the methods by which their conclusions have been reached. Readers should not be subjected to the task of inferring the un-stated premises of the author. It is important to clearly and logically articulate the manner in which an interpretation has been reached; *ex cathedra* statements will not suffice.

After the application of culture-culture followed by the contextual approach, I chose the homological (often called the direct historical) approach rather than the analogical one because securely dated ethno-historic and ethnographic data exists for the Algonquian speaking peoples from this region in the

Canadian Shield. Homologies are identified by tracing cultural continuities through time within a single or a series of historically related cultural traditions. Interpretations employing homologies frequently utilise the direct historical approach to identify parallels between culturally specific beliefs and their material expressions during the early historical period, and it employs material culture to trace these beliefs back to pre-historic times. The bridging arguments for establishing homologies between the present and the past remain culturally specific. Watson, LeBlanc, and Redman argued that homologies work well in regions of strong cultural continuity where the same techniques and implements have been used over a long period of time.¹² Written records, oral heritage, and ethnographic observations are arguably the strongest types of evidence to be deployed when devising bridging arguments.¹³ Scholars often exploit these materials to establish which beliefs existed in specific cultures.¹⁴

APPLICATION OF VIPS/IP DURING THE CULTURE-HISTORICAL APPROACH

Since a search for meaning starts with the culture-historical approach, a preliminary analysis of the image files was conducted while collecting site data in 2001. That type of analysis, indicated in Figure 4, is undertaken during the application of the culture-historical approach. A preliminary analysis of the images in 2001 using Adobe Photoshop 6.0 was attempted and the indications suggested by these initial insights were confirmed by the results of the employment of Vasari Image Processing Software [VIPS/ip], a far more powerful device. The on-site analysis was undertaken using Adobe Photoshop 6.0 while conducting fieldwork in the Lake of the Woods. It revealed that a limited range of motifs did appear in the rock image sites. At a deeper level, it provided some insight into the manner in which sentient beings perceive a physical shape. Close observation revealed that the perception of the precise physical shape on the rock face could depend upon the viewer rather than upon the presence of red ochre, as evident in the individual images. The power of this insight was enhanced by the results of the employment of the Vasari Image Processing Software [VIPS/ip], a far more powerful device that runs in a UNIX environment. VIPS/ip was developed to enable the identification of shapes within oil paintings, prints, etchings, sketches etc. This open source software has been used in numerous European research projects to analyse large images.¹⁵ It is also used by a number of world-class museums and galleries, including the UK National Gallery which uses it for in-house imaging research. The software was:

designed for speed, automatic multithreading and ease of programming. Its NIP GUI provides a spreadsheet-like interface with its own functional language for scripting. It has a wide develop/user community around the

Figure 5. Examples of the same ochre images once they mathematically become black and white (© Author 2006).

world and runs on almost any platform (using C/C++/Python). It has been used for mosaicing images, dealing with multi-GB images and colour calibration.¹⁶

The TIFF files collected during my 2001 fieldwork season were up loaded to one of the dedicated servers at the IAM Group laboratory [Intelligence, Agents, Multimedia Group, School of Electronics and Computer Science, University of Southampton], so that they could be processed within the local VIPS/ip environment.

VIPS/ip software was invoked during the culture-historical approach at a critical stage of the analysis established that the human eye and the brain play a major role in the identification of individual images. This role is most clearly evident once a specific image, shape, such as that in Figure 5, is isolated from its context upon the surface of the rock using the VIPS/ip software and is viewed against a black background away from its original context. It became clear that turning and changing the graphic shapes, from a red image in a colour background, into black and white images was the most powerful introduction to a description of the shapes themselves. The software further

revealed that such shapes often had indistinct edges. The observer's gaze renders them distinct, possibly by identifying the physical edges of the shapes themselves.

This analysis took several stages. First, each graphic shape in red ochre in each TIFF file, was first extracted using a custom-built slider tool. The shape is understood as the physical shape of the graphic red ochre shape visible in the TIFF image. The VIPS/ip software assumed that the image photographed was on a flat surface at 90 degrees to the camera lens and not upon a slanted or a curved surface. Nature is curved so none of the images at each site was located on such a flat surface at 90 degrees to the camera. With that in mind the slider tool allowed for some control of these images and compensated for some of the shortcomings of the VIPS/ip software. For this reason, the colour saturation of each image remained uneven, so each shape could be independently processed, handled, using the slider tool. Preliminary image analysis conducted in the field during 2001 already had indicated the importance of this issue. It was obvious that the different angles of each rock face would have an impact on the quality of the image which resulted.

The TIFF images of a pictograph site comprised graphic shapes resting on surfaces that are at different angles to one another. However, if all the graphic shapes can be processed simultaneously at precisely the same settings the results will differ for each of the red shapes on any given image that might be visible. The use of the VIPS/ip slider made alterations to the colour saturation levels according to each individual ochre shape possible. This meant that each member of a group of shapes could be dealt with separately. The slider tool also enabled the physical description of each of these shapes to be ascertained.

The close examination of the TIFF files revealed that the accumulation of white mineral deposit on the surface of the cliff face had affected the images at six sites: DhKm-3, DiKm-3, DhKo-1, DiKp-1, DiKn-1, and DhKm-5.¹⁷ Detailed examination using VIPS/ip enabled me to indicate when images at DhKm-3, DiKm-3, DhKo-1, DiKp-1, DiKn-1, and DhKm-5 were superimposed over white mineral deposits which in their turn obscured other red images. DhKm-5, in Figure 6, is an example of a site where red images are superimposed over each other and are further affected by white mineral deposits. A visual examination of the different colours evident in the TIFF file of DhKm-5 suggests that the red images of shapes have been painted over other shapes.

An examination of the TIFF files of DhKm-5 using the VIPS/ip slider tool revealed that images, or shapes, were overlaid several times over an unknown period since the tool enabled me to transform the colour of pixels that I selected, as I examined each of the TIFF files. The tool identified and caused the other similar red pixels that I was interested in to appear against a black background while the remaining red pixels and the other colours became part of a black background.

Figure 6. An overview of the majority of DhKm-5, Whitefish Bay, Lake of the Woods (© Author June 2006).

It is important to understand what is going on here. In figure 6 it is clear that different reds are evident. Indeed, analysis of the TIFF file using the VIPS/ip slider tool indicated different layers of red/pinkish paint, ochre, superimposed on one another with white mineral deposits, calcium carbonate (CaCO_3) between in each layer. The accumulation of these mineral deposits is probably influenced by the quantity of soil at the top of the cliff, the number of times it rains during the year, and the physical structure of the rock itself. However, since ground water periodically seeps down the rock face, mainly during the spring and fall period, it is possible that faint images are older than the bright ones. The presence of both the pale and the dark red images in ochre as well as the modern spray painted images indicates that these places were and are being used. Unfortunately, it is impossible to determine with precision either the implements used to apply the ochre-based paint or their ingredients. It is possible to posit that fingers were probably used to apply the paint. Ethnographic evidence supports the idea that iron ore (ochre) was used and possibly with isinglass from the air bladder of the sturgeon, a fish once common in Lake of the Woods. It can be argued that many pictographs are probably older than 50 years. The observations of Wainwright, Taylor and Meyer during 1970s pushed the date that the pigments

were applied and migrated over an undetermined time.¹⁸ The point is reinforced by image analysis of the adjacent rock surface which suggested that although lichen encroachment had occurred at the earliest documented site in Lake of the Woods called DiKp-1, paler images, which neither Lawson 1885¹⁹, Dewdney (1962)²⁰, Molyneaux (1974)²¹, nor Reid (1974)²² recorded, also exist at this site. None of these additional, paler, and hence possibly older, images were observed or discussed, although the principal group of images had been examined in considerable depth.

Writing in the 1970s, Taylor and his colleagues argued that the gradual accumulation of this white mineral deposit on pictographs led to 'the faded appearance' of many of the images. They observed that two scatter patterns were evident within the samples. One pattern was identified as hematite and the other as calcium carbonate, a white mineral. They asserted that these scatter patterns indicated that the pigment was not directly attached to the surface of the rock but was intimately mixed with the calcium carbonate deposit on the rock's surface in a sandwich-like structure. The deposit consequently acted as a protective coating for the pigment against the leaching actions of the rain and wind erosion. They suggested that these results might offer some explanation of why wet surface chemical field tests conducted on the paintings had failed to identify the hematite. The results also indicated that the calcium carbonate prevented the pigment from dissolving away.²³

However, let us return to an example of applying VIPS/ip to an area of the images of DhKm-5. It is possible that red images were either superimposed upon another strong red shape or that the pale red/pink areas had faded either before or after they were covered in the white mineral deposits. Regardless of this possibility, if Figure 7 is examined, it should be evident that I positioned Box A7, to consider the area of red pixels encompassed within the boundaries of the Box A2, so that I could compare the red pixels here with the red pixels in the Box A2 in isolation of those in Box A1.

Box A1 is the entire TIFF and Box A2 is a selection of that larger Box. By its very nature, Box A7 is small because I was concerned to isolate the same level of red pixels within Box A2 to see whether other shapes within close physical proximity of the shape that I was interested in had the same colour and may have been painted at the same time. The transformation that occurred once the images were exposed to the VIPS environment excluded the other visual information in the larger Box A1. The results of the transformation are in Box A22, which presents the red pixels as white pixels against a black background. (Box A22 is the same size as Box A2.) The white pixels in Box A22 are the same red images affected by the white mineral deposits in Boxes A2 and A1. Once the TIFF file was loaded into VIPS/ip all the red pixels selected in the box labelled Box A2 that were not selected in Box A7 were converted into white pixels and every other colour evident in the file became black pixels. Regardless of whether

Figure 7. Screenshot of some of the red images below the white mineral deposits.
(© Author 2006).

they are below or superimposed on white mineral deposits, all the red pixels will become white pixels and show up as shapes among the black pixels visible in the box labelled Box A22.

If the screenshot in Figure 8 above is compared to Figure 7, it becomes evident that the accumulation of white mineral deposits at DhKm-5 is not uniform. This occurred because I moved the area encompassed by and within Box A7 in order to isolate a different shade of red coloured pixels different to the one that I had previously selected (evident in Figure 7). This enabled me to determine whether other images that were apparently hidden co-existed with the images that initially appeared on the surface originally isolated in Box A2. If the white images in Boxes A22 (in both slides) are compared, it is clear that some images are superimposed and that these have been obscured by the white mineral deposits discussed above. These deposits are not uniform, and do not cover the entire image. They cause images to become paler and eventually to disappear altogether, obscured by the white deposits. Image analysis of the TIFF files, using VIPS/ip in conjunction with the commercial Adobe PhotoShop 6.0, indicates the fragility of such sites and their images, as well as the changes which occur as a result of natural action. The flip side of this analysis also indicates the key role played by the human eye in recognizing the images themselves.

Figure 8. If this screen shot is compared with the screen shot above it is clear that the accumulation of white mineral deposits at DhKm-5 is not uniform. (© Author 2006).

The human brain recognizes the images but begs the question of whether these images are actually there? The red images were not solid blocks of red upon a greyish granite surface. The edges of a group of white pixels that once constituted the red image were not clearly delineated and the centre of an image was often not solid white. The reddish orange or pale red on the surface of the pictograph site arguably indicate that some of the images may have become superimposed on white deposits. Yet their paleness could also be a consequence of accumulation of deposits over them. This means that the edges of some of the images have become difficult to determine. Experimentation with various tools in the VIPS/ip environment attempted to mathematically remove the white pixels deemed noise and to make the shape in question become solid. The screen shot, in Figure 9, demonstrates an example of my attempts using a shape that occurs on the pictograph site in the same lake labelled DjKn-1.

Any attempts to make the shape solid and remove the noise meant that my eyes and brain were filling in the gaps when they recognised an image and they perfected the resultant shape so that it could be identified, labelled, and classified. This is inherently problematic. The brain and the eye of the observer make decisions as to the location of the edges or boundaries of each image. The role played by the human memory in identifying the shape of an image

Figure 9. Screenshot showing what occurs to the same images using different tools when I mathematically tried to remove the white pixels deemed ‘noise’. (©Author 2006)

increases in importance as the edges of superimposed images are identified and made available for analysis through the interaction of the software and human memory. The limitations of this methodology are thereby exposed.

WHAT EMERGES FROM THE APPLICATION OF THE CULTURE-HISTORICAL APPROACH TO THESE IMAGES?

Several important points emerged through the application of the culture historical approach to the pictograph sites of the Lake of the Woods. The use of VIPS/ip indicates that a wide range of images are evident, but many suffered from the ravages of time and none of them had the perfectly straight edges often attributed to the work of artists. VIPS/ip demonstrated that not all the images at all of the pictograph sites were solid and, once closely examined, were physically different one from another. A rock image must initially be considered as a shape since it reduced the possibility of investing the description with meaning during the recording stage. In the digital age more care must be employed when choosing describing the vocabulary used to describe the shape or form of an image in order to avoid either inadvertently or prematurely ascribing meaning(s). Only the form of a shape should be referenced. Meaning could not be ascribed at this stage. That discussion must be postponed to a later and

very different level of analysis. Such an analysis should evolve from a secure technology of description.

For instance the precise size of an image should not be considered at this stage. The length and width of a particular section of an image should not be measured since it may or may not mean something. A detailed examination of the ethnographic record of the indigenous peoples reveals that it is inherently difficult to establish whether size might be important. The size of an image recorded in 2001 might well depend upon uncontrollable elements such as the deposition of minerals upon the rock surface, exfoliation, and plant growth. Considerable care will have to be taken to consider the vocabulary to be used prior in attributing written descriptions of such images because it would invariably result in their classification.

In creating a classification I drew upon the work of Gerhard Jaritz, an art historian interested in the every-day life and the material culture of the general populace of Europe during the Middle Ages, to enable me to think through the issues involved in classification. His research data consisted of medieval paintings of the every-day life of common people, not aristocrats. The issues created by the images he examined forced him to undertake highly detailed descriptions of complex images.²⁴ Standards for describing such an image simply did not exist. Jaritz and Schuh noted that, although many proposals for classification have been forward, none is widely accepted by the academic community as effective enough to describe and consider such images as potential sources of information about the cultures of the past. Five reasons for the lack of standards were offered:

1. Formal language cannot effectively discuss the specifics of an image.
2. Different interests and consequently different approaches exist for different art historians.
3. Considerable gaps exists in 'certain areas of terminological research.'
4. 'Fear of losing flexibility and openness by using a system of strict standards' exists among scholars.
5. Different techniques have been used by scholars who analyse varying amounts of pictures for their research.²⁵

Jaritz and Schuh offered some suggestions for creating standards, but the utility of these is questionable. The images they considered were European; those from the Lake of the Woods are derived from an entirely different cultural tradition.

In view of this impasse, it was necessary to employ a vocabulary that implied as little meaning as possible and that merely described the physical outline of an image. My goal was not to permit any supposition drawn from poorly preserved or ambiguous data. A technique had to be used to describe all the images, even those barely visible to the human eye. So only the present form could be described; nothing was inferred. In this way smears, blobs, and spots are

apparent and should as described as such. They should certainly not be ignored. Somebody's smear could be someone else's cultural artefact: the eye would be informed by the memory.

CONCLUSION

The use of VIPS/ip demonstrates that many of the images to be found on the sites in Lake of the Woods were adversely affected by exfoliation, the accretion of white mineral deposits, as well as by the accumulation of rock tripe and lichen. Such images no longer had their original distinct clear edges, and many had been destroyed. Many of these images were probably nearing the end of their respective life-cycles, thus creating severe problems. The attempts to describe the images using Adobe Photoshop 6.0 and VIPS/ip indicated their fragile nature, as they also indicated that of the sites and identified their changing natures. Use of the software highlighted the considerable role played by the human eye and brain in the identification and subsequent description of these images. The question lingers; what is the brain but a professional memory?

There is a larger question for archaeologists as well as for other humanities scholars who examine images either as a primary resource or for additional evidence for their research.²⁶ These scholars ultimately seek to establish and understand another world, another mind-set, one that has to be imagined because in all probability it has not existed for centuries, if not millennia. 'Squeezing the data as if it was an orange' is therefore vital and the sequence of frameworks remains essential because once an archaeological site has been excavated, it has been destroyed. But an archaeological site is neither an archive nor a library. Once isolated from the rock as the result of an excavation, an artefact may well lose much of its potential explanatory power. In attempting to see what once existed, archaeologists therefore employ a series of different types of viewers through which they might better perceive the materials under examination. It is in the task of identification and classification, these acts of seeing, that archaeologists practice their craft and must articulate the manner in which they achieve a conclusion. By using different tools, which might include appropriate and customized software suites, it is possible not only to discover new information but to harness a greater quantity of data than might have previously been available.

Employing VIPS/ip during the application of the culture-historical approach supported the initial findings discovered with Adobe Photoshop 6.0. By clearly specifying the role of both the human eye and the brain in identifying an image, the inherent danger of speaking *ex cathedra* could be avoided. The use of this software within a clearly defined series of frameworks suggested that theory could be, and was, successfully interwoven with and not simply informed by classical archaeological method. It is important to indicate the

nexus between looking and interpreting that occurs within the daily practice of every archaeologist. The locus of theory remains central to the archaeological endeavour because it informs the act of seeing, asking, and above all challenging the practitioner.

In the act of looking or viewing an image, or a shape, the human brain interacts with the eyes. The relationship between the mechanical act of seeing and the activity of the mind is rarely registered by the person examining the object, image, or screen in question. This relationship is a vital one. It means that archaeologist and the humanities scholar alike implicitly address the grand challenge by addressing the issues which arise from a holistic perspective. Indeed, for both purposes the collection of data for such a research project is 'as important is the activity that goes on around it, contributes to it, and eventually integrates with it.'²⁷ Although written for a very different audience, the argument is pertinent because the engineers and scientists who wrote the ACLS report acknowledge that the use by scholars of evidence from images to support their arguments should not allow that evidence to be restricted by the boundaries imposed by discipline, institution, national, or cultural affiliations. Humanities researchers, including archaeologists, must develop a sophisticated mental infrastructure that enables the collection, organization, structuring, and examination of that data. Such an infrastructure would entail the employment of various lenses or filters, such as those utilised with the pictographs, that provide distance and perspective for researchers and their audiences.

END NOTES

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- ² E. H. Gombrich, *Art and illusion*, 202.
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- ⁵ Frank (2000) summarises the intellectual arguments, and debates concerning the development of the different theories that led to different objects and images being termed "decorative" or "fine" arts or handicrafts. Dondis (1973), Gombrich (1984), Layton (1991), Murphy (1989), and Rapaport (1997) considered the question of what can be defined as art, crafts, and visual literacy. Haselberger (1961) proposed a method for dealing with ethnological art.
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- ⁸ D. S. Whitley, *Handbook of rock art research* (Lanham, MD, 2001), 22–23.
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- ¹² P. J. Watson, S. A. LeBlanc and C. L. Redman, *Explanation in archaeology: an explicitly scientific approach* (New York, 1971), 50.
- ¹³ B. G. Trigger, 'Expanding middle range theory', 452.
- ¹⁴ For example, see G. R. Hamell, 'Strawberries, floating islands, and rabbit captains: mythical realities and European contact in the Northeast during the sixteenth and seventeenth centuries', *Journal of Canadian Studies* 21:4 (1987), 72–94.
- ¹⁵ *VIPS – vasari image processing library* [World Wide Web Page – open source image software library] <http://www.ecs.soton.ac.uk/research/projects/566> [last accessed March 15, 2011].
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- ¹⁷ Borden numbers originate from a grid system superimposed on the geographical mass that constitutes Canada. That system is itself based on geographic coordinates. Each block is identified by two upper case alpha characters that create a grid sequence that runs from south to north and from east to west. Each upper case alpha is followed by a lower case alpha which in turn designates a subdivision based on latitude and longitude. Archaeological sites in Ontario are allocated sequential numbers by the responsible provincial ministry.
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