FORUM: Art in World History

Red Handed: An Inquiry Into the Meaning of Prehistoric Red Ochre Handprints

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Figure 1: Red Ochre Handprints – "Hands at the Cuevas de las Manos upon Rio Pinturas, near the town of Perito Moreno in Santa Cruz Province, Argentina." Courtesy of Wikimedia Commons via Wikimedia at http://upload.wikimedia.org/wikipedia/commons/f/f4/SantaCruz-CuevaManos-P2210651b.jpg. For other examples drawn from around the world, seehttp://www.bradshawfoundation.com/hand_paintings_rock_art.php.

Our pan-human heritage includes the world wide presence of red ochre handprints, which for tens of thousands of years, served as a preliterate symbol of our presence.[1] To investigate their meaning we will employ scholarship drawn from variety of fields, including linguistics, archaeology and anthropology.[2] Art is

rooted in knowing from inside our bodies, i.e., in our genetically programmed senses and neurological processes, just as it was for our ancestors, of necessity because we, as the advocates of the new sub-field of World History known as Big History seek to remind us, are biologically the same as Homo Sapiens of one hundred thousand years ago.[3] Then and now we see, touch, breath and hear. We connect meanings to colors, images, places, sounds and symbols. We remember these connections. To explore these connections and locate some meaning for preliterate red ochre hand prints, we will first look at red ochre, then the human hand. Details on dating techniques used are offered in Table 1.

Red Ochre

Red ochre is made of silica, clay and iron oxide; its colors vary from yellow to red, purple and brown (see Table 2 for specific pigment colors). Plentiful all over the world, one of its properties is excellent permanence. Iron oxide pigments continue as basic palette from prehistory right up to the present moment.[4] Red has the longest wavelength and the nearest visible wavelength to infrared, which actually produces the sensation of heat. Hence, red really is, literally and physically, a warm color. We have been using fire for at least two million years, so connections between warm blooded mammals (red blood) and fire (red heat) easily lead to a conflation where red is a color symbolizing life.

For humans red is a primal color of emotion and attraction that relates to blood. Upon experiencing restored vision after blindness, or even after extended time in darkness, the first color humans see is red. If I say, "He saw red when I told him the bad news," most people know it means the person 'seeing red' was filled with intense emotion. To be caught 'red handed,' a particularly apt saying for our purposes, originally meant that blood was still on your hands, which is to say you had killed an animal, (human or otherwise). Many languages, including Hebrew, use the same root word for red and blood.[5] Among the many current ethnographic references to the red ochre, the most extensive is for puberty rites.[6] Red has a significant role in every culture on earth[7] and its ritual representation as blood or red paint pervades human society. When we see blood we are apt to react and many people literally cannot stand the sight of blood. We know blood is a life fluid in our bodies, hence expressions like: "Blood curdling" and "Cold Blooded killer." When have your hands touched blood? Menstruating? Birthing? Butchering? Cooking dinner? Injuries on a battlefield? From the ancient human practices to recent scientific advances, blood and red ochre are connected.

The Aboriginal Australians' fifty thousand year cultural history is the longest of any human group, so their belief system about blood is particularly instructive the further back we wish to explore human art making in general and red ochre in particular (see Tables 3 & 4 for Hominind activity leading to and detailing red ochre uses). For them, the spiritual state of dreamtime is invisible and a physical correlate which communicates between the dreaming and the perceivable world is blood. They believe that veins of ochre are the blood circulation system of the earth.[8] Their word for red ochre means clay mixed with blood.[9] Red ochre may be rubbed over the entire naked body for ritual and may be mixed with blood, which is used to fasten feathers onto people's bodies. Today, *The Red Ochre Award* in Australia is given to an Australian Aboriginal Artist for an outstanding contribution to the arts.

Western traditions, too, believe in the power of blood across generations. Ancient Romans believed in the ancestral spirit which traveled in families via "bloodlines" and we still hear it said that "blood is thicker than water." We continue to believe in the power of blood to transfer potency and even disease across generations, as the presence of babies born addicted to drugs and with AIDS demonstrate. Nor does a

small drop negate the power of blood, for we find dilution can make a substance more powerful in both homeopathic medicine and aboriginal practices. For the latter, a minute quantity "intensifies its need and ability to bond with others and imprint its energetic qualities on the surrounding shell of difference."[10] Less happily, as Christina Firpo has demonstrated, "one drop of blood" was sufficient to consign Europe's colonial mixed-race subject-peoples to inferior status and was once used within the anthropological community as a basis for distinguishing races.[11]

As for the antiquity of red ochre art, in 2001, nine carved red ochre pieces, dating back 77,000 years, were found in South Africa.[12] They resemble the lunar calendars carved in stone that paleoarchaeologist Alexander Marshack has decoded.[13] David Lewis-Williams is among the rock art scholars who argue that symbols of entopic art indicate a world wide visual symbol system derived from our pan human neurological processing system.[14] The oldest evidence of stone age art was also found in South Africa, a red ochre paint studio complete with an abalone shell paint container, dating back one hundred thousand years. [15]

Application of Paint

Humans have a long history of using and processing red ochre and applying it to various surfaces. Besides uses for body paint, red ochre was rubbed on teeth.[16] Ochre was mixed with binders, such as vegetable juices, urine, animal fat, bone marrow, blood or albumen from eggs, whereupon one has a red liquid similar in look and magnetic properties, to blood. Let us call this red liquid a paint. Given paint, various applicators are possible, such as brushes from animal hairs, feathers, twigs, pads of lichen or moss and, of course, fingers to smear, dab, or draw. We know that red ochre was mixed with blood as a binder and this spray went either directly from the mouth or through hollow bones to the rock surface.[17] Surely making a paint and blowing in from the mouth is more trouble than simply picking up a piece of red ochre and drawing with it, as Michelangelo did, so what is the significance of processing it, making a paint, and blowing it on the walls? Is the 'breath of life' being invoked? Is there a sonorous relationship between these ideas and the early bone flutes that have been found (see Table 5 for a discussion of "Sound Engineering" and the possible reasons why caves were sacred ritual sites)?

The idea of life is most present when its opposite, death, is realized. Thus, it is no surprise that at this time there are plenty of Neolithic graves where hunter-gathering societies of humans are buried with up to ten kilos of red powdered ochre. Some French sites from two hundred thousand years ago have red ochre floors that are eight inches thick. From two hundred thousand to thirty thousand BCE (the period of the Neanderthals), the pigments increased in frequency in occupation deposits and in burials. Indeed, when skeletons are found sprinkled with red powder, one wonders if it was on the skin as a remnant of tattoos, applied as funeral rites, such as to suggest the blood of new life beyond the grave, or to perhaps to mask the odor of death. In any case, when the body decomposed, what was left in hundreds of burial sites was the skeleton and the red ochre pigment. From twenty thousand years ago most base-relief and portable sculptures were painted red, including the Venus figurines. By fifteen thousand years ago in Lascaux, France, Paleolithic paintings are made with ochre from twenty-five miles away.

Red ochre use in caves, which is a hallmark of ice age art, begs the question: what is the significance rock and cave as locations for the red ochre handprint? We have already mentioned the auditory and echo like properties of the caves. But many later paintings are outside. In the Canadian Shield, the vision site such as the mountain itself are considered sacred, not just the rock art. Thus one finds entire areas where the

pictographs are entirely red ochre 'wash'.[18] Today there is considerable talk about creating a 'sense of place;' our ancestors often used red ochre to indicate the importance of a location. In his book, *Mind in the Cave*, noted rock art scholar David Lewis-Williams has suggested that the rock was the 'presence' itself of spirit and by putting one's hand to the stone one connected with that spirit. He argues that the pigment was a membrane-like veil which connected the spirit world behind and within the rock to the spirit of the person who touched it.[19]

Hands

Given that red ochre is found all over the world, has been used by humans for a least a million years and made into paint for a at least a hundred thousand years, we may ask why during the last ice age, did the human hand become a symbol on permanent surfaces? As neurologist Dr. Frank Wilson noted in his book, *The Hand*, our hands, complete with opposable thumbs are both the basic instrument for human arts and symbols of content rich remembrance.[20]

Presumably there were many years of working with red ochre on perishable materials. Tattooing, for instance, has long been used by our species, as the uncovering of the Ice Man in Italy in the early 90's showed. His tattooed skin had been preserved by his entombment in ice for thousands of years.

If ethnographic analogies are a useful indication of our species' history, it is well to note that decorative hand prints placed all over the body are well documented into the 19th and 20th centuries. Perhaps our ancestors painted or tattooed hand prints on their bodies. Tattooing and painting red ochre hands on human skin likely went on for many tens of thousands of years before so called 'creative explosion' 35,000 or so years ago.

This 'creative revolution' was an intensified interest in permanence generally and in the human hand specifically. This is when we began to outline objects on stone surfaces. This outlining seems to me to be a kind of making permanent or 'binding.' We already know that hands were 'outlined' as stencils by diluting pigment blown around the edge of the hand as a kind of air brush technique. This was done both directly from the mouth and through hollow bones. Besides outlines of hands there are handprints, where the hand is covered in red ochre paint and then pressed to stone and finally, the image of hands is engraved into the stone.

The hand occurs as a popular and ongoing motif in tribal art from very early times and everywhere in the world, from the Americas to Africa and Australia. Tribesmen "often painted or stamped directly on the human body…Among the Plains Indians, few body decorations were more important than the human hand motif, painted or tattooed on the chest."[21] They also occur in the Tlingit, Tsimshina, and Haida along the northwest coast of North America. The hand, like the bear track and the thunderbird, is found "in almost every major rock drawing area in North and South America, from Alaska to Patagonia."[22]

Similarly, handprints are common in Australia with its much longer record of human occupancy, for example on readily accessible rock shelter walls near Sydney and rarely visited sites on islands 5 to 6 miles off the coast of Queensland on the Great Barrier Reef.[23] From such widespread distribution of hand prints we might well ask, what is the meaning of the hand as a prehistoric symbol?

Clearly the word and the image of the hand are central to the human psyche and the human body. To

draw examples from language, a later invention: "handwriting on the wall" (the obvious); "I have to hand it to you" (obviously you win); "Hands of a surgeon" (skill); handshake: to greet, seal bargain, say goodbye; Judge by handshake (character indicated); Hand it over (deliver, give, give in); Hand made (human created) and Red Handed (caught, especially committing murder).

One can imagine hand prints on the wall indicating territory, trading events, or rites of passage such as puberty or marriage. Sometimes the hands are seen with animals or human figures. The late Grant Campbell, noted rock art specialist, suggested that these handprints were a form of signature and where great numbers are found together may be an identification with a tribal unit.[24]

In or out of a tribal unit, once something or someone, is present, it or they can be counted and accounted for. So, it is not surprising that among the fundamental meanings given to human hands is the idea of counting. And this human form of counting or accounting begins long before the written word. When you count your principle hand joints, you will find there are twenty-eight of them, so perhaps this was a handy way for women to keep a lunar or menstrual calendar on their hands! Who among us did not, as a child, count on their fingers? Kinship, which we may think of as a people one counts on, and puberty rites, which indicate we are counting time and have arrived at a certain point in our ability to generate kin, especially for women with the arrival of blood and child bearing, are also part of the meaning of the human hand. We know from ethnographic analogies and decades long research that the handprint literally means kinship.

In Australian aboriginal culture, when someone close to you died, you removed a portion of your finger at the joint. Which one you removed was a function of your specific kinship relation to the deceased. In other words, when someone close to you dies, a part of you literally leaves with them. Severing digits, as Robert Lawlor reports in *Voices of the First Day*, is a practice which aboriginal Australian men continued into the 20th century as a way of indicated when a close relative died.[25]

Indeed, digital mutilation has a long history in many cultures, for the practice is also found in Papua New Guinea, Borneo and Taiwan, with Eskimos from Greenland to Siberia, and among the Haida in British Columbia. As long ago as 30,000 BCE (upper Paleolithic) in France and Spain, many handprints show finger amputation identical to technique of Australian aborigines. Carpenter and Schuster believe that widespread use of these practices and the mutilated fingers going back as far as the 30,000 year old in European hand painting, argues for very great antiquity of the practice.[26] But this remains contentious. We simply cannot know whether Paleolithic people inadvertently lost their digits from accident or frost bite or intentionally removed them to ritually acknowledge the loss of kin.

But we do know the human hand has long conveyed the idea of connections and disconnections. Given that red ochre relates to blood and the hand to relatives, what might red ochre handprints communicate, beside the obvious possibility of blood relative?[27] Semiotic theory may be helpful here, but to take an obvious practice of digital marking, to this day many celebrate birth by making a print of a new baby's hand or foot, a permanent record of the new person's presence.

These very ancient images, the oldest symbol of our species, are reminders of our universal humanity and physical nature , anatomical and neurological. And also of our a of thinking. They both lengthen and broaden our view of history and that is what world history is all about.

Summary

There are both practical and symbolic values supporting the use of red ochre, especially for handprints. We know that Homo began using red ochre at least a million years ago and its use continues today. Now we may partially answer why. First, it was and is there and is plentiful. Second, it has the property of permanence. Third, it was initially easy to use 'as is' and relatively easy to process and combine with other substances to increase its range of forms and uses. Fourth, it had practical benefits, such as covering the smell of death and stopping bleeding. Sixth, red ochre came to be seen as having physical and metaphoric resonance with blood, so it became a meaningful symbol of relationships between people, the land, and the animals.

These relationships are represented by the human hand, which is a defining characteristic of the species and itself a symbol of human family relations. Even the twenty-eight joints in the hand correspond to a woman's menstrual cycle. The power of life was activated to make handprints in the blowing of the paint upon the stone. Thus were created kinship charts that demonstrated relationship. No wonder that ubiquitous red ochre became the blood paint of human handprints. What better indicator that we are present than a show of hands?

Table 1 - Dating Methods

Below are three common interpretive methods anthropologists and archaeologists use to understand 'signs from the past' which are relevant to our inquiry. Beyond these, dating rock art may be relative or absolute. Relative = weathering, stylistics, superimposition, spatial analysis. Absolute uses more recent advances, such as accelerators and mass spectrometry, associations of amino acids, e.g., egg as a binder. Note – handprints seem to predate the stencil technique in Australia.

1. **Stratigraphic contiguity**, carbon 14 dating and ethnographic analogy. (I am leaving aside dendrochronology aka tree ring dating, as it does not pertain to our 'handwriting on the wall'). Stratigraphic contiguity means what else to we find at the same layer of excavation? What is above and below it? From this we may infer a date for the location and objects we are investigating.

> In Australia, in the Western Arnheim Land, a complex sequence of changing art styles has been uncovered. Authors differ on the details of the sequences identified but generally agree on the principal stages. The earliest is characterized by large-scale, but static, images of animals and humans painted in red. Some unusual figures among these have been identified as extinct animals and, on this basis, an antiquity of up to 25,000 years has been suggested. See P. Murray and G. Chaloupka, "The Dreamtime Animals: Extinct Megafauna in Arnhem Land rock art," *Archaeology of Oceania* (Volume 19, 1986), 105–16.

2. **Carbon 14** looks at the rate of carbon decay but is often in error when found as a printed date, because we have discovered that the amount of carbon present on the planet was not constant for the entire history of the planet and so most dates cited before the 1980's need to be recalibrated, sometimes by many thousands of years.

3. **Ethnographic analogies**. Rouletting marks on a piece of clay found in African may be dated to which is dated to thousands of years BCE. When we see local peoples still marking clay with precisely the same pattern, we infer the same methods were used, and perhaps the same purposes and meanings operate.

Table 2 – Red Ochre as Pigment Sources

- Ochre=clay w/ hydrous iron oxide, usually opaque.
- Sienna=ochre w/ hi iron content, usually translucent.
- Umber=iron oxide w/ manganese.
- Burnt umber= calcined umber, a red hematite.

Note: The raw color is often yellow, which is easy to remember because both raw and yellow have a 'w'. Roasted ochre, often called calcined, is red, which comes from the loss of hydrating water. This, too, is easy to remember as there is an r is both roasted and red.

Table 3 - Time Line Hominid Activity

Million years ago	Human Activity
6	Bi-pedal hominid
5	Australopithecus tool maker
2	Homo erectus has fire
.1	Homo sapiens makes paint

Table 4 – Time Line Hominid Ochre Use

Years Ago	What Happened with Ochre
1,000,000	Transported to sites in South Africa
400,000	Pigment and grinding equipment in Zambia
300,000	Stone tools and bones w/ 60+ pieces ochre many colors, French Riviera
130,000	Ochre rubbed on teeth and tusks
120,000	Red Ochre paint
77,000	Elaborately carved red ochre, South Africa

Table 5 – Acoustical Engineering

The relationships between the senses, such as seeing red and feeling red heat or feeling matter and hearing sound are quite interesting and exploring them takes us to the idea of synasthesia and acoustical engineers, such as Steven Waller and Hans Jenny. The reader is encouraged to obtain and view a cymatics video for a first hand demonstration of the relationship between sound and matter. Oscillating chemical reaction of Belousav-Shabotinsky is a graphic example of the beauty of moving matter based which visually resembles the work of Hans Jenny. See www.cymaticsource.com. I wonder what the chemical reaction of the pigments with the binders looks like, especially when applied via blowing with air via the human mouth! Sound, like human life, is temporary and fugitive. If you were living 50,000 years ago, how would you capture and record a sound? How would you leave a permanent visual echo of your presence? Most of us, even as we sit comfortably in heated and air-conditioned rooms, feel a kind of superiority to our ancestors, whose short lives would challenge us even on the most brief and aggressive of camping trips.

Acoustical engineer Steven Waller uses sound to record the echoes in caves all over the world. See his website: https://sites.google.com/site/rockartacoustics/ Interestingly enough, the sound that he found to create the strongest response in the caves is the sound of hands clapping. Though not everyone accepts his findings, he claims to have found direct correlations between the kinds of echoes and the images presented. Clearly our ancestors were aware of the sounds that happened in each space. Waller, and since him other acoustical engineers, have determined that: the points of resonance have paintings on them; painted images recalling animals are echoed in the sounds. In other words, animal movements are recall by echoes of the animal being painted. Too, bone flutes of similar size have been found in conjunction with European cave paintings, so the idea that sound was part of the experience with the paintings is not beyond consideration. Open air= 8 decibels. Deep in caves, such as France's painted chambers sound is between 23 and 31 decibels. Deep cave walls w/ cats at 1 – 7 decibels. Surfaces w/o paint are 'totally flat'. Australian artists appear to have used rock shelters like parabolic reflectors to focus echoes. See Leigh Dayton, "Rock art evokes beastly echoes of the past," *New Scientist*, November 28, 1992, p.14.

This is particularly interesting in light of what is called 'red shift.' "This refers to the change in frequency of waves of sound or light which occurs when the source and observer are in motion relative to one another. It is most often experienced in the sound of a passing siren. When the source and the receiver are approaching each other, just as sound becomes higher pitched, light becomes bluer. It becomes redder when source and observer are moving apart." See Marshall Editions Ltd.*Color*. (Los Angeles: Knapp Press, 1980), 186.

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Notes

[1] Many people prefer 'pre-literate' to 'prehistoric' because they find the latter privileges writing over oral history in accuracy, relevance, importance, etc. Too, there are degrees of literacy and the shift from image to text is gradual and varied, so we seem to have a continuum rather than a sharp yes or no regarding the emergence of history and visual literacy. One is reminded of children learning to read, of languages becoming transcribed, and many other related issues. But these are beyond our present concern. For 100,000 years we Homo sapiens were 'prehistoric' animals, meaning we lived without phonetic alphabets. The development of phonetic indicators translated the breath stream from auditory to visual channels in permanent materials. Before the alphabet our human story is called "prehistory" and everything after alphabetic writing is "history". In this way we symbolize the journey of our species as 'beginning' with a specific kind of abstract symbol system.

[2] The study of world wide preliterate art has been largely ignored by art historians and the scant attention it has been paid has been largely "European prehistoric" art, much in keeping with traditional Eurocentric art history survey courses. The first red ochre was transported for use in African almost a million years ago. Although the earliest hominid remains now date to a bipedal skeleton from six million years ago, we may conservatively ignore several million years of hominid adventures, by conservatively assuming we ('modern' Homo sapiens sapiens) have been around for a hundred thousand years. Most of the scholars working in the field of preliterate and tribal art are social scientists, such as anthropologists, archaeologists and evolutionary psychologists; the classic text,*World Rock Art*, was written by Emanuel Anati, an Italian archaeologist.

[3] Big History "is the attempt to understand, in a unified way, the history of Cosmos, Earth, Life and Humanity." See The Big History Association homepage (http://www.ibhanet.org/) for its focus and seminal works.

[4] Nearly a million years ago pieces of hematite, (waterless ferric oxide) were carried into habitation sites in South Africa. See Paul G. Bahn, *Cambridge Illustrated History of Prehistoric Art*(Cambridge: Cambridge University Press, 1998), 71. Four hundred thousand year old pigment and paint grinding equipment were found in Zambia. See *BBC News*, Science and Technology, May 2, 2000. In southwest France, a three hundred thousand year old beach site on the French Riviera, Terra Amata, contained "stone tools and bones with over sixty pieces of red, purple, yellow, brown ochre, brought to the site for unknown purposes." See John Pfeiffer, *The Creative Explosion* (New York: Harper, 1982), 86. Our oldest red ochre paint to date is over 120,000 years old. Additional uses for red iron oxide include treating animal skins to prevent decay, applying to corpses to control smell and preserve the body, to cauterize and clean injuries, to dry bleeding wounds and maintain warmth. Symbolic and aesthetic uses of red ochre include stripes and dots recorded as late as the 1850's in Australia, with specific meanings to each location, number of strokes and designs. Generally speaking, the use of the pigment begins in close proximity to the natural occurrence of the red ochre pigments, and is subsequently transported by the tens of kilos. Perhaps the commonly found small balls of red ochre found buried together in large numbers were thought of as 'rock seeds' and the way one 'got more rocks.' Given that our ancestors saw that seeds fell from plants and trees and produced more of themselves, why not the same for rocks? And certainly red ochre was the rock which symbolized blood and life. Australian occupation sites date red ochre from sixty thousand BCE; mines of hematite in South African date from fifty thousand BCE, those in Hungary from thirty thousand BCE. By the Upper Paleolithic (from 30,000 to 10,000 BCE) red ochre is abundant and ubiquitous. Cave art and forms of personal decoration such as beads and pendants increase simultaneously. Obviously most biodegradable coloring materials such as those from plants are gone. Evidence found in June 2002 in England showing hominids there with stone and bone tools 200,000 years earlier than thought now push habitation back to 700,000 years ago. See *BBC News*, June 5, 2002. I wonder if they will find red ochre there, too!

[5] In Hebrew red is dm and dom means blood.

[6] Bahn, *Cambridge Illustrated History of Prehistoric Art,* passim; Robert Lawlor, *Voices of the First Day: Awakening in the Aboriginal Dreamtime* (Rochester, Vermont: Inner Traditions, 1991.)

[7] There are literally volumes of alchemical and symbolic meanings for the color red, as well as contemporary works.

[8] Lawlor, *Voices of the First Day*, 2.

[9] Perhaps our early attraction to iron oxide contributed to our discovery and use of clay as a material to work with the hands and with fire.

[10] Lawlor, *Voices of the First Day*, 335.

[11] See Christina Firpo, "Crises of Whiteness and Empire in Colonial Indochina: The Removal of Abandoned Eurasian Children From the Vietnamese Milieu, 1890–1956" *Journal of Social History*43.3 (2010): 587-

613.

[12] David Whitehouse, "Oldest' prehistoric art unearthed," *BBC News*, January 10, 2002, accessed on-line ,April 12, 2012 at http://news.bbc.co.uk/2/hi/science/nature/1753326.stm

[13] This is my interpretation of the linkage. For Marshack, see his *The Roots of Civilization: The Cognitive Beginnings of Man's First Art, Symbol and Notation* (Mount Kisco, N.Y.: Moyer Bell, 1991).

[14] David Lewis-Williams, *The Mind in the Cave* (London, Thames & Hudson, 2002). Two other important voices in this wider arena of inquiry are Emmanuel Anati, *World Rock Art, The Primordial Language*, Third Edition (Oxford: Archaeopress, 1994) and Paul Devereux, *Symbolic Landscapes* (Glastonbury: Gothic Image, 1992).

[15] Eric Powell, "51, Stone Age Art Studio Unearthed," *Discover Magazine*, January/February 2012, 62-3.

[16] Was this like an oath or an indication of commitment, seriousness of purpose, "true-blood" as it were?

[17] Bahn, *Cambridge Illustrated History of Prehistoric Art*, 126.

[18] Selwyn Dewdney, "Insights on Vision Sites: A Matter of Relevance," *Archaeological Newsletter*, Royal Ontario Museum, Vol.69, Royal Ontario Museum, Toronto, Canada, 1971.

[19] Lewis-Williams, *The Mind in the Cave*, 190.

[20] Frank R. Wilson, *The Hand, How its use shapes the brain, language and human culture*(New York: Pantheon, 1998).

[21] Edmund Carpenter and Carl Schuster, *Patterns that connect: social symbolism in ancient & tribal art* (New York: Abrams, 1996), 150.

[22] Campbell Grant, "Important Design Motifs" in *Rock Art of the American Indian* (New York: Promontory Press, 2001), 54.

[23] Pfeiffer, *The Creative Explosion*, 153.

[24]See Campbell Grant, *Rock Paintings of the Chumash* (Modified Reprint Series) Ez Nature Books, 1993.

[25] Lawlor, *Voices of the First Day*, passim.

[26] Carpenter and Schuster, *Patterns that Connect*, passim.

[27] Our theoretical frameworks in general invokes questions of how meaning is constructed and more specifically asks how meaning is represented with symbols. The field has grown from the first semiotic writings of Charles Peirce to many specializations. These include: visemics (which combines visual and semiotic inquiries, synaesthetic research (where the crossing of senses and the knowing through multiple

senses, Howard Gardener aside, are plentiful.) and categorization inquiries through cognitive sciences.