

Probing Prehistoric Cultures: Data, Dates and Narratives

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1. Epistemological challenges: methods and attitudes.

Like all other domains of science, rock art research, which is the main source of data for investigating prehistoric symbolic cultures, aims at acquiring knowledge, that is, at establishing the validity of some new propositions. These propositions can be formulated linguistically in the form of predications, mathematically in the form of equations, visually in the form of diagrams or figuratively in the form of narratives. The propositions produced by scientific research are usually not the result of immediate intuitions such as those pertaining to common sense knowledge, but they are most often counterintuitive. They are obtained through a complex constructive process of which the successive steps can be traced back and scrutinized by the scientific community whose first task is to try to prove them false. They are validated by their resistance to these critical procedures and by their logical consistency. They often have the ability to provide explanations and to generate predictions that yield pragmatic results, and therefore have social, economic and political impacts.

The issue of what constitutes scientific knowledge is the focus of ongoing discussions among scientists, sociologists and philosophers (e.g., Psillos 1999). Since the debates between Ernst Mach and Max Planck in the earlier part of the twentieth century (Fuller 2000), and the development of the sociology of science which started in the early 1930s with Ludwig Fleck (Elias 1971) and culminated with Thomas Kuhn (1962), scientific knowledge has been the object of radical criticism. Modern "constructionist" and "deconstructionist" efforts have cast a shadow of skepticism on the soundness of the scientific method that is perceived by some as mere discourse and ideology (e.g., Pickering 1995, Latour 1987, 1999). Counter arguments have been effectively propounded to show that evolution and changes in the process of creating knowledge support the value of the method rather than undermine it (e.g., Gottfried & Wilson 1997). Archaeology has not escaped the scrutiny of critical archaeologists, sociologists and humanists (e.g., Gardin & Peebles 1992, Tilley 1991) and has shown its capacity to resist "destructivist" tendencies by elaborating a balanced epistemological reflection (e.g., Bednarik 1994).

The construction of scientific knowledge is not a tidy, smooth process as it is often abstractly described in methodology textbooks. It is achieved by individuals and groups organized in institutions and forming subcultures, each one with its own ideology, traditions, and priorities at any given point in time. As all human groups sharing resources, scientific communities are rife with factional and personal conflicts arising from ranking within the pecking order, competitive securing of financial support and social recognition, and establishing territorial control. Nationalism also can occasionally distort the perception of evidence through loyalties to theories conceived as cultural heritage. In spite of these unavoidable psycho-sociobiological, ideological and political interferences, models that more or less closely fit the

dynamics of our environment -- of which we are a part -- emerge from this quest and impact this environment in ways that create both new life constraints and opportunities, and new cognitive challenges for inquisitive minds.

It ensues that all disciplines have a history, form a subculture and mold, to a lesser or greater extent, their social and physical environments. Prehistory, as a discipline, is no exception. Indeed, the propositions produced through the discourse of prehistorians ultimately determine the representations that populations form of themselves and of others. It offers narratives that compete with other narratives to settle questions of identity and ontology. It strives to base its narratives on hard data rather than authoritative traditions and memory. But discourses are in constant interactions that take the form of refutations, counter-arguments, and intertexts. These discourses most often unwittingly carry a load of assumptions. They have also the power to construe data out of perceptions or memories that are prone to be biased by language categorizations. An acute awareness of the conditions of production of "scientific propositions" and their potential pitfalls is not necessarily a ground for absolute skepticism but rather constitutes an incentive to constantly monitor this process and assess critically its results.

Advocating discipline and rigor in accordance with the best methodological standards in the construction of scientific propositions is not purely a matter of ethic and intellectual integrity but a very pragmatic issue of the most inclusive sort: is the virtual knowledge produced by a discipline adaptive in the long run? A fallacious theory can bring fame and fortune to its proponent(s) and ultimate disaster to the society or group that embraces it, as the neo-Lamarckism of Trofim Lysenko demonstrated [see note 1]. The global spread of hastily developed knowledge-based technologies is rightly perceived by some as a major risk which may not serve the long-term survival of *Homo sapiens* by contributing to further reducing the biodiversity of its environment and its own genetic pool. While the propositions produced by research bearing upon the prehistoric past of humans may appear of lesser importance in this respect, it would be a mistake to simply consider them as irrelevant and of purely theoretical value. In fact, much more is at stake than an accurate knowledge of how things were and who did what for which purpose in the remote past of our species. The narratives produced by prehistory are powerful algorithms that organize the representations which humans form of themselves within a configuration of factors and actors. This narrative selects agencies, assigns causes, identifies motivations, and provides means of assessing past results as well as future strategies. The fact that prehistoric research sounds at times like a conflict of mystery stories (did they walk their way from Africa? Did they appear simultaneously in various regions of the planet? Did they come from outer space? What did happen to the Neanderthals? Were they killed off, or did they interbreed with the newcomers? Did they form alliances based on heterogamy? How much did early hominids know about their environment, the process of reproduction, their own past? Why did they do this or that? The only sure thing is that enough of "them" survived and that their genes -- that is, ours -- are still roaming the not-so-friendly planet. The ultimate challenge of prehistoric research is to elaborate an accurate global memory for humankind going beyond all the local histories, which are all recent, ethnocentric constructs of surviving written languages.

For long, the traces that prehistoric populations had left behind could be explained away in the framework of existing narratives. These traces could be considered the relatively recent works of uneducated or insane persons, or signs produced by deities or lesser spirits. The emergence of

palaeontology and evolutionism provided a new context for these traces (Groenen 1994). Today's methods of dating create new data but the usual algorithm still posits a strong disjunction between we, the civilized (evolved or redeemed) humans, and "them", the agencies responsible for these marks of willful activities. This algorithm generates congruent constraints according to which the marks themselves can only be categorized (and perceived) *privatively*, that is, as *lacking something*. The notion of art, as opposed to science, fits this categorical schema. Moreover, prehistoric "art" has variously been characterized as "primitive", "childish", "magic", "hallucinatory", etc., in other words as lacking "sophistication", "maturity", "rationality", and "normality", etc., whatever these latter terms may mean beyond being in mutual relations of inverted semantic symmetry with the above categories. The specialized literature still abounds in theories whose authors purport to demonstrate that the prehistoric agencies who produced these signs of pictorial activities lacked full (that is, modern) cognitive competence, or had reached only an early stage of mental development, or were acting in trances induced by hallucinatory plants, or had schizophrenic delusions. The latest avatar of the discourse of disjunction is found in British philosopher Nicholas Humphrey's casual assimilation of palaeolithic art to the characteristics found in the paintings of an autistic child, hence the argument that the Pleistocene populations who produced rock art had mental capacities similar to those of autistic children (Humphrey 1999). These theories purport to retrace "mental stages" of evolutionary development over a time period that is conceived as spanning only a few ten thousands years (e.g., Halverson 1992). They naively project onto the evolutionary axis data borrowed from developmental and pathological psychology, oblivious of the fact that while such data may indeed also apply to the mental development of prehistoric children, they certainly cannot be applied to the parents or, more generally, adult groups that brought them up.

It is interesting to witness the "astonishment", or even the spontaneous skepticism, that is expressed among prehistorians when the scientific dating of newly found paleolithic remnants forces us to modify the established time frame of rock art and to push back some tens of thousand years "stylistically advanced" paintings, so called according to standards borrowed from modern art history. Dating methods keep feeding information that upsets previous narratives and suggests a temporal depth far beyond the perspective imagined by XXth century mainstream prehistorians. The resistance to the new data yielded by dating methods seems to come from a reluctance to grant too much too early to palaeolithic humans, a move that makes them "too close to us for comfort" with respect to the accepted narratives and their generative algorithm. That stone age technologies could be contemporaneous with sophisticated cultural forms seems impossible to imagine for post-metallurgic, let alone post-industrial, mentalities who have not yet fully come to grips with the tenets of evolutionary thinking.

2. The meaning of hand signs.

The case of the numerous hands that are observed all over the world among the clearly identifiable patterns that have survived in the painted caves provides an example of the way in which perceptions are usually biased by assumptions, and data are constructed by narratives [see note 2]. Hand representations have a particular status because they evoke more vividly than any other traces the physical presence of the humans that once lived in these regions. They indeed appear to be produced either by direct imposition of the painted palms and fingers on the rock surface (positive hands), or by stencil (negative hands) through methods that have been extensively discussed and tested by contemporary researchers

(e.g., Groenen 1990). However, their interpretation seems to have been comparatively less contentious than any other rock art patterns. They are immediately identifiable -- it is well known that hands and faces are overriding perceptual forms among the primates (Sackett 1973; Cross et al. 1972) -- and they are perceived as part of intentional gestures. The problems they raise usually are restricted to the sphere of "deictic" meaning, that is, meaning determined by the immediate context in which the gestures have been performed,. This is why their interpretations have been overwhelmingly of a pragmatic or ritualistic nature. These hand impressions are spontaneously related to individual humans in particular situations: appropriating an animal through the magical grasping of its image; asserting tribal ownership of a place; offering to a deity the visual proof of sacrificial finger mutilations; marking the rocks as a gesture of allegiance or as an element of an initiation, and the like. These various deictic gestures have been assumed by researchers such as, for instance, Raphael (1945), Nougier (1966) Janssens (1957) and Leroi-Gourhan (1967). While there have been interpretations that construed zoomorphic paintings and geometric signs as symbolic representations to be understood in relation to religious codes (myths) or secular systems (kinship, astronomical calculation, or even forms of reckoning), hand morphs have not been integrated in these symbolic interpretative attempts except possibly as individual or collective "signatures".

Once a semiotic model has been selected -- such as a deictic model in the case of positive and negative hands -- perceptual biases impose on the data a form of spontaneous calibration congruent to the model. The pathological hypothesis concerning the incomplete negative hands of Gargas by Ali Sahly (Sahly 1969) for instance, triggered a series of morphological categorizations of the fingers and finger segments into "spatulate" (enlarged stump), "bridge" (narrowed outline of the finger), and "plateau" (straight stump). The categorization of these shortened fingers as "stumps" leads to a narrative which purports that those who left the imprints of their hands were afflicted by various accidental (e.g. frostbites) or pathological (e.g. leprosy) conditions, of which 24 are listed by Sahly and further commented by Barrière (1976:83). Admittedly, the hand patterns are often faded or obscured by mineral accretions. In addition, at the time when the cave was discovered in 1870 (Garrigou & de Chasteignier 1870, Cartailhac 1878, 1906) more hands were visible, notably at the low cave entrance, than nowadays. Barrière notes that fifteen hands that were still clearly marked around 1965, according to Dr. Sahly's observations, were reduced to mere "vague paint marks" ten years later (1976:17). While there is no reason to doubt such unsupported witnessing -- rapid deterioration may indeed occur as a result of industrial pollution, artificial lighting, chemical and microbial contaminations due to the impulsive tendency of visitors to superimpose their own hands on these patterns, etc. -- it is also a fact that preconceived models can guide (or distort) perception and even create false memories. The narrative that underlies the pathological interpretation of these hand marks suggests ancient populations in which crippled or mutilated hands (and assumedly also feet) were endemic, a picture that fits the broader notion of the "primitive horde" that did not yet benefited from scientific medical knowledge and perhaps would come and imprint on the cave walls whatever remained of their (left?) hands as a sort of inarticulate imploration to some unknown deity. This kind of narrative excludes the possibility that a single individual could have been responsible for at least a set of (left?) hands through bending selectively the phalanx joints before applying the paint, as Marc Groenen claims to have done (1990:15), or even that the pattern could result from a single artificial design tool made of wood or leather. Consequently little attention seems to have been granted to the comparative morphology of these hands beyond the missing segments.

Hands are complex figures whose various geometrical properties can be assessed with enough precision for being used for the purpose of individual identification. However, with the exception of Groenen (forthcoming), morphometrics does not seem to have been systematically applied to the negative and positive hands that are commonly found in decorated caves and on other surfaces. There are occasional mentions of smaller hands with the suggestion that these must be hands of children or of adolescents undergoing some sort of initiations, thus jumping uncritically from a first impression to a narrative closure. In this respect, the story of the interpretations of the Gargas hands could provide a textbook example for a treatise on taphonomy, the discipline that studies incompleteness and bias in palaeontological research (Martin 1999). At least two kinds of information that seem to have been overlooked can be extracted of the raw data: first, anatomic and physiological information and, secondly, semiotic information.

For the former order of information, both positive and negative hands can be considered as negative fossils that can be related to surviving elements of skeletons. Comparative morphometrics of these imprints should provide indications on the length and form of the bones, on the angle of freedom of articulations and on the chiral muscular masses in a way almost as reliable as the reasoning applied to bone remains (Musgrave 1969, Villemeur 1994). Recent discoveries concerning the comparative finger-length ratios in both sexes could be used for such anatomic analyses that may yield surprising information (Williams et al. 2000). Dermatoglyphics -- the patterned tracers of fine ridges on fingers, palms and soles -- could constitute another potential source of information if micro-analyses in conjunction with computer calibrating would provide evidence regarding the differential identities of the agents responsible for the imprints. Moreover, it is not implausible, as some researchers have suggested, that these dermatoglyphs were an object of obsessive attention for early humans (e.g. Cummins and Midlo 1943) and that whorls, loops and arches that combine in individual patterns did also inspire paintings, tracings and petroglyphs. Mallery (1893) called the attention to this possible source for the interpretation of convoluted designs and to the existence of at least one petroglyph representing an engraved right hand that includes detailed dermatoglyphics (reproduced in Cummins and Midlo 1943:3). Numerous engravings and finger tracings, diversely called "macaroni" or "meanders" remain a puzzling phenomenon that some have explained away by categorizing them as mere impulsive behavior, or "psychograms" (Anati 1989:162) but that others have related to dermatoglyphics patterns (Cummins 1930). The metaphoric "macaroni" as well as the pathological sounding "psychograms" have contributed to bias the perception of these lines as "something in which there is nothing to identify beyond the first confusing impression they produce. Once again a narrative -- the primitive, inarticulate man bursting with energy, driven by frustration or creative impulse, creates these "un-designed" lines with bare hands in contact with malleable clay -- construes data in a way that precludes further analysis. It is symptomatic that, in the inventory of the Gargas cave, Barrière lists 250 hands, 145 animal carvings, and "countless 'macaroni' drawings" (1976:14), lumping a large number of deliberately produced traces in an indifferentiated mass which some have proposed to explain through natural or artificially induced phosphenic effects (Bednarik 1994:155) rather than dermatoglyphic extrapolations (Cummins 1930). The correlation of line markings with hand imprints does not seem to have been studied systematically. However, these two kinds of marks are observed in close association in the form of patterned hand prints in Australia (Gunn 1998) and in South Western U.S.A. (Grant 1967). From the examination of 109 hands

recorded from nine shelters Gunn concludes that "[t]hese patterns had a common structure, though all differed in detail, suggesting that they were a form of monoprint printed from a prepared hand" (Gunn 1998:75)

In spite of this remark, as well as others, that should naturally lead to a consideration of the way in which these hand marks are positioned with respect to each other, and whether they form strings or clusters exhibiting some sort of recurring or combinatorial patterning with other morphs, the research remains focused on mere inventories of items and statistic knowledge rather than on associations among types of items. Gunn (1998), for instance, counts the hands found in each sites he describes, and sorts them out according to colors (red / purple, yellow and white) and methods of production (stencils, prints, peckings and abradings). He gives the ratios of hands to other morphs for each site and for the total of sites he examined. It is the same approach that is found in the various accounts of the Gargas hands (Barrière 1976). The deictic bias is so strong in the conceptualization of human hands representations that Marc Groenen (1990), in his critical reassessment of the Gargas material in the context of Franco-Cantabric area, sets the hand stencils apart from the other categories of representations: zoomorphs, anthropomorphs and signs. For him indeed hand stencils (*mains négatives*) result from "mechanical" acts of production that do not require any prior mental reconstruction (1990:10). It seems that the apparent bodily immediacy of these marks disqualifies them for articulating abstract propositions and symbolic values. It is possible to reconstruct the gestures, postures and artifacts that have made them possible. But, beyond speculating that they may have served as identity marks of distinct ethnic groups (a typical deictic function of the kind "I was here"), our ignorance of the context precludes any credible deciphering of their signification. This is why Groenen's approach is fundamentally very similar to Gunn's: the hands are counted (440 in 19 sites), classified according to techniques of production and colors, and compared numerically with other categories (318 ibexs, 261 mammoths, etc.). Groenen explicitly distinguishes these hands from "signs" (geometric morphs) on the ground that they are "figurative". He produces tables that show the comparative numbers of hands in the various sections of the Gargas and Tibiran caves and establishes the percentages of each distinctive digital configuration created by the apparently missing fingers or parts of fingers. While his approach assumes that the hand clusters that can still be observed at particular locations must have performed some meaningful function, Groenen denies them full symbolic status, and criticizes, after others, on the ground of inconsistency and incompleteness, Leroi-Gourhan's theory (1967) according to which Pyrenean hand configurations would encode the four basic animal symbols (bison, horse, ibex and deer) and recreate, in a sort of hand language, the distinctive collocations of these zoomorphs in other caves in the same broad cultural area. Groenen's 1990 article concludes nevertheless with a mention of the apparent compositional design of these hand marks notably in relation to other marks he calls "punctuations", thus hinting at some virtual meaning that is beyond our decoding power (1990:29).

3. Marks or symbols? Toward an early writing systems hypothesis.

The shortcomings of Leroi-Gourhan -- who was perhaps indeed prone to see confirmation of his symbolic theory by accommodating the data to his interpretative models -- should not detract one from

seeking and exploring other symbolic hypotheses. These might be dead ends, but only unambiguous evidence of randomness in the distribution of the hand prints and other marks within bounded areas would be apt to tip the balance toward a purely deictic interpretation. It would imply actions spread over time in which individuals, for ritualistic or ludic purposes, would leave their hand marks on whatever parietal space was both accessible and available, that is, not already occupied by the hand prints of someone else. A close examination of the current literature concerning palaeolithic hand representations shows that the dominant narratives have led to data constructions that do not seem to fully exploit all the available information. Before formulating an hypothesis regarding the meaning and function of positive (handprints) and negative (hand stencils) representations of human hands, several questions should be answered: (i) What are the geometric characteristics of the hands and how do they compare with contemporary fossil hands in view of the works of Marzke and Shackley (1986), Musgrave (1970) and Villemeur (1994) for example? Current research concerning various geometrical measurements of the hand for the purpose of automatic identification could be exploited in this comparative assessment. (ii) Can dermatoglyphic information be gathered from hand prints? Even fragmentary patterns as those found sometimes on clay artifacts could be invaluable. Answers to these first two anatomical questions could help determine whether the hand marks on a given site are more likely to have been produced by Neanderthals, whose hands were anatomically distinct, or by modern humans, and whether these marks show natural geometrical and dermatoglyphic variability. Information concerning the latter would provide hard evidence of whether some sets of marks were produced by a single individual or a restricted group of individuals, or if they reflect a greater anatomical diversity over space and time. It could also help decide whether, as some have suggested, some hand stencils were produced by cut patterns. Should there be any evidence that sets of hand marks were produced by single individuals or by stereotypes, the plausibility of the status of symbolic signs of these marks would be considerably reinforced.

Hand marks may differ according to several variables: laterality (left or right, ventral or dorsal), orientation (vertical, horizontal, or intermediate), integrity (whole or lacking some parts), openness (maximal or minimal digital extension, and various angular figures), mode of production (stencils, prints, or engravings), chromatism (black, red, ocre, yellow, white), background (natural, painted, or decorated), and topology (relative positions with respect to the site and to other marks). While these variables have been the object of some attention in the characterization of hand representations, they have not been systematically correlated within sites and among sites within a particular area, taking into consideration as much as possible taphonomic constraints. They have not been either systematically compared with other represented objects offering a similar potential for digital variability, that is, absence or presence of some elements of these objects, a property which would enable such sets to form the basis of a calculus and function as languages (Bouissac 1997). Only by testing these correlations can it be decided whether any recurring combinatorial patterns are statistically significant. But for such information to become data, it is necessary to heuristically develop alternative narratives. Extrinsic information can be useful in this respect, notably the archaic existence of hand computational systems and the well established fact that sign languages are natural communication phenomena that are coterminous with articulate languages and appear to have evolved at the same time. Bruce Wright has shown the relevance of this latter domain for the understanding of hand motif variations in the stenciled art of the Australian Aborigines (Wright 1985)

The dominant deictic paradigm assumes that the correlations are mostly random or determined by pragmatic factors that are for ever lost such as beliefs in the sacredness of certain places and marked spaces or conventional values attributed to some hand gestures. The semiotic paradigm, by contrast, would first try and see if any formal constraints could emerge from a systematic parsing of the data. But for such virtual data to exist it is necessary to develop heuristic narratives that would potentially endow these sets of marks with formal consistency. If such systematicity would resist attempts to demonstrate that the distribution of marks is random, or follow some extrinsic necessity such as physical accessibility (hands are located where the rock surface can be reached), surface availability (hands are located in the regions not yet used for other representation), or even context insensitivity (the exact positions of hands on the available surface are irrelevant, as it would be the case if they had been imprinted in complete darkness or if the only relevant constraint were that it be done on any rock surface), then formal systems of organization of the marks could be described as a first step toward an understanding of their meaning. Many such systems have been decoded in the recent past, which at first were considered as purely deictic, decorative or so arbitrary as to be totally impenetrable (Fischer 1997). The history of the decipherment of Egyptian hieroglyphs and Maya scripts bear witness to the resistance of the preconceptions embodied in the mainstream narratives of a given time and the blind force they oppose to emerging hypotheses (Coe 1992). In today's prevailing paradigms among prehistorians, the idea that some palaeolithic populations could have developed sophisticated scripts appears to be mostly unacceptable in spite of the fact that it is now generally accepted that complex languages may have evolved much earlier than was previously assumed and that script systems have developed independently at least in four different areas on the globe. Attempts at finding some keys to the cryptic sets of signs preserved on the cave walls, such as those daringly, but not inconsistently, made by Hans Bornefeld (1994) [see note 3] are by and large met with amused incredulity and discarded with contempt.

While a great deal of cultural information can be inferred from the analysis of fossilized tokens of the material cultures of palaeolithic populations (e.g., D'Errico 2000, Groenen 1997), our knowledge of these populations' world views and social organizations necessarily will remain sketchy at best. Only decipherable inscriptions could provide glimpses of their beliefs, memories and political economy. However, as the huge palimpsest formed by the surface of the earth keeps revealing more and more layers of graphic productions whose symbolic status appears evident (Conkey et al. 1997, Robb 1998), it is becoming increasingly plausible that at least some of these sets of paintings and engravings have textual properties in the literal sense of the word. This plausibility now motivates more attentive and thorough recordings than was the case when, in the early years of their discipline, prehistorians were taking for granted that only the animal forms they could identify counted as data. Mark Groenen (1994, 1999) has brilliantly documented the ways in which theoretical assumptions distorted the perception and methods of recording, and were responsible for providing highly unreliable data. At a time when the reigning narrative among prehistorians denied full linguistic and symbolic competence to palaeolithic humans, it did not make any sense to search for any kind of logical organization among the motifs represented. Little attention, if any, was paid to graphic signs which were not depicting animals and other assumedly identifiable concrete objects such as hunting weapons or sexual organs. The implicit ideological agenda at work was to assert an absolute gap between primitivism and civilization. Since the foundation of the latter was held to be associated with the invention of writing conceived as the ultimate stage of evolutionary progress, it was posited very early that palaeolithic art could not be a form of script.

However, the prehistory paradigm appears to be in the process of shifting away from some of his long-held rigid assumptions, not so much because of assaults coming from the margins of the profession (e.g., Hans Bornefeld's unconventional challenges), but through reflections being developed and discussed within main stream research groups (e.g., Conkey et al. 1997, D'Errico 1995). A multidisciplinary convergence appears to be forming toward a new narrative in which the last 30,000 years of human cultural life are perceived as a relatively short period of time against the background of evolutionary time rather than as the obscure backdrop of ethnocentric conceptions of historical times, the unfathomable night that preceded the rise of civilization. This new perspective brings closer to us the technological, psychological and cognitive competencies of early modern humans and we see less and less good reasons to deny them the fundamental abilities which define humankind: cumulative knowledge and memory, recording and transmission of this knowledge in symbolic forms, fostering of cultural systems which can evolve over time, and segmental awareness of the languages they spoke (Miller 1994), to name only a few features which would make very plausible indeed the invention of scripts devised for a variety of purposes. This emerging narrative is already bringing forth a host of new data yielded by more accurate methods of observing and recording. More attention is paid to composition than to motifs; abstract signs are no longer ignored or casually described according to a few coarse categories but they are carefully examined and recorded with all their details; the need for constructing comprehensive databases along principles which do not exclude a priori the script hypotheses is being felt by many; testing such hypotheses is less than ever perceived as a waste of resources. For instance, Bornefeld's claim, in spite of the eccentricity of its expository style, is explicit enough for being tested and possibly falsified. The script rules he proposes, if real rather than fanciful, should have generated recurring sequences in which commutable segments should be obvious. If it can be proved that compositions in a given cave or area do not follow the systematic constraints he suggests, then it is either because there are no such systematic constraints or because other kinds of constraints have to be hypothesized. Deciding whether or not the finite set of items that form the "vocabulary" of parietal representations follow some combinatorial rules cannot be the result of perceptual impressions biased by assumptions, but should emerge from rigorous evaluation and parsing. In a similar vein, if it were some day demonstrated through anatomical morphometrics that a set of differentiated stencilled hands was produced by a single individual in a single temporal operation, the presence or absence of systematicity in the composition could be tested with profit. Negative results would be scientifically as significant as positive ones. This is the arduous path toward a reliable understanding of palaeolithic cultures, that is, our own past.

Notes

1. Trofim Lysenko, a neo-Lamarckian botanist who was president of the Lenin Academy of Agricultural Science in the Soviet Union, promoted for several decades an official theory of evolution that claimed the inheritance of acquired characters was the main motor of evolutionary changes, a principle which was considered to be more compatible with the basic tenets of Marxism-Leninism than neo-Darwinism. It is notorious that his influence, until he fell from power in 1965, proved to be catastrophic for both agricultural policies and genetic research in the Soviet Union.

2. Besides the well known examples of the Franco-Cantabric area (e.g. The caves of Gargas, Tibiran, Cosquer, etc.), there are numerous sites in Africa (e.g. Manhire 1998), Australia (e.g., Wright 1985,

Gunn 1998) and South America (Gradin *et al.* 1976). Besides these numerous instances of large set of hand prints which seem to saturate large parietal surfaces, isolated hands are also found in association with other representations and "abstract" signs.

3. Bornefeld's hypothesis is framed by a general conspiratorial narrative which contends that the catholic church, which was and remains influential in the countries mapping the Franco-cantabrian area where palaeolithic rock art was first discovered, manipulated researchers and biased mainstream interpretations of the paintings and engravings toward illiterate primitivism. His argument is rooted in earlier condemnations by the church of rock art and persisting associated cults which were perceived as pertaining to witchcraft and devil worshipping. Later, the mere possibility that these visual remnants of high antiquity might lend textual credibility to a history of mankind which would be at odds with biblical truths prompted those he calls "the screeners" (gate keepers) to discredit all attempts to decipher the data beyond the description of the hunting magic practices of primitive patriarchal societies. By contrast, Bornefeld endorses the assumption that these populations were dominated by matriarchal religions and power structures, and were cognitively more advanced than it is usually believed. Thus, within his contemporary conspiratorial narrative is embedded a prehistoric narrative according to which leading groups or castes of priestesses who worshipped a Mother Goddess held sway over the rest of the population thanks to their secret knowledge of the mechanism of solar and lunar eclipses which allowed them to make accurate predictions of incoming dangers. Having posited the gnoseological and textual nature of parietal paintings, Bornefeld undertakes to decipher their script. He starts from two well supported types of evidence concerning the context of these assumed messages: the fossilized fauna and the complex periodicity of the eclipses which can yield reliable data concerning, on the one hand, animal behavior for the wild species which are still extant since it is highly unlikely that their anatomical characteristics and ethology were significantly modified over the last fifty thousands years, and, on the other hand, the what, when and where of eclipses since these sidereal events can be reconstructed in the past as well as projected in the future. Bornefeld's next plausible assumption is that there is at least a basic set of objects for which palaeolithic populations had words: sun, moon, bison, boar, horse, hart, mammoth, and the like. Then, drawing, or extrapolating from recent research into the hypothetical reconstruction of linguistic macro-families (e.g., Shevoroshkin 1989, Nichols 1992) and their possible common origin in a mother tongue (e.g., Ruhlen 1987), he tentatively proposes a list of phonetic matrices (or words) which plausibly referred to the basic set of most relevant objects in the "umwelt" of early humans. The final step consists of applying to some selected examples of recorded parietal art the same methods which enabled other decipherers to break apparently unbreakable script codes with their mixture of direct representations of referents, strings of images forming rebus, hypothesized logograms and numerals as well as conventional symbols. The differential positions (e.g., backward versus forward) or incomplete representations (e.g., headless versus backless) of animals can thus lead to a syllabic script in which, for instance, a headless "bi-son" would stand for "son" in English. Bornefeld has proposed some "traductions" whose phonetics relies on an ur-language which he assumes was spoken some 20,000 years ago in the Franco-Cantabric area and whose semantics is guided by his matricial (matriarchal) narrative. He thus puts forward the strong claim that he has partially deciphered the palaeolithic scripts which are hidden in apparently naturalistic rock art displays.

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