

AESTHETICS OF HUNTING: A NEURO-AESTHETICAL STUDY OF A MESOLITHIC ROCK-ART OF BISON-HUNTING AT BHIMBETKA

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Abstract: Archaeological sites with cave-paintings offer a glimpse of Prehistoric past. Such paintings usually depict a range of activities, from ritual dancing to communal feasting, with each painting performing either an apotropaic or sympathetic function in a magical-cultural context, as gleaned from specificity and selectivity in the choice of locations, treatment of surfaces, delineation of contours etc. The deep involvement of intentionality and deliberation entails aesthetical qualification as well. In this paper, an attempt shall be made to apply principles of neuro-aesthetics to Mesolithic rock-painting of a Bison-hunt, and dive into cognitive frameworks of prehistoric populace to glean their milieu and mechanisms, in order to develop a wider discourse with purpose, 'philosophy' and aesthetics of prehistoric-art. This artistic hunt shall be minutely analyzed both contextually and from a neuro-aesthetic perspective, which would aid our understanding of deeper aesthetic-artistic prospects of hunt concerned herein, but would also help in gleaning interesting data about inter-community interactions and artistic exchange of ideas amongst different spatially and chronologically proximal Mesolithic social-groups. Also, emphasis shall be made on the need to broaden the horizons of Rock-art analysis, where Neuro-aesthetics can play a critical role.

Keywords: Rock-art, cave-paintings, Neuro-aesthetics, Prehistoric Artwork, Paleo-artistry, Bhimbetka.

Aesthetics, functions and Bhimbetka Rock art

Art is considered as one of the essential traits of human beings, something which makes us innovative, expressive, emotive and imaginative (Chandra, 1983: ii). It has remained a component of human life since times immemorial (Pandey, 2012: 118)¹, though more recent attempts to date its initiation put its point of germination in Middle Paleolithic Cultures (36,000 BP- see Chakrabarty, 1999: 214). Since then, art has accompanied mankind in all times and chimes, from scorching deserts (Thakur, 1967: 12) to mountainous cliffs and hilltops (Burkitt, 1933: 56), primarily been drawn on surface of rocks, stones, boulders, or gigantic rock-debris (David, 2017: xi).

In the studies of and discourses on Art, aesthetical feats and facets invariably invite much attention, even though its *subjective* (Hedonistic) and *objective* parameters of evaluation and appreciation stand in complete opposition to each other, and remain an unsettled territory of conflict (Stokes, 2009: 715). However, studies in evolutionary psychology assert that aesthetics have been a prime point

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of consideration even for Paleolithic painters (Heyd, 2017: 341), somewhat anachronistically similar to procedures of their ‘modern’ counterparts (Kelly, 2009: xi). The study of *sense of aesthetics* deployed in the making of art, whether on a canvas or rocks, allows us to develop an understanding and comprehend the *philosophy of art* of its producers (Gibbon, 2017: 368). Moreover, it aids our endeavours to decipher *cognitive frameworks* of prehistoric people (Renfrew & Bahn, 2018: 284). Here, we shall make an earnest attempt to study such cognitive patterns of artistic action by applying principles of neuro-aesthetics, developed by Ramachandran & Herstein (1998: 124), and further elaborated by Ramachandran (2010: 283). The study of Aesthetics must comply with functions of art, in order to ascertain the *directionality* of implied intentions, and the purpose behind the same. Based on the writings of Desai (1989: 21-56), the following functions are of relevance-

1. *Communicative function* (convey or transmit culturally relevant or significant messages, themes or beliefs to progenies or other interested, allied groups).
2. *Recreational function* (to soothe or relax strained or perturbed state of existence, and rejuvenate ‘life-force’ for efficient functioning).
3. *Informative function* (to inform or transmit culturally sensitive and accumulated information to upcoming generation, or other marginal groups).
4. *Livelihood function* (to provide avenue or source of indulgence in task to specific social groups or individuals therein).
5. *Social function* (to integrate and bind all social agents operating contemporarily to generate strong and mirthful social force and cohesion).

These functions shall help us in making a *functional assessment* of intentions that led to cave-paintings, based on the belief that every human endeavor has a particular function operational in the background. The performance of targeted task fulfills the function, attenuates the essence of operation, and satiates the realized *need of performance*, in a condition where every need has a specific mode and manner of fulfillment (Malinowski, 1944: 52). In this context, cave-paintings probably served to delineate planned hunts of prehistoric hunter-gatherer people (Hasnain, 1992: 51), somewhat akin to *sympathetic magic*, where like produces like, i.e. painting of hunts would *magico-ritually* increase the probability of hunt (Hasnain & Misra, 2020: 88). The greater quantum of depiction of such scenes, in both Indian and European cases (Burkitt, 1933: 228) well illustrates the sanctity of this assertion. It is speculated by many scholars (Misra, 1985: 21; Wakankar, 2005: 78) that Mesolithic era figurations probably functioned in this capacity only. The rituals associated with such hunts can be gleaned-off from ethnographic studies of contemporary tribes/forester populace, who still practice and have elaborate performances to ritually

visualize and enact the life sustaining hunt (Reddy, 2014: 34).

The Cave paintings in the caves and rock-shelters of Bhimbetka (Abdur-Rahmanganj, Madhya Pradesh), present a spectacular marvel, witnessing which is a wondrous experience, one that unceasingly and unfailingly awes us and makes us flummoxed (Carllyle, 1885: 23). The rock-art there received the earliest notice and mention in the journals of a British administrator, W.Kincaid in 1888, who erringly described it as a Buddhist Site. J. Cockburn, an enthusiastic antiquarian, also visited Bhimbetka and thought that the antiquity of such paintings was not more than 700-900 years, though he used only coincidental arguments to prove his contention (Cockburn, 1899: 72). D.H. Gordon primarily worked on the rock-paintings of Mahadeo Hills, but also painstakingly developed stylistic techniques to decide the chronological classification of prehistoric artwork (Gordon, 1958: 64). In the 1950s, through a moving train's window, archaeologist and art-historian V.S. Wakankar (2005: 19) saw what put him into a happy trance. With a professional team of experts, he earmarked, studied and brought Bhimbetka in front of expectant international eyes, placing it rightly in the ranks of Lascaux and Palmira sites of paleo-artistry (Hasnain, 1992: 136).

Later, Mathpal (1972: 67) also studied the rock-art of Bhimbetka in great detail, and analyzed minutely the materials used to draw figures and paint them, producing categorical classification still of much value (Hasnain, 1992: 78). Misra (1985: 238) carried on extensive archaeological excavations at Bhimbetka, and discovered about five hundred more such paintings along the Vindhyan range of mountains. Allchin (1995: 89) highlighted the salient characteristics of social life as was evident from a close perusal of many paintings. The attempt to utilize such paintings as primary source for gleanings-off data on social history of prehistoric (Bahn, 2018: 42) and even historic (Cockburn, 1893: 26) was a veritable consequence of the *Processual School* of archaeological thought (Sankalia, 1979: 56), and was seen as a welcoming novelty in the field of Rock-art Studies (for *further details of Bhimbetka*, see Neumayer, 1993: 02-18).

From the above discussion, it is clearly evident that the studies of Bhimbetka have been, till now, only able to extract data related to Social and Ritual History, with some sidelight on techniques of making them and materials used in this exemplary prehistoric enterprise. However interesting such endeavors have been, a void is still felt, when evaluation takes into account the burgeoning and budding fields of Cognitive Psychology and Computational Archaeology (Mithen, 2012: 37). While Renfrew (2008: 378) showed the light for prehistoric paintings in European continent, Bahn (2018: 34) compiled and discussed developments in this direction across the world. But, recent attempts by Reddy (2014: 68) primarily and excessively focused upon archaeological aspects, with the chronological classifications elaborated in the writings of Chakrabarty (1999: 54). Our neuro-aesthetic analysis can act as a valuable tool to complement the paradigm of research

in rock-art of India.

This endeavour shall profit us enormously, by supplying firm analytical terms which will infuse elements of art-appreciation in Archaeology. Furthermore, it shall present explicitly the non-temporal tryst of humanity with art, and its various manifestations. Also, it will help us, even if marginally, to reach some conclusions on firm grounds, about the possible motives or intentions behind the use of particular stylistic highlights and techniques employed at Bhimbetka. Before we proceed, it will be highly pertinent to discuss our methodical framework and methodology to be utilized for gleaning-off requisite data from Rock-art.

Methods and Hypotheses

Neuro-aesthetics is a novel venture in the realm of Aesthetics and Neuroscience. Applying it to any other discipline, especially one with historical connotations, can work in both theory and practice, when one specifically considers related dimensions of art-historical and artwork-analysis, with definitive anthropological underpinnings. Here, studies of Rock-art can create a suitable and stable fusion, and initiate a more holistic analytical trend. In order to delineate and describe the full utility of this analysis, it will be profitable, at the point of commencement, to give a brief outline of our proposed and planned endeavor.

1. The paper primarily aims to study a particular example of cave-painting from Bhimbetka using principles of Neuro-aesthetics. Concordance with other Rock-art examples will help to establish the widespread use of such art strategies by paleo-artists. To state briefly, our analysis shall consist of following parts-
 - a) a brief outline of contextual delineation of Mesolithic people and their art and life-activities at Bhimbetka,
 - b) Neuro-aesthetic analysis of the Bison painting, where each sub-heading would explain- the relevant principle, its application in Bison-hunt painting, use of similar strategy by neighboring communities, possible artistic interaction and inspiration between such social-groups, and how it throws revelatory light at our example.
 - c) The sites that have been selected *as control* for comparative assessment with Bison painting also hail from Mesolithic period, and have followed a similar trajectory of archaeo-cultural development as Bhimbetka, and (barring Nurla, Ladakh) had similar ecological niches of existence in c.10, 000- 8,000 BP (see Maps 1&2 for ref.).
1. We will also highlight numerous functions of art, in myriad contexts and conditions of its existence. These functions shall help us to develop the fertile ground, from where shall stem our novel theoretical pursuits. They shall aid our decipherment of intentions that possibly guided prehistoric

artwork. Together with Neuro-aesthetics, this method would give us the magical-cultural tradition of Mesolithic era, in addition to the art-cognitive styles of its reproduction on rock canvas.

2. The eight core principles of Neuro-aesthetics, as initially and originally developed by Ramachandran and Herstein (1998) shall be enunciated, explicated and elaborated upon and detailed briefly, along with graphic example and illustrations from different sites of prehistoric art, with suitable explanations behind their selection and explanation in relation to the explication of a particular cognitive stratagem.
3. Lastly, we shall attempt to generalize the applicatory aspect of Neuro-aesthetics in Rock-art context and analysis, in order to relevantly underscore the wider utility of our method and disciplinary suitability of Neuro-aesthetics for the analysis of cave-paintings.

We have selected Bhimbetka for it is the most renowned and rich in both evidence and its documentation is of the highest standard. While a Neurological assessment of Rock-art has been posited by many publications (Bahn, 2010; Heyd, 2017; especially Onians, 2024: 482*f.*), their prime concern remains the examination of Cognitive fluency, neural plasticity, ontogenetic structuration. Neuro-aesthetics, on the other hand, attempts to combine best of two worlds- neurologically sanctioned principles of cognitive perception with artistic sensibility. Our Hypothesis intends to provision a new vantage point in Rock-art by studying cave-paintings from a Neuro-aesthetic perspective, and use examples from Indian subcontinent to mirthfully enunciate the critical utility of Neuro-aesthetics; The test-case at Bhimbetka has been selected on the basis of dearth of its analysis in existing literature beyond Archaeology and Art, and it's potential in cementing this trend further.

With the basics in view, it will be profitable to proceed directly to our selected painting, which will be analyzed minutely using the tool of Neuro-aesthetics. However, before beginning it, some contextual details are necessary, in order to tightly establish chronological and cultural position of the painting. Our analysis of the painting and explanation of Neuro-aesthetic principles will go together simultaneously.

The Ritual and Artistic Hunt of the Bison

Neuro-aesthetic Methods and Applications

One specific cave-painting from Bhimbetka holds immense but mysterious significance, on account of the shortage of its artistic analysis in conducted studies, and its positional placement in the multimodal canvas of Zoo Rock, labelled C-III 50 in Archaeological reports (Misra, 1985: 66). The site is starkly different from other cave-paintings at Bhimbetka, due to its continuity across boulders and obsessive

focus upon hunting scenes (Mathpal, 1984: 89).

The Mesolithic cultural complex is glimpsed from the discovery of micro-lithic tools, scrapers, borers, crescentic blades, retouched and parallel blades, transversely flaked gravers etc. (Pandey, 2012: 57; Hasnain, 1992: 71). The increasing interest in ritual activities is further configured from elaborate burial activities, where a single space (*the auditorium*) was selected and repeatedly utilized for such works, along with the application of ochreous material to inlaid bodies (Gupta, 1974: 36). Chakrabarty (1999: 169), out of which our example closely fits Phase D (stylized depiction of living beings, humans dominating landscape, dotted lines/coloured patches etc.) of development of Mesolithic context art at Bhimbetka. The Mesolithic people at Bhimbetka were chiefly hunter-gatherers, who hunted in groups to optimize chances of capturing meal of the day. However, this region of Madhya Pradesh was not rich in agricultural produce (only realized in Early Historic Period at this site).

While plants nourished a major portion of the prehistoric populace, protein-scarcity intensively required dietary augmentation (Basu Roy, 2010: 363), which was accomplished through hunting animals abundant in the locality. However, as has become evident from studies across the globe, hunter-gatherer generally develop complex rituals to propitiate *animal spirits* (which are essential parts of nature), or to recruit them for apotropaic purposes (Sankalia, 1964: 49). Also, a general balance is maintained, where not every member of the faunal species is consumed. Some are deliberately released to ensure continuation of nature's cycles.

Here, in the cave-painting adduced below (see Fig. 01), we have our prime example from Bhimbetka. On close observation, one can categorically distinguish between animal and human figurines, and also concentrate on their relative size and space allotted on the rocky canvas. The color used herein, red, is certainly made from ferrous or hematite held in abundance by mineral ferric ores in the surrounding terrain (Wadia, 1926: 22). The animal figure is identified by some scholars with wild buffalo (Hasnain, 1992: 78), or more accurately, a female bison (*Bos gaurus*) (Misra, 1978: 56), with her young calf, while the 'mother bison' appears expectant. Humans cover the bison linearly, obviously overjoyed and gleeful with the potential meal of the day. Functionally, this illustration fulfills the- *Communicative* (daily mores of hunting-gathering), *informative* (group strategy to trap target, and probably the best time to do so), *recreational* (customary dance on such festive occasion), a social (prowess of collective stance) functions quite satisfactorily. While Wakankar (1976: 34) earlier speculated it to be a ritual ceremony for the performance of fertility rites, the presence of an arrow stuck on the left forelimb of mother bison gives it a thematic format that primarily depicts hunting. Coming now to the dimension of Neuro-aesthetics, we can clearly discern some of its principles at work, which will highlight the internal dynamics at play here.



Fig. 01- A Rock painting, depicting ritual hunt of a pregnant bison from Zoo Rock, Bhimbetka (Source- Wakankar, 1976).

Ramachandran and Herstein (1998: 24), through these principles, attempted to present a unified theory of art analysis, and provide some helpful methodological tools to study art-subjects in a consistent and orderly manner. Its three assumptions are 1-) *Internal Logic*- Every painting possesses some coherent and intrinsic logic, which, on close enough scrutiny, can be discerned by man due to congenial biocognitive similarity, 2-) *Evolutionary perspective*- Universal human evolution has made our minds structurally familiar in latent, but biologically and cognitively discernable and active ways, and 3-) *Neural mechanisms*- Universal and simultaneous human evolution has made our neural activities and functions similar and intact.

In order to analyze our example from Bhimbetka, a holistic comprehension and judicious application of such principles is necessary, in order to infuse certainty in our enterprise. Moreover, for clarity, some examples from other sites of Rock-art in India (located in close proximity to Bhimbetka- temporally and culturally), shall be used to exhibit how the same Neuro-aesthetic principles was being applied in different regions. Herein, we will observe both similarities and differences, on accord of societal interactions, ecological factors, etc. However, its incorporation into the discussion of our prime example (Fig. 01) shall eloquently illustrate the aesthetic sense in Mesolithic period, which, on the other hand, would aid us in ascertaining ritual context, its artistic rendition, and therefrom *detect latent meanings* behind the cave-painting of our interest. Also, as we shall show ahead, a neuro-aesthetic analysis of attested examples would reveal a fact of interest that will further enliven our painting of choice. In the succeeding paragraphs, we shall firstly explain the neuro-aesthetic principle, followed by its application in the analysis of our example, along with its distinctive appearance and artistic utilization at other venues of

prehistoric artwork. The eight principles, along with their applicatory aspect and cross-cultural examples are as follows-

Peak-shift

Human perceptivity and perspicuity reacts to exaggeration, or rather to exaggerated difference from habituated stimulation. Our cognitive system, through the visual cortex, produces a visibility-sensitive region through neuro-assimilation, which becomes accustomed to a specific visual structure. Shifts or successful movements that affect our principal focus, and shift it to novel stimuli, helps in grasping significant attention from our cognitive economy, and aid aesthetic differentiation. Example- If a rat is trained to differentiate rectangle from square, with rectangle's aspect ratio being 3:1, rat will more actively respond to a rectangle with aspect ratio 4:1, provided the reward-circuitry of our brain encodes the consequential differing in visual modes afore it.

The figurative painting of bison (see Fig. 01) occurs on a cave-wall with several other similar paintings. What distinguishes this portrait from others is the ritual sanctity accorded to it, along with the size of its illustration. Peak shift would have surely occurred to an eye habituated of seeing of quotidian, regular bison-hunt paintings. This phenomenon ostensibly enhanced exponentially the degree and quantum of attentional economy allotted to its viewing, by all means a measure of success for our paleo-artist.

In Fig. 02, the contours of the human body appear exaggerated to distortional proportions, with the shot of an arrow dragged horizontally to show the element of speed and 'big-hunt'. Amongst other thematically similar paintings, this one would have quickly attracted much attention of the Paleolithic community, due to its distinguished composition and depiction of a significant event in an artistically effective way. A fact of significance is the delineation of motion to infuse dynamism of hunt and run in the scene. In Fig. 01 too, this facet is seen in the figures surrounding the bison atop, which appear to run swiftly. This created even more tension, and demonstrated the differential effect of peak shift, since the infusion of dynamism separates our Bison painting from its neighboring static hunts.

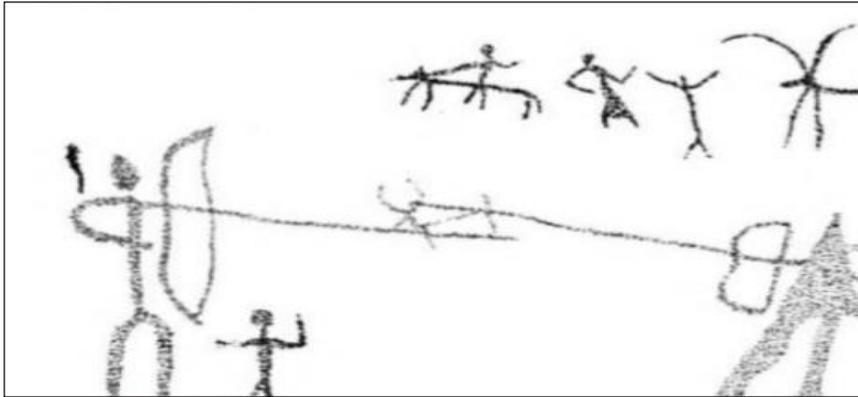


Fig. 02- Hunting/in-fighting scene from Ladakh, Nurla (Neumayer, 1993: Fig. 33).

Problem solving

Human brain likes to work in an auto-pilot state of action, with actions and decisions based on previously accumulated visual and cognitive experience (Barrett, 2020: 22). Problem-solving requires considerable cerebral resources, and increases the aesthetical satisfaction and satiation when a solution is reached. It is a constructive process, that analytically possesses two poles of experience- pattern-based (bottom-top process) and knowledge-based (top-bottom process), with our visual acuity serving at the lower-level, and cognitive processing faculties at the upper one. On a lower-level, visual patterns and modes are *visually bounded* with each other, and their activation leads subsequently to chains of associations, which further engross and ensnare the observer in the artwork. The more brain tries to extract meanings or themes out of an image or art, the greater is the aesthetic pleasure derived out of observation (Solso, 1999: 38). While it could be argued whether prehistoric painters used this device intentionally or not, but their abstract, geometrical artwork, in a ritual context, surely enhanced their perceptions of sacred rites and rituals performed (Misra, 1978: 66).

It generally involves the greater use of mental faculties and cognitive frameworks in order to extract maximum meaning out of a particular context or observation. Many scholars observed that our Fig. 01 does not have a typological prototype, i.e. no other painting on the so-called Zoo Rock resembles it in theme, content, structure or mode of presentation, which makes its presence and formation even more significant (Misra, 1985: 89; Wakankar, 1976: 31). This would have invited relatively more cognitive attention from its observers, in order to understand its background and basis. Prehistoric paintings were, by all means, special affairs, where labour, usable in other more critical affairs of life, was deviated and deployed to craft and create a work of art (Pandey, 2012: 344). In Prehistoric times, art

was not simply for art's sake (Agrawala, 1965: 10), and had deeper connotations. Problem-solving helped artists to gain prompt and proper response. The intertwined texture and transverse arrangement of lines was one such neuro-aesthetic strategy.

In Fig. 03 (below), a scene of hunt has been differentiated from normal, usual scenarios through the use of additional geometrical lines, both internally and externally; the former probably shows the *Zeitgeist* of communal, ritual hunt, where the chieftain or chief-hunter enacts a hunting stance, and shows a *portrait of power* (Wakankar, 1976: 35), while the Shaman simultaneously performs ceremonies to increase efficacy of the ritual. Both are connected by linear equivalence and similar geometrical arrangements (inside of them). With its relatively simpler associates, this painting would have surely evoked aesthetical pleasure once the arrangement of line contour would have been comprehended (the figures are strongly coloured with green and red materials). This observation helps us in evaluating Fig. 01 in two ways- the artistic rendition of shaman, and his *style of participation* in the ritual. In our example, while the Shaman stands among the community of hunters (with possible forward stagger), with hands raised above in prayer (Wakankar, 2005: 125). The presence of Shaman on the site of hunt probably enhanced the efficacy of ritual sacrifice, making it an integral part of prehistoric hunting scenes.

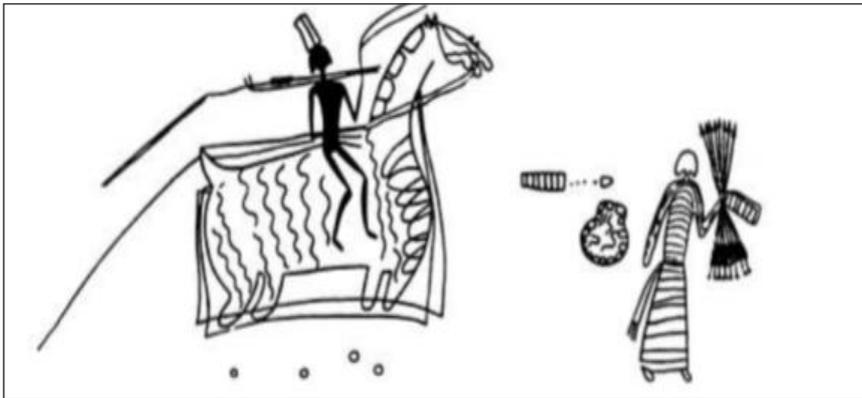


Fig. 03- The ritual hunt at Urden (Neumayer, 1993: 133; Fig. 573).

Perceptual binding and grouping

It states that the constituent singular units in any art are painted in some specific streams to visually stimulate human attention. When our mind sees a collection of discrete entities, it swiftly organizes the constituent units into random subsets, which then becomes perceptually bound. Herstein asserted that it is possible that different areas of our visual system evolved for differing visual modalities, and subsequently got interconnected with myriad limbic structures (pleasure-centers).

Perceptual grouping is based on the principles developed by Wertheimer (1923:

301-305) of Gestalt School of Psychology, designed from his experimentations on the epistemological question of conflict between what our mind *does* and what it *might have* done. He constructed a simple series of dots, in order to obtain data regarding factors which influence the structuration of patterns out of visual elements. He suggested the following factors of prime interest-

1. Similarity – Items that are the same are grouped together.
2. Proximity – Items that are physically close are grouped.
3. Common Fate – Items that move together are grouped.
4. Continuity – Items that form or are joined by a line are grouped.
5. Closure – Items that form closed regions of space are grouped.
6. Past Experience – Items are interpreted based on surrounding items.

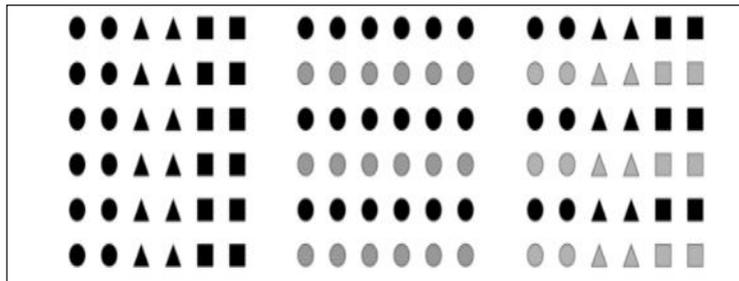


Fig. 04- Left: An example of grouping by similarity of shape. Center: An example of grouping by similarity of color. Right: An example of grouping by similarity overwhelming the perception of grouping by shape. (After Gooch, 2002: 6) see below.

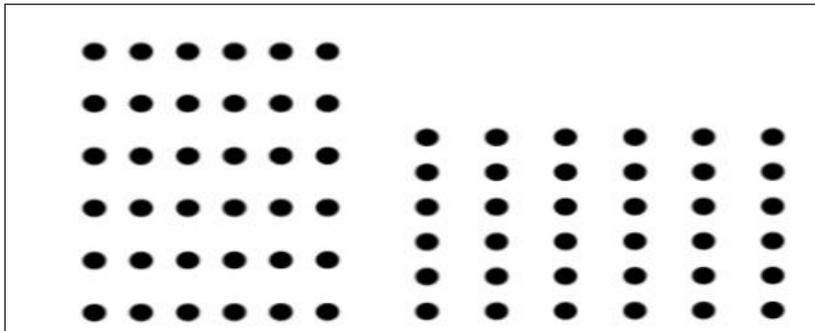


Fig. 05- Examples of grouping by proximity. The matrix of dots on the left is perceived as being composed of rows while the matrix of dots on the right is perceived as being composed of columns. See below.

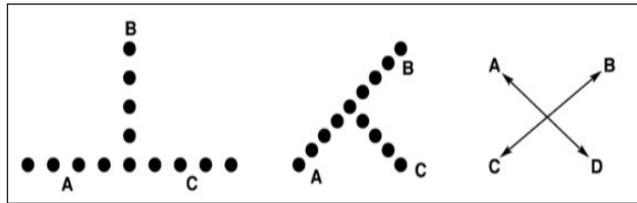


Fig. 06- Left and Center: Examples of grouping by continuity. Most observers perceive these Figures as composed of two lines segments instead of three separate segments. Right: An example of another aspect of grouping by continuity. Observers group this scene into two sets A, D and C, B because of the lines joining the letters (After Gooch, 2002: 7).

These Perceptual grouping factors are noticeable even in rock-paintings at Bhimbetka. However, the interaction between all factors of perceptual grouping is not simple, as our visual reaction to parts is affected by the whole, our perceptive judgements are comparative, and one factor can be overridden by other (see Fig. 05).

The ‘Zoo-rock’ at Bhimbetka carries plethora of figures, including humans and animals (Mathpal, 1984: 252). While it is ultimately human reaction and reception to size, shape, depth, motion, angle and colour that eventually structures our Perceptual faculties. To optimize this process further, the prehistoric artist probably made the human figures surrounding the bison almost of a starkly resembling texture, if not of the exact same size. This would have perceptually bounded the human figures together in visual unison, and helped our prehistoric connoisseurs to view this art out of a bewildered intermixture of numerous narratives with vast thematic gulfs between them.

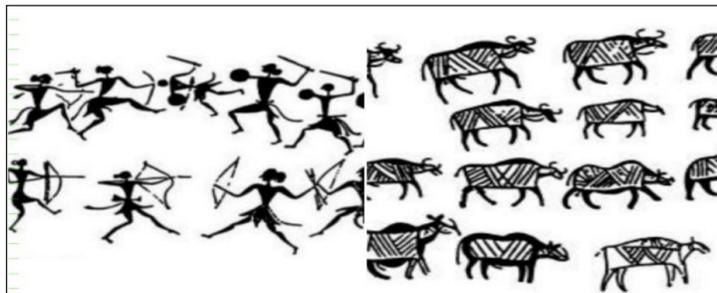


Fig. 07- Use of perceptual grouping at Mahadeo Hills, Eeshing Shrang (left) and Raisen, Ramchajja (right) (Source- Wikimedia Commons).

In Fig. 07, one can witness a perceptual arrangement of similar figures together, in close proximity, along with other features such as continuity, closure, common fate etc. deliberately inserted into the scenario to increase the effectiveness of community and for artistic direction. In Fig. 01, such a principled stance can be observed in the placement of humans/hunters around the slayed bison in a bloated circle; such an artistic stratagem effectually accentuated both communal-feeling

and consequential gains from the hunt.

Isolation

Excessive focus over singular visual module provides reasonable credence to the procession of peak shift, and helps to focus attention of viewer on the relatively newer (shifted) point or space of stimulation. In other words, by providing a single visual module, one can isolate a particular visual modality, and increase the effectiveness of visual cue presented. Zeki (1999: 34) asserted that whether it be colour, movement, mobility etc. artists partially isolate it from other property that seems to lie outside the *scope of emphasis*. This affects cognitive procession by human brain, which in its top-bottom processing focuses more upon ‘what is more significant’ than simply ‘what is present’. Neumayer (1993: 26) averred that whereas application of colors blurred outlines, bold line drawings helped to enhance focus and explicate the symbolic meaning implied (Geertz, 1973: 54). Possibly, our primitive artist was trying to achieve isolation after ‘peak focus’, and utilized line-sketches to illustrate his implicit perspective, in order to invite maximum attention.

Our gigantic bison is probably framed in this manner due to intentional bases of consideration. Here, thematic isolation plays a major role, as it serves two co-joint purposes- induce alacrity into the prehistoric narrative, so that the themes of ritualism and hunting become clear at a single glance. Secondly, it makes the relatively bigger feminine bison appear dangerous, enthralling and un-normal, in order to highlight it’s special status in the ritual and exceptional efforts undertaken to subdue it to human will, where shamanistic prayers probably were of crucial importance, evident from associational appearance of specially dressed humanoid figures with the slain mother bison.



Fig. 08- Use of bold border lines to create differentiation at Mahadeo Hills, Bori West
(Source- Neumayer, 1993: 120; Fig. 473).

In Fig. 08, we can see one such attempt by our paleo-artist to distinguish one narrative scene from other through a long, extended bold line, which simultaneously acts as both a delimitating border and tool held in the hand of a Prehistoric individual. Our Bison painting artist also deployed bold border lines to isolate the Bison-hunt from others, and also used *spatial distancing*, which points strongly towards the special status of this painting. Another point of connection between the two paintings is the hand-gesture of figure atop the perspective, which shows *anxiety, emergency, and urgency* of the moment (Neumayer, 1993: 39), also seen in the Bison hunt. How can these two paintings have strong interconnections? This was a novel method at Bhimbetka, and is not evident in other examples at this site. Here, based on our neuro-aesthetic analysis, we may lend some more credence and weight to an earlier speculation by Wakankar (1976: 55), who suspected that this painting (our Fig. 01) was probably inspired by ones in Mahadeo Hills. We, however, state that since both paintings were roughly made in the same period, they depict a possible *exchange of ideas* between two close communities and their artists. This exchange even has a material basis, evidenced in the commonality of tool-fabrication and subsistence strategies (see Allchin, 1995: 56f.). The utilization of such an art-method, when accompanied by coloured portraiture and scenic narration, created a resplendent assemblage of scenes of daily life in the Mesolithic Age.

Symmetry

Humans have a preference for symmetry, possibly due to perceived aesthetic quality, less visual effort, proximity with natural objects in reality etc. (Ramachandran & Herstein, 1998: 61). It is generally considered a result of our evolutionary biology, a fact confirmed, though not strictly proven by reported preference of animals and humans for mates having bilateral symmetry (Thornhill, 1998: 25). A prehistoric preferential status is ostensible by the examination of artistic structuration of limbs, dress, implements and decorative motifs, where it acted as a helping visual cue, unconscious visual strategy, artistic arrangement and a device to bring proportion and balance into the brilliant splash of organic colours (Misra, 1978: 19).

In Fig. 01, symmetrical arrangement is seen in the equal distribution of drawn constituents of the painting equally (though roughly almost), along the segments hypothetically delineated by a mid-axis passing perpendicularly through middle of the painting. Greatest clarity is evinced in the human-figures, who exhibit highest symmetry; this symmetrical arrangement aids the artistic enterprise performed by focusing upon the elements of *envelopment* (bison surrounded on all sides), and *collective community* (all acting in unison and with co-ordination for successful completion of ritual), feats which are not seen in other paintings (Mathpal, 1998: 72).

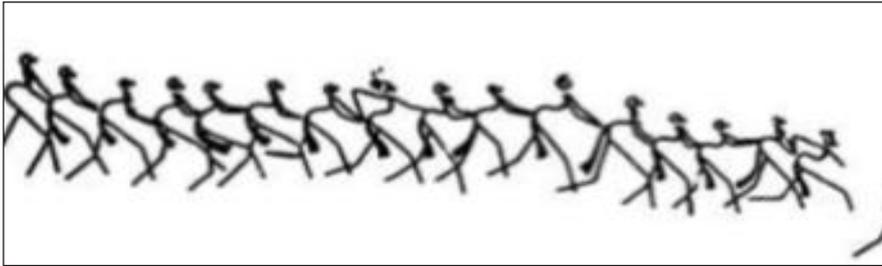


Fig. 09- The symmetrical rhythm of life, from Lakhiapur (Neumayer, 1993: 45; Fig. 28).

One can also witness a similar symmetrical arrangement at Lakhiapur, where our Mesolithic artist has clubbed and grouped all participants of *ritual contest* with bilateral symmetry, to infuse intensity of action and panoramic essence into the view. This further enhances the dynamic stance of depicted figures. In the Bison-hunt, the somewhat symmetrical arrangement aggravates the *ritual activity* going on, with a differential emphasis made to accommodate ritual performance with glory of hunting. The Lakhiapur painting is also a part of ritual context, though it's purpose remains unspecified. The excessive focus on activity, shamans nearby, ritual themes in associated paintings and sacrifice of animals gives it a ritualistic outlook. Use of symmetry herein also made the scenario aesthetically more pleasing and wholesome in composition, proven by its repetition in Early Historic paintings at Bhimbetka and elsewhere.

Contrast Extraction

Visually, regions of advanced perception are the places with higher contrast, i.e. a dividing (or connecting) line between two physically dissimilar objects placed close together, i.e. the highest perceptibility of information is recorded at the juncture of transition, from one state to another (Gooch, 2002: 13). Thematically, contrast in shape, size and colour aided the artistic enterprise of paleo-artists in crafting dynamic tension and visual appeal on their rocky canvas, seen in small human figures placed around a gargantuan beast bison, who is in the pose to attack and maul his assaulters, if provoked (Wakankar, 1976: 32). Visually, it helps to distinguish one string of events from another in a spatially delimited area of painting, where the non-use of such subtle strategies would have merged paintings into one, creating an artistic horror. Contrast is chiefly of three types- size, intensity and position.

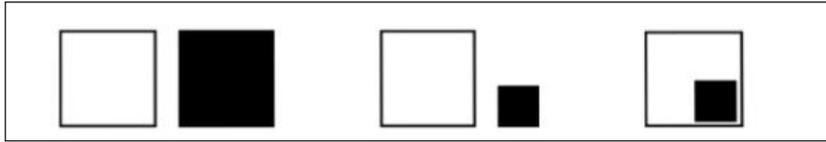


Fig. 10- Left: An example of intensity contrast between the two squares. Center: An example of size contrast between the two squares. Right: An example of position contrast between the two squares (inside versus outside).

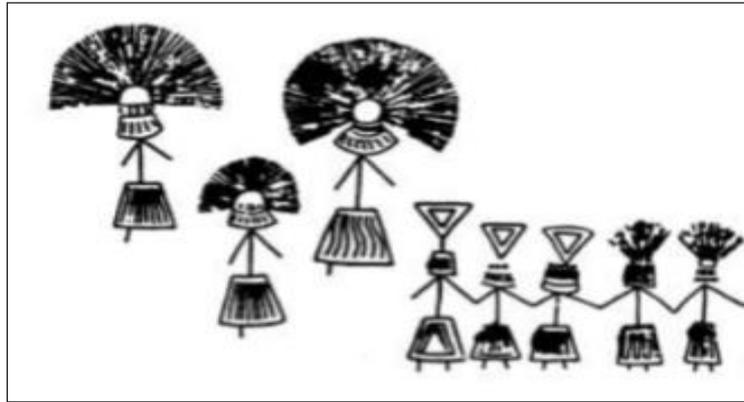


Fig. 11- Contrast in size, position and thence in ritual function observed at Kathotia (Neumayer, 1993; Fig. 39).

The greatest ostensible contrast in our Bison-hunt painting is the distinction in the size and mode of occupancy of space of two types of figures. While humans are small, grouped, and stand in close proximity, the ferocious beast- the mother-bison stands all alone, which shows successful consequence of execution of premeditative hunt-planning, but also thematically exhibits, most importantly, the gargantuan furiousness of the bison, which not only acts to praise the hunt, but also indicates the scale, efficacy, meaning and symbolism of the ritual; greater the catch, more shall be the meal, and greater the sacrifice, more the contentment of nature, which will appease natural forces to sustain this ecological-process, a fact possibly underlined by the young infant bison. His difference in colour, visual appeal, positioning and movement-stance probably signals that it was left to the wilds, so that the natural cycle remains functional and operational (Ember, 2015: 188-191). Painting-space at Bhimbetka was limited, and some differentiation was required in order to accommodate multiple scenarios in a spatially delimited region (Neumayer, 1993: 67), also observable in Fig. 11 from Kathotia, another Mesolithic site near Bhimbetka, where limitation of space forced the painters to reduce the size and differently paint the accompanying figures. Probably, this ritual painting inspired the artist of Bison-hunt painting to accommodate all figures of consideration with aesthetic style and swerve.

Generic Viewpoint

The concept of viewpoint explores the optimal direction and decision of not just focusing visual acuity, but also narrowing bewildering alternatives, which helps the viewers of art optimize their observation, and consequently, the degree of aesthetical pressure derived therefrom (Tyler, 1999: 285). The viewpoint that gets repeatedly preferred or selected by random candidates is called *canonical* (Palmer, 1981: 186). Verfaillie (1999: 24) asserted that, on an average, a three-fourth (quarter) view is preferred (Gooch, 2002: 14). Studies by Blantz et. al. (1999: 578) have highlighted three cognitive factors that influence our viewpoint-selection: *significance* (object shown, manner of presentation, environment and direction of orientation), *stability* (change produced if object is hypothetically moved; edges create confusion) and *minimal number of occlusions* (in order to have complete idea about the object/scene of consideration).

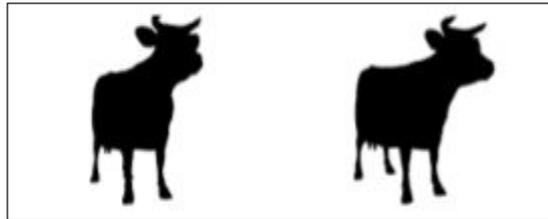


Fig. 12- Left: an “accidental” view where one of the cows hind legs ends up directly behind a front leg. Right: the same cow from a slightly perturbed viewing direction.

Kleiner (2010: 07) pledges the profile view as canonical for prehistoric paintings. In Fig. 01, the mother-bison is typically drawn in profile, the human figures do exume a somewhat closeness with partial quarter view, brought about by their circular spread on surface, and use of metaphorical distance-view (*vide infra*). This differentiation in the formulation of animal and human figures can also be a consequence of the degree of comprehension of motor-movements and implicit dynamic narrative, which places greater emphasis upon the socially recognized and communally sanctified human action of ritually appealing to the meal, so that their (bison’s) species also perpetuates along with humans, for constant maintenance of a regularized food-chain. Upper Paleolithic paintings at Bhimbetka deployed a flattish, bland view of vision, which was swiftly discarded by succeeding generation of mesolithic artists, as it failed to give precise information, and was ostensibly not quite pleasing as well (see Fig. 13).

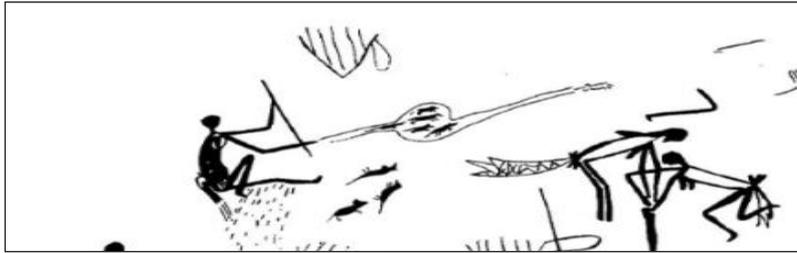


Fig. 13- Life in community painting from Upper Paleolithic cultural deposits of Bhimbetka (Source- Man and Environment 1989).

Metaphor

It iterates that artistic productions follow a work procedure abstracted through the meticulous and syntactic use of analogy. Ex. an atom is like solar system, as it comprises a nucleus like sun, orbitals like planetary orbits, and electrons like planets. Another popular reference is the artistic attempt to capture the essence of speed through motion capture, which gives a general approximation, a snapshot of the actual vigorous ferocity of the movement (Edelman et. al., 1992: 2835). Such metaphorical allusions occur frequently in cave-paintings, where the geometrical lines, along with mineral and vegetative colors, in league with the *encaptured reality* (Eliade, 1951: 249), produce an unmatched effect of force upon its observers.

In Fig. 01, a categorically evidenced metaphor is the distance-view, observed patently in the relative positioning of human figures around the hunted mother-bison. From left, human figures 3 and 4 are slightly off-set in forward direction, and do not stand on the same horizontal viewership line of action. While they could be shamans performing the ritual or praising the hunt, this metaphorical device also enhances the feeling of envelopment of targeted hunt, and artistically introduces expression of numerical strength, i.e. there could certainly be more than five individuals involved in the process.

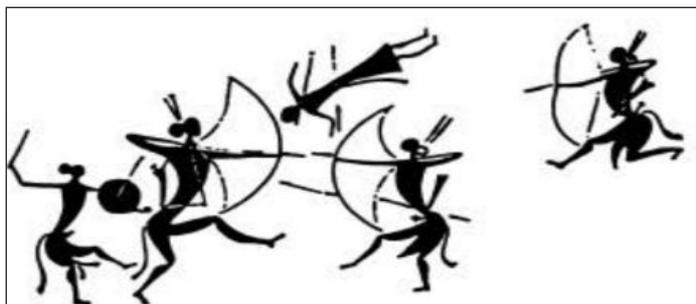


Fig. 14- Use of Metaphor in Rock-art at Mahadeo Hills, Pahar (Source- Neumayer, 1993: 39; Fig. 25).

Another use of Distance-view in Rock-art comes from Mahadeo Hills (Fig. 14), where the temporally elongated and protracted internecine struggle is shown through strategically positioning involved agents with varying distances between them. The slayed victims also accompany the scene, just like how the bison in our example both scares his assaulters, but has also been slayed (as evident from arrow). This intertemporal chronological narrative was a unique development of mesolithic rock-art (Chakrabarty, 1999: 167).

Hasnain highlights the magical function performed by this illustration. In his own words- “Going by Frazer’s terminology, the Sympathetic magic, which believed that like begets or produces like, is possibly seen here. The paint, mixed with chrome, hematite, some other ochreous mixtures, blessed by the presiding Shaman, was applied on walls, with the future vision of happy tribes, plenty of prey, masculine prowess and above all, successful execution of every hunting excursion.” (Hasnain, 1992: 94). Wakankar (1976: 27) remarked- “It is a matter of significance, that these works of art reveal so much to a trained eye, and more so to an analyzing one. The bison is surrounded with men, the hunters of its soul, or we can say, that the bison is dead already, and it gives us a sight of ritual cooking, and modes of celebrations associated with such ritual-sacrificial roles and mores.”

Although, these principles later faced somewhat moderate criticism due to their allegedly tautological nature, constructivist notions, unrealistic universalism, and rigorous determination. But, their use in laboratory experiments (see McMahon, 2000: 169) and clinical applications (Ramachandran, 2010: 148) have definitely worked and produced results in their favour (Kowalski, 2001: 56), though some academic reservations persist (see Apodaca, 2000).

Conclusion

Our informants from the Stone Age are few, restricted, segmented and limited in their *historical ability* to present a proper view and strides of narrative afore us. Only the use of analytical techniques can enlighten the way forward, and help us in extracting maximum possible information from available sources. While mineral-analysis, stylistic patterns and chronological orders play a major role, they cannot give us a deeper insight into the motives and methods of prehistoric artists, and their artwork.

A cognitive basis of study makes us somewhat proximal to the application of the dreaded and derelict principle of *anthropological universalism* (Hasnain & Misra, 2015: 92). It can be averred, on the contrary, that a study of neuro-aesthetics only permits us a partial view of Rock-art, and does not lend us an eyewitness account or rigid certainty. It gives a rather good and optimal approximation of the possible motives and mechanisms that consequented the conception of a specific painting in a particular way, and helps us to speculate about the activities and actions of our

Prehistoric ancestors with reasonable rationality, which is not strictly overwhelming, and can allow for multiple situation-based deviations, which are fairly apparent when one sifts through available data on rock-art and paleo-artistry. It also allows diversity of opinions, which again, is a core facets of any artistic rendition (Kleiner, 2010: 16), though with contextual and socio-cultural delimitations, which permit only a fair incongruence, and not wider disagreements. Furthermore, it also exhibits the diverse strategies of art and stratagems of motive that were taken or readily employed by prehistoric artists to cope-up with limited space and still greater scarcity of resources and time (Burkitt, 1922: 51).

Bhimbetka is a site of exemplary archaeological significance. Our detailed examination of the Bison/Hunters-shamans painting of Bhimbetka offers a unique perspective, in that it attempts to answer the *Why-element* of historical question. It is important to know the *how, where, what*, but the questionnaire would only have data of acclamatory credence when why is also mentioned in detail, or speculated about if direct answers remain obscure. The application of Neuro-aesthetics to this rock painting permitted us to view it with a different, complex and contextually relevant vantage point. It allowed us to reasonably speculate about and possibly even decipher every minute detail and issue worthy of consideration, and also examine a somewhat subterranean exchanges of ideas, motifs, methods and strategies of Paleo-artistry.

Neuro-aesthetics can suitably aid our endeavors of deciphering symbolically rich and thematically complex Rock-art, by providing a collection of tools of analysis, that are both temporally contextual and psycho-biologically significant. The explication of the eight neuro-aesthetic principles, when accompanied by the evaluation of different cave-paintings from locations dispersed throughout India, all generally hailing from an Upper Paleolithic and Mesolithic cultural context, and located near Bhimbetka (barring Fig. 2), highlights the degree of effectivity and potential promise of this novel analytical approach, as it can be applied to sites and centers of Rock-art not just in India, but throughout the world, since this approach possesses two advantage- *contextual application*, as it takes into account and considers the context of art production and assimilates/blends into it without much trouble, and secondly, *cognitive basis*, which exceeds other technological, logical, stylistic and stratigraphical parameters of consideration. This makes neuro-aesthetics an inseparable part and parcel of the archaeological quest to expand our horizons of knowledge, and artist's quest to examine and evaluate the aesthetical feats and facets of a bygone age.

The discipline of Rock-art study is far from mature (Heyd, 2017: 221). It needs continuous support from allied archaeological sources and techniques of both analysis and interpretation. The application of Neuro-aesthetics can possibly bring a newer and research-based quotient into the equation of interpretative advancement, and help us reach greater proximity with the minds, motives of our prehistoric

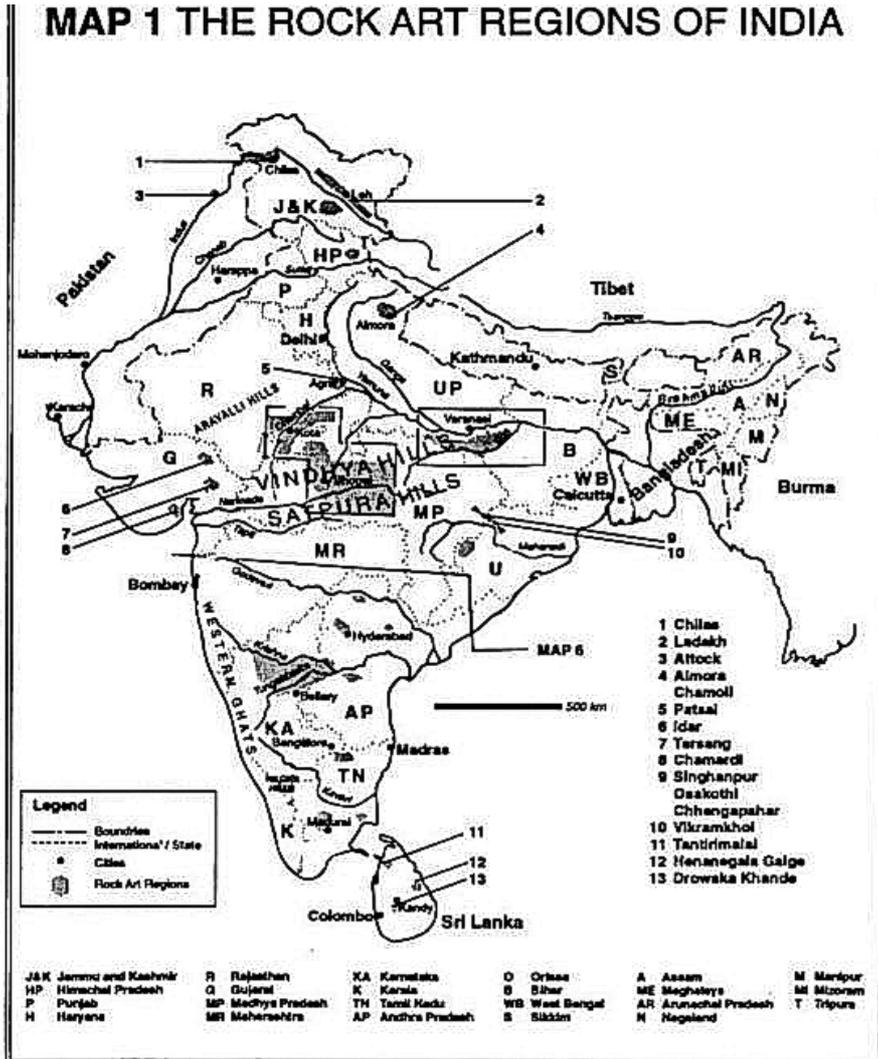
ancestors, their way of life, their actions and activities, and the mechanisms that guided their artistic pursuits.

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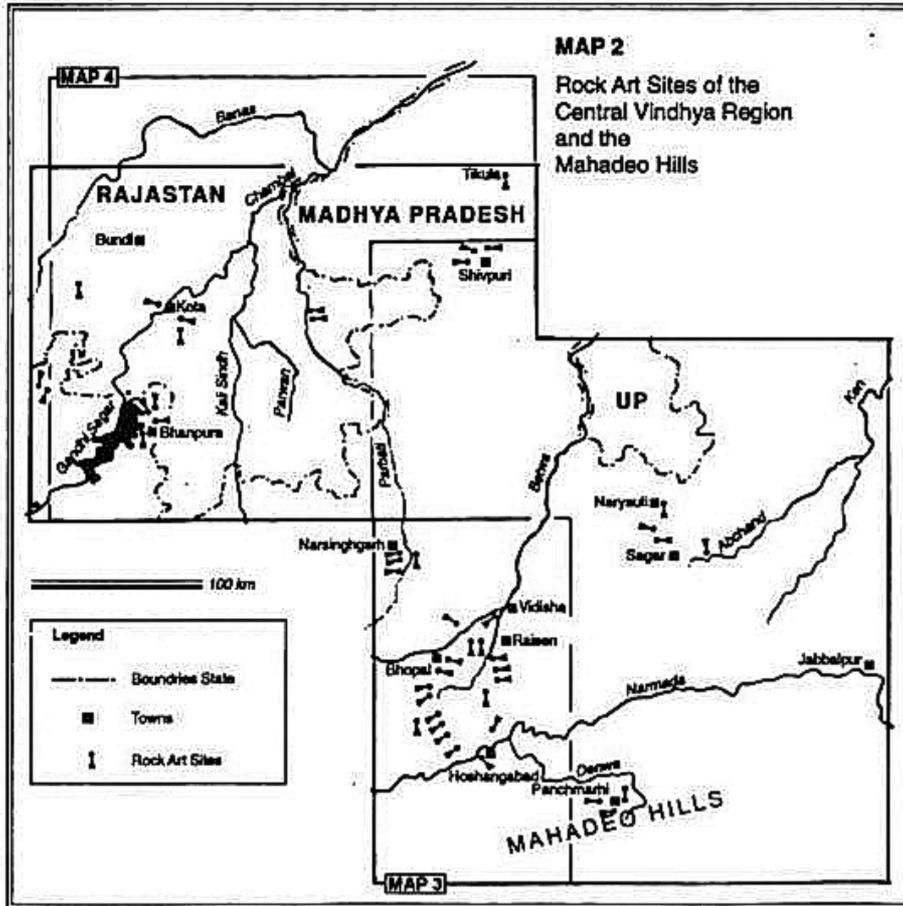
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Map 1- Different Rock-art regions of India (Source- Neumeyer 1993: 12).



Map 2- Rock-art centres in Central Vindhya region, Rajasthan and Southern Uttar Pradesh
(Source- Neumeyer 1993: 13).